Lithgow Solid Waste Facility (EPL 6004)
2015/2016 Annual Environmental Monitoring Report

115659
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REV	Date	Written	Reviewed	Approved	Approved Signature
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1 Introduction

Meinhardt Infrastructure and Environment (Meinhardt) was commissioned by Lithgow City Council (Council) to prepare the Annual Environmental Monitoring Report (AEMR) for the Lithgow Solid Waste Facility (SWF) for the 2015/16 reporting period in accordance with the Environmental Protection Licence (EPL) No. 6004 issued under the Protection of the Environment Operations Act 1997. The 2015/16 reporting period for Lithgow SWF was from 24 September 2015 to the 23 September 2016.

The 2015/16 Annual Report is the first year Meinhardt has been commissioned to undertake the annual reporting requirement for Lithgow City Council.

1.1 Purpose

The purpose of the Annual Report is to comply with Lithgow Landfill's Environmental Protection Licence No. 6004, anniversary date 24th September, which was issued under the Protection of the Environment Operations Act 1997. (A copy of the licence is included in Appendix B).

1.2 Licence Reporting Requirements

Section R1.1 of the licence states:

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

a) a Statement of Compliance; and

b) a Monitoring and Complaints Summary.

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

In addition, the licence also states the objectives of the AEMR are to meet the annual reporting requirements stipulated in Condition R1.8 of the Licence which states:

The licensee must supply with the Annual Return a Monitoring Report which provides:

a) an analysis and interpretation of monitoring results;

b) actions proposed / taken to correct identified adverse trends; and

c) The achieved compaction rate (excluding cover material) for the premises and the remaining disposal capacity for the premises.

Section 5 of the EPL specifies environmental monitoring requirements which are provided in Section 4 of this report.

1.3 Objectives

The objectives of the Annual Report are to meet the annual reporting requirements stipulated in Condition R1.8 of Lithgow Landfill's Licence including:

- An assessment of environmental performance relevant to licence conditions;
- Tabulated results of all monitoring data collected;
- A graphical presentation of data from at least the last three years (if available) in order to show variability and/or trends. Any statistically significant variations or anomalies should be highlighted and explained;
- An analysis and interpretation of all monitoring data;
- An analysis of and response to any complaints received;
- Identification of any deficiencies in environmental performance identified by the monitoring data, trends or incidents and any remedial action taken or proposed to address these deficiencies; and

- Recommendations on improving the environmental performance of the premises.

1.4 Scope of Works

The scope of works completed includes:

- Accumulated gas monitoring inside all buildings within 250 m of waste filled areas on monthly basis;
- Surface water monitoring at discharge point SW1 monthly during discharge;
- Groundwater monitoring of 7 wells on biannual basis;
- Leachate monitoring of one leachate well LW1 on biannual basis;
- Produce biannual results report for inclusion on council website;
- Review groundwater, surface water, leachate and gas monitoring and analysis data including assessment of methodology and QA check of field and laboratory data;
- Review previous historical data and provide assessment on current data and trends;
- Compile Annual Return on behalf of council and submit to EPA; and
- Prepare one Annual Environmental Monitoring Report (AEMR), drawing technical conclusions and making recommendations based on results of the analysis during the assessment period.

2 Site Details

2.1 Site Description and History

Lithgow SWF is located adjacent to the Lithgow Sewage Treatment Plant (STP) in a valley approximately 800 metres north of Geordie Street and approximately 1.8 kilometres (km) northwest of Lithgow town centre. The site comprises Lot 1 Deposited Plan (DP) 190934, Lot 1 DP 630638, Lot 1 DP 947828 (portion), Lot 44 DP 751655 (portion) and a section of Crown Land. The land is zoned Rural (General) 1(a) under the Lithgow City Local Environmental Plan 1994.

The site's location in a regional context and the site features are shown in Figure 1 and Figure 2 of Appendix A respectively.

The facility is owned and operated by Lithgow City Council in accordance with Environment Protection Licence (EPL) No. 6004 issued under Section 55 of the Protection of the Environment Operations Act 1997. The facility accepts general solid waste (putrescible and non-putrescible), asbestos, tyres and clinical and related wastes. The site has been in use as a landfill since the 1940s.

The site features and location is described below:

- The landfill site is approximately 12 Hectares (ha).
- The landfill extends into part of a number of lots, namely Lot 1 Deposited Plan (DP) 190934, Lot 1 DP 630638, Lot 1 DP 947828 (portion), Lot 44 DP 751655 (portion) and a section of Crown Land.
- Land to the South West of the existing waste depot has Lithgow Sewage Treatment Works.
- The Landfill, adjoins bushland on the northern, western and eastern boundaries of the waste depot land.
- South of the landfill is the Great western Highway and the hamlet of Hermitage Flat.

The land parcels which comprises the waste mass and the Sewage Treatment Plant site is tabulated below, see Table 2-1 below:

Table 2-1 Landfill Depot - Land Parcels

LAND DESCRIPTION	LOT/PORTION	AREA (ha)
Landfill Site	Lot 1 Deposited Plan (DP) 190934, Lot 1 DP 630638, Lot 1 DP 947828 (portion), Lot 44 DP 751655 (portion) and a section of Crown Land	12*
Lithgow Sewage Treatment Works	Part Lot 1 – DP 947828	4*
All land is in the Parish of Marrangaroo, County of Cook, Lithgow City Council.		

* Subject to confirmation by survey.

A locality plan of surrounding land ownership within 800 m of the site is displayed in the LEMP provided in Appendix H.

2.2 Surrounding Land Use

With the site being located in a valley surrounded by steep hillsides the area immediately to the north, north west, east and south is un-cleared native bushland. Land to the north, east and west is mapped as Environmentally Sensitive under the Local Environmental Plan.

The Lithgow STP is located immediately south west from the site and located down hydraulic gradient between the SWF and Farmers Creek.

The closest residential properties are located along Geordie Street and in Chivers Close approximately 650m to the south and south west of the waste mass respectively.

2.3 Site Operations

The site is licenced to accept 50,000 tonnes of waste per annum, measured and recorded by Council using the calibrated weighbridge that was installed in late 2012.

The LSWF is permitted to dispose of the following waste types:

- General solid waste (putrescible)
- General solid waste (non-putrescible)
- Tyres (with limitations)
- Asbestos
- Clinical and related waste.

Council undertook a review of the potential to extend the operational life of landfilling at the LSWF in 2010. As part of the review which was based on landfill surveys and volume calculations undertaken between July 2008 and April 2010 the average annual filling rate at the LSWF was calculated at approximately 33,310 m^3/year. Since installation of the weighbridge, this has been re-estimated at around 25,000 m^3/year . The results of this review demonstrated that there is capacity to significantly extend the operational life of the LSWF. In the LEMP (2016), a four stage plan was prepared that extended the life of the LSWF to the year 2038; providing for another 22 years of land filling operations.

Further operational details conducted at the site are contained in the LEMP.

2.4 Site Topography and Drainage

The SWF is located in a valley with a north-east to south-west orientation, which drains into Farmers Creek approximately 600 metres to the south west. Farmers Creek is an ephemeral first-order tributary of the Coxs River.

The area around the SWF comprise a series of relatively deeply incised gullies which level out to gently sloping alluvial flats closer to Farmers Creek. Relatively steep slopes of between 17 and 21 degrees flank the SWF on the north western and eastern perimeters.

A detailed surface water management system was designed and built in 2004 to 2006. Surface water controls were designed to prevent surface water from mixing with waste to avoid the generation of excessive leachate, erosion of cover material and/or waste from the landfill, and sediment or contaminants from being carried off the landfill site. The system at the site includes upslope diversion drains, surface water collection drains and sedimentation basin to manage surface water at the landfill.

Surface water runoff from the catchment upstream of the site is intercepted by clean water diversion drains which have been installed on the east and south of the site. In addition, an existing ephemeral creek which ran through the valley in the western portion of the site has been diverted around the northern edge of the site and acts as a diversion drain for the slopes to the north west of the site.

The site has been designed such that surface water runoff from the landfill areas is collected in a series of informal collection drains and directed into a sedimentation basin located in the north western portion of the site. However, areas of the access road and some operational areas to the south of the sedimentation basin do not drain to the sedimentation basin. The area draining to the sedimentation basin is approximately 7ha and the basin was designed to have a capacity of 4,090m^3 (Geolyse, 2014). Prior to release the water within the basin is treated with flocculants and discharged to maintain adequate storage within the basin for future rainfall events. The

current active filling area is surrounded by earth bunding to contain the leachate generated within this area. It appears that the bunding will prevent any discharge of leachate to the dirty water system (Geolyse, 2014).

A groundwater/leachate collection trench and sump has been constructed at the base of a cutting within the sewage treatment plant and is regularly sampled as part of the monitoring requirements of the landfill. The trench collects perched groundwater/leachate which seeps out of the cutting wall below the STP site office in the vicinity of the decommissioned trickle filters. A leachate collection and pumping system has been set up to transfer this leachate back to the landfill.

In general it appears that the areas currently being utilised have been minimised and the remainder of the site has been or are being stabilised and rehabilitated. In general previously filled areas are stabilised and revegetated, however, some areas were more recently capped and covered with material to allow revegetation to occur.

The layout of the site is shown on Figure 2.

2.5 Geology

The Sydney 1:250,000 scale geological map indicates that the Lithgow region is underlain by the Permian-age Shoalhaven Group and Illawarra Coal Measures. The Shoalhaven Group is dominated by siltstones, claystones and minor sandstone and conglomerate. The Illawarra Coal Measures are similar in lithology, the difference being that numerous coal seams are present.

Investigations undertaken by Environmental and Earth Sciences Pty Ltd (EES, 2000) confirm that the site is underlain by the sedimentary sequences of the Shoalhaven Group and Illawarra Coal Measures. Borehole logs indicate that the subsurface profile comprises interbedded sandstones, shales and claystones, with minor occurrences of coalaceous shales and coal. Units are described below.

Sandstone Predominantly cream to orange, medium to coarse-grained, with minor conglomeritic lenses and gravel; well sorted, quartzose with sporadic iron nodules and weathered ironstone fragments.

Siltstone Light grey to grey, thinly laminated with occasional fine-grained sand and claystone laminite, moderately to well sorted.

Claystone Grey to dark grey, moderately to well sorted, extremely thinly laminated with minor coal.

Soils across the site vary from coarse sands to sandy clays and gravelly loams, reflecting the influence of geomorphic position on soil genesis. Soil thickness, where soil is present, varies between approximately 1.0 and 2.3 metres, although it is expected to be much shallower in the steeper areas of the site.

It is quite probable that the valley at the site represents the surface expression of the major fracture and aeromagnetic lineament which according to Shephard et al. (1981) lies immediately to the north and north-west of Lithgow township. Beneath such lineaments the geological strata are commonly fractured by joint swarms and faulting. Such features significantly enhance secondary porosity and permeability (Jewell 2001).

A review of the Wallerawang 8931 1:100,000 scale soil landscape series sheet indicates that the site is underlain by soils of the Hassans Walls and Lithgow Soil Groups. Typical features of these soils include the following:

- A loose and extremely friable sandy topsoil.
- An increasing clay content with depth, particularly on topographically flat areas and low-angle hillslopes.
- Extremely shallow to moderately deep profiles depending on geomorphic position.
- Low fertility and low organic material within soils.
- Low available water capacity.
- High permeability.
- High erodability and minor rill erosion on exposed surfaces.
- Localised stoniness, primarily ironstone.

2.6 Hydrogeology

Groundwater movement is likely to be via two processes. Groundwater would move predominantly through secondary features such as fracturing associated with the network of joints and features such as subhorizontal bedding-plane fractures. In addition, some intergranular flow may occur in horizons of weathered sandstone, cross-stratified sandstone, and coarse, poorly cemented sandstone. Groundwater flow directions are controlled by regional topography, and regional geological structure (Jewell 2001).

The site is part of a groundwater recharge zone and groundwater is present at a depth of 2 to 15 metres below ground level (within the Shoalhaven and Illawarra Coal Measures Group sediments). Groundwater flow at the site is controlled by local topography, and regional geological features. Therefore the shape of the water table in the area is likely to reflect that of the topography. This results in groundwater permeating to the south-south-west of the site and discharging to Farmers Creek.

Sandstone units within the sedimentary sequence are separated by numerous siltstone and claystone lenses which occur throughout its lateral and stratigraphic extent. Lenses are generally of the order of 2.5 metres to 5.0 metres in thickness.

A review of the Hawkesbury-Nepean Groundwater Vulnerability Map (1998) indicates that the groundwater at the site would generally be considered to have a moderate to low probability of being impacted by surface activities.

2.6.1 Groundwater Database Search

A search of the NSW Natural Resource Atlas undertaken in June 2016 indicated there were four registered groundwater bores within a 500 metre radius of the site. Bore completion reports were available and summarised in Table 2-2 below.

Table 2-2 NSW Natural Resource Atlas Groundwater Bore Details

NSW Groundwater Bore ID	Installation Date	Bore Depth (mbgl)	Screen Length Intervals (mbgl)	Intended Bore Use	Direction from landfill	Approximate Distance from landfill (m)
GW104218	24/05/2001	17.3	13.6 – 16.6	Monitoring (STP)	South - west	50
GW104220	25/05/2001	21.3	17.8 – 20.8	Monitoring (STP)	South - west	50
GW104221	26/05/2001	48.6	35.1 – 38.1	Monitoring (STP)	South - west	50
GW104222	29/05/2001	38.8	13.5 – 16.5	Monitoring (STP)	South - west	200

Bore lithology and installation details for the registered bores are listed in Table 2-2 were also obtained from the NSW Natural Resource Atlas, provided by the DIPNR. Borelogs reported a similar lithology to what exists at the site. Bore lithology and installation details, as well as a map displaying the identified bores within 500 m radius of the site have been included in Appendix C.

2.6.2 On-site Groundwater Monitoring Network

There are nine active and one inactive existing groundwater monitoring bores located onsite, seven of which require to be monitored by the Licence. The groundwater monitoring bores are identified as MB1, MB5, MB6-B, MB9, MB10, (EPL Points 1–5), MB12 and MB14 (EPL Points 7-8).

The licence also requires the monitoring of a sump (LW1) located on the STP site.

Based upon an inferred south westerly groundwater flow direction bore MB1 and MB6B are located upgradient and bores MB5, MB12 and MB14 are downgradient. Table 2-2 provides details of the groundwater monitoring network at Lithgow Landfill.

Table 2-2 Summary of Lithgow Landfill Groundwater Monitoring Network

EPA Monitoring Reference Point	Council Monitoring Reference Point	NSW Groundwater Bore ID	Installation Date	#Easting	#Northing	Depth (mbgl)	Screen Interval (mbgl)	Status	SWL (mtoc)
EPA1	MB01	NA	NA	234435	6293263	6.2	NA	Inactive	3.825
	MB02	NA	NA			10	NA	Lost/destroyed	
	MB03	NA	NA			10	NA	Lost/destroyed	
	MB04	NA	NA	234071	6292875	12.38	NA	Active	3.99
EPA2	MB05	NA	NA	234121	6292846	9.8	NA	Active	3.74
	MB06	NA	NA				NA	Lost/destroyed	
EPA3	MB06B	NA	NA	234473	6292861	16.65	NA	Active	12.19
EPA4	MB09	NA	NA	234151	6292973	17.1	NA	Active	13.83
EPA5	MB10	NA	NA	234228	6293075	13.7	NA	Active	6.67
	MB11	GW104218	24/05/2001	234134	6292826	17.9	13.6 - 16.6	Active	6.515
EPA7	MB12	GW104220	25/05/2001	234173	6292800	21.3	17.8 – 20.8	Active	8.455
	MB13	GW104221	26/05/2001	234133	6292826	38.6	35.1 – 38.1	Active	6.54
EPA8	MB14	GW104221	26/05/2001	234042	6292483	38.8	35.1 – 38.1	Active	

Note:
- mbgl - metres below ground level
- SWL - standing water level
- NA – Not available
- #Six Maps MGA56

Throughout this Annual Report groundwater bores will be referred to by their council monitoring reference point. Borehole logs as provided by the DIPNR are included in Appendix C.

3 EPA License Conditions

The site is subject to Environment Protection License (EPL) issued by the Environmental Protection Authority under the Protection of the Environment Operations Act (1997). The EPL was last amended on 17 April 2015 (refer to Appendix B for the Environment Protection License).

Table 3-1 EPL Monitoring and Discharge Points

EPA Monitoring Point	Lithgow SWF Identification Number	Description
1	MB01	Groundwater monitoring bore
2	MB05	Groundwater monitoring bore
3	MB06B	Groundwater monitoring bore
4	MB09	Groundwater monitoring bore
5	MB10	Groundwater monitoring bore
6	SW1	Surface water discharge point
7	MB12	Groundwater monitoring bore
8	MB14	Groundwater monitoring bore
9	LW01	Leachate monitoring bore
10	Various	Accumulated landfill gas monitoring

A LEMP was prepared in August 2016 which details the procedures to manage and operate the Lithgow SWF to meet the relevant environmental goals specified in the Environment Protection Authority's Environmental Guidelines: Solid Waste Landfills, Second Edition, 2016.

A Pollution incident Response Management Plan was prepared for Lithgow SWF in November 2014.

3.1 Groundwater

The licence requires that groundwater quality monitoring is undertaken at the seven piezometers (groundwater monitoring bores) shown in *Table 3-2* which are located on and off the site.

The licence states all seven bores must be inspected every six months and sampled for analysis where water is present.

The licence requires that groundwater quality monitoring of monitoring points of each pollutant and specified frequency shown in *Table 3-2*.

Table 3-2 EPL Groundwater Monitoring Requirements

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	mg/L	Every 6 months	Grab sample
Aluminum	mg/L	Every 6 months	Grab sample
Ammonia	mg/L	Every 6 months	Grab sample
Calcium	mg/L	Every 6 months	Grab sample
Chemical oxygen demand	mg/L	Every 6 months	Grab sample
Chloride	mg/L	Every 6 months	Grab sample
Chromium (hexavalent)	mg/L	Every 6 months	Grab sample
Chromium (total)	mg/L	Every 6 months	Grab sample
Conductivity	µS/cm	Every 6 months	Grab sample
Fluoride	mg/L	Every 6 months	Grab sample
Iron	mg/L	Every 6 months	Grab sample
Magnesium	mg/L	Every 6 months	Grab sample

Pollutant	Units of measure	Frequency	Sampling Method
Manganese	mg/L	Every 6 months	Grab sample
Nitrate	mg/L	Every 6 months	Grab sample
Pesticides	mg/L	Every 6 months	Grab sample
pH	pH	Every 6 months	Grab sample
Phosphorus	mg/L	Every 6 months	Grab sample
Potassium	mg/L	Every 6 months	Grab sample
Sodium	mg/L	Every 6 months	Grab sample
Standing water level (SWL)	As appropriate	Every 6 months	Grab sample
Sulfate	mg/L	Every 6 months	Grab sample
Total dissolved solids	mg/L	Every 6 months	Grab sample
Total organic carbon (TOC)	mg/L	Every 6 months	Grab sample
Total Phenolics	mg/L	Every 6 months	Grab sample
Total petroleum hydrocarbons (TPH)	mg/L	Every 6 months	Grab sample

During inspections Meinhardt gauged the standing water level (SWL) in the bores. Groundwater gauging was:

- Carried out prior to any disturbance by sampling;
- Measured relative to top of casing and ground level; and
- Referenced to Australian Height Datum (AHD).

3.2 Surface Waters

The licence requires that surface water quality monitoring is undertaken at one monitoring point SW01 which is the discharge point of the surface water dam located in the north western portion of the site.

The licence states the discharge point must be inspected each month and sampled for analysis of each pollutant shown in Table 3-3 when discharging.

Table 3-3 Surface Water Monitoring Requirements

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	mg/L	Monthly during discharge	Grab sample
Aluminum	mg/L	Monthly during discharge	Grab sample
Ammonia	mg/L	Monthly during discharge	Grab sample
Calcium	mg/L	Monthly during discharge	Grab sample
Chemical oxygen demand	mg/L	Monthly during discharge	Grab sample
Chloride	mg/L	Monthly during discharge	Grab sample
Chromium (hexavalent)	mg/L	Monthly during discharge	Grab sample
Chromium (total)	mg/L	Monthly during discharge	Grab sample
Conductivity	µS/cm	Monthly during discharge	Grab sample
Fluoride	mg/L	Monthly during discharge	Grab sample
Iron	mg/L	Monthly during discharge	Grab sample
Magnesium	mg/L	Monthly during discharge	Grab sample
Manganese	mg/L	Monthly during discharge	Grab sample
Nitrate	mg/L	Monthly during discharge	Grab sample
Pesticides	mg/L	Monthly during discharge	Grab sample
pH	pH	Monthly during discharge	Grab sample

Pollutant	Units of measure	Frequency	Sampling Method
Phosphorus	mg/L	Monthly during discharge	Grab sample
Potassium	mg/L	Monthly during discharge	Grab sample
Sodium	mg/L	Monthly during discharge	Grab sample
Sulfate	mg/L	Monthly during discharge	Grab sample
Total organic carbon (TOC)	mg/L	Monthly during discharge	Grab sample
Total Phenolics	mg/L	Monthly during discharge	Grab sample
Total suspended solids	mg/L	Monthly during discharge	Grab sample
Total petroleum hydrocarbons (TPH)	mg/L	Monthly during discharge	Grab sample

3.3 Leachate

The licence requires that leachate quality monitoring is undertaken at one monitoring point LW01 which is a leachate drainage collection sump located in the north eastern portion of the STP site.

The licence states the leachate sump must be inspected every six months and sampled for analysis of each pollutant shown in *Table 3*- where liquid is present.

Table 3-4 Leachate Monitoring Requirements

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	mg/L	Every 6 months	Grab sample
Ammonia	mg/L	Every 6 months	Grab sample
Calcium	mg/L	Every 6 months	Grab sample
Chloride	mg/L	Every 6 months	Grab sample
Fluoride	mg/L	Every 6 months	Grab sample
Iron	mg/L	Every 6 months	Grab sample
Magnesium	mg/L	Every 6 months	Grab sample
Manganese	mg/L	Every 6 months	Grab sample
Nitrate	mg/L	Every 6 months	Grab sample
pH	pH	Every 6 months	Grab sample
Potassium	mg/L	Every 6 months	Grab sample
Sodium	mg/L	Every 6 months	Grab sample
Sulfate	mg/L	Every 6 months	Grab sample
Total organic carbon (TOC)	mg/L	Every 6 months	Grab sample
Total Phenolics	mg/L	Every 6 months	Grab sample

3.4 Landfill Gas

The Licence requires that accumulated landfill gas (methane) monitoring is undertaken inside all buildings within 250 metres of waste filled areas (Monitoring Point 10) on a monthly basis. Buildings within 250 m include the following on and off-site buildings:

- Site Shed (onsite)
- STP Site Office
- STP Green shed
- STP Pump Room
- STP Switchroom 1
- STP Switchroom 2
- Sludge Belt Room
- Ultraviolet Shed

4 Beneficial Uses of Groundwater

The beneficial uses of groundwater to be protected are specified by the NSW Groundwater Quality Protection Policy 1998 and are based on the NWQM Strategy Guidelines for Groundwater Protection in Australia (1995). The beneficial uses of groundwater include:

- ecosystem protection;
- recreation and aesthetics;
- raw water for drinking water supply;
- agricultural water; and
- Industrial water.

The classification of whether a beneficial use is existing or likely is based upon the quality of groundwater present and the potential values of the water in the long term. The beneficial uses of a groundwater system need to be identified before setting appropriate water quality objectives and the most sensitive beneficial use for an aquifer system is to be protected. The Protection Policy states that:

"The Government will classify all the major groundwater systems in consultation with local and regional communities and tabulate information or publish maps which show this classification."

The Department of Land and Water Conservation "Groundwater Management Map" 2001 details the groundwater management areas of NSW. According to this map the Lithgow SWF is located in an area of moderate groundwater vulnerability.

Based upon the information provided in the NSW Natural Resource Atlas (Section 3) and an assessment of the groundwater quality beneath the site, the potential groundwater beneficial uses which are considered existing, likely or unlikely in the vicinity of Lithgow SWF have been assessed in *Table 4-1*. All existing and likely beneficial uses are required to be protected.

Table 4-1: Summary of Groundwater Beneficial Uses

Beneficial Use	Existing	Likely	Unlikely	Comment
Ecosystem Protection		✓		Groundwater from the site is likely to discharge into surrounding surface waters, therefore, this use is considered likely.
Recreation and Aesthetics			✓	Groundwater bores within the vicinity of the site are not registered for the use of recreation, therefore, recreation and aesthetics is considered an unlikely beneficial use of groundwater.
Raw Water for drinking water supply			✓	The "*Groundwater Management Area*" indicates that Lithgow is located in Groundwater Management Area "Sydney Basin – Blue Mountains Sandstone". No groundwater bores within the vicinity of the site are registered for drinking water supply reticulated water is available. Therefore the beneficial use of raw water for drinking water supply is considered to be unlikely.
Agricultural Water		✓		Yields obtained from the Berry Formation siltstones are generally low, usually less than 1.5 litres per second; salinity is variable and is typically between 500 and 3000 milligrams per litre. Groundwater is generally classified as brackish. The TDS concentration at the site ranges between 50 and 1800 µS/cm. The use of groundwater for stock watering, therefore agricultural water is considered a likely beneficial use of groundwater.

Industrial Water			✓	There are no wells in the vicinity of site registered for industrial purposes.

4.1 Adopted Beneficial Guidelines

To determine whether contaminant concentrations are potentially hazardous to the surrounding ecosystems, the NSW Groundwater Quality Protection Policy provides the following objective:

"All groundwater systems should be managed so that the most sensitive identified beneficial use (or environmental value) is maintained."

Based upon the assessment of the beneficial uses in Table 4-1 above the following groundwater beneficial uses are considered existing or likely for the groundwater surrounding Lithgow landfill:

- Ecosystem protection.
- Agricultural water.

The 2007 Guidelines for the Assessment and Management of Groundwater Contamination reference the use of the ANZECC & ARMCANZ 2000 guidelines to establish the numerical default criteria (trigger values) to protect the beneficial uses of groundwater and for groundwater discharging to surface water bodies. Specifically the following adopted guidelines will be used to protect the ecosystem protection and agricultural water beneficial uses of groundwater:

- ANZECC & ARMCANZ (2000) Fresh Water Ecosystems (95% level of protection) for the beneficial use of ecosystem protection; and
- ANZECC & ARMCANZ (2000) Irrigation and ANZECC & ARMCANZ (2000) Stock Watering Criteria for the beneficial use of agricultural water.

The resultant adopted guidelines are presented in Table 4-2 below. The guideline limits in bold represent the most sensitive guideline limit for a particular analyte. The following guidelines will also be adopted to assess surface water monitored at Lithgow City Landfill.

Table 4-2 Assessment Guidelines

Analyte	ANZECC & ARMCANZ (2000) Fresh Water Ecosystems (95% level of protection)	ANZECC & ARMCANZ (2000) Irrigation Criteria*	ANZECC & ARMCANZ (2000) Stock Watering Criteria
pH (units)	**6.5 – 8.0**		5.0 – 9.0
Electrical Conductivity (µS/cm)	**125 – 2,200**	950	-
Total Dissolved Solids (mg/L)	**-**		2000
Ammonia (as N) (mg/L)	**0.9**		--
Nitrate (mg/L)	**0.159**		90
Nitrite	**-**		**30**
Fluoride (mg/L)	-		**2**
Sulphate (as SO_4^{2-}) (mg/L)	-		**1,000**
Calcium (mg/L)	-		**1,000**
Arsenic (mg/L)	**0.013**	0.1	0.5
Cadmium (mg/L)	**0.0002**		0.01
Chromium (mg/L)	**-**	**0.1**	-
Chromium (hexavalent) (mg/L)	**0.001**	-	-
Copper (mg/L)	**0.0014**	0.2	0.4
Lead (mg/L)	**0.0034**	2	0.1
Manganese (mg/L)	**1.9**	0.2	-
Zinc (mg/L)	**0.008**	2	20

Note:

- Figures in bold represent the lowest adopted value for a particular analyte.
- Phenols, OCPs, OPP and PAHs have been historically below the limits of reporting and therefore guideline limits for these analytes have not been included in the above table.
- Irrigation guidelines are for long term trigger values (long-term use up to 100 yrs) for heavy metals and metalloids and phosphorus.
- Chromium hexavalent value is for 90 % level of protection as the laboratory limit of reporting (LOR) is above the 95 % level of protection.

5 Sampling Methodology

Meinhardt undertook groundwater monitoring or Eurofins (Formerly MGT) was directly engaged by Meinhardt to undertake the groundwater monitoring. Eurofins are a National Association of Testing Authority (NATA) accredited laboratory.

Samples were collected with regard to:

- EPA 1994. Water Quality Investigations Manual, Preferred Methods for Sampling and Analysis-Draft. NSW Environment Protection Authority;
- Australian/New Zealand Standard: Water Quality – Sampling – Part 11: Guidance on Sampling of Groundwaters, AS/NZS 5667.11-1998 (Standards Australia & Standards New Zealand 1998); and
- Australian/New Zealand Standard: Water Quality – Sampling – Part 6: Guidance on Sampling of Rivers and Streams, AS/NZS 5667.6-1998 (Standards Australia & Standards New Zealand 1998).

Table 5-1 Groundwater Sampling Methodology

Groundwater Sampling Methodology	Comment
Calibration	Calibration of field equipment was conducted prior to use on site each day that equipment was used on-site.
Bore Gauging	Monitoring bores were gauged using an interface meter.
Bore Purging	Monitoring bores were purged until field parameters (dissolved oxygen, electrical conductivity, pH, redox potential and temperature) stabilised.
Bore Sampling	Sampling was conducted using a low flow micropurge pump.
Decontamination Procedure	Sampling equipment and interface meter were decontaminated and rinsed with deionised water between bores.
Field measurements	Field parameters were measured using a water quality meter.

A copy of Meinhardt/Eurofins' sampling procedure is provided in Appendix E.

A micropurge pump was used for low flow sampling until chemical equilibrium was reached. This method requires that only small volumes of water, typically between 0.1 – 0.5 L/min are purged. A review of field sampling and stabilisation records show that SWLs generally did not drop by more than 0.5m.

Surface water and leachate samples were collected according to the sampling methodology specified in Table 5.2 below.

Table 5-2 Leachate and Surface Water Sampling Methodology

Leachate and Surface Water sampling methodology	Comment
Calibration	Calibration of field equipment was conducted prior to use on-site each day that equipment was used on-site.
Sampling	Surface water sampling was conducted using a sample stick and leachate sampling using a disposable bailer.
Decontamination Procedure	Sampling equipment was decontaminated and rinsed with deionised water between sampling locations.

A copy of Eurofins's groundwater and surface water sampling procedure is provided in Appendix D and Eurofins Field sheets are included in the Eurofins laboratory reports located in Appendix E.

6 Groundwater Monitoring

Groundwater monitoring occurred twice between September 2015 to September 2016.

Groundwater sampling could not be completed in accordance with Environmental Protection Licence No. 6004 because groundwater bore MB1 was found dry (October 2015) or with insufficient water to sample in July 2016.

6.1 Field Observations

Groundwater bore MB1 was dry during October 2015 and with insufficient water to carry out a complete analysis of all required parameters in July 2016.

6.2 Groundwater Depth

Standing water levels (SWL) within the groundwater monitoring bores were measured and recorded during each monitoring round. The SWL was measured relative to top of casing and prior to any disturbance by sampling. Table 6-1 below displays the SWLs for the monitoring period.

Table 6-1 Groundwater Bore Standing Water Levels

EPA Monitoring Point	Lithgow SWF Identification Number	SWL Range (mBTOC)
MP1	MB01	3.83
MP2	MB05	3.34 – 4.08
MP3	MB06B	12.18 – 12.19
MP4	MB09	13.30 – 13.83
MP5	MB10	6.30 – 6.67
MP7	MB12	8.35 – 9.73
MP8	MB14	2.74 – 3.06

6.3 Analytical results

Table 6-3 summarises parameters reported to exceed the freshwater ecosystem, irrigation and stock watering guidelines during the 2015/2016 reporting period.

Table 6-2 Groundwater Exceedances of Adopted Guidelines 2015/2016

Analyte	Guideline Value*	Min*	Max*	Groundwater Wells Exceeding Limit
Chloride	175[b]	14	310	MB5 and MB12 in May 2016
Conductivity (µS/cm)	125 – 2200[a]	120	1400	MB10 in May 2016
	950[b]			MB5, MB6B and MB12 in May 2016
pH (field)	6.5 – 8.0[a]	3.4	7.9	MB9, MB10 and MB12 in May 2016
Ammonium as N	0.900[a]	0	19	MB06B, MB09, MB12, MB05 and MB14 in May 2016
Nitrate	0.159[a]	<0.2	6.1	MB5, MB10 and MB14 in May 2016
	90[c]			None
Sodium	115[b]	5.3	190	MB12 in May 2016
TDS	2000[c]	67	900	None
Chromium	1.9 [a]	<0.001	<0.005	None

(hexavalent)				
Iron	0.2[b]	<0.05	5.4	MB6B, MB10 and MB12 in May 2016
	20[c]			None
Manganese	1.9 [a]			
	0.2 [b]			

Note:
a = ANZECC & ARMCANZ (2000) Freshwater ecosystem 95% Species Protection.
b = ANZECC & ARMCANZ (2000) Irrigation.
c = ANZECC & ARMCANZ (2000) Stock Watering.
* = Units are in mg/L unless otherwise stated.
(1) LOR is greater than the Chromium (CrVI) guideline for Freshwater ecosystem 95% Species Protection.

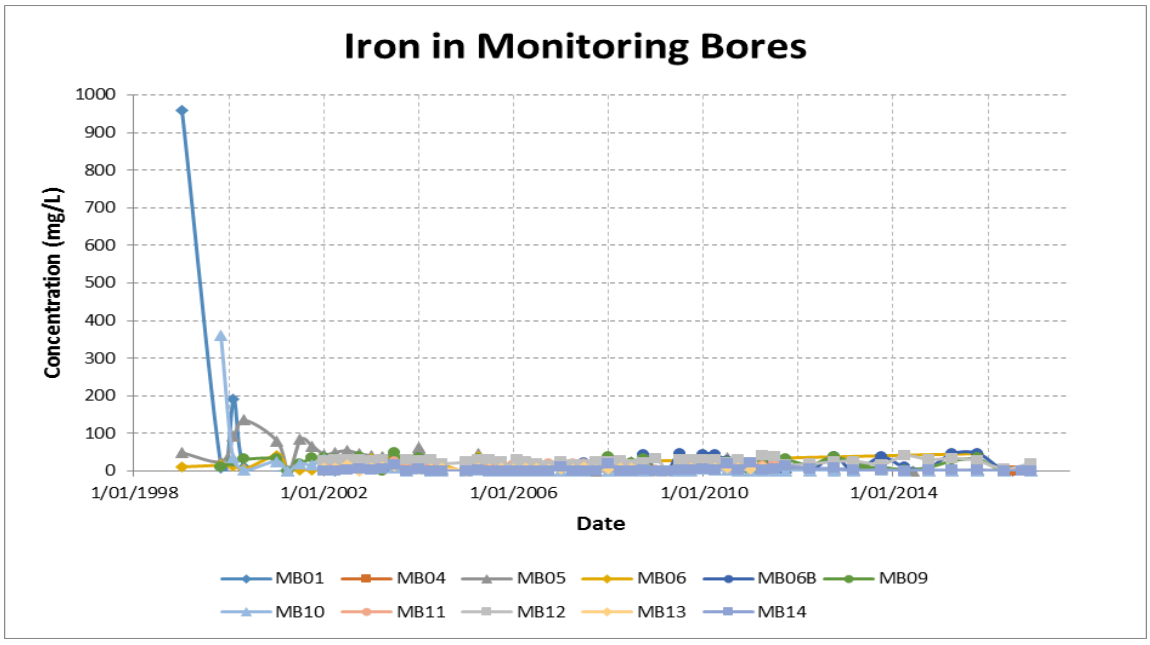
Laboratory certificates are provided in Appendix E and a summary of the groundwater results is provided in Appendix F, Summary of Results.

6.4 Groundwater Trend Analysis

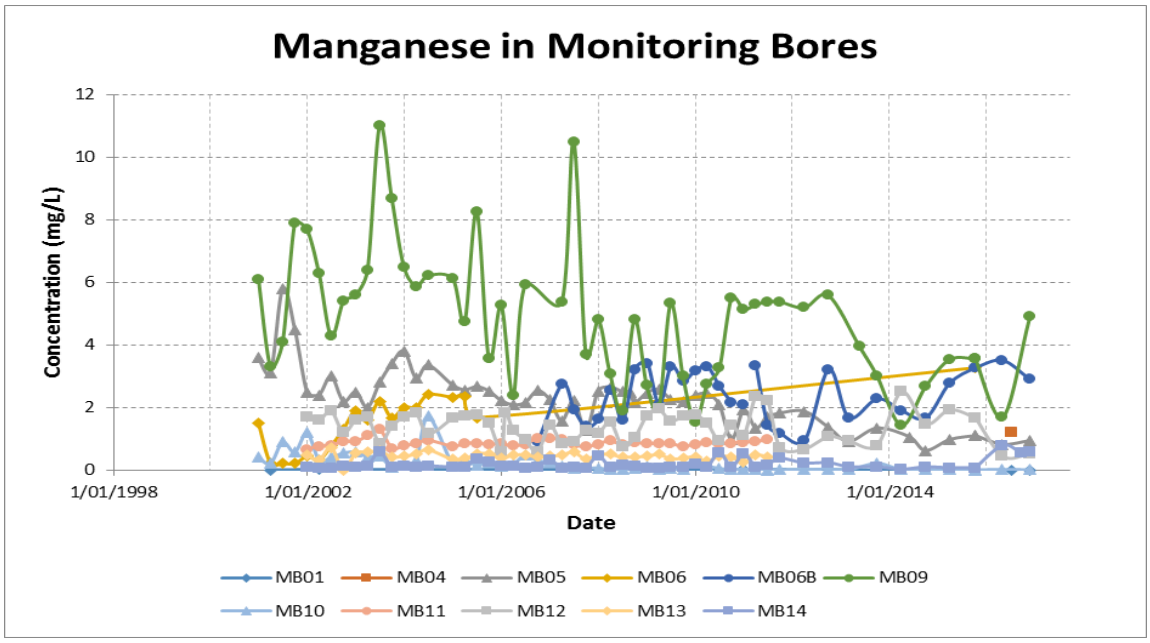
Council has provided Meinhardt with groundwater monitoring results dating back to early 1999. For key groundwater analytes trend analysis plots have been plotted to observe any indications of leachate impacts to the groundwater. Summary tables of selected historical data is provided in Appendix F and groundwater trend plots are provided in Appendix G.

6.4.1 Heavy Metals

Iron concentrations in MB6B, MB10 and MB12 exceeded the irrigation criteria in May 2016. Iron concentrations for the 2015/2016 reporting period were within recent historical variations. The plots also show that iron concentrations in all bores have been decreased between 1999 and 2005 before remaining relatively constant since 2005.

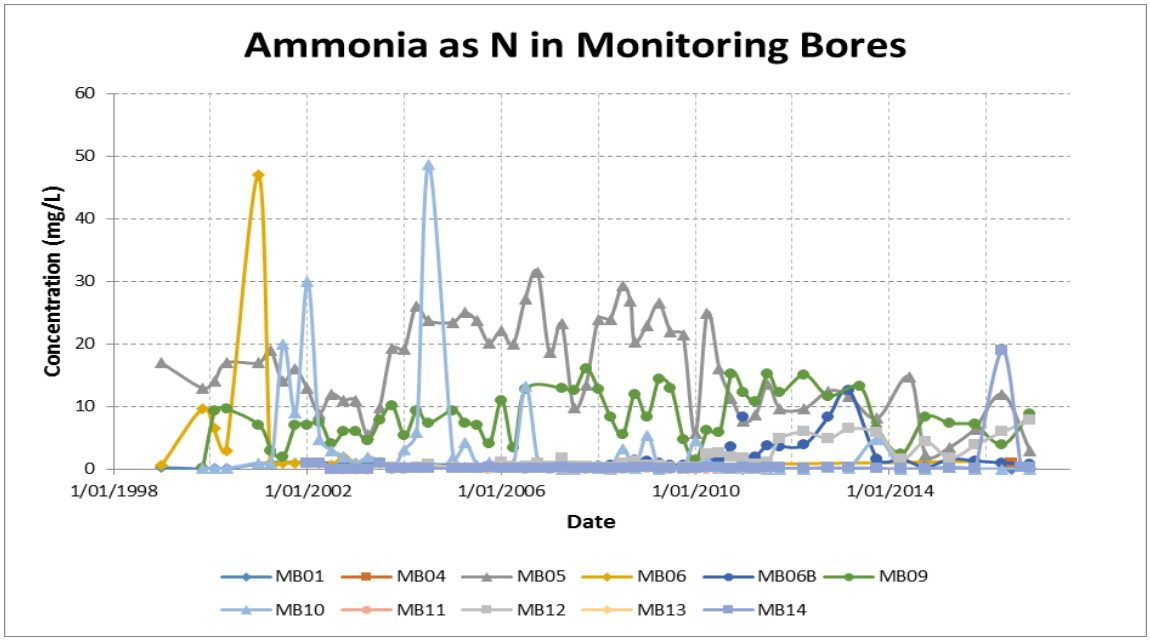


Manganese concentrations in MB06B, MB12 and MB14 exceeded irrigation guidelines and MB06B also exceeded the freshwater guidelines. Manganese concentrations for the 2015/2016 reporting period were within recent historical variations. Groundwater from MB09 had higher concentrations of manganese during most sampling rounds.

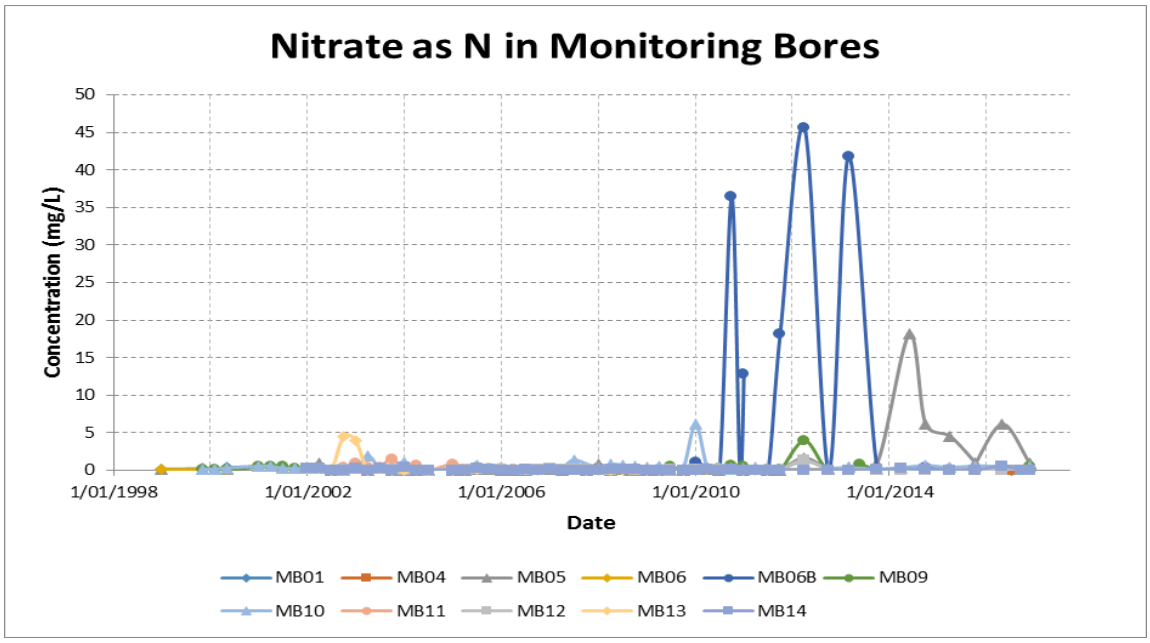


6.4.2 Nutrients

Ammonia (as N) was above adopted freshwater ecosystem 95% guideline concentrations in most monitoring bores during the 2015/2016 monitoring period. Historically ammonia has exceeded guideline concentrations (0.9 mg/L) in most monitoring bores at the site. The historical plot shows ammonia concentrations have been generally decreasing since 1999.

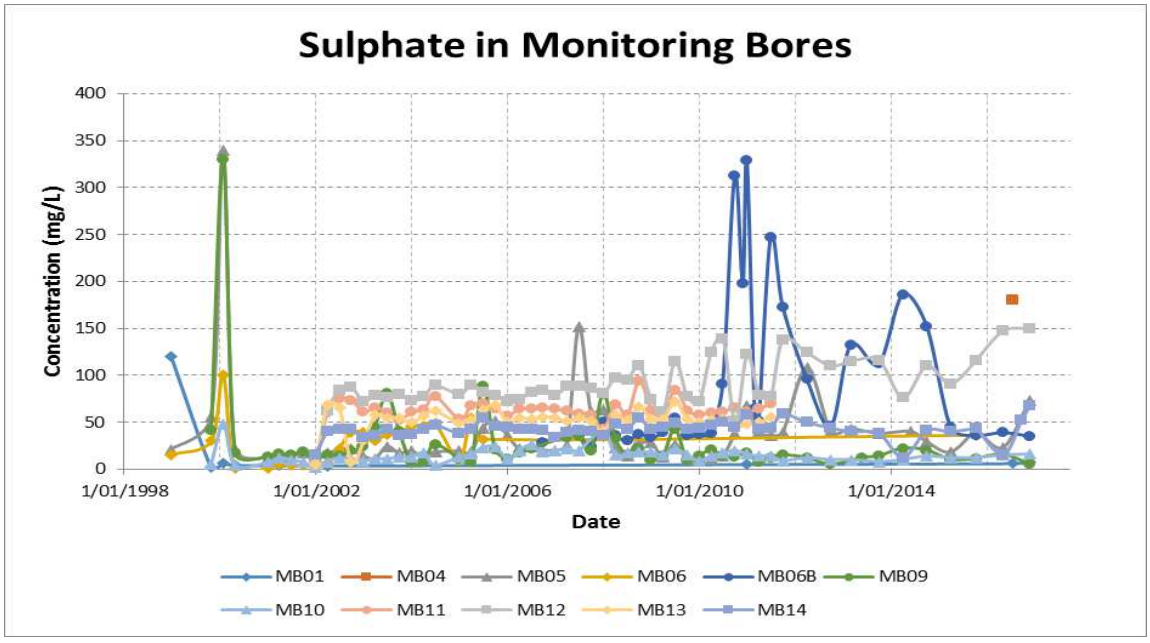


Nitrate concentrations in MB5, MB10 and MB14 in May 2016 were above adopted Freshwater Ecosystem guideline concentrations during the 2015/2016 monitoring period. The historical plot shows nitrate concentrations were within historical variations during the 2015-2016 reporting period. The exception is MB05 which increased in 2013 and has remained above its historical trend over the past 3 years.

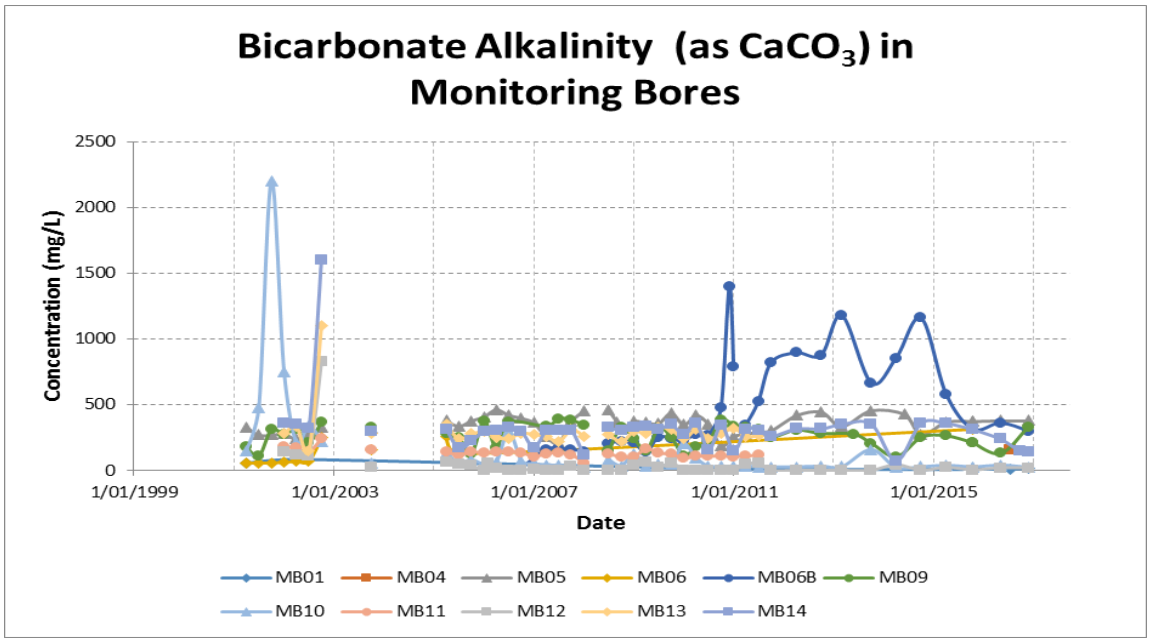


6.4.3 Reactive Components

Sulphate concentrations have remained relatively stable since 2001, except MB12 and MB06B which have been showing an increasing trend. The sulphate concentrations in MB09 and MB10 were generally the lowest concentration and have remained relatively stable since monitoring began.



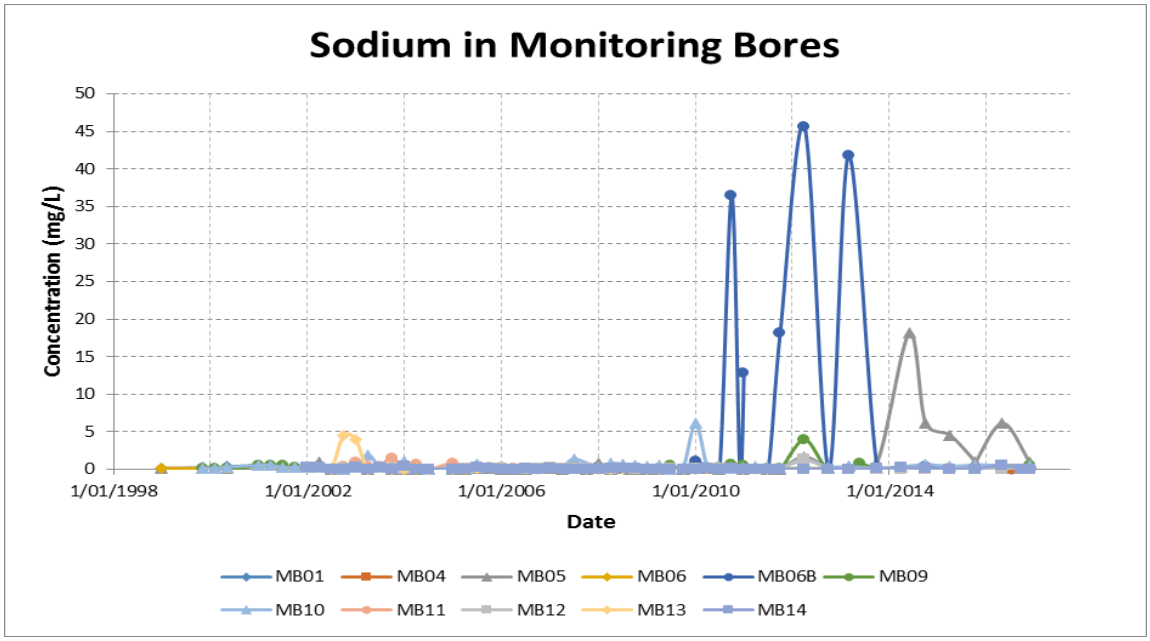
Other reactive components (such as alkalinity) were generally within historical concentrations except MB06B which showed increased concentration between 2010 and 2016. Upgradient and downgradient concentrations were generally consistent with each other.

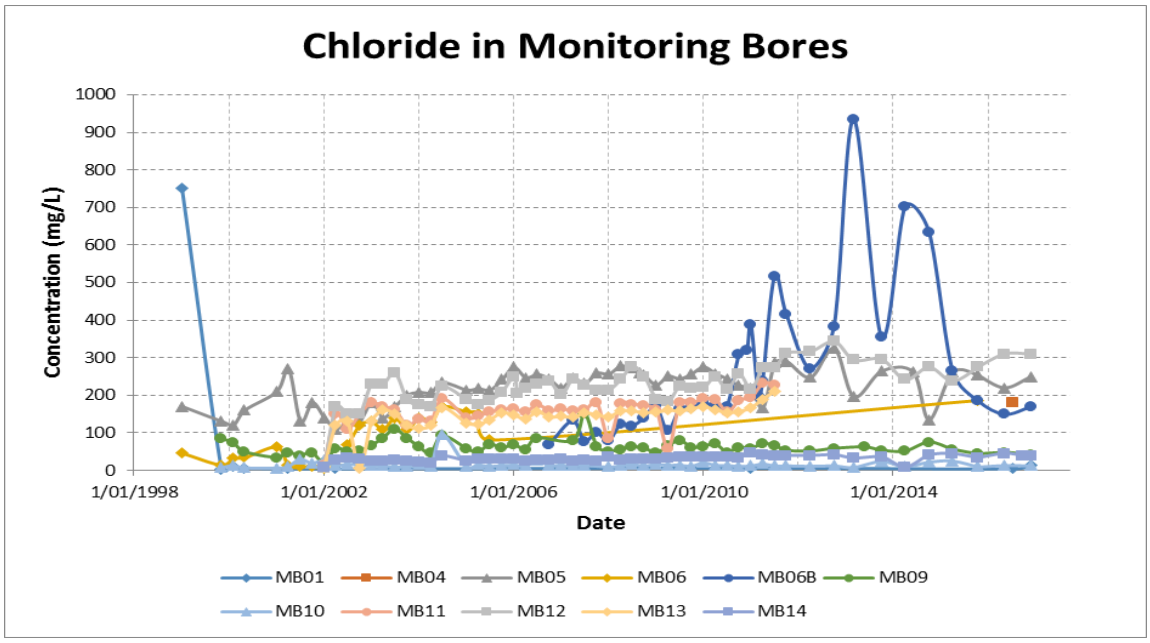


6.4.4 Salinity

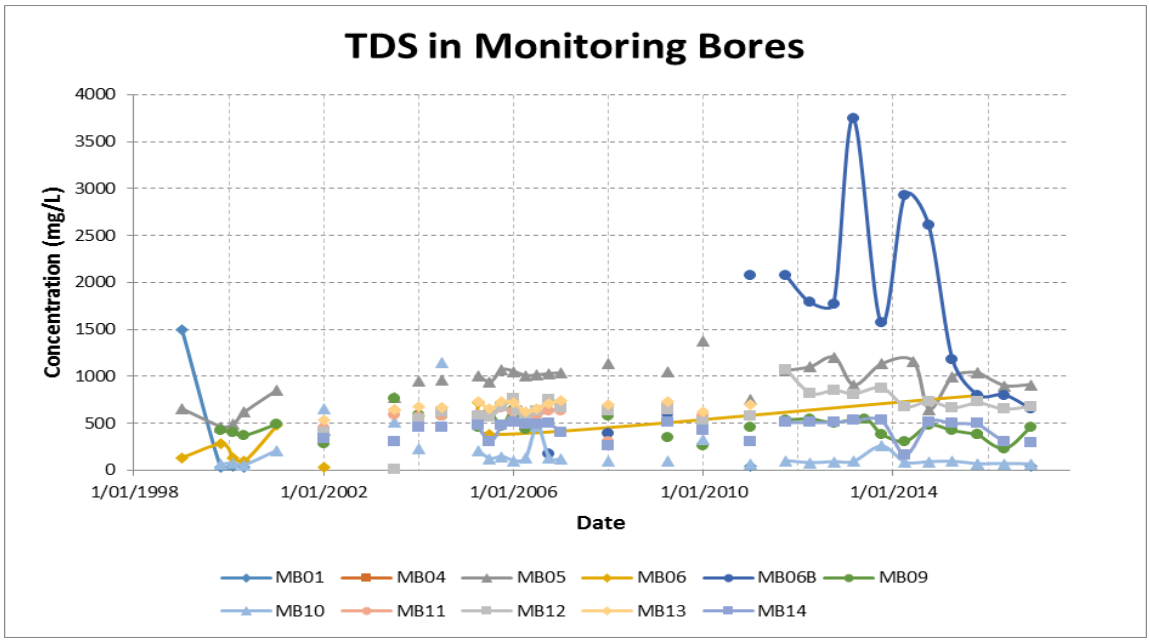
Sodium and chloride concentrations have remained relatively stable and lower in bores MB09, MB10 and MB14 since 1999. Sodium and chloride concentrations have been increasing and higher in bores MB06B, MB12, MB05, MB11 and MB13 since 1999.

Sodium and chloride exceeded the Irrigation Guidelines of 115 mg/L and 175 mg/L in MB12 during May 2016 and chloride in MB05 during May 2016.





TDS concentrations were below the Stock Watering (2000 mg/L) guidelines during the 2015/2016 monitoring period. The TDS plot shows TDS was generally within historical concentrations at the site and TDS within MB06B have been decreasing over the past 3 years.



6.4.5 TPH, BTEX, PAHs, Phenols, OCPs, OPPs and PCBs

All TPH, BTEX, PAHs, Phenols, OCPs, OPPs and PCBs concentrations have been below laboratory LORs for the majority of sampling rounds.

7 Surface Water Monitoring

Surface water samples were taken from monitoring point SW01 (EPA 6) (a surface water dam located on the north-west of the site). The LEMP specifies that surface water controls must prevent surface water from mixing with waste to avoid the generation of excessive leachate, erosion of cover material and/or waste from the landfill, and sediment or contaminants from being carried off the landfill site. The surface water management system includes upslope diversion drains, surface water collection drains and sedimentation basin to manage surface water at the landfill.

The surface water dam was sampled 5 times between September 2015 and September 2016, when surface water was discharging, for the analytes specified by the EPA licence 6004. Council provided Meinhardt with surface water data collected from 1999.

7.1 Analytical Results

Table 7-2 summarises parameters reported to exceed the freshwater ecosystem, irrigation and stock watering guidelines during the 2015/2016 reporting period.

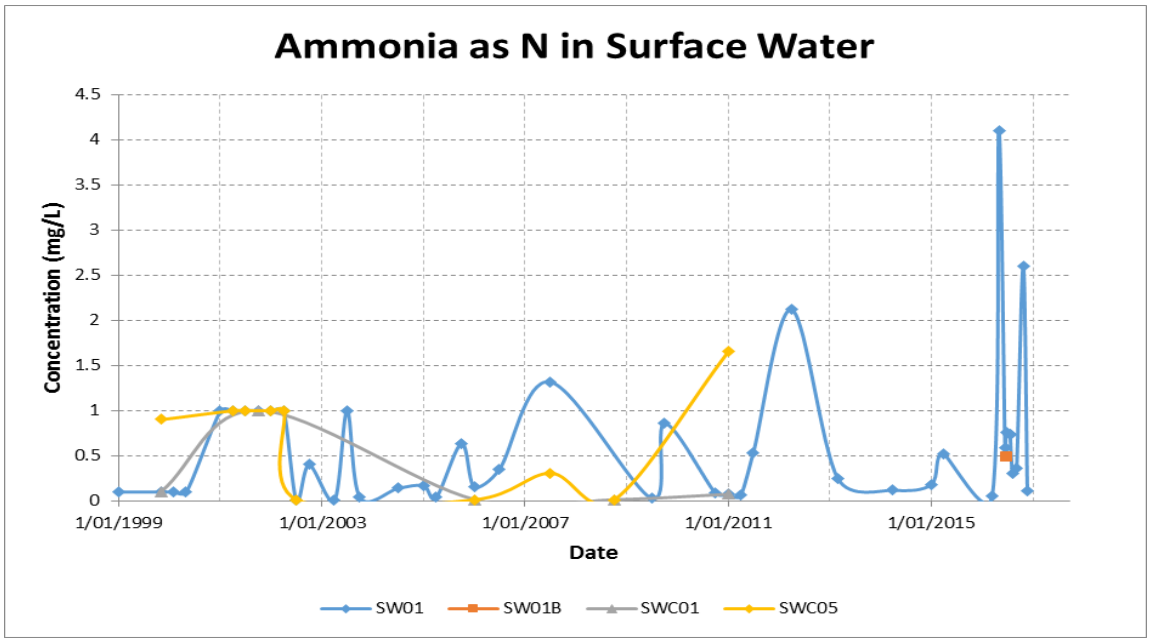
Table 7-1 Surface Water Exceedances of Adopted Guidelines 2015/2016

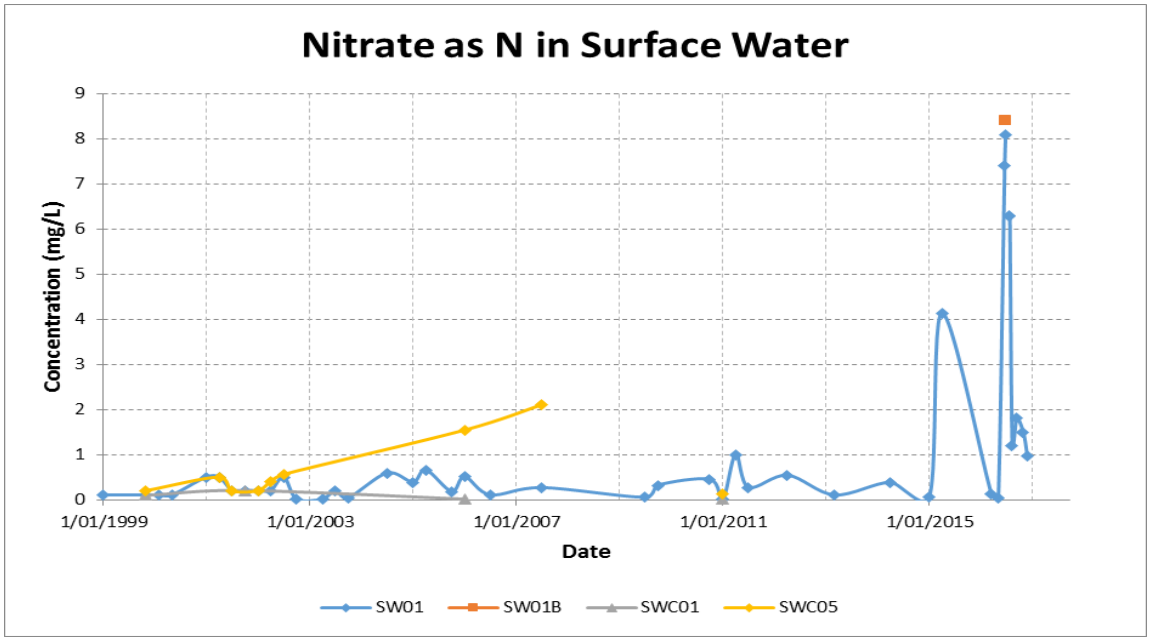
Analyte	Guideline Value*	Min*	Max*	Surface water monitoring points Exceeding Limit
pH	6.5 – 8.0[a]	7.0	7.9	None
	5.0 – 9.0[c]			None
EC (lab)	950[b]	370	570	None
	125-2200[a]			None
Ammonia (as N)	0.9[a]	0.05	4.1	SW1 during May 2016
Nitrate (as N)	0.159[a]	0.04	8.1	SW1 during June 2016
	90[c]			None
Fluoride	2[c]	<0.5	<0.5	None
Chromium VI	0.001[a]	<0.001	<0.001	None
Sodium	115[c]	24	52	None
Chloride	175[c]	27	64	None

Note:
a = ANZECC & ARMCANZ (2000) Freshwater ecosystem 95% Species Protection.
b = ANZECC & ARMCANZ (2000) Irrigation.
c = ANZECC & ARMCANZ (2000) Stock Watering.
* = Units are in mg/L unless otherwise stated.

The surface water results for 2015/2016 reporting period indicate the following:

- Conductivity results were relativity low indicating the dam is likely to consist of overland run-off and rainwater and that minimal overflow from onsite leachate dams is flowing into the dam;
- Field pH was ranged from 7.0 – 7.9, remaining within the Freshwater Ecosystem 95% Species Protection Stock Watering guideline limits;
- TOC concentrations were relatively low with the highest value of 44mg/L detected during the May 2016 monitoring event;
- Ammonia concentrations exceeded the Freshwater Ecosystem 95% Species Protection guideline limit of 0.9 mg/L in May 2016; and
- Nitrate concentrations exceeded the Freshwater Ecosystem 95% Species Protection guideline limit of 0.159 mg/L in June 2016.





Based on the observed surface water results from the on-site dam SW1, ammonia and nitrate parameters were elevated during the May and June 2016 monitoring event. This could indicate a potential failure to separate leachate from onsite surface water. Current works to divert stormwater around the landfill surface, and a recommended review of leachate management (which is currently extracted from a trench on the STP and reused on the landfill surface) should see an improvement to surface water quality results in future.

Laboratory certificates are provided in Appendix E and a summary of the surface water results is provided in Appendix F.

8 Leachate Monitoring

The Licence requires that leachate quality monitoring occurs at sampling point LW1 (EPA 9), which is an on-site leachate drainage sump. Leachate quality monitoring at sampling point LW1 is required for the pollutants and specified frequency shown in Table 3-4.

8.1 Field Observations

Leachate sump LW1 was sampled during the October 2015 and April 2016 monitoring events.

8.2 Analytical Results

2015/2016 leachate monitoring results from onsite leachate sump have been compared against 1 year old and 15 year old key leachate indicators in Table 8-2 below.

Table 8-2 Leachate Comparisons 2015/2016

	Ammonia as (N) (mg/L)	TDS (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Calcium (mg/L)	Sodium & Potassium (mg/L)	Iron & Magnesium
LW1 -2015/2016 Concentration	0.3 – 0.42	670	68 - 260	11 - 39	39 - 72	41 – 128	3 - 584
Typical Leachate[a] after 1 year	1,500	20,000	2,000	1,000	2,500	2,000	700
Typical Leachate[a] after 15 years	60	2,000	500	50	300	100	100

Notes:
All results reported in mg/L unless otherwise stated.
a = McBean *et. al*, 1995.

Laboratory certificates are provided in Appendix E and a summary of the leachate results is provided in Appendix F.

Comparing the results against the key leachate indicators shows that while some leachate indicators are well below leachate of 1 and 15 year nature, parameters such as chloride, sulphate, and sodium plus potassium are within the range of leachate generated at a typical landfill site that is greater than 15 years of age.

9 Landfill Gas Monitoring

The licence requires that monthly landfill gas monitoring occurs in all buildings within 250 meters of waste filled areas. Two buildings were monitored within the landfill and seven buildings were monitored within the STP.

The landfill gas monitoring was conducted in accordance with the Victorian EPA (2006) Draft Landfill Gas Fugitive Emissions Monitoring Guidelines.

The NSW EPA 'Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases' sets the criteria for surface and accumulated gas, which is shown in table 9-1 below.

Table 9-1 NSW EPA Gas Assessment Criteria

Surface Emission Criterion	**Notification to EPA within 24 hours and increase in monitoring frequency : >1.25%v/v of methane**
Gas Accumulation Criterion	Daily testing until controlled: >1.25% v/v of methane
Source: NSW EPA (2012) Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases	

A summary of the LFG monitoring results completed by Meinhardt is provided in Appendix F. No methane or CO_2 emissions were above the NSW EPA guideline limits for surface emissions and gas accumulations. Methane concentrations ranged between 0% and 0.02% v/v.

10 Quality Assurance

Analysis of the quality of the data set is important to determine if trends observed in tested parameters are likely to be the result of changes in chemical characteristics of the water being tested, or are likely to be due to changes or errors in field or laboratory methodology.

Eurofins adopted a number of field and internal laboratory quality assurance and quality control (QA/QC) procedures in accordance with Australian Standard AS 4482.1-2005 (Standards Australia, 2005) to ensure accuracy and precision of results.

Historical data (prior to August 2012) was provided to Meinhardt by Council. The historical data provided contained no discernable quality assurance data so the accuracy of this data cannot be confirmed.

10.1 Field Testing Quality Assurance

The QA/QC procedures adopted are outlined in the table below.

Table 10-1 Field QA/QC Procedures

Item	Procedure
Blind Duplicate Sample	At least one blind duplicate sample was submitted to the primary laboratory for every 20 parent samples taken.
Split Duplicate Sample	Split duplicates were not analysed as part of the 2015/2016 monitoring period.
Rinsate Blanks	A rinsate sample was taken directly from sampling equipment during a monitoring round.

10.1.1 Duplicate Analysis

The duplicate analyses are compared using the Relative Percent Difference (RPD) method. The RPD is calculated according to the following formula:

$$RPD = \frac{\text{Result No.1} - \text{Result No.2}}{\text{Mean Result}} \times 100$$

(Source: AS 4482.1)

The criteria ranges for RPD per relative limit of reporting (LOR) are shown in Table 10-2 below.

Table 10-2 RPD Criteria Ranges

Limit of Reporting (LOR) Ranges	RPD Required
<10 x LOR	0 - 100 %
10 x LOR <30 x LOR	0 - 50 %
> 30 x LOR	0 - 30 %

No internal or external duplicate RPD exceedances were found in the 2015/16 monitoring year.

RPD analysis of duplicates is included in Appendix F, RPD analysis as calculated by Eurofins is included in laboratory reports provided in Appendix E.

10.1.2 Rinsate Analysis

A rinsate sample was collected during the October 2015 monitoring round. The rinsate samples reported cations, Electrical Conductivity, sodium and TDS equal or above the laboratory reporting limit The values were still very low and may indicate that distilled, rather than dionised water was use for the rinsate sample. All other analytes were below the laboratory reporting limit, thereby indicating no contamination resulting from sampling procedures.

10.2 Laboratory Quality Assurance

The Laboratories used in the 2015/2016 monitoring round adopt a number of internal laboratory quality control (QC) procedures to ensure accuracy and precision of results. Eurofins and ALS conducted internal data quality checks for each monitoring round including internal duplicates, spike and recoveries and method blanks. The Laboratories also conducted internal data quality checks on the samples analysed including internal duplicates, method blanks, spike and recoveries.

Table 10-4 below summarises acceptable criteria for quality control procedures adopted by the primary laboratory Eurofins.

Table 10-3 Quality Control Criteria

QC Term	Definition	To Monitor	Frequency	Target
Laboratory Control Spike	Certified reference material	Laboratory preparation technique	1 per analytical lot per analytical method	85 - 130%
Batch Duplicate	An intra-laboratory split sample randomly selected from the sample batch	Method precision in a given sample matrix.	1 every 10 samples per analytical method per matrix	RPD < 20% if >20 x limit of reporting
Equipment Rinsate	A sample of reagent water used to rinse the sampling equipment between the decontamination and sampling steps	Equipment decontamination	1 per sample batch per matrix analysed	Non detect

Eurofins and ALS are accredited by the National Association of Testing Authorities (NATA) for the test methods and matrix for the analytes of concern. Eurofins utilise USEPA and APHA testing procedures.

For the groundwater, surface water and leachate sampling conducted the 2015/2016 monitoring period, the following QC comments have been reported by the laboratories:

- July 2015: Matrix spike recovery for sodium was outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix
- August 2016: Spike recovery for Total Alkalinity (as CaCO3) was outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Refer to Appendix E for QA/QC reports incorporated into Eurofins and ALS final reports.

11 Landfill Operations

11.1 Waste Quantities

For the 2015/16 reporting period, Council recorded 45,313 tonnes landfilled at the site, which included 12,280 tonnes of virgin excavated natural material (VENM) used for capping. Therefore, the total waste amount received for licensing purposes was 33,033 tonnes. Licence condition L3.1 for the Lithgow Solid Waste Facility sets a maximum of 50,000 tonnes per annum of waste including putrescible and non-putrescible, asbestos, clinical waste and waste tyres. Reported amounts are below this licence condition.

11.2 Effective Compactions

Licence condition O6.15 sets a compaction rate for Lithgow SWF of 650 kg per cubic metre. Compaction is calculated by dividing the tonnage received by the volume utilised, however a volumetric survey of the site was not completed at the end of the reporting period. Therefore the average waste compaction for the landfill in the reporting period was unable to be calculated. At the end of each day waste is covered using 150 mm VENM, and compacted with a 20 tonne excavator, and it is anticipated that this achieves the compaction rate of 650 kg per cubic metre.

11.3 Environmental Complaints

Lithgow City Council maintain a record of any environmental complaints received in regards to Lithgow Landfill. No environmental complaints were received in the 2015/2016 reporting period.

11.4 Management of Offensive Odour

Lithgow City Council has not received any environmental complaints for 2015/2016 reporting period in regards to offensive odours.

11.5 Landfill Environmental Management Plan (LEMP)

Lithgow City Council has a LEMP to manage the conditions specified in Lithgow City Landfill's Environment Protection Licence (6004).

The objectives of the LEMP include the following:

- Comply with development consent;
- Comply with the Lithgow City Landfill's Environment Protection Licence (6004); and
- Outline the requirements of the NSW EPA Environmental Guidelines: Solid Waste Landfills and compare the expected standards to current practices of Council.

The LEMP provides site specific management practices in accordance with the limit conditions, operating conditions and monitoring and recording conditions of Environment Protection Licence (6004). A copy of the Lithgow City Council LEMP is included in Appendix H.

12 Discussion

Monitoring of groundwater, leachate and surface water was undertaken at the Lithgow City Garbage Facility in accordance with the requirements of Licence 6004. The licence states the 2015/2016 anniversary date is 24th September.

There are nine existing active groundwater monitoring bores located onsite of which seven require regular monitoring as stipulated by the licence.

Based upon an inferred south westerly groundwater flow direction groundwater bores MB01 and MB06B are located upgradient and groundwater bores MB05, MB11, MB13 and MB14 are downgradient of the landfill while MB09 and MB10 are cross gradient to the landfill. Groundwater flow at the site is controlled by local topography, and regional geological features. Therefore the shape of the water table in the area is likely to reflect that of the topography. This results in groundwater permeating to the south-south-west of the site and discharging to Farmers Creek. Groundwater would move predominantly through secondary features such as fracturing associated with the network of joints and features such as subhorizontal bedding-plane fractures. A review of the Hawkesbury-Nepean Groundwater Vulnerability Map (1998) indicates that the groundwater at the site would generally be considered to have a moderate to low probability of being impacted by surface activities.

According to the LEMP the Lithgow landfill fills waste along the length of the open face, moving north-west as capacity fills. The existing landfill does not have a constructed leachate barrier system under the waste. The landfill relies on natural geology to drain the leachate to a cutting and sump at the STP. This liquid is then pumped onto the landfill surface.

Based on the observed surface water results from the on-site dam SW1, ammonia and nitrate parameters were elevated during the May and June 2016 monitoring event. This could indicate a potential failure to separate leachate from onsite surface water. Current works to divert stormwater around the landfill surface, and a recommended review of leachate management should see an improvement to surface water quality results in future.

The 2015/2016 groundwater monitoring results indicate no clear signs of leachate impact to the groundwater. Groundwater quality up- and down- gradient of the landfill appears to be characterised by elevated ammonia (as N), chloride, conductivity, nitrate, sodium, TDS, iron, manganese and lower pH which have reported concentrations outside the adopted guidelines. The 2015/2016 monitoring results were generally consistent with historical groundwater monitoring results.

Historically, ammonia and nitrate at the site has exceeded guideline concentrations in most monitoring bores and concentrations of ammonia have been generally decreasing since 1999. Likewise, nitrate concentrations were within historical variations during the 2015-2016 reporting period. The exception is MB05 which increased in 2013 and has remained above its historical trend over the past 3 years. Nitrate and ammonia are potentially elevated due to agricultural activities in the area, but could also be signs of leachate contamination. It's unclear due to the elevated levels in most monitoring bores across the site, therefore, there are no clear signs of leachate impact to the groundwater.

Results of the 2015/2016 monitoring period and analysis of historical data do not indicate any clear signs of leachate impacts to the groundwater quality due to landfilling at the site which would preclude the beneficial uses of freshwater ecosystems, irrigation and stock watering.

Leachate monitoring results from STP dam L1 indicate that while some leachate indicators are well below leachate of 1 and 15 year nature, parameters such as chloride, sulphate, and sodium plus potassium are within the range of leachate generated at a typical landfill site that is greater than 15 years of age.

During the 2015/2016 reporting period landfill gas monitoring was completed on a monthly basis as required by Licence 6004. Landfill gas monitoring results show that methane concentrations have not been detected above the NSW EPA Gas Assessment Criteria at any of the locations on-site, indicating that minimal fugitive methane emissions are accumulating in buildings within 250m of the landfill.

13 References

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Lithgow City Council, 2016, Lithgow Solid Waste Facility Landfill Environmental Management Plan (LEMP), Version 6

Standards Australia & Standards New Zealand 1998, AS/NZS 5667.11-1998 Water Quality – Sampling Part 11: Guidance on Sampling of Groundwaters.

Standards Australia & Standards New Zealand 1998, AS/NZS 5667.6-1998 Water Quality – Sampling Part 6: Guidance on Sampling of Rivers and Streams.

14 Statement of Limitations

The assessment in this report was restricted to the agreed scope of works and is subject to the limitations set out below or elsewhere within this report.

The assessment has been undertaken and performed in a professional manner consistent with the skill and care ordinarily exercised by reputable consultants under similar circumstances. No other warranty, expressed or implied, is given.

Where Meinhardt Infrastructure & Environment Pty Ltd (Meinhardt) has relied on verbal information and/or documentation provided by the client and/or third parties, Meinhardt did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions or recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Meinhardt assume no responsibility for any consequences arising from any information or condition that was inaccurate, concealed, withheld, misrepresented, or otherwise not fully disclosed or made available to Meinhardt.

Other than the visual observations and analytical data as stated in this report, no representations or warranties are made concerning the nature or quality of the soil and/or water on the site. On all sites varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no sampling technique can completely eliminate the possibility that samples are not totally representative of soil and/or groundwater conditions on a site.

It should also be recognised that site conditions, including contaminant extent and concentrations can change with time. Hence, the information in this report is only accurate as at the date of issue. If this report is used after a protracted delay, further investigation of the site may be necessary.

This report has been prepared on behalf of the client for the benefit of the client only (the authorised recipient).

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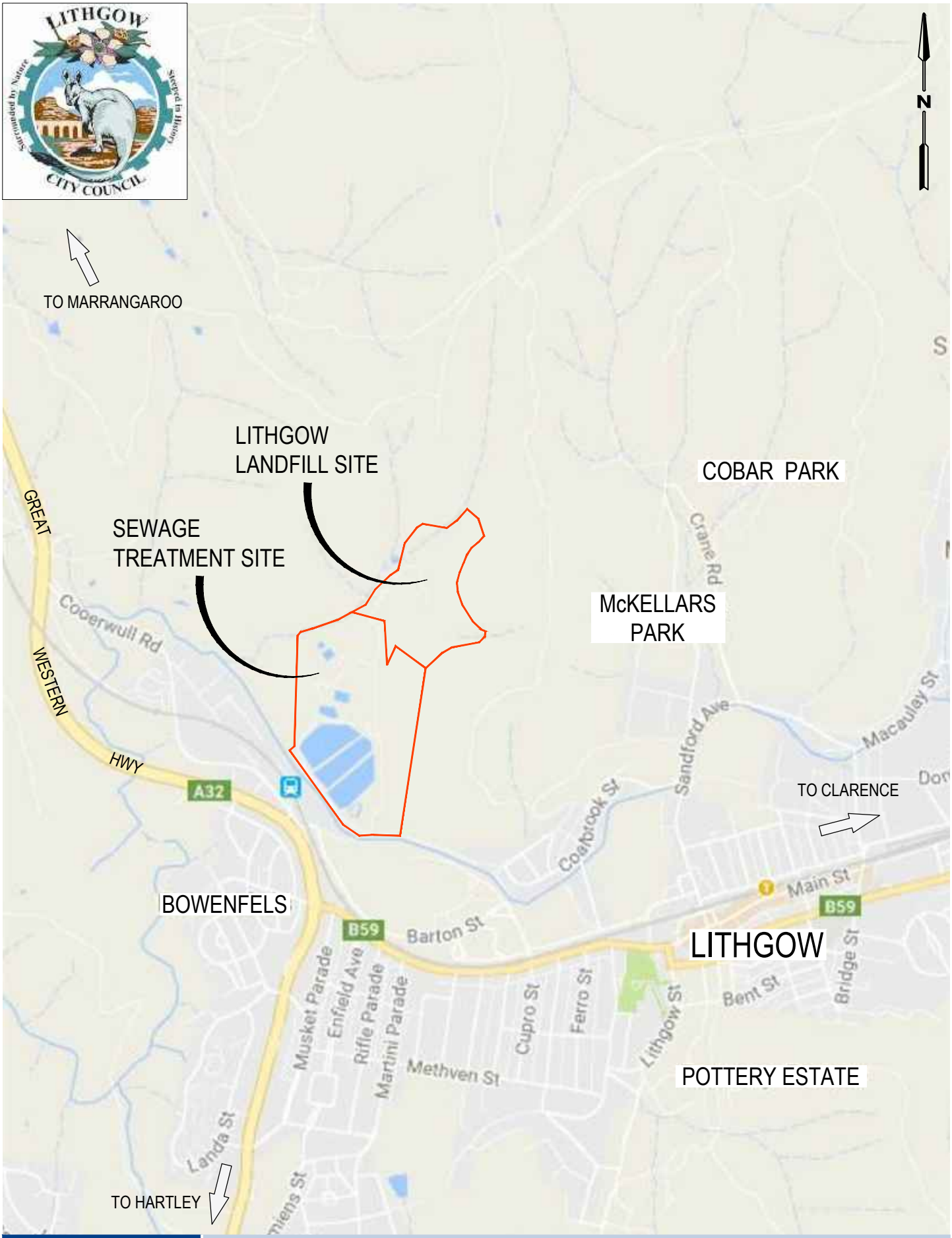
APPENDIX A FIGURES



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Title
FIGURE 1
SITE LOCATION PLAN

0 200 400 600 800 1000m
SCALE 1:20000 AT ORIGINAL SIZE

Project
LITHGOW LANDFILL ANNUAL REPORT 2016

Client
MEINHARDT PTY LTD

Project Number	Reference Number	Revision
115659	AR-F01	A

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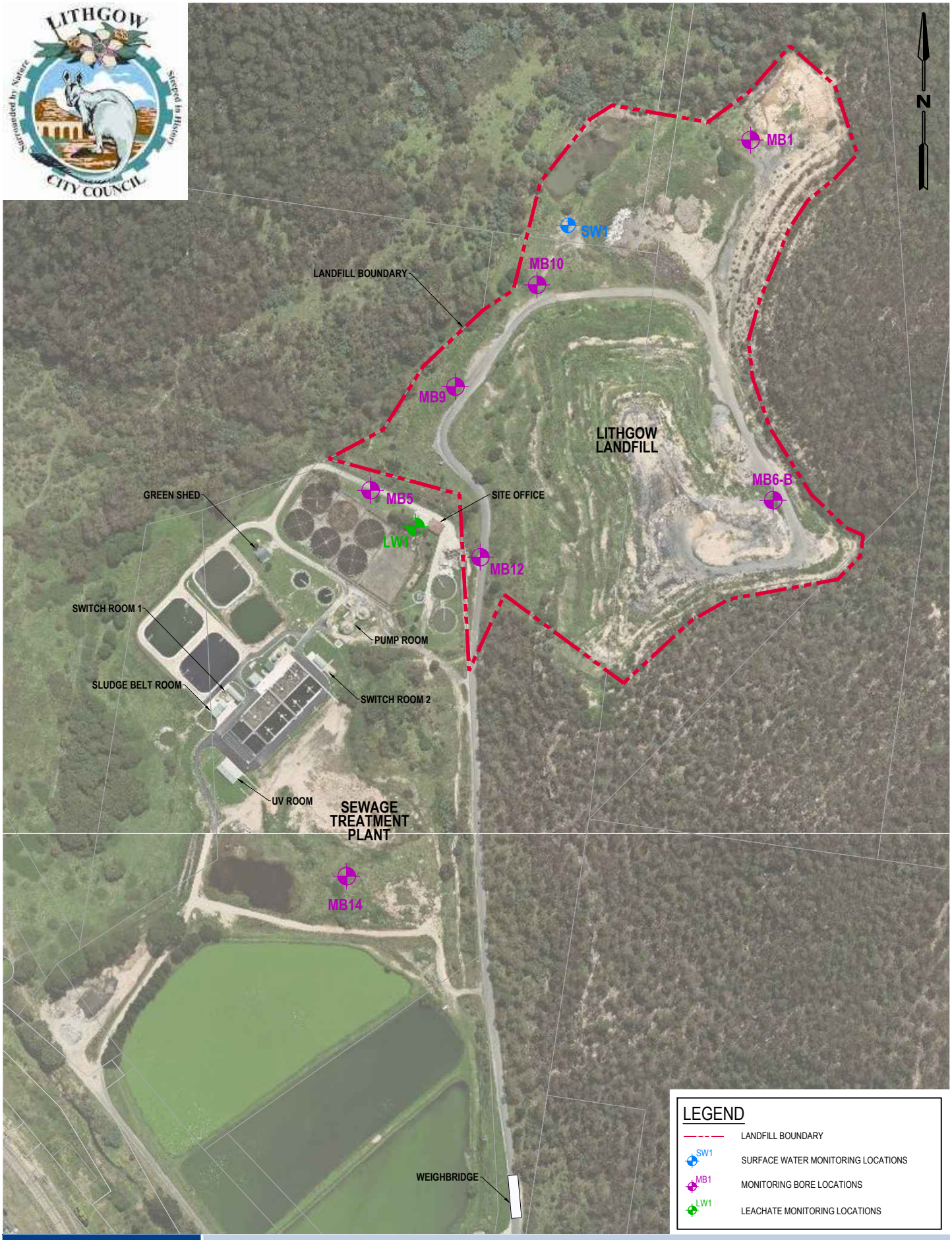

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Title
FIGURE 2
SITE LAYOUT PLAN

0 50 100 150 200 250m
SCALE 1:5000 AT ORIGINAL SIZE

Project
LITHGOW LANDFILL
Client
LITHGOW CITY COUNCIL

Project Number	Reference Number	Revision
115659	AR-F02	B

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APPENDIX B ENVIRONMENT PROTECTION LICENSE

Environment Protection Licence

Licence - 6004

Licence Details	
Number:	6004
Anniversary Date:	24-September

Licensee

CITY OF LITHGOW COUNCIL

PO BOX 19

LITHGOW NSW 2790

Premises

LITHGOW SOLID WASTE FACILITY

GEORDIE STREET

LITHGOW NSW 2790

Scheduled Activity

Waste Disposal (application to land)

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

Region

South - Bathurst

Lvl 2, 203-209 Russell Street
BATHURST NSW 2795

Phone: (02) 6332 7600

Fax: (02) 6332 7630

PO Box 1388 BATHURST

NSW 2795

Environment Protection Licence

Licence - 6004

Environment Protection Licence

Licence - 6004

Environment Protection Licence

Information about this licence

Dictionary

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

Responsibilities of licensee

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

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

Variation of licence conditions

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

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

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

Duration of licence

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

Licence review

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

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

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

Environment Protection Licence

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

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

Transfer of licence

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

Public register and access to monitoring data

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

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

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

This licence is issued to:

CITY OF LITHGOW COUNCIL
PO BOX 19
LITHGOW NSW 2790

subject to the conditions which follow.

Environment Protection Licence

Licence - 6004

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

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

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

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
LITHGOW SOLID WASTE FACILITY
GEORDIE STREET
LITHGOW
NSW 2790
LOT 1, DP 190934; LOT 1, DP 630638; PART OF LOT 1, DP 947828; PART OF LOT 44, DP 751655

A3 Other activities

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

Ancillary Activity
Waste processing (non-thermal treatment)
Waste storage

A4 Information supplied to the EPA

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

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence

replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

A4.2 Any other document and/or management plan is not to be taken as part of the documentation in condition A4.1, other than those documents and/or management plans specifically referenced in this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
10	Landfill gas monitoring (accumulated)		Inside all buildings within 250 metres of waste filled areas (and where consent / permission is granted for buildings not owned by the licensee)

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Groundwater quality monitoring		Groundwater Monitoring Bore "MB1" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
2	Groundwater quality monitoring		Groundwater Monitoring Bore "MB5" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014

3	Groundwater quality monitoring		Groundwater Monitoring Bore "MB6-B" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
4	Groundwater quality monitoring		Groundwater Monitoring Bore "MB9" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
5	Groundwater quality monitoring		Groundwater Monitoring Bore "MB10" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
6	Discharge to waters Discharge quality monitoring	Discharge to waters Discharge quality monitoring	Surface Water Discharge and Monitoring Point "SW1" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
7	Groundwater quality monitoring		Groundwater Monitoring Bore "MB12" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
8	Groundwater quality monitoring		Groundwater Monitoring Bore "MB14" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014
9	Leachate quality monitoring		Leachate Monitoring Point "LW1" as identified on drawing 07A_EV03 contained within the Lithgow Solid Waste Facility Pollution Incident Response Management Plan dated 11/2014

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

Environment Protection Licence

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Water and/or Land Concentration Limits

POINT 6

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				30

L3 Waste

L3.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	General solid waste (putrescible)	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	See Note following table
NA	General solid waste (non-putrescible)	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	See Note following table

N220	Asbestos	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	See Note following table
R100	Clinical and related wastes	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	See Note following table
T140	Tyres	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	See Note following table

Note: The total amount of all wastes listed under the 'Waste' heading of this table and disposed of at the premises must not exceed 50,000 tonnes per annum, including no more than 5 tonnes per annum of clinical and related waste.

L4 Noise limits

Operating hours

L4.1 Operational activities at the premises must only be conducted during the following operating hours:
a) 8.00am to 5.00pm, Monday to Sunday, Australian Eastern Standard time; and
b) 8.00am to 6.00pm, Monday to Sunday, Australian Daylight Savings time.

Operating limits

L4.2 Noise from the premises must not exceed:
a) an $L_{Aeq\ (15\ minute)}$ noise emission criteria of 45 dB(A) during the operating hours stipulated by condition L4.1 at any noise sensitive receiver (land use) as defined by the NSW Industrial Noise Policy (EPA, 2000/2001).

L4.3 To determine compliance with condition L4.2, noise from the premises is to be measured at the most affected point within the sensitive receiver boundary, or at the most affected point within 30 metres of the sensitive receiver boundary where the residence/building is more than 30 metres from the sensitive receiver boundary.

L4.4 To determine compliance with condition L4.2, the modification factors in Section 4 of the NSW Industrial Noise Policy (EPA, 2000/2001) must be applied, as appropriate, to the noise levels measured by any noise monitoring equipment.

L4.5 The noise limits stipulated by condition L4.2 apply under all meteorological conditions except for the following:
a) wind speeds greater than 3 metres per second at ground level; and
b) temperature inversions as outlined in Section 5 of the NSW Industrial Noise Policy (EPA, 2000/2001).

L5 Potentially offensive odour

L5.1 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

Note: Plant is defined in the Dictionary. The type of plant and equipment that should be considered includes, but is not limited to, drainage systems; infrastructure and pollution control equipment such as (but not limited to) spill containment and clean-up equipment; dust screens and collectors; sediment collection systems, traps and sumps; waste collection, storage and disposal equipment.

O3 Dust

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

O3.2 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O4 Emergency response

O4.1 The licensee must have in place and implement procedures to minimise the risk of fire at the premises.

O4.2 The licensee must have adequate fire prevention measures in place, and ensure that facility personnel are able to access fire-fighting equipment and manage fire outbreaks at any part of the premises.

O4.3 The licensee must extinguish fires at the premises as soon as possible.

O5 Processes and management

Staff/personnel training

O5.1 The licensee must ensure that adequately trained staff/personnel are available at the premises in order to administer the requirements of this licence.

Unauthorised entry

O5.2 The licensee must take all practicable steps to control entry to the premises.

O5.3 The licensee must install and maintain a stockproof perimeter fence around the premises.

O5.4 The licensee must install and maintain lockable security gates at all access and departure locations.

O5.5 The licensee must ensure that all lockable security gates are locked whenever the premises is unattended.

Control of pests, vermin and weeds

O5.6 The licensee must control pests, vermin and weeds at the premises.

Tracking of mud and other materials

O5.7 The licensee must take all practicable measures to minimise the tracking of mud and waste by vehicles leaving the premises.

Surface water management

O5.8 Surface water must be diverted away from any area where waste is being or has been landfilled and/or any leachate disposal and/or utilisation area if there is surface water run on potential of any kind.

O5.9 The licensee must minimise, including through the use of rehabilitation/revegetation techniques, the area of the premises that is able to generate suspended material when water runs over it.

O5.10 The licensee must maximise the diversion of rain/storm water containing suspended material (not including leachate) to the sediment basin installed at the premises.

O6 Waste management

Leachate management

O6.1 The licensee is prohibited from discharging from the premises any waters or residue liquids that have come in contact with waste contained in the defined waste disposal areas.

O6.2 The licensee must install an EPA endorsed leachate barrier and collection system for expansion stages 3, 4 and 5 of the premises.

O6.3 The licensee must install an EPA endorsed leachate barrier on any surface to be used for the storage/impoundment of leachate.

O6.4 Leachate collected at EPA Identification Point 9 (interception point) may be irrigated on the following utilisation area(s):
a) any surface on the premises that has received waste, excluding any road surfaces.

O6.5 Leachate applied to the utilisation area must not generate any surface runoff.

O6.6 Leachate applied to the utilisation area must not cause any spray drift.

Screening of waste

O6.7 The licensee must have in place and implement procedures to identify and prevent the disposal of any waste not permitted by this licence to be disposed of at the premises.

Filling of waste

O6.8 The licensee must manage the disposal of waste at the premises in accordance with the progressive filling plan within the in-force Landfill Environmental Management Plan.

Asbestos waste

Note: The *Protection of the Environment Operations (Waste) Regulation*, as in force from time to time, stipulates the disposal requirements for asbestos waste.

Clinical waste

O6.9 The licensee must ensure that any clinical waste received/disposed of at the premises is packaged in accordance with the requirements set out in the document called "Waste Management Guidelines for Health Care Facilities - August 1998" as published by the NSW Ministry of Health and as in force from time to time.

O6.10 The licensee must ensure that any clinical waste received at the premises must be:
a) immediately buried, or
b) immediately contained prior to later disposal in a manner that prevents the waste coming into contact with any persons or animals.

Tyre waste

O6.11 The licensee must not receive tyres at the premises which are delivered in a load containing more than five (5) whole tyres.

O6.12 The licensee must ensure that tyres stockpiled on the premises:
a) do not exceed fifty (50) tonnes at any one time; and
b) are located in a clearly defined area away from the waste disposal areas; and

c) are managed to control vermin; and
d) are managed to prevent any tyres from catching on fire.

O6.13 The licensee must not dispose of any tyres at the premises unless:
a) the tyre/s have a diameter of less than 1.2 metres; or
b) the tyre/s have been shredded so that the pieces measure no more than 250 millimetres in any direction; or
c) the tyre/s have had their walls removed.

Litter

O6.14 The licensee must ensure that the local amenity is not degraded by litter from the premises.

Compaction

O6.15 An average compaction rate of not less than 650 kg per cubic metre must be achieved for all waste disposed of at the premises.

Capping and covering

O6.16 Cover material must be virgin excavated natural material either won on premises or imported to the premises and be applied as follows:
a) Daily cover: cover material must be applied to a minimum depth of 15 centimetres over all exposed landfilled waste prior to ceasing operations at the end of each day.
b) Intermediate cover: cover material must be applied to a depth of 30 centimetres over surfaces of the landfilled waste at the premises which are to be exposed for more than 90 days.
c) Cover material stockpile: at least two weeks cover material must be available at the premises under all weather conditions. This material may be won on site, or alternatively, a cover stockpile must be maintained adjacent to the tip face.

O6.17 The licensee must ensure that the landfill cells are capped progressively and in accordance with the conditions of this licence and the in-force Landfill Environmental Management Plan.

O6.18 Final capping must comprise two layes in the order of installation as follows:
a) a seal bearing surface (600mm think); and
b) a revegetation layer (150mm thick).

5 Monitoring and Recording Conditions

M1 Monitoring records

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

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

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

M2.2 Air Monitoring Requirements

POINT 10

Pollutant	Units of measure	Frequency	Sampling Method
Methane	percent by volume	Monthly	Probe

M2.3 Water and/ or Land Monitoring Requirements

POINT 2,1,3,4,5,7,8

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Special Frequency 1	Grab sample
Aluminium	milligrams per litre	Special Frequency 1	Grab sample
Ammonia	milligrams per litre	Special Frequency 1	Grab sample
Calcium	milligrams per litre	Special Frequency 1	Grab sample
Chemical oxygen demand	milligrams per litre	Special Frequency 1	Grab sample
Chloride	milligrams per litre	Special Frequency 1	Grab sample
Chromium (hexavalent)	milligrams per litre	Special Frequency 1	Grab sample
Chromium (total)	milligrams per litre	Special Frequency 1	Grab sample
Conductivity	microsiemens per centimetre	Special Frequency 1	Grab sample
Fluoride	milligrams per litre	Special Frequency 1	Grab sample
Iron	milligrams per litre	Special Frequency 1	Grab sample
Magnesium	milligrams per litre	Special Frequency 1	Grab sample
Manganese	milligrams per litre	Special Frequency 1	Grab sample

Environment Protection Licence

Licence - 6004

Nitrate	milligrams per litre	Special Frequency 1	Grab sample
Pesticides	milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Phosphorus	milligrams per litre	Special Frequency 1	Grab sample
Potassium	milligrams per litre	Special Frequency 1	Grab sample
Sodium	milligrams per litre	Special Frequency 1	Grab sample
Standing Water Level	As approp.	Special Frequency 1	Grab sample
Sulfate	milligrams per litre	Special Frequency 1	Grab sample
Total dissolved solids	milligrams per litre	Special Frequency 1	Grab sample
Total organic carbon	milligrams per litre	Special Frequency 1	Grab sample
Total Phenolics	milligrams per litre	Special Frequency 1	Grab sample
TPH	milligrams per litre	Special Frequency 1	Grab sample

POINT 6

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Monthly during discharge	Grab sample
Aluminium	milligrams per litre	Monthly during discharge	Grab sample
Ammonia	milligrams per litre	Monthly during discharge	Grab sample
Calcium	milligrams per litre	Monthly during discharge	Grab sample
Chemical oxygen demand	milligrams per litre	Monthly during discharge	Grab sample
Chloride	milligrams per litre	Monthly during discharge	Grab sample
Chromium (hexavalent)	milligrams per litre	Monthly during discharge	Grab sample
Chromium (total)	milligrams per litre	Monthly during discharge	Grab sample
Conductivity	microsiemens per centimetre	Monthly during discharge	Grab sample
Fluoride	milligrams per litre	Monthly during discharge	Grab sample
Iron	milligrams per litre	Monthly during discharge	Grab sample
Magnesium	milligrams per litre	Monthly during discharge	Grab sample
Manganese	milligrams per litre	Monthly during discharge	Grab sample
Nitrate	milligrams per litre	Monthly during discharge	Grab sample
Pesticides	milligrams per litre	Monthly during discharge	Grab sample
pH	pH	Monthly during discharge	Grab sample

Environment Protection Licence

Licence - 6004

Phosphorus	milligrams per litre	Monthly during discharge	Grab sample
Potassium	milligrams per litre	Monthly during discharge	Grab sample
Sodium	milligrams per litre	Monthly during discharge	Grab sample
Sulfate	milligrams per litre	Monthly during discharge	Grab sample
Total organic carbon	milligrams per litre	Monthly during discharge	Grab sample
Total Phenolics	milligrams per litre	Monthly during discharge	Grab sample
Total suspended solids	milligrams per litre	Monthly during discharge	Grab sample
TPH	milligrams per litre	Monthly during discharge	Grab sample

POINT 9

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Special Frequency 1	Grab sample
Ammonia	milligrams per litre	Special Frequency 1	Grab sample
Calcium	milligrams per litre	Special Frequency 1	Grab sample
Chloride	milligrams per litre	Special Frequency 1	Grab sample
Fluoride	milligrams per litre	Special Frequency 1	Grab sample
Iron	milligrams per litre	Special Frequency 1	Grab sample
Magnesium	milligrams per litre	Special Frequency 1	Grab sample
Manganese	milligrams per litre	Special Frequency 1	Grab sample
Nitrate	milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Potassium	milligrams per litre	Special Frequency 1	Grab sample
Sodium	milligrams per litre	Special Frequency 1	Grab sample
Sulfate	milligrams per litre	Special Frequency 1	Grab sample
Total organic carbon	milligrams per litre	Special Frequency 1	Grab sample
Total Phenolics	milligrams per litre	Special Frequency 1	Grab sample

Note: For the purpose of condition M2.3:
a) Special Frequency 1 means: inspect every 6 months and sample for analysis where liquid is present.

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this

licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Recording of pollution complaints

M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M6 Other monitoring and recording conditions

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

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

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

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

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

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 Monitoring Report.
The licensee must supply with the Annual Return a Monitoring Report which provides:
a) an analysis and interpretation of monitoring results;

b) actions proposed/taken to correct identified adverse trends;
c) The achieved compaction rate (excluding cover material) for the premises and the remaining disposal capacity for the premises.

R2 Notification of environmental harm

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

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

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

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

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

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

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

R4.3 The licensee must notify the EPA within 24 hours by telephoning the Environment Line service on 131 555 if any landfill gas monitoring required by this licence detects methane above 1.25%(v/v), and increase the frequency of monitoring to daily, until the EPA determines otherwise.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Contact number for incidents and responsible employees

G2.1 The licensee must operate 24-hour telephone contact lines for the purpose of enabling the EPA to directly contact one or more representatives of the licensee who can:
a) respond at all times to incidents relating to the premises; and
b) contact the licensee's senior employees or agents authorised at all times to:
i) speak on behalf of the licensee; and
ii) provide any information or document required under this licence.

G2.2 The licensee is to inform the EPA in writing of the appointment of any subsequent contact persons, or changes to the person's contact details as soon as practicable and in any event within fourteen days of the appointment or change.

G3 Signage

G3.1 The location of EPA point identification numbers 1 to 9 must be clearly marked by a sign that indicates the point identification numbers used in this licence and located as close as practical to each point.

8 Pollution Studies and Reduction Programs

U1 Site Water Management Implementation

U1.1 By 5pm on 30 September 2016:
1). The licensee must implement all the recommendations identified at Section 2.6 of the "Site Wide Water Management Study, Lithgow Landfll" (Geolyse Pty Ltd, September 2014).
2). The licensee must implement project planning, project timing, monitoring and reporting procedures during the implementation of those measures identified at point 1 above.

U1.2 By 5pm on 30 October 2016, the licensee must provide a report to the EPA's Head Central West Unit (Bathurst Office) that provides details of the works undertaken as required by condition U1.1 with demonstrated proof (e.g. independent inspection/s, survey maps, photographs etc).

Environment Protection Licence

Licence - 6004

Dictionary

General Dictionary

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

Environment Protection Licence

Licence - 6004

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

Environment Protection Licence

Licence - 6004

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

Mr Terry Knowles

Environment Protection Authority

(By Delegation)

Date of this edition: 10-November-2000

Environment Protection Licence

Licence - 6004

End Notes

1	Licence varied by notice 1009282, issued on 11-Sep-2001, which came into effect on 06-Oct-2001.
2	Licence varied by notice 1022777, issued on 10-Feb-2003, which came into effect on 07-Mar-2003.
3	Licence varied by notice 1026055, issued on 15-Sep-2003, which came into effect on 10-Oct-2003.
4	Licence varied by notice 1075622, issued on 05-Jul-2007, which came into effect on 05-Jul-2007.
5	Licence varied by repair to Annual Return Archive, issued on 18-Jul-2007, which came into effect on 18-Jul-2007.
6	Licence varied by notice 1081121, issued on 15-Jan-2008, which came into effect on 15-Jan-2008.
7	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
8	Licence varied by notice 1092351, issued on 18-Dec-2008, which came into effect on 18-Dec-2008.
9	Licence varied by notice 1109393, issued on 03-Feb-2010, which came into effect on 03-Feb-2010.
10	Licence varied by notice 1501044 issued on 04-Oct-2011
11	Licence varied by notice 1509831 issued on 01-Nov-2012
12	Licence varied by notice 1515576 issued on 04-Sep-2013
13	Licence varied by notice 1529476 issued on 17-Apr-2015

APPENDIX C NATURAL RESOURCE ATLAS GROUNDWATER DATABASE SEARCH

NSW Office of Water
Work Summary

GW104221

Licence: 10BL160107 **Licence Status:** ACTIVE

Authorised Purpose (s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type: Other Govt

Commenced Date:
Completion Date: 26/05/2001
Final Depth: 38.60 m
Drilled Depth: 38.60 m

Contractor Name: Macquarie Drilling
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: LITHGOW COUNCIL SEWERAGE WORKS GEORDIE ST LITHGOW 2790 NSW
Standing Water Level:
GWMA: -
GW Zone: -
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	COOK	COOK.030	015/1129-3090
Licensed:	COOK	MARRANGAROO	Whole Lot 1//947828

Region: 10 - Sydney South Coast
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6292826.0
Easting: 234133.0
Latitude: 33°28'15.9"S
Longitude: 150°08'20.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.50	150			Auger
1		Hole	Hole	8.50	38.60	100			Other
1		Annulus	Waterworn/Rounded	24.30	38.60				Graded
1	1	Casing	Pvc Class 18	0.00	35.10	60			Seated on Bottom, Screwed
1	1	Casing	Pvc Class 18	35.10	38.10	60			Screwed
1	1	Opening	Screen	35.10	38.10	60		1	PVC Class 18, Screwed, A: 0.40mm
1	1	Casing	Pvc Class 18	38.10	38.60	60			Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.30	1.30	TOPSOIL	Topsoil	
1.30	8.00	6.70	SANDSTONE	Sandstone	
8.00	13.50	5.50	SILTY SANDSTONE	Sandstone	
13.50	15.00	1.50	SHALE	Shale	
15.00	15.80	0.80	SILTSTONE	Siltstone	
15.80	16.30	0.50	SANDSTONE	Sandstone	
16.30	20.30	4.00	SANDSTONE SILTY	Sandstone	
20.30	20.50	0.20	CLAY	Clay	
20.50	32.50	12.00	SANDSTONE SILTY	Sandstone	
32.50	35.00	2.50	SILTSTONE SANDY	Siltstone	
35.00	37.20	2.20	SANDSTONE	Sandstone	
37.20	38.60	1.40	SANDSTONE SILTY	Sandstone	

Remarks

02/05/2002: Gravel Pack: Quantity:112 kg.

***** End of GW104221 *****

NSW Office of Water
Work Summary

GW104220

Licence: 10BL160107
Licence Status: ACTIVE

Authorised Purpose (s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type: Other Govt

Commenced Date:
Completion Date: 25/05/2001
Final Depth: 21.30 m
Drilled Depth: 21.30 m

Contractor Name: Macquarie Drilling
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: LITHGOW COUNCIL SEWERAGE WORKS GEORDIE ST LITHGOW 2790 NSW
Standing Water Level:
GWMA: -
GW Zone: -
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	COOK	COOK.030	LT 1 DP 190934
Licensed:	COOK	MARRANGAROO	Whole Lot 1//947828

Region: 10 - Sydney South Coast
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6292800.0
Easting: 234173.0
Latitude: 33°28'16.7"S
Longitude: 150°08'22.3"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	21.30	150			Rotary Air
1		Annulus	Waterworn/Rounded	16.80	21.30				Graded
1	1	Casing	Pvc Class 18	0.00	17.80	60			Seated on Bottom, Screwed
1	1	Casing	Pvc Class 18	17.80	20.80	60			Screwed
1	1	Opening	Screen	17.80	20.80	60		1	PVC Class 18, Screwed, A: 0.40mm
1	1	Casing	Pvc Class 18	20.80	21.30	60			Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
18.30	21.30	3.00	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	4.50	4.50	FILL	Fill	
4.50	6.00	1.50	CLAYSTONE	Claystone	
6.00	8.50	2.50	SANDSTONE	Sandstone	
8.50	18.00	9.50	SILTY SANDSTONE	Invalid Code	
18.00	19.50	1.50	SHALE	Shale	
19.50	21.30	1.80	SANDSTONE	Sandstone	

Remarks

02/05/2002: Gravel Pack:Quantity: 70 kg.

***** End of GW104220 *****

NSW Office of Water
Work Summary

GW104218

Licence: 10BL160107
Licence Status: ACTIVE

Authorised Purpose (s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type: Other Govt

Commenced Date:
Completion Date: 24/05/2001
Final Depth: 17.30 m
Drilled Depth: 17.30 m

Contractor Name: Macquarie Drilling
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: LITHGOW COUNCIL SEWERAGE WORKS GEORDIE ST LITHGOW 2790 NSW
Standing Water Level:
GWMA: -
GW Zone: -
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	COOK	COOK.030	015/1129-3090
Licensed:	COOK	MARRANGAROO	Whole Lot 1//947828

Region: 10 - Sydney South Coast
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6292826.0
Easting: 234134.0
Latitude: 33°28'15.9"S
Longitude: 150°08'20.8"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	17.30	120			Rotary Air
1		Annulus	Crushed Aggregate	12.80	17.30				Graded
1	1	Casing	Pvc Class 18	0.00	13.60	60			Seated on Bottom, Screwed
1	1	Casing	Pvc Class 18	13.60	16.60	60			Screwed
1	1	Opening	Screen - Wire Wound	13.60	16.60	60		1	PVC Class 18, Screwed, A: 0.40mm
1	1	Casing	Pvc Class 18	16.60	17.30	60			Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
8.20	9.00	0.80	Unknown						
14.80	17.30	2.50	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	TOPSOIL	Topsoil	
1.00	1.60	0.60	FILL	Fill	
1.60	4.50	2.90	CLAY	Clay	
4.50	8.80	4.30	SANDSTONE	Sandstone	
8.80	13.00	4.20	SHALE	Shale	
13.00	17.30	4.30	SANDSTONE	Sandstone	

Remarks

02/05/2002: Gravel Pack:Quantity: 63 kg.

***** End of GW104218 *****

NSW Office of Water
Work Summary

GW104222

Licence: 10BL160107 **Licence Status:** ACTIVE

Authorised Purpose (s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type: Other Govt

Commenced Date:
Completion Date: 29/05/2001
Final Depth: 38.80 m
Drilled Depth: 38.80 m

Contractor Name: Macquarie Drilling
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: LITHGOW COUNCIL SEWERAGE WORKS GEORDIE ST LITHGOW 2790 NSW
Standing Water Level:
GWMA: -
GW Zone: -
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	COOK	COOK.030	015/1129-3090
Licensed:	COOK	MARRANGAROO	Whole Lot 1//947828

Region: 10 - Sydney South Coast
CMA Map:
River Basin: - Unknown
Area/District:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6292483.0
Easting: 234042.0
Latitude: 33°28'26.9"S
Longitude: 150°08'16.9"E

GS Map: -
MGA Zone: 0
Coordinate Source: GPS - Global Positioning System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	2.70	150			Auger
1		Hole	Hole	2.70	38.80	100			Other
1		Annulus	Waterworn/Rounded	10.45	17.00				Graded
1	1	Casing	Pvc Class 18	0.00	13.50	60			Seated on Bottom, Screwed
1	1	Casing	Pvc Class 18	13.50	16.50	60			Screwed
1	1	Opening	Screen	13.50	16.50	60		1	PVC Class 18, Screwed, A: 0.40mm
1	1	Casing	Pvc Class 18	16.50	17.00	60			Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
14.00	17.00	3.00	Unknown						

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	FILL	Fill	
0.50	2.50	2.00	CLAY	Clay	
2.50	3.30	0.80	SANDSTONE	Sandstone	
3.30	4.50	1.20	SILTSTONE	Siltstone	
4.50	33.00	28.50	SANDSTONE PEBBLY	Sandstone	
33.00	37.30	4.30	PEBBLY SILTSTONE	Gravel	
37.30	38.80	1.50	SANDSTONE CONGLOMERATE	Sandstone	

Remarks

29/05/2001: Form A Remarks:
Gravel Pack: Quantity: 52 kg.

***** End of GW104222 *****

APPENDIX D EUROFINS SAMPLING PROCEDURES

Groundwater Sampling

Scope

This procedure is to be used for the sampling of in-situ groundwater monitoring bores.

The in-situ groundwater monitoring bore construction is not covered within this procedure.

This procedure uses as a reference EPA (Victoria) IWRG701, Groundwater Sampling Guidelines – Publication 669 – April 2000 and Australian/New Zealand Standard – AS/NZS 5667.11:1998– Water Quality Sampling – Part 11: Guidance on sampling of groundwaters. Both of these Standards are available within the mgt-Labmark Library for direct reference.

Other applicable procedures and methods can also be referenced within the mgt-Labmark Library these include:

1 EPA (Victoria) Groundwater Sampling Guidelines – Publication 669 – April 2000.
2 EPA (Victoria) A guide to the Sampling and analysis of Water and Waste Water – Publication 441 – (mgt is NATA accredited for this method)
3 Australian Standard – AS 2031.1-1986 – Selection of containers and preservation of water samples for Chemical and Microbiological analysis – Part A & B (mgt is NATA accredited for this method)
4 Australian/New Zealand Standard AS/NZS 5667.1:1998 – Water Quality Sampling – Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
5 Melbourne Water – Sampling and analysis of Trade Wastes – December 1997 (mgt is NATA accredited for this document)
6 EPA (Victoria) Industrial Waste Resource Guidelines IWRG701 - 2009

Apparatus

Either:

- Stainless Steel Bailer
- Disposable Bailer
- Down Hole Submersible Pump system – with one way foot valve fitted to the bottom.
- Syphon Tubes with non-return ball valve
- MicroPurge System – Including 12V compressor, *QED* controller and *SamplePro* pump
- QED Well Wizard Bladder Pumps

Electronic Water/Product Level sensor
Thermometer
Barometer
pH Meter
Conductivity Meter
Dissolved Oxygen Meter
Tap Water
Deionised Water
Nitrile gloves
Leather gloves
Rope
Bailer twine
Buckets
Flow-Through-Cell
Washing equipment – Tarp for ground covering
Phosphate Free Detergent (Decon 90)
Tool Kit
Borehole keys
Groundwater field Log Book
Sample containers
Sample Preservatives
In field filtration system
Esky and ice
Low Flow tubing
Sample labels

Sampling Procedure

Prior to commencing fieldwork the field instrument being used must be calibrated at the beginning and end of each day of sampling using calibration solution standards. EC probes are calibrated both to 0.0uS/cm and 1413uS/cm as well as a six monthly broad-spectrum calibration. The pH probes are calibrated at pH4.0 and pH7.0 (and confirmed with at pH10). D.O. probes are calibrated to zero when the membrane is replaced and an air calibration daily as well asat least a six monthly span calibration in solution using a Winkler titration. A reading of redox potential is also taken using either a +251mV or +475mV solution.

Pre-Purging

1 Take air temperature and barometric pressure – record in Groundwater Field Log Book.
2 Open bore hole casing – use keys to unlock the casing where required – if the lock is jammed due to weather or dirt clean it – if it is still jammed apply graphite powder to the lock.
3 Remove the borehole end cap and clear the top of the bore of dirt and other foreign material, taking care that no material enters the bore.
4 Place the end cap in an area that will not receive any contamination from other material.
5 Decontaminate the level sensor as per the decontamination procedure detailed below. NOTE: Groundwater elevation measurements should be taken at all locations on the same day prior to sampling.
6 Lower the level sensor into the borehole until an audible electronic beep is heard – read the depth measurement from the tape against the top of the bore hole casing (or nominated AHD reference point) and record in the field log book – withdraw the tape and level sensor from the borehole. Be sure to record the level and depth-to-water of any Phase Separated Hydrocarbon (PSH) layers which may be present. A total depth should also be taken if it has not been predetermined.
7 Calculate the holding volume of water within the bore from bore hole construction details if the bore cannot be purged with the Low Flow technique and the 3-5 holding volumes method is required.
8 Decontaminate all sampling equipment as per the decontamination procedure detailed below.
9 Lower the sampling equipment slowly into the borehole minimising agitation and mixing in the water column.

Purging - MicroPurge

1 After setting the pump at a pre-determined depth, based on a client request or the bore construction details, the purging rate must be selected on the controller.
2 If a pre-determined pump depth has not been supplied by the client, the pump should be set to a depth that is in the middle of the screened interval of the bore and/or at least 0.5 metres below the pre-purging standing water level. If the bore construction details have not been provided to enable this determination, a screened interval of 4 metres will be assumed.
2 If previous sampling rounds cannot determine a purging rate the bore must be initially purged at a rate of 100mL/min while monitoring any drawdown of the SWL. If significant drawdown is evident, purging must be reduced to 50mL/min however if minimal drawdown occurs the purging rate may be increased provided little change in the SWL occurs.
3 During purging run all purged water from the bore through the sealed flow through cell where the pH, Temperature, Dissolved Oxygen, Redox Potential and Conductivity are all measured and recorded in the field log sheet.
4 The purge water is stored in a drum and transported off site and if deemed safe, disposed of in the MGT trade waste pit. If the purge water is deemed unsuitable for disposal it is given to *Chemsal* for removal and treatment.
5 Taking readings of the above mentioned physical and chemical parameters every 3 minutes, the results should fall within the following stabilisation criteria over 3 consecutive reading intervals. *Temperature within ±0.5°C, EC within ±3%, pH within ±0.05 units, Redox within ±10mV, D.O . within ±10% and the SWL should not exceed 0.50m of drawdown over the period of purging.*
In addition to these parameters a minimum of 5 sets of readings must be taken and a minimum of 2 litres of groundwater must be purged from the bore to ensure that the sample obtained is representative of the target formation.
6 Once all in-situ parameters have stabilised and purge criteria have been met, the sample can be taken. The sample tubing is gently removed from the flow through cell, minimising agitation, and placed directly into the 1L unpreserved plastic or amber glass container. Refer above documents for suitable sample containers and preservatives. The flow rate must remain the same during sampling as it was while purging.
7 Label the sample bottles with the Site Name, Sample ID and date.
8 While purging continues, the sample can be decanted into the acid dosed sample bottles. The unpreserved container must NEVER come in direct contact with an open, pre-preserved bottle. The metals sample can be filtered using the process outlined below.
9 Remove the sampling equipment from the bore and undergo the decontamination procedure mentioned below.

10 Be sure to record a post sampling measurement of the SWL once this process is complete.

Purging - Submersible Pump

1 After setting the pump at a pre-determined depth, based on a client request or the bore construction details, the purging rate must be selected by manually adjusting the controller and measuring the rate at which water is being purged into a container of a known volume.
2 The same process is followed as for *Purging – MicroPurge* mentioned above.

Purging – 3 x Holding Volumes Method-Syphon Tube

1 Once gauging is complete the Holding Volume of the bore must be calculated. This can be accomplished with the use of bore log info and the length of the water column in the bore.
2 When using the syphon tubing – which is usually left dedicated in-situ at each borehole, attach the foot-valve to the Waterra tubing and lower gently into the water column.
3 In a jiggling fashion, pull the tubing up and down the water column to bring water to the surface. Measure the rate of purging and calculate the time and volume needed accordingly.
4 Be sure not to allow the foot valve to strike the bottom of the bore as this may stir up particles.

Purging – 3 x Holding Volumes Method- Hand Bailer

1 Once gauging is complete the Holding Volume of the bore must be calculated. This can be accomplished with the use of bore log info and the length of the water column in the bore.
2 When using a disposable hand bailer, follow the same calculation processes mentioned above and allow the bailer to gently enter the water column and remove. 1 full hand bailer should be equal to 1L of water.
3 Repeat this process frequently checking the SWL to ensure the bore is not being completely dewatered.
4 For slow recovering bore, excessive drawdown may be unavoidable. If the bore becomes dry, allow it to recover over several hours and return to sample and take final readings if volume allows.
5 Recovery time should not exceed 24 hours.
6 Dispose of bailer after use.

Please note: when using either holding volume method, chemical and physical parameters must be stable (as per micro purging method) before a sample can be taken. If this does not occur after 3 x holding volumes have been removed, purging should continue until stabilisation. The default removal of 3 x holding volumes is not by itself sufficient to ensure a representative sample.

Samples can then be submitted to the laboratory under COC documentation via Sample Receipt for analysis after being appropriately labeled as detailed within MGT In-house Procedure MGT AO7.

Transportation of samples to the laboratory must be conducted on ice.

Field Filtration Procedures

Syringe Filtration Method

- While sampling, the sample can be removed from the unpreserved container with the use of a disposable, sterile syringe and a 0.45µm PES or nylon filter.
- Withdraw sample into the syringe and run it through the filter directly into the nitric acid preserved sample bottle.
- Repeat this process until the volume of filtered sample has reached the red indicator line on the label.
- If the filter becomes dirty and makes filtration difficult, replace filter and continue. If the sample is too turbid to filter at the time of sampling, allow it to stand upright on ice for 1 hour once sampling is complete and retry.

In-Line Filtration Method

- After all other sample bottles have been adequately filled, a 0.45µm in-line filter may be used to obtain a sample for metals analysis.
- Attach the 0.45µm in-line filter to the sample line using a clean/decontaminated piece of rubber tubing.
- Allow the pump to discharge sample into the filter casing. When filter casing is full direct the filter outlet into a nitric acid preserved sample bottle to fill.
- When the pump has discharged adequate sample into the preserved sample bottle, switch the pump off, remove the filter equipment and continue with the sampling procedure.
- Discard the used in-line filter (single use), though rubber tubing may be decontaminated with other sampling equipment and re-used.

On-site sampling equipment decontamination procedures.

Between sampling bores the following decontamination procedure of all sampling equipment is to be followed to ensure that cross contamination of the samples does not occur:

1. De-contaminate away from bore hole locations.
2. Wiping of excess dirt from the equipment using paper towel.
3. Rinsing of all sampling equipment with tap water.
4. Washing (with scrubbing implement) of all sampling equipment with a deionised water and decon 90 solution
5. Rinsing all equipment with tap water.
6. Inspection of equipment to determine cleanliness – if equipment still appears dirty, repeat steps 4 and 5.
7. Rinse with deionised water.
8. The equipment is then allowed to dry.
9. When using the submersible pump – run the pump in the above waters, decon solutions and rinsing waters as well as cleaning the outside surfaces as shown above.
10. When the bladder pump system is used, break the pump down and decontaminate in the fashion mentioned above.
11. The water level meter must be decontaminated – including the probe and length of tape that entered the bore.
12. Finally, the field probes and flow-through-cell must also undergo the decontamination process.

Surface Water sampling – MGT/ AA13

Scope

This procedure provides general direction for the sampling, storage, preservation and transportation used for the sampling of surface waters. It also provides an overview of the different sample techniques and commonly monitored field parameters involved in the collection of surface waters from streams, rivers, lakes, leachate ponds and any other open water bodies.

This procedure uses as a reference EPA (Victoria) IWRG701, Groundwater Sampling Guidelines – Publication 669 – April 2000 and Australian/New Zealand Standard – AS/NZS 5667.11:1998– Water Quality Sampling – Part 11: Guidance on sampling of Surface waters. Both of these Standards are available within the mgt Library for direct reference.

Other applicable procedures and methods can also be referenced within the mgt Library these include:

1 EPA (Victoria) Groundwater Sampling Guidelines – Publication 669 – April 2000.
3 Australian Standard – AS 2031.1-1986 – Selection of containers and preservation of water samples for Chemical and Microbiological analysis – Part A & B (mgt is NATA accredited for this method)
4 Australian/New Zealand Standard AS/NZS 5667.1:1998 – Water Quality Sampling – Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
5 EPA (Victoria) Industrial Waste Resource Guidelines IWRG701 - 2009
6 Australian/New Zealand Standards for Water Quality – Sampling parts 1, 6, and 11 (numbers 5667.1:1998; 5667.6:1998; and 5667.11:1998) and other referenced sources.

Section 1: Apparatus

Stainless Steel Cup
Plastic Cup
Extendable Reach Pole
Disposable Bailer
TPS 90 Field Meter:
- PH meter
- Conductivity meter
- Dissolved Oxygen Meter
- Redox Probe
- Temperature Probe

Esky and Ice
Washing Equipment:
- Phosphate Free Detergent (Decon 90)
- Tap Water
- Deionised Water

Tubs
Nitrile Gloves
Rope
Bailer String
Tool Kit
Sample Containers
Sample Labels
Field filtration system
GPS – for Recording Exact Location
Camera
Sampling JSA
Work Order
First Aid Kit

Section 2: Equipment

Prior to commencing fieldwork the field instrument being used must be calibrated at the beginning and end of each day of sampling using calibration solution standards. Refer to Field 012 - TPS 90 -FLMV Field Meter Calibration Method

Section 3: Sampling Procedure

1. Locate the sampling point and ensure that it is representative of the surface water location. Sampling points are nominally described within EPA Licenses or client agreements – where possible obtain a copy of the relevant documentation.
2. Always obtain a sample from a flowing source unless otherwise directed by the client.
3. Details relevant to the analysis and readings should be recorded on the field sheets, any information necessary to assist in data interpretation, ie. Flow rate, water level, vegetation, colour, sheen, debris and air temperature. Refer to mgt *Environmental Documentation Index FIELD009 – Surface Water Field Sheets.* It is necessary for a photo of the sample location to be taken and GPS coordinates to be recorded. These are then to be included in the final report.
4. Field Readings (taken from TPS 90 field meter) are to be taken directly from the sample point. Place probes gently into the flowing source as to not agitate sediment and alter readings. Allow reading to stabilize then record field readings on the field sheets: *Temperature, EC, pH, Redox, Dissolved Oxygen* and *Time* of sampling should be noted. In the case Field Meter probes cannot reach the water source, field readings may be taken from a Sample Cup.
5. Decontaminate the sampling equipment (Sample cup) as per the decontamination procedure detailed below

   If using a disposable bailer refer to step 9

6. Before sample collection the sample cup is to be placed in the stream with the opening facing upstream. The cup is filled and rinsed, then emptied downstream. This process is then repeated three (3) times prior to sampling to reduce the contamination risk between sample locations.
7. Submerge sample cup directly down (approximately 100mm in depth) away from any edges or obstructions to maintain air in the cup thereby avoiding the collection of any surface film.
8. Once approximately 100mm under the surface. Face the sample cup opening upstream and fill.

   If not using a sample cup refer to step 11.

9. When using a disposable bailer lower the bailer into the surface water attached to a suitable clean length of bailer string or rope.

10. The sample bailer should be lowered into the sample point slowly away from any edges, walls, obstructions etc. as to not disturb any sediment that may be present at the sample location. Rinse the sampling apparatus within the collection point prior to obtaining a sample.
11. Fill unpreserved sample container from either the Sample Cup or Disposable Bailer completely to exclude air from containers. Place the sample volumes required in appropriately preserved containers making sure not to cross-contaminate sample containers, if necessary filter the surface water prior to preserving for metals as per *Section 4 - Field Filtration Procedures* and *Section 5 Preservation, Transportation and Storage* methods below.
12. Label each of the sample containers with the sample ID, Bore ID, Date, Site, Time and field samplers name.
13. Remove the sampling equipment from the sample point.
14. Replace all equipment or object that was moved to obtain the sample prior to leaving site.

Section 4: Field Filtration Procedures

1. While sampling, the sample can be removed from the unpreserved container with the use of a disposable, sterile syringe and a 0.45µm PES or nylon filter.
2. Withdraw sample into the syringe and run it through the filter directly into the nitric acid preserved sample bottle.
3. Repeat this process until the volume of filtered sample has reached the red indicator line on the label (approximately 60mLs is required).
4. If the filter becomes dirty and makes filtration difficult, replace filter and continue. If the sample is too turbid to filter at the time of sampling, allow it to stand upright on ice for 1 hour once sampling is complete and retry.

Section 5: Preservation, Transportation and Storage

Samples should be stored according to the preservation procedure. Please refer to SOP 03 – Sample Management and QS3001 – Sample Preservation and Sampling Guide.

Transportation of samples to the laboratory should be conducted on ice to ensure that representative results from analysis are obtained.

Samples can then be submitted to the laboratory under COC documentation via Sample Receipt for analysis after being appropriately labeled.

On-site sampling equipment decontamination procedures.

1. Between sampling bores the following decontamination procedure of all sampling equipment is to be followed to ensure that cross contamination of the samples does not occur:
2. De-contaminate away from bore hole locations.
3. Wiping of excess dirt from the equipment using paper towel.
4. Rinsing of all sampling equipment with tap water.
5. Washing (with scrubbing implement) of all sampling equipment with a deionised water and decon 90 solution
6. Rinsing all equipment with tap water.
7. Inspection of equipment to determine cleanliness – if equipment still appears dirty, repeat steps 4 and 5.
8. Rinse with deionised water.
9. The equipment is then allowed to dry.
10. When using the submersible pump – run the pump in the above waters, decon solutions and rinsing waters as well as cleaning the outside surfaces as shown above.
11. When the bladder pump system is used, break the pump down and decontaminate in the fashion mentioned above.
12. The water level meter must be decontaminated – including the probe and length of tape that entered the bore.
13. Finally, the field probes and flow-through-cell must also undergo the decontamination process.

APPENDIX E EUROFINS MONITORING REPORTS

eurofins | mgt

Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **516839-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Sep 22, 2016

Client Sample ID			**MB14**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Se21148**
Date Sampled			**Sep 21, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	62
Tetrachloro-m-xylene (surr.)	1	%	71

Client Sample ID			MB14
Sample Matrix			Water
Eurofins | mgt Sample No.			S16-Se21148
Date Sampled			Sep 21, 2016
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Azinphos-methyl	0.002	mg/L	< 0.002
Bolstar	0.002	mg/L	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002
Coumaphos	0.02	mg/L	< 0.02
Demeton-S	0.02	mg/L	< 0.02
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
EPN	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Omethoate	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02
Pyrazophos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Terbufos	0.002	mg/L	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	84
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	0.27
Chemical Oxygen Demand (COD)	25	mg/L	< 25
Chloride	1	mg/L	39
Chromium (hexavalent)	0.001	mg/L	< 0.001
Conductivity (at 25°C)	1	uS/cm	390
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	< 0.02
pH	0.1	pH Units	7.9
Phenolics (total)	0.05	mg/L	< 0.05

Client Sample ID			MB14
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Se21148**
Date Sampled			**Sep 21, 2016**
Test/Reference	LOR	Unit	
Phosphate total (as P)	0.05	mg/L	0.26
Sulphate (as SO4)	5	mg/L	52
Total Organic Carbon	5	mg/L	< 5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	148
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Total Alkalinity (as CaCO3)	20	mg/L	148
Alkali Metals			
Calcium	0.5	mg/L	33
Magnesium	0.5	mg/L	19
Potassium	0.5	mg/L	6.2
Sodium	0.5	mg/L	30
Heavy Metals			
Aluminium (filtered)	0.05	mg/L	< 0.05
Chromium (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	0.13
Manganese (filtered)	0.005	mg/L	0.54

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Sep 26, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 22, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 26, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Sep 26, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	Sep 26, 2016	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	Sep 22, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Sep 22, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Sep 22, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as SO4)	Melbourne	Sep 22, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Sep 22, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Alkali Metals	Melbourne	Sep 22, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			
Chemical Oxygen Demand (COD)	Melbourne	Sep 22, 2016	28 Days
- Method: LTM-INO-4220 Determination of COD in Water			
Chromium (hexavalent)	Melbourne	Sep 22, 2016	28 Day
- Method: Cr (VI) by MGT 1170A			
Conductivity (at 25°C)	Melbourne	Sep 22, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Sep 22, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Melbourne	Sep 22, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Sep 22, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Melbourne	Sep 23, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Total Organic Carbon	Melbourne	Sep 23, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals (filtered)	Melbourne	Sep 22, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name:	Meinhardt Infrastucture and Environment Pty Ltd	**Order No.:**	115659	**Received:**	Sep 22, 2016 1:40 PM
Address:	Level 4, 66 Clarence St Sydney NSW 2000	**Report #:**	516839	**Due:**	Sep 29, 2016
		Phone:	+61 2 8252 0406	**Priority:**	5 Day
		Fax:	+61 2 9319 7508	**Contact Name:**	Ken Douglas-Hill
Project Name:	LITHGOW LANDFILL				
Project ID:	115659				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium (filtered)	Chemical Oxygen Demand (COD)	Chromium (filtered)	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron (filtered)	Manganese (filtered)	pH	Phenolics (total)	Phosphate total (as P)	Total Organic Carbon	Eurofins | mgt Suite B14	Eurofins | mgt Suite B11A	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																				
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**															
1	MB14	Sep 21, 2016		Water	S16-Se21148	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.001			0.001	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as SO4)	mg/L	< 5			5	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.05			0.05	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	124			70-130	Pass	
TRH C10-C14	%	98			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	82			70-130	Pass	
TRH C6-C10	%	113			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	72			70-130	Pass	
4.4'-DDE	%	73			70-130	Pass	
4.4'-DDT	%	70			70-130	Pass	
a-BHC	%	111			70-130	Pass	
Aldrin	%	91			70-130	Pass	
b-BHC	%	95			70-130	Pass	
d-BHC	%	98			70-130	Pass	
Dieldrin	%	122			70-130	Pass	
Endosulfan I	%	78			70-130	Pass	
Endosulfan II	%	125			70-130	Pass	
Endosulfan sulphate	%	112			70-130	Pass	
Endrin	%	98			70-130	Pass	
Endrin aldehyde	%	92			70-130	Pass	
Endrin ketone	%	108			70-130	Pass	
g-BHC (Lindane)	%	127			70-130	Pass	
Heptachlor	%	123			70-130	Pass	
Heptachlor epoxide	%	94			70-130	Pass	
Hexachlorobenzene	%	81			70-130	Pass	
Methoxychlor	%	88			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	107			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	102			70-130	Pass	
Chemical Oxygen Demand (COD)	%	117			70-130	Pass	
Chloride	%	116			70-130	Pass	
Chromium (hexavalent)	%	80			70-130	Pass	
Fluoride	%	100			70-130	Pass	
Nitrate (as N)	%	102			70-130	Pass	
Phenolics (total)	%	128			70-130	Pass	
Phosphate total (as P)	%	99			70-130	Pass	
Sulphate (as SO4)	%	112			70-130	Pass	
Total Organic Carbon	%	99			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	84			70-130	Pass	
Total Alkalinity (as CaCO3)	%	100			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	109			70-130	Pass	
Magnesium	%	105			70-130	Pass	
Potassium	%	102			70-130	Pass	
Sodium	%	104			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Chromium (filtered)	%	101			80-120	Pass	
Iron (filtered)	%	99			80-120	Pass	
Manganese (filtered)	%	103			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M16-Se21463	NCP	%	107			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M16-Se17215	NCP	%	72			70-130	Pass	
4.4'-DDE	M16-Se06808	NCP	%	94			70-130	Pass	
4.4'-DDT	M16-Se17215	NCP	%	76			70-130	Pass	
a-BHC	M16-Se17215	NCP	%	101			70-130	Pass	
Aldrin	M16-Se06808	NCP	%	86			70-130	Pass	
b-BHC	M16-Se17215	NCP	%	82			70-130	Pass	
d-BHC	M16-Se17215	NCP	%	80			70-130	Pass	
Dieldrin	M16-Se17215	NCP	%	97			70-130	Pass	
Endosulfan I	M16-Se17215	NCP	%	78			70-130	Pass	
Endosulfan II	M16-Se17215	NCP	%	80			70-130	Pass	
Endosulfan sulphate	M16-Se17215	NCP	%	89			70-130	Pass	
Endrin	M16-Se17215	NCP	%	84			70-130	Pass	
Endrin aldehyde	M16-Se17215	NCP	%	87			70-130	Pass	
Endrin ketone	M16-Se12666	NCP	%	125			70-130	Pass	
g-BHC (Lindane)	M16-Se17215	NCP	%	113			70-130	Pass	
Heptachlor	M16-Se17215	NCP	%	112			70-130	Pass	
Heptachlor epoxide	M16-Se17215	NCP	%	102			70-130	Pass	
Hexachlorobenzene	M16-Se17215	NCP	%	84			70-130	Pass	
Methoxychlor	M16-Se17215	NCP	%	75			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-Se21463	NCP	%	107			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Se20893	NCP	%	95			70-130	Pass	
Chemical Oxygen Demand (COD)	A16-Se20936	NCP	%	102			70-130	Pass	
Chloride	A16-Se20936	NCP	%	95			70-130	Pass	
Chromium (hexavalent)	M16-Se20790	NCP	%	101			70-130	Pass	
Fluoride	M16-Se20909	NCP	%	98			70-130	Pass	
Nitrate (as N)	M16-Se20893	NCP	%	93			70-130	Pass	
Phenolics (total)	S16-Se22053	NCP	%	128			70-130	Pass	
Phosphate total (as P)	M16-Se22509	NCP	%	107			70-130	Pass	
Sulphate (as SO4)	B16-Se20686	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Bicarbonate Alkalinity (as CaCO3)	M16-Se21746	NCP	%	101			70-130	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Se20907	NCP	%	107			70-130	Pass	
Total Alkalinity (as CaCO3)	M16-Se21746	NCP	%	129			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M16-Se21593	NCP	%	104			70-130	Pass	
Magnesium	M16-Se21593	NCP	%	105			70-130	Pass	
Potassium	M16-Se21593	NCP	%	95			70-130	Pass	
Sodium	M16-Se21593	NCP	%	112			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium (filtered)	S16-Se22041	NCP	%	85			70-130	Pass	
Iron (filtered)	M16-Se22579	NCP	%	86			70-130	Pass	
Manganese (filtered)	M16-Se21019	NCP	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M16-Se21050	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M16-Se21050	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M16-Se21050	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S16-Se22359	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	S16-Se22359	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	S16-Se22359	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Se21050	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M16-Se21050	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M16-Se21050	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-Se20893	NCP	mg/L	0.05	0.05	7.0	30%	Pass	
Chemical Oxygen Demand (COD)	S16-Se21148	CP	mg/L	< 25	< 25	<1	30%	Pass	
Chloride	A16-Se20936	NCP	mg/L	530	530	<1	30%	Pass	
Chromium (hexavalent)	S16-Se21148	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Conductivity (at 25°C)	M16-Se21764	NCP	uS/cm	930	910	2.0	30%	Pass	
Fluoride	B16-Se20685	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate (as N)	M16-Se20893	NCP	mg/L	0.21	0.17	22	30%	Pass	
pH	M16-Se21764	NCP	pH Units	8.1	8.1	pass	30%	Pass	
Phenolics (total)	S16-Se22053	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Phosphate total (as P)	M16-Se22508	NCP	mg/L	0.08	0.08	1.0	30%	Pass	
Sulphate (as SO4)	M16-Se20913	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Total Organic Carbon	M16-Au20593	NCP	mg/L	5.9	5.8	1.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	B16-Se20541	NCP	mg/L	700	730	4.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	B16-Se20541	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Total Alkalinity (as CaCO3)	B16-Se20541	NCP	mg/L	700	730	4.0	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Se21593	NCP	mg/L	100	120	12	30%	Pass	
Magnesium	M16-Se21593	NCP	mg/L	250	280	12	30%	Pass	
Potassium	M16-Se21593	NCP	mg/L	15	18	19	30%	Pass	
Sodium	M16-Se21593	NCP	mg/L	1600	1700	9.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	B16-Se24020	NCP	mg/L	0.82	0.78	4.0	30%	Pass	
Chromium (filtered)	S16-Se22041	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M16-Se23032	NCP	mg/L	1.9	1.9	3.0	30%	Pass	
Manganese (filtered)	M16-Se23032	NCP	mg/L	2.2	2.2	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **514982-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Sep 08, 2016

Client Sample ID			**SW1**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Se08048**
Date Sampled			**Sep 07, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	58
Tetrachloro-m-xylene (surr.)	1	%	66

Client Sample ID			SW1
Sample Matrix			Water
Eurofins | mgt Sample No.			S16-Se08048
Date Sampled			Sep 07, 2016
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Azinphos-methyl	0.002	mg/L	< 0.002
Bolstar	0.002	mg/L	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002
Coumaphos	0.02	mg/L	< 0.02
Demeton-S	0.02	mg/L	< 0.02
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
EPN	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Omethoate	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02
Pyrazophos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Terbufos	0.002	mg/L	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	112
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	0.36
Chemical Oxygen Demand (COD)	25	mg/L	< 25
Chloride	1	mg/L	19
Chromium (hexavalent)	0.001	mg/L	< 0.001
Conductivity (at 25°C)	1	uS/cm	180
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	1.8
pH	0.1	pH Units	7.1
Phenolics (total)	0.05	mg/L	< 0.05

Client Sample ID			SW1
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Se08048**
Date Sampled			**Sep 07, 2016**
Test/Reference	LOR	Unit	
Phosphate total (as P)	0.05	mg/L	0.07
Sulphate	5	mg/L	18
Suspended Solids	1	mg/L	5.9
Total Organic Carbon	5	mg/L	< 5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	31
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Total Alkalinity (as CaCO3)	20	mg/L	31
Heavy Metals			
Aluminium	0.05	mg/L	0.28
Chromium	0.001	mg/L	< 0.001
Iron	0.05	mg/L	0.25
Manganese	0.005	mg/L	0.017
Alkali Metals			
Calcium	0.5	mg/L	14
Magnesium	0.5	mg/L	4.3
Potassium	0.5	mg/L	4.4
Sodium	0.5	mg/L	11

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Sep 09, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 08, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Sep 09, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Sep 09, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	Sep 09, 2016	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	Sep 08, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Sep 08, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Sep 08, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate	Melbourne	Sep 08, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Sep 08, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Alkali Metals	Melbourne	Sep 08, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			
Chemical Oxygen Demand (COD)	Melbourne	Sep 13, 2016	28 Days
- Method: LTM-INO-4220 Determination of COD in Water			
Chromium (hexavalent)	Melbourne	Sep 08, 2016	28 Day
- Method: Cr (VI) by MGT 1170A			
Conductivity (at 25°C)	Melbourne	Sep 08, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Sep 08, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Melbourne	Sep 08, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Sep 13, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Melbourne	Sep 12, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Suspended Solids	Melbourne	Sep 08, 2016	7 Day
- Method: LM-LTM-INO-4100 (Suspended Solids @ 103°C - 105°C)			
Total Organic Carbon	Melbourne	Sep 13, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Melbourne	Sep 08, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name:	Meinhardt Infrastucture and Environment Pty Ltd	**Order No.:**	115659	**Received:**	Sep 8, 2016 2:55 PM
Address:	Level 4, 66 Clarence St Sydney NSW 2000	**Report #:**	514982	**Due:**	Sep 15, 2016
		Phone:	+61 2 8252 0406	**Priority:**	5 Day
		Fax:	+61 2 9319 7508	**Contact Name:**	Ken Douglas-Hill
Project Name:	LITHGOW LANDFILL				
Project ID:	115659				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Chemical Oxygen Demand (COD)	Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Manganese	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B14	Eurofins | mgt Suite B11A	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																					
Brisbane Laboratory - NATA Site # 20794																					
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	SW1	Sep 07, 2016		Water	S16-Se08048	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.001			0.001	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate	mg/L	< 5			5	Pass	
Suspended Solids	mg/L	< 1			1	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	89			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	105			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	101			70-130	Pass	
TRH C6-C10	%	81			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	78			70-130	Pass	
4.4'-DDE	%	87			70-130	Pass	
4.4'-DDT	%	91			70-130	Pass	
a-BHC	%	125			70-130	Pass	
Aldrin	%	103			70-130	Pass	
b-BHC	%	117			70-130	Pass	
d-BHC	%	112			70-130	Pass	
Dieldrin	%	127			70-130	Pass	
Endosulfan I	%	76			70-130	Pass	
Endosulfan II	%	106			70-130	Pass	
Endosulfan sulphate	%	84			70-130	Pass	
Endrin	%	105			70-130	Pass	
Endrin aldehyde	%	108			70-130	Pass	
Endrin ketone	%	87			70-130	Pass	
g-BHC (Lindane)	%	108			70-130	Pass	
Heptachlor	%	70			70-130	Pass	
Heptachlor epoxide	%	94			70-130	Pass	
Hexachlorobenzene	%	117			70-130	Pass	
Methoxychlor	%	98			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	79			70-130	Pass	
Dimethoate	%	120			70-130	Pass	
Ethion	%	90			70-130	Pass	
Fenitrothion	%	91			70-130	Pass	
Methyl parathion	%	81			70-130	Pass	
Mevinphos	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	105			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	93			70-130	Pass	
Chemical Oxygen Demand (COD)	%	105			70-130	Pass	
Chloride	%	111			70-130	Pass	
Chromium (hexavalent)	%	106			70-130	Pass	
Fluoride	%	101			70-130	Pass	
Nitrate (as N)	%	95			70-130	Pass	
Phenolics (total)	%	103			70-130	Pass	
Phosphate total (as P)	%	120			70-130	Pass	
Sulphate	%	114			70-130	Pass	
Suspended Solids	%	94			70-130	Pass	
Total Organic Carbon	%	99			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	104			70-130	Pass	
Total Alkalinity (as CaCO3)	%	109			70-130	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals							
Chromium	%	86			80-120	Pass	
Iron	%	84			80-120	Pass	
Manganese	%	85			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	108			70-130	Pass	
Magnesium	%	111			70-130	Pass	
Potassium	%	102			70-130	Pass	
Sodium	%	101			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M16-Se06458	NCP	%	122			70-130	Pass	
TRH C10-C14	M16-Se10711	NCP	%	105			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M16-Se06458	NCP	%	128			70-130	Pass	
TRH C6-C10	M16-Se06458	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M16-Se06808	NCP	%	91			70-130	Pass	
4.4'-DDE	M16-Se06808	NCP	%	94			70-130	Pass	
4.4'-DDT	M16-Se05365	NCP	%	78			70-130	Pass	
a-BHC	M16-Se06808	NCP	%	112			70-130	Pass	
Aldrin	M16-Se06808	NCP	%	86			70-130	Pass	
b-BHC	M16-Se06808	NCP	%	101			70-130	Pass	
d-BHC	M16-Se06808	NCP	%	97			70-130	Pass	
Dieldrin	M16-Se06808	NCP	%	108			70-130	Pass	
Endosulfan I	M16-Se06808	NCP	%	70			70-130	Pass	
Endosulfan II	M16-Se06808	NCP	%	100			70-130	Pass	
Endosulfan sulphate	M16-Se06808	NCP	%	89			70-130	Pass	
Endrin	M16-Se06808	NCP	%	73			70-130	Pass	
Endrin aldehyde	M16-Se06808	NCP	%	103			70-130	Pass	
Endrin ketone	M16-Se06808	NCP	%	74			70-130	Pass	
g-BHC (Lindane)	M16-Se06808	NCP	%	117			70-130	Pass	
Heptachlor	M16-Se05499	NCP	%	72			70-130	Pass	
Heptachlor epoxide	M16-Se05365	NCP	%	75			70-130	Pass	
Hexachlorobenzene	M16-Se06808	NCP	%	126			70-130	Pass	
Methoxychlor	M16-Se06808	NCP	%	72			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M16-Se07382	NCP	%	94			70-130	Pass	
Dimethoate	M16-Se07382	NCP	%	108			70-130	Pass	
Ethion	M16-Se07382	NCP	%	104			70-130	Pass	
Fenitrothion	M16-Se07382	NCP	%	109			70-130	Pass	
Methyl parathion	M16-Se07382	NCP	%	88			70-130	Pass	
Mevinphos	M16-Se07382	NCP	%	126			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-Se10711	NCP	%	105			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Se07290	NCP	%	88			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chloride	B16-Se07365	NCP	%	89			70-130	Pass	
Chromium (hexavalent)	M16-Se08029	NCP	%	84			70-130	Pass	
Fluoride	S16-Se07944	NCP	%	106			70-130	Pass	
Nitrate (as N)	M16-Se07290	NCP	%	94			70-130	Pass	
Phenolics (total)	M16-Se09341	NCP	%	94			70-130	Pass	
Phosphate total (as P)	M16-Se08799	NCP	%	125			70-130	Pass	
Sulphate	M16-Se08534	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Carbonate Alkalinity (as CaCO3)	M16-Se11068	NCP	%	115			70-130	Pass	
Total Alkalinity (as CaCO3)	M16-Se11738	NCP	%	124			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium	S16-Se07224	NCP	%	90			75-125	Pass	
Manganese	S16-Se07224	NCP	%	90			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	S16-Se08048	CP	%	92			70-130	Pass	
Magnesium	S16-Se08048	CP	%	97			70-130	Pass	
Potassium	S16-Se08048	CP	%	88			70-130	Pass	
Sodium	S16-Se08048	CP	%	86			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M16-Se06457	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M16-Se10710	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M16-Se10710	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M16-Se10710	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M16-Se06457	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M16-Se06457	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-Se07381	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M16-Se07381	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	M16-Se06455	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Bolstar	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorfenvinphos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorpyrifos	M16-Se07381	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Chlorpyrifos-methyl	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Coumaphos	M16-Se07381	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-S	M16-Se07381	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Demeton-O	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Diazinon	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dichlorvos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dimethoate	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Disulfoton	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
EPN	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethoprop	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethyl parathion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenitrothion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fensulfothion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenthion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Malathion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Merphos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Methyl parathion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Mevinphos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Monocrotophos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Naled	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Omethoate	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Phorate	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Pirimiphos-methyl	M16-Se07381	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Pyrazophos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ronnel	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Terbufos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tetrachlorvinphos	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tokuthion	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Trichloronate	M16-Se07381	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Se10710	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M16-Se10710	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M16-Se10710	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-Se07290	NCP	mg/L	0.12	0.12	8.0	30%	Pass	
Chemical Oxygen Demand (COD)	S16-Se09376	NCP	mg/L	1300	1300	3.8	30%	Pass	
Chloride	B16-Se07365	NCP	mg/L	96	96	<1	30%	Pass	
Chromium (hexavalent)	S16-Se08048	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Conductivity (at 25°C)	M16-Se10291	NCP	uS/cm	50000	49000	1.0	30%	Pass	
Fluoride	M16-Se09076	NCP	mg/L	0.6	0.5	8.0	30%	Pass	
Nitrate (as N)	M16-Se07290	NCP	mg/L	0.15	0.15	1.0	30%	Pass	
pH	M16-Se10291	NCP	pH Units	7.7	7.6	pass	30%	Pass	
Phenolics (total)	M16-Se09341	NCP	mg/L	1.1	1.1	1.0	30%	Pass	
Phosphate total (as P)	M16-Se08562	NCP	mg/L	6.8	6.9	2.0	30%	Pass	
Sulphate	M16-Se08534	NCP	mg/L	64	66	2.3	30%	Pass	
Suspended Solids	M16-Se07969	NCP	mg/L	1100	1100	<1	30%	Pass	
Total Organic Carbon	M16-Se12208	NCP	mg/L	18	18	1.0	30%	Pass	

Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Se10291	NCP	mg/L	600	610	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Se10291	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M16-Se10291	NCP	mg/L	600	610	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Chromium	S16-Se07224	NCP	mg/L	0.003	0.003	1.0	30%	Pass	
Iron	S16-Se07224	NCP	mg/L	1.5	1.6	1.0	30%	Pass	
Manganese	S16-Se07224	NCP	mg/L	0.010	0.010	4.0	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	S16-Se08048	CP	mg/L	14	14	<1	30%	Pass	
Magnesium	S16-Se08048	CP	mg/L	4.3	4.2	1.0	30%	Pass	
Potassium	S16-Se08048	CP	mg/L	4.4	4.3	2.0	30%	Pass	
Sodium	S16-Se08048	CP	mg/L	11	11	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Alex Petridis	Senior Analyst-Metal (VIC)
Alex Petridis	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | mgt

Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **511513-W**
Project name LITHGOW LANDFILL
Project ID 115659L
Received Date Aug 10, 2016

Client Sample ID			**SW01**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Au11636**
Date Sampled			**Aug 09, 2016**
Test/Reference	LOR	Unit	
Ammonia (as N)	0.01	mg/L	0.30
Chemical Oxygen Demand (COD)	25	mg/L	< 25
Chloride	1	mg/L	11
Chromium (hexavalent)	0.005	mg/L	< 0.005
Conductivity (at 25°C)	1	uS/cm	160
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	1.2
pH	0.1	pH Units	6.8
Phenolics (total)	0.05	mg/L	< 0.05
Phosphate total (as P)	0.05	mg/L	< 0.05
Sulphate (as S)	2	mg/L	5.0
Suspended Solids	5	mg/L	8.0
Total Organic Carbon	5	mg/L	< 5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	5	mg/L	50
Carbonate Alkalinity (as CaCO3)	5	mg/L	< 5
Total Alkalinity (as CaCO3)	5	mg/L	50
Heavy Metals			
Aluminium	0.05	mg/L	0.29
Chromium	0.001	mg/L	< 0.001
Iron	0.05	mg/L	0.13
Manganese	0.005	mg/L	0.019
Alkali Metals			
Calcium	0.5	mg/L	11
Magnesium	0.5	mg/L	3.1
Potassium	0.5	mg/L	3.2
Sodium	0.5	mg/L	9.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	Aug 12, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Sydney	Aug 12, 2016	28 Day
- Method: E033 /E045 /E047 Chloride			
Nitrate (as N)	Melbourne	Aug 12, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Sydney	Aug 12, 2016	28 Day
- Method: E045 Sulphate			
Alkalinity (speciated)	Sydney	Aug 11, 2016	0 Day
- Method: E035 Alkalinity			
Alkali Metals	Sydney	Aug 11, 2016	180 Day
- Method: E022/E030 Unfiltered Cations in Water			
Chemical Oxygen Demand (COD)	Melbourne	Aug 15, 2016	28 Days
- Method: LTM-INO-4220 Determination of COD in Water			
Chromium (hexavalent)	Sydney	Aug 12, 2016	28 Day
- Method: E043 /E057 Total Speciated Chromium			
Conductivity (at 25°C)	Sydney	Aug 12, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Aug 15, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Sydney	Aug 15, 2016	1 Day
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Aug 11, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Sydney	Aug 12, 2016	28 Day
- Method: E038 /E052 Total Phosphate (as P)			
Suspended Solids	Sydney	Aug 15, 2016	7 Day
- Method: 4100 Total Suspended Solids dried at 103-105°C			
Total Organic Carbon	Melbourne	Aug 12, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Sydney	Aug 11, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name:	Meinhardt Infrastucture and Environment Pty Ltd	**Order No.:**	115659L	**Received:**	Aug 10, 2016 2:15 PM
Address:	Level 4, 66 Clarence St Sydney NSW 2000	**Report #:**	511513	**Due:**	Aug 17, 2016
		Phone:	+61 2 8252 0406	**Priority:**	5 Day
		Fax:	+61 2 9319 7508	**Contact Name:**	Ken Douglas-Hill
Project Name:	LITHGOW LANDFILL				
Project ID:	115659L				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Chemical Oxygen Demand (COD)	Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Manganese	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B11A
Melbourne Laboratory - NATA Site # 1254 & 14271							X				X				X			X	X
Sydney Laboratory - NATA Site # 18217						X		X	X	X		X	X	X		X	X		X
Brisbane Laboratory - NATA Site # 20794																			
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	SW01	Aug 09, 2016		Water	S16-Au11636	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Conductivity (at 25°C)	uS/cm	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 2			2	Pass	
Suspended Solids	mg/L	< 5			5	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Ammonia (as N)	%	98			70-130	Pass	
Chemical Oxygen Demand (COD)	%	104			70-130	Pass	
Chloride	%	105			70-130	Pass	
Chromium (hexavalent)	%	113			70-130	Pass	
Conductivity (at 25°C)	%	97			70-130	Pass	
Fluoride	%	99			70-130	Pass	
Nitrate (as N)	%	99			70-130	Pass	
Phenolics (total)	%	100			70-130	Pass	
Phosphate total (as P)	%	71			70-130	Pass	
Sulphate (as S)	%	103			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	%	124			70-130	Pass	
Total Alkalinity (as CaCO3)	%	124			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	90			70-130	Pass	
Chromium	%	89			70-130	Pass	
Iron	%	94			70-130	Pass	
Manganese	%	91			70-130	Pass	
LCS - % Recovery							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Alkali Metals									
Calcium			%	97			70-130	Pass	
Magnesium			%	98			70-130	Pass	
Potassium			%	96			70-130	Pass	
Sodium			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Au10912	NCP	%	91			70-130	Pass	
Chemical Oxygen Demand (COD)	M16-Ap13272	NCP	%	116			70-130	Pass	
Chloride	S16-Au09282	NCP	%	113			70-130	Pass	
Chromium (hexavalent)	S16-Au10834	NCP	%	105			70-130	Pass	
Fluoride	S16-Au11653	NCP	%	101			70-130	Pass	
Nitrate (as N)	M16-Au10912	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	S16-Au09279	NCP	%	53			70-130	Fail	Q08
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	S16-Au10672	NCP	%	93			70-130	Pass	
Chromium	S16-Au11651	NCP	%	98			70-130	Pass	
Iron	S16-Au11651	NCP	%	93			70-130	Pass	
Manganese	S16-Au11651	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	S16-Au11651	NCP	%	107			70-130	Pass	
Magnesium	S16-Au11651	NCP	%	104			70-130	Pass	
Potassium	S16-Au11651	NCP	%	105			70-130	Pass	
Sodium	S16-Au11651	NCP	%	79			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-Au11156	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chemical Oxygen Demand (COD)	M15-De21946	NCP	mg/L	220	220	<1	30%	Pass	
Chloride	S16-Au09281	NCP	mg/L	3.4	3.4	<1	30%	Pass	
Chromium (hexavalent)	S16-Au10834	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Conductivity (at 25°C)	S16-Au11637	NCP	uS/cm	1100	1100	<1	30%	Pass	
Fluoride	S16-Au11653	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate (as N)	M16-Au11156	NCP	mg/L	4.3	4.3	<1	30%	Pass	
Phenolics (total)	M16-Au11439	NCP	mg/L	0.38	0.39	1.0	30%	Pass	
Phosphate total (as P)	S16-Au11636	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphate (as S)	S16-Au09584	NCP	mg/L	17	17	<1	30%	Pass	
Suspended Solids	S16-Au13085	NCP	mg/L	22	19	12	30%	Pass	
Total Organic Carbon	M16-Au11675	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	S16-Au10984	NCP	mg/L	110	100	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	S16-Au10984	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Total Alkalinity (as CaCO3)	S16-Au10984	NCP	mg/L	110	100	5.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S16-Au11465	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Chromium	S16-Au11465	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron	S16-Au11465	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese	S16-Au11465	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	S16-Au09678	NCP	mg/L	30	31	4.0	30%	Pass	
Magnesium	S16-Au09678	NCP	mg/L	19	19	4.0	30%	Pass	
Potassium	S16-Au09678	NCP	mg/L	6.8	7.1	4.0	30%	Pass	
Sodium	S16-Au09678	NCP	mg/L	140	140	6.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	No
Appropriate sample containers have been used	No
Sample containers for volatile analysis received with minimal headspace	No
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Huong Le	Senior Analyst-Inorganic (VIC)
Ivan Taylor	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Inorganic (NSW)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **508123-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Jul 15, 2016

Client Sample ID			**MB01**	**MB04**	**SW01**
Sample Matrix			**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-Jl12111**	**S16-Jl12112**	**S16-Jl12113**
Date Sampled			**Jul 14, 2016**	**Jul 14, 2016**	**Jul 14, 2016**
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	-
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	-
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	-
Organochlorine Pesticides					
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	-
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	-
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	-
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	-
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	-
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	-
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	-
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	-
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	-
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	-
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	-
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	-
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	-
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	-
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	-
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	-
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	-
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	-
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	-
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	-
Toxaphene	0.01	mg/L	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	92	92	-
Tetrachloro-m-xylene (surr.)	1	%	70	60	-

Client Sample ID			MB01	MB04	SW01
Sample Matrix			**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-Jl12111**	**S16-Jl12112**	**S16-Jl12113**
Date Sampled			**Jul 14, 2016**	**Jul 14, 2016**	**Jul 14, 2016**
Test/Reference	LOR	Unit			
Organophosphorus Pesticides (OP)					
Azinphos-methyl	0.002	mg/L	< 0.002	< 0.002	-
Chlorpyrifos	0.02	mg/L	< 0.02	< 0.02	-
Coumaphos	0.02	mg/L	< 0.02	< 0.02	-
Demeton (total)	0.004	mg/L	< 0.004	< 0.004	-
Diazinon	0.002	mg/L	< 0.002	< 0.002	-
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	-
Dimethoate	0.002	mg/L	< 0.002	< 0.002	-
Disulfoton	0.002	mg/L	< 0.002	< 0.002	-
Ethoprop	0.002	mg/L	< 0.002	< 0.002	-
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	-
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	-
Fenthion	0.002	mg/L	< 0.002	< 0.002	-
Malathion	0.002	mg/L	< 0.002	< 0.002	-
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	-
Mevinphos	0.002	mg/L	< 0.002	< 0.002	-
Monocrotophos	0.002	mg/L	< 0.002	< 0.002	-
Parathion	0.002	mg/L	< 0.002	< 0.002	-
Phorate	0.002	mg/L	< 0.002	< 0.002	-
Profenofos	0.002	mg/L	< 0.002	< 0.002	-
Prothiofos	0.002	mg/L	< 0.002	< 0.002	-
Ronnel	0.002	mg/L	< 0.002	< 0.002	-
Stirophos	0.002	mg/L	< 0.002	< 0.002	-
Trichloronate	0.002	mg/L	< 0.002	< 0.002	-
Triphenylphosphate (surr.)	1	%	118	116	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-
Ammonia (as N)	0.01	mg/L	< 0.01	0.89	-
Chemical Oxygen Demand (COD)	25	mg/L	120	110	-
Chloride	1	mg/L	4.9	180	-
Chromium (hexavalent)	0.005	mg/L	< 0.005	< 0.005	-
Conductivity (at 25°C)	1	uS/cm	45	790	-
Fluoride	0.5	mg/L	< 0.5	< 0.5	-
Nitrate (as N)	0.02	mg/L	0.04	< 0.02	-
pH	0.1	pH Units	5.8	6.1	6.9
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	-
Phosphate total (as P)	0.05	mg/L	< 0.05	< 0.05	-
Sulphate (as S)	2	mg/L	< 2	60	-
Suspended Solids	5	mg/L	-	-	6.5
Total Organic Carbon	5	mg/L	< 5	14	-
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	5	mg/L	11	160	-
Carbonate Alkalinity (as CaCO3)	5	mg/L	< 5	< 5	-
Total Alkalinity (as CaCO3)	5	mg/L	11	160	-

Client Sample ID			MB01	MB04	SW01
Sample Matrix			**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-Jl12111**	**S16-Jl12112**	**S16-Jl12113**
Date Sampled			**Jul 14, 2016**	**Jul 14, 2016**	**Jul 14, 2016**
Test/Reference	LOR	Unit			
Alkali Metals					
Calcium	0.5	mg/L	1.8	60	-
Magnesium	0.5	mg/L	1.5	36	-
Potassium	0.5	mg/L	1.1	7.4	-
Sodium	0.5	mg/L	3.5	35	-
Heavy Metals					
Aluminium (filtered)	0.01	mg/L	0.03	< 0.01	-
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-
Iron (filtered)	0.05	mg/L	< 0.05	0.96	-
Manganese (filtered)	0.001	mg/L	< 0.001	1.2	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jul 20, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jul 15, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jul 20, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Sydney	Jul 20, 2016	7 Day
- Method: E013 Organochlorine Pesticides (OC)			
Organophosphorus Pesticides (OP)	Sydney	Jul 20, 2016	7 Day
- Method: E014 Organophosphorus Pesticides (OP)			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Sydney	Jul 19, 2016	28 Day
- Method: E036/E050 Ammonia as N			
Chloride	Sydney	Jul 18, 2016	28 Day
- Method: E033 /E045 /E047 Chloride			
Nitrate (as N)	Melbourne	Jul 18, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Sydney	Jul 18, 2016	28 Day
- Method: E045 Sulphate			
Alkalinity (speciated)	Sydney	Jul 18, 2016	0 Day
- Method: E035 Alkalinity			
Alkali Metals	Sydney	Jul 18, 2016	180 Day
- Method: E022/E030 Unfiltered Cations in Water			
Chemical Oxygen Demand (COD)	Melbourne	Jul 25, 2016	28 Days
- Method: LTM-INO-4220 Determination of COD in Water			
Chromium (hexavalent)	Sydney	Jul 15, 2016	28 Day
- Method: E043 /E057 Total Speciated Chromium			
Conductivity (at 25°C)	Sydney	Jul 19, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Jul 18, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Sydney	Jul 19, 2016	1 Day
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Jul 15, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Sydney	Jul 21, 2016	28 Day
- Method: E038 /E052 Total Phosphate (as P)			
Suspended Solids	Sydney	Jul 15, 2016	7 Day
- Method: 4100 Total Suspended Solids dried at 103-105°C			
Total Organic Carbon	Melbourne	Jul 15, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals (filtered)	Sydney	Jul 15, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Received: Jul 15, 2016 11:50 PM
Due: Jul 25, 2016
Priority: 5 Day
Contact Name: Ken Douglas-Hill

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium (filtered)	Chemical Oxygen Demand (COD)	Chromium (filtered)	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron (filtered)	Manganese (filtered)	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B11A	Eurofins | mgt Suite B14	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271							X				X				X			X	X		
Sydney Laboratory - NATA Site # 18217						X		X	X	X		X	X	X		X	X		X	X	X
Brisbane Laboratory - NATA Site # 20794																					
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	MB01	Jul 14, 2016		Water	S16-Jl12111	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
2	MB04	Jul 14, 2016		Water	S16-Jl12112	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
3	SW01	Jul 14, 2016		Water	S16-Jl12113									X			X				
Test Counts						2	2	2	2	2	2	2	2	3	2	2	1	2	2	2	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides (OP)							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton (total)	mg/L	< 0.004			0.004	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Parathion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phorate	mg/L	< 0.002			0.002	Pass	
Profenofos	mg/L	< 0.002			0.002	Pass	
Prothiofos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Stirophos	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Conductivity (at 25°C)	uS/cm	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 2			2	Pass	
Suspended Solids	mg/L	< 5			5	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	5.0			5	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Total Alkalinity (as CaCO3)	mg/L	5.0			5	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Aluminium (filtered)	mg/L	< 0.01			0.01	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese (filtered)	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	117			70-130	Pass	
TRH C10-C14	%	93			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	104			70-130	Pass	
TRH C6-C10	%	123			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	92			70-130	Pass	
4.4'-DDD	%	101			70-130	Pass	
4.4'-DDE	%	95			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDT	%	88			70-130	Pass	
a-BHC	%	94			70-130	Pass	
Aldrin	%	89			70-130	Pass	
b-BHC	%	96			70-130	Pass	
d-BHC	%	100			70-130	Pass	
Dieldrin	%	95			70-130	Pass	
Endosulfan I	%	93			70-130	Pass	
Endosulfan II	%	92			70-130	Pass	
Endosulfan sulphate	%	100			70-130	Pass	
Endrin	%	99			70-130	Pass	
Endrin aldehyde	%	97			70-130	Pass	
Endrin ketone	%	106			70-130	Pass	
g-BHC (Lindane)	%	95			70-130	Pass	
Heptachlor	%	98			70-130	Pass	
Heptachlor epoxide	%	93			70-130	Pass	
Methoxychlor	%	116			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides (OP)							
Demeton (total)	%	100			70-130	Pass	
Dimethoate	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	98			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	98			70-130	Pass	
Chemical Oxygen Demand (COD)	%	103			70-130	Pass	
Chloride	%	105			70-130	Pass	
Chromium (hexavalent)	%	85			70-130	Pass	
Conductivity (at 25°C)	%	90			70-130	Pass	
Fluoride	%	100			70-130	Pass	
Nitrate (as N)	%	99			70-130	Pass	
Phenolics (total)	%	99			70-130	Pass	
Phosphate total (as P)	%	86			70-130	Pass	
Sulphate (as S)	%	84			70-130	Pass	
Suspended Solids	%	94			70-130	Pass	
Total Organic Carbon	%	119			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	%	120			70-130	Pass	
Total Alkalinity (as CaCO3)	%	120			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	97			70-130	Pass	
Magnesium	%	98			70-130	Pass	
Potassium	%	87			70-130	Pass	
Sodium	%	92			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium (filtered)	%	102			70-130	Pass	
Chromium (filtered)	%	97			70-130	Pass	
Iron (filtered)	%	97			70-130	Pass	
Manganese (filtered)	%	94			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S16-Jl11695	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-Jl11695	NCP	%	95			70-130	Pass	
TRH C6-C10	S16-Jl11695	NCP	%	87			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	S16-Jl13883	NCP	%	95			70-130	Pass	
Chemical Oxygen Demand (COD)	M16-My21474	NCP	%	100			70-130	Pass	
Chloride	S16-Jl13883	NCP	%	109			70-130	Pass	
Fluoride	M16-Jl11970	NCP	%	85			70-130	Pass	
Nitrate (as N)	M16-Jl11970	NCP	%	96			70-130	Pass	
Phenolics (total)	S16-Jl11406	NCP	%	98			70-130	Pass	
Sulphate (as S)	S16-Jl13883	NCP	%	105			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	S16-Jl11933	NCP	%	128			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	S16-Jl11143	NCP	%	90			70-130	Pass	
Magnesium	S16-Jl11143	NCP	%	90			70-130	Pass	
Potassium	S16-Jl11143	NCP	%	87			70-130	Pass	
Sodium	S16-Jl11143	NCP	%	24			70-130	Fail	Q08
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium (filtered)	S16-Jl16532	NCP	%	113			70-130	Pass	
Chromium (filtered)	S16-Jl16532	NCP	%	100			70-130	Pass	
Manganese (filtered)	S16-Jl16532	NCP	%	70			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S16-Jl12112	CP	%	115			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S16-Jl12112	CP	%	122			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	S16-Jl12112	CP	%	92			70-130	Pass	
Phosphate total (as P)	S16-Jl12112	CP	%	73			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-Jl11694	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	S16-Jl12111	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	S16-Jl12111	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	S16-Jl12111	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-Jl11694	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S16-Jl11694	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-Jl12111	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	S16-Jl12111	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	S16-Jl12111	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S16-Jl12111	CP	mg/L	4.9	4.8	2.0	30%	Pass	
Conductivity (at 25°C)	S16-Jl12111	CP	uS/cm	45	47	3.0	30%	Pass	
Fluoride	M16-Jl11970	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate (as N)	M16-Jl11970	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Phenolics (total)	S16-Jl11406	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Phosphate total (as P)	S16-Jl12111	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphate (as S)	S16-Jl12111	CP	mg/L	< 2	< 2	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	S16-Jl11143	NCP	mg/L	45	45	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	S16-Jl11143	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Total Alkalinity (as CaCO3)	S16-Jl11143	NCP	mg/L	45	45	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	S16-Jl12111	CP	mg/L	1.8	1.9	4.0	30%	Pass	
Magnesium	S16-Jl12111	CP	mg/L	1.5	1.6	6.0	30%	Pass	
Potassium	S16-Jl12111	CP	mg/L	1.1	1.2	8.0	30%	Pass	
Sodium	S16-Jl12111	CP	mg/L	3.5	3.6	3.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium (filtered)	S16-Jl16531	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chromium (filtered)	S16-Jl16531	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S16-Jl16531	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Manganese (filtered)	S16-Jl16531	NCP	mg/L	1.3	1.3	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S16-Jl12112	CP	mg/L	0.89	0.89	<1	30%	Pass	
Chemical Oxygen Demand (COD)	S16-Jl12112	CP	mg/L	110	100	9.0	30%	Pass	
Chromium (hexavalent)	S16-Jl12112	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Total Organic Carbon	S16-Jl12112	CP	mg/L	14	16	13	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Suspended Solids	S16-Jl12113	CP	mg/L	6.5	5.0	26	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Huong Le	Senior Analyst-Inorganic (VIC)
Ivan Taylor	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Inorganic (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **505718-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Jun 24, 2016

Client Sample ID			**SW1B**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Jn22802**
Date Sampled			**Jun 23, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	96
Tetrachloro-m-xylene (surr.)	1	%	55

Client Sample ID			SW1B
Sample Matrix			Water
Eurofins | mgt Sample No.			S16-Jn22802
Date Sampled			Jun 23, 2016
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Azinphos-methyl	0.002	mg/L	< 0.002
Bolstar	0.002	mg/L	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002
Coumaphos	0.02	mg/L	< 0.02
Demeton-S	0.02	mg/L	< 0.02
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
EPN	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Omethoate	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02
Pyrazophos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Terbufos	0.002	mg/L	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	54
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	0.49
Chemical Oxygen Demand (COD)	25	mg/L	< 25
Chloride	1	mg/L	29
Chromium (hexavalent)	0.001	mg/L	< 0.001
Conductivity (at 25°C)	1	uS/cm	410
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	8.4
pH	0.1	pH Units	7.3
Phenolics (total)	0.05	mg/L	< 0.05

Client Sample ID			SW1B
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Jn22802**
Date Sampled			**Jun 23, 2016**
Test/Reference	LOR	Unit	
Phosphate total (as P)	0.05	mg/L	< 0.05
Sulphate (as S)	5	mg/L	18
Suspended Solids	1	mg/L	30
Total Organic Carbon	5	mg/L	7.8
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	70
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Total Alkalinity (as CaCO3)	20	mg/L	70
Heavy Metals			
Aluminium	0.05	mg/L	0.71
Chromium	0.001	mg/L	0.001
Iron	0.05	mg/L	0.89
Manganese	0.005	mg/L	0.019
Alkali Metals			
Calcium	0.5	mg/L	35
Magnesium	0.5	mg/L	6.8
Potassium	0.5	mg/L	8.4
Sodium	0.5	mg/L	24

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jun 27, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 24, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 27, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Jun 27, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	Jun 27, 2016	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	Jun 27, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 27, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Jun 24, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Alkali Metals	Melbourne	Jun 24, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			
Chemical Oxygen Demand (COD)	Melbourne	Jun 24, 2016	28 Days
- Method: APHA 5220 COD Open Reflux Method			
Chromium (hexavalent)	Melbourne	Jun 24, 2016	28 Day
- Method: Cr (VI) by MGT 1170A			
Conductivity (at 25°C)	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Jun 27, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Melbourne	Jun 24, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Jun 24, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Melbourne	Jun 24, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Suspended Solids	Melbourne	Jun 24, 2016	7 Day
- Method: LM-LTM-INO-4100 (Suspended Solids @ 103°C - 105°C)			
Total Organic Carbon	Melbourne	Jun 24, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Melbourne	Jun 24, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name:	Meinhardt Infrastucture and Environment Pty Ltd	**Order No.:**	115659	**Received:**	Jun 24, 2016 4:05 PM
Address:	Level 4, 66 Clarence St Sydney NSW 2000	**Report #:**	505718	**Due:**	Jul 1, 2016
		Phone:	+61 2 8252 0406	**Priority:**	5 Day
		Fax:	+61 2 9319 7508	**Contact Name:**	Ken Douglas-Hill
Project Name:	LITHGOW LANDFILL				
Project ID:	115659				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Chemical Oxygen Demand (COD)	Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Manganese	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B14	Eurofins | mgt Suite B11A	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																					
Brisbane Laboratory - NATA Site # 20794																					
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	SW1B	Jun 23, 2016		Water	S16-Jn22802	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

mg/l: milligrams per litre

ug/l: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100ml: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.001			0.001	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Suspended Solids	mg/L	< 1			1	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	110			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	104			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	100			70-130	Pass	
TRH C6-C10	%	107			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	81			70-130	Pass	
4.4'-DDE	%	88			70-130	Pass	
4.4'-DDT	%	72			70-130	Pass	
a-BHC	%	92			70-130	Pass	
Aldrin	%	91			70-130	Pass	
b-BHC	%	77			70-130	Pass	
d-BHC	%	88			70-130	Pass	
Dieldrin	%	108			70-130	Pass	
Endosulfan I	%	114			70-130	Pass	
Endosulfan II	%	113			70-130	Pass	
Endosulfan sulphate	%	91			70-130	Pass	
Endrin	%	86			70-130	Pass	
Endrin aldehyde	%	72			70-130	Pass	
Endrin ketone	%	125			70-130	Pass	
g-BHC (Lindane)	%	92			70-130	Pass	
Heptachlor	%	96			70-130	Pass	
Heptachlor epoxide	%	107			70-130	Pass	
Methoxychlor	%	70			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	78			70-130	Pass	
Dimethoate	%	77			70-130	Pass	
Ethion	%	83			70-130	Pass	
Fenitrothion	%	70			70-130	Pass	
Methyl parathion	%	80			70-130	Pass	
Mevinphos	%	115			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	106			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	93			70-130	Pass	
Chemical Oxygen Demand (COD)	%	97			70-130	Pass	
Chloride	%	103			70-130	Pass	
Chromium (hexavalent)	%	104			70-130	Pass	
Fluoride	%	99			70-130	Pass	
Nitrate (as N)	%	96			70-130	Pass	
Phenolics (total)	%	100			70-130	Pass	
Phosphate total (as P)	%	95			70-130	Pass	
Sulphate (as S)	%	105			70-130	Pass	
Total Organic Carbon	%	90			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	%	109			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	109			80-120	Pass	
Chromium	%	102			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Iron			%	107			80-120	Pass	
Manganese			%	111			80-120	Pass	
LCS - % Recovery									
Alkali Metals									
Calcium			%	100			70-130	Pass	
Magnesium			%	101			70-130	Pass	
Potassium			%	88			70-130	Pass	
Sodium			%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	B16-Jn22273	NCP	%	119			70-130	Pass	
TRH C10-C14	M16-Jn22746	NCP	%	122			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	B16-Jn22273	NCP	%	105			70-130	Pass	
TRH C6-C10	B16-Jn22273	NCP	%	109			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-Jn22746	NCP	%	125			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Jn23061	NCP	%	87			70-130	Pass	
Chemical Oxygen Demand (COD)	M15-De24344	NCP	%	124			70-130	Pass	
Chloride	B16-Jn22158	NCP	%	104			70-130	Pass	
Fluoride	B16-Jn22151	NCP	%	100			70-130	Pass	
Nitrate (as N)	M16-Jn23061	NCP	%	96			70-130	Pass	
Phosphate total (as P)	B16-Jn22246	NCP	%	105			70-130	Pass	
Sulphate (as S)	B16-Jn22158	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	M16-Jn22674	NCP	%	130			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium	S16-Jn22802	CP	%	96			75-125	Pass	
Manganese	S16-Jn22802	CP	%	98			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M16-Jn23064	NCP	%	102			70-130	Pass	
Magnesium	M16-Jn23064	NCP	%	98			70-130	Pass	
Potassium	M16-Jn22674	NCP	%	100			70-130	Pass	
Sodium	M16-Jn23064	NCP	%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	B16-Jn22272	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M16-Jn22745	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M16-Jn22745	NCP	mg/L	0.4	0.4	3.0	30%	Pass	
TRH C29-C36	M16-Jn22745	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	B16-Jn22272	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	B16-Jn22272	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-Jn21113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	M16-Jn21113	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Jn22745	NCP	mg/L	0.19	0.23	18	30%	Pass	
TRH >C16-C34	M16-Jn22745	NCP	mg/L	0.3	0.3	11	30%	Pass	
TRH >C34-C40	M16-Jn22745	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S16-Jn22694	NCP	mg/L	0.04	0.03	14	30%	Pass	
Chemical Oxygen Demand (COD)	M16-My23973	NCP	mg/L	260	270	4.0	30%	Pass	
Chloride	M16-Jn26859	NCP	mg/L	590	600	2.0	30%	Pass	
Chromium (hexavalent)	M16-Jn22577	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Conductivity (at 25°C)	M16-Jn23061	NCP	uS/cm	2600	2200	18	30%	Pass	
Fluoride	M16-Jn25710	NCP	mg/L	1.5	1.5	2.0	30%	Pass	
Nitrate (as N)	S16-Jn22694	NCP	mg/L	0.09	0.09	3.0	30%	Pass	
pH	M16-Jn23061	NCP	pH Units	7.7	7.7	pass	30%	Pass	
Phosphate total (as P)	B16-Jn22246	NCP	mg/L	0.08	0.08	4.0	30%	Pass	
Sulphate (as S)	B16-Jn22158	NCP	mg/L	9.1	9.1	<1	30%	Pass	
Suspended Solids	M16-Jn24899	NCP	mg/L	1600	1700	4.0	30%	Pass	
Total Organic Carbon	S16-Jn22550	NCP	mg/L	25	20	19	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	630	560	13	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	630	560	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M16-Jn18349	NCP	mg/L	0.27	0.28	1.0	30%	Pass	
Chromium	S16-Jn22802	CP	mg/L	0.001	0.001	<1	30%	Pass	
Iron	S16-Jn22802	CP	mg/L	0.89	0.93	4.0	30%	Pass	
Manganese	S16-Jn22802	CP	mg/L	0.019	0.019	2.0	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Jn23064	NCP	mg/L	77	73	5.0	30%	Pass	
Magnesium	M16-Jn23064	NCP	mg/L	50	49	3.0	30%	Pass	
Potassium	M16-Jn22674	NCP	mg/L	24	24	<1	30%	Pass	
Sodium	M16-Jn23064	NCP	mg/L	81	81	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | mgt

Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **505717-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Jun 24, 2016

Client Sample ID			**SW1**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Jn22801**
Date Sampled			**Jun 23, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	110
Tetrachloro-m-xylene (surr.)	1	%	55

Client Sample ID			SW1
Sample Matrix			Water
Eurofins | mgt Sample No.			S16-Jn22801
Date Sampled			Jun 23, 2016
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Azinphos-methyl	0.002	mg/L	< 0.002
Bolstar	0.002	mg/L	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002
Coumaphos	0.02	mg/L	< 0.02
Demeton-S	0.02	mg/L	< 0.02
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
EPN	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Omethoate	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02
Pyrazophos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Terbufos	0.002	mg/L	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	64
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	0.76
Chemical Oxygen Demand (COD)	25	mg/L	< 25
Chloride	1	mg/L	27
Chromium (hexavalent)	0.001	mg/L	< 0.001
Conductivity (at 25°C)	1	uS/cm	370
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	8.1
pH	0.1	pH Units	7.7
Phenolics (total)	0.05	mg/L	< 0.05

Client Sample ID			SW1
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Jn22801**
Date Sampled			**Jun 23, 2016**
Test/Reference	LOR	Unit	
Phosphate total (as P)	0.05	mg/L	0.06
Sulphate (as S)	5	mg/L	17
Suspended Solids	1	mg/L	19
Total Organic Carbon	5	mg/L	< 5
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	57
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10
Total Alkalinity (as CaCO3)	20	mg/L	57
Heavy Metals			
Aluminium	0.05	mg/L	0.88
Chromium	0.001	mg/L	0.001
Iron	0.05	mg/L	1.1
Manganese	0.005	mg/L	0.020
Alkali Metals			
Calcium	0.5	mg/L	30
Magnesium	0.5	mg/L	6.7
Potassium	0.5	mg/L	8.2
Sodium	0.5	mg/L	24

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jun 27, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 24, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jun 27, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Melbourne	Jun 27, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	Jun 27, 2016	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	Jun 27, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Jun 27, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Alkalinity (speciated)	Melbourne	Jun 24, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Alkali Metals	Melbourne	Jun 24, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			
Chemical Oxygen Demand (COD)	Melbourne	Jun 24, 2016	28 Days
- Method: APHA 5220 COD Open Reflux Method			
Chromium (hexavalent)	Melbourne	Jun 24, 2016	28 Day
- Method: Cr (VI) by MGT 1170A			
Conductivity (at 25°C)	Melbourne	Jun 24, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Jun 27, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Melbourne	Jun 24, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Jun 24, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Melbourne	Jun 24, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Suspended Solids	Melbourne	Jun 24, 2016	7 Day
- Method: LM-LTM-INO-4100 (Suspended Solids @ 103°C - 105°C)			
Total Organic Carbon	Melbourne	Jun 24, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Melbourne	Jun 24, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name:	Meinhardt Infrastucture and Environment Pty Ltd	**Order No.:**	115659	**Received:**	Jun 24, 2016 4:05 PM
Address:	Level 4, 66 Clarence St Sydney NSW 2000	**Report #:**	505717	**Due:**	Jul 1, 2016
		Phone:	+61 2 8252 0406	**Priority:**	5 Day
		Fax:	+61 2 9319 7508	**Contact Name:**	Ken Douglas-Hill
Project Name:	LITHGOW LANDFILL				
Project ID:	115659				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Aluminium	Chemical Oxygen Demand (COD)	Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Manganese	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B14	Eurofins | mgt Suite B11A	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																					
Brisbane Laboratory - NATA Site # 20794																					
External Laboratory																					
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
1	SW1	Jun 23, 2016		Water	S16-Jn22801	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chemical Oxygen Demand (COD)	mg/L	< 25			25	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.001			0.001	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Suspended Solids	mg/L	< 1			1	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	110			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	104			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	100			70-130	Pass	
TRH C6-C10	%	107			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	81			70-130	Pass	
4.4'-DDE	%	88			70-130	Pass	
4.4'-DDT	%	72			70-130	Pass	
a-BHC	%	92			70-130	Pass	
Aldrin	%	91			70-130	Pass	
b-BHC	%	77			70-130	Pass	
d-BHC	%	88			70-130	Pass	
Dieldrin	%	108			70-130	Pass	
Endosulfan I	%	114			70-130	Pass	
Endosulfan II	%	113			70-130	Pass	
Endosulfan sulphate	%	91			70-130	Pass	
Endrin	%	86			70-130	Pass	
Endrin aldehyde	%	72			70-130	Pass	
Endrin ketone	%	125			70-130	Pass	
g-BHC (Lindane)	%	92			70-130	Pass	
Heptachlor	%	96			70-130	Pass	
Heptachlor epoxide	%	107			70-130	Pass	
Methoxychlor	%	70			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	78			70-130	Pass	
Dimethoate	%	77			70-130	Pass	
Ethion	%	83			70-130	Pass	
Fenitrothion	%	70			70-130	Pass	
Methyl parathion	%	80			70-130	Pass	
Mevinphos	%	115			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	106			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	93			70-130	Pass	
Chemical Oxygen Demand (COD)	%	107			70-130	Pass	
Chloride	%	103			70-130	Pass	
Chromium (hexavalent)	%	104			70-130	Pass	
Fluoride	%	99			70-130	Pass	
Nitrate (as N)	%	96			70-130	Pass	
Phenolics (total)	%	100			70-130	Pass	
Phosphate total (as P)	%	95			70-130	Pass	
Sulphate (as S)	%	105			70-130	Pass	
Total Organic Carbon	%	90			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	%	109			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	109			80-120	Pass	
Chromium	%	102			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Iron			%	107			80-120	Pass	
Manganese			%	111			80-120	Pass	
LCS - % Recovery									
Alkali Metals									
Calcium			%	100			70-130	Pass	
Magnesium			%	101			70-130	Pass	
Potassium			%	88			70-130	Pass	
Sodium			%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	B16-Jn22273	NCP	%	119			70-130	Pass	
TRH C10-C14	M16-Jn22746	NCP	%	122			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	B16-Jn22273	NCP	%	105			70-130	Pass	
TRH C6-C10	B16-Jn22273	NCP	%	109			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-Jn22746	NCP	%	125			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-Jn23061	NCP	%	87			70-130	Pass	
Chemical Oxygen Demand (COD)	S16-Jn22801	CP	%	119			70-130	Pass	
Chloride	B16-Jn22158	NCP	%	104			70-130	Pass	
Fluoride	M16-Jn20016	NCP	%	100			70-130	Pass	
Nitrate (as N)	M16-Jn23061	NCP	%	96			70-130	Pass	
Phosphate total (as P)	B16-Jn22246	NCP	%	105			70-130	Pass	
Sulphate (as S)	B16-Jn22158	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Total Alkalinity (as CaCO3)	M16-Jn22674	NCP	%	130			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium	S16-Jn22801	CP	%	104			75-125	Pass	
Manganese	S16-Jn22801	CP	%	108			75-125	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M16-Jn23064	NCP	%	102			70-130	Pass	
Magnesium	M16-Jn23064	NCP	%	98			70-130	Pass	
Potassium	M16-Jn22674	NCP	%	100			70-130	Pass	
Sodium	M16-Jn23064	NCP	%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-Jn22801	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M16-Jn22745	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M16-Jn22745	NCP	mg/L	0.4	0.4	3.0	30%	Pass	
TRH C29-C36	M16-Jn22745	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-Jn22801	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S16-Jn22801	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-Jn21113	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M16-Jn21113	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	M16-Jn21113	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-Jn22745	NCP	mg/L	0.19	0.23	18	30%	Pass	
TRH >C16-C34	M16-Jn22745	NCP	mg/L	0.3	0.3	11	30%	Pass	
TRH >C34-C40	M16-Jn22745	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S16-Jn22694	NCP	mg/L	0.04	0.03	14	30%	Pass	
Chemical Oxygen Demand (COD)	M16-Jn03004	NCP	mg/L	69	71	3.0	30%	Pass	
Chloride	M16-Jn26859	NCP	mg/L	590	600	2.0	30%	Pass	
Chromium (hexavalent)	M16-Jn22577	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Conductivity (at 25°C)	M16-Jn23061	NCP	uS/cm	2600	2200	18	30%	Pass	
Fluoride	M16-Jn25710	NCP	mg/L	1.5	1.5	2.0	30%	Pass	
Nitrate (as N)	S16-Jn22694	NCP	mg/L	0.09	0.09	3.0	30%	Pass	
pH	M16-Jn23061	NCP	pH Units	7.7	7.7	pass	30%	Pass	
Phosphate total (as P)	B16-Jn22246	NCP	mg/L	0.08	0.08	4.0	30%	Pass	
Sulphate (as S)	B16-Jn22158	NCP	mg/L	9.1	9.1	<1	30%	Pass	
Suspended Solids	M16-Jn24899	NCP	mg/L	1600	1700	4.0	30%	Pass	
Total Organic Carbon	S16-Jn22550	NCP	mg/L	25	20	19	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	630	560	13	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Total Alkalinity (as CaCO3)	M16-Jn23061	NCP	mg/L	630	560	13	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M16-Jn18349	NCP	mg/L	0.27	0.28	1.0	30%	Pass	
Chromium	S16-Jn22801	CP	mg/L	0.001	0.001	14	30%	Pass	
Iron	S16-Jn22801	CP	mg/L	1.1	1.0	7.0	30%	Pass	
Manganese	S16-Jn22801	CP	mg/L	0.020	0.017	11	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Jn23064	NCP	mg/L	77	73	5.0	30%	Pass	
Magnesium	M16-Jn23064	NCP	mg/L	50	49	3.0	30%	Pass	
Potassium	M16-Jn22674	NCP	mg/L	24	24	<1	30%	Pass	
Sodium	M16-Jn23064	NCP	mg/L	81	81	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

eurofins | mgt

Certificate of Analysis

Meinhardt Company Pty Ltd
Attention: Accounts
Level 12, 501 Swanston St Melb
VIC 3000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **499609-W**
Project name LITHGOW SWF MAY 2016
Project ID 115659
Received Date May 06, 2016

Client Sample ID			**MB5**	**MB6**	**MB9**	**MB10**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-My07743**	**S16-My07744**	**S16-My07745**	**S16-My07746**
Date Sampled			**May 03, 2016**	**May 03, 2016**	**May 03, 2016**	**May 03, 2016**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	144	79	131	87
Tetrachloro-m-xylene (surr.)	1	%	72	56	61	75
Organophosphorus Pesticides						
Azinphos-methyl	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorfenvinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Chlorpyrifos-methyl	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Coumaphos	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02

Client Sample ID			MB5	MB6	MB9	MB10
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			S16-My07743	S16-My07744	S16-My07745	S16-My07746
Date Sampled			May 03, 2016	May 03, 2016	May 03, 2016	May 03, 2016
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Demeton-S	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dimethoate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
EPN	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Malathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Monocrotophos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Omethoate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Pirimiphos-methyl	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Pyrazophos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Terbufos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tetrachlorvinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	94	89	82	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Ammonia (as N)	0.01	mg/L	12	0.98	3.9	< 0.01
Chloride	1	mg/L	220	150	47	14
Chromium (hexavalent)	0.001	mg/L	< 0.005	< 0.001	< 0.001	< 0.001
Conductivity (at 25°C)	1	uS/cm	1400	1100	430	120
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate (as N)	0.02	mg/L	6.1	0.02	0.04	0.48
pH	0.1	pH Units	6.6	6.6	6.4	6.3
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphate total (as P)	0.05	mg/L	0.17	0.13	0.09	0.20
Sulphate (as S)	5	mg/L	7.6	13	5.2	< 5
Total Dissolved Solids	10	mg/L	900	800	230	67
Total Organic Carbon[M10]	5	mg/L	11	13	7.3	< 5
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	380	360	130	39
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Total Alkalinity (as CaCO3)	20	mg/L	380	360	130	39

Client Sample ID			MB5	MB6	MB9	MB10
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			S16-My07743	S16-My07744	S16-My07745	S16-My07746
Date Sampled			May 03, 2016	May 03, 2016	May 03, 2016	May 03, 2016
Test/Reference	LOR	Unit				
Heavy Metals						
Chromium	0.001	mg/L	0.002	0.001	0.004	0.004
Iron (filtered)	0.05	mg/L	< 0.05	2.4	< 0.05	0.26
Manganese (filtered)	0.005	mg/L	0.82	3.5	1.7	0.030
Alkali Metals						
Calcium	0.5	mg/L	86	67	23	7.0
Magnesium	0.5	mg/L	27	57	12	5.0
Potassium	0.5	mg/L	61	15	11	1.9
Sodium	0.5	mg/L	100	60	25	5.3

Client Sample ID			MB12	MB14	SW1	LW1
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			S16-My07747	S16-My07748	S16-My07749	S16-My07750
Date Sampled			May 03, 2016	May 03, 2016	May 02, 2016	May 03, 2016
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	0.2	-
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	0.3	-
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	0.5	-
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.01	-
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.001	-
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	-
Dibutylchlorendate (surr.)	1	%	117	120	int	-
Tetrachloro-m-xylene (surr.)	1	%	63	85	57	-
Organophosphorus Pesticides						
Azinphos-methyl	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Chlorfenvinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Chlorpyrifos	0.02	mg/L	< 0.02	< 0.02	< 0.02	-

Client Sample ID			MB12	MB14	SW1	LW1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-My07747**	**S16-My07748**	**S16-My07749**	**S16-My07750**
Date Sampled			**May 03, 2016**	**May 03, 2016**	**May 02, 2016**	**May 03, 2016**
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Chlorpyrifos-methyl	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Coumaphos	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
Demeton-S	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Dimethoate	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
EPN	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Ethyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Malathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Monocrotophos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Omethoate	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Pirimiphos-methyl	0.02	mg/L	< 0.02	< 0.02	< 0.02	-
Pyrazophos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Terbufos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Tetrachlorvinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	-
Triphenylphosphate (surr.)	1	%	93	126	86	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	-
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	0.5	-
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	-
Ammonia (as N)	0.01	mg/L	6.0	19	4.1	0.42
Chloride	1	mg/L	310	45	64	260
Chromium (hexavalent)	0.001	mg/L	< 0.001	< 0.001	< 0.001	-
Conductivity (at 25°C)	1	uS/cm	1100	530	570	1100
Fluoride	0.5	mg/L	< 0.5	< 0.5	< 0.5	< 0.5
Nitrate (as N)	0.02	mg/L	0.03	0.58	0.04	3.6
pH	0.1	pH Units	3.4	7.0	7.0	7.2
Phenolics (total)	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
Phosphate total (as P)	0.05	mg/L	< 0.05	0.19	3.2	-
Sulphate (as S)	5	mg/L	49	< 5	25	11
Suspended Solids	1	mg/L	-	-	29000	-
Total Dissolved Solids	10	mg/L	650	300	-	-
Total Organic Carbon[M10]	5	mg/L	24	11	44	22

Client Sample ID			MB12	MB14	SW1	LW1
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S16-My07747**	**S16-My07748**	**S16-My07749**	**S16-My07750**
Date Sampled			**May 03, 2016**	**May 03, 2016**	**May 02, 2016**	**May 03, 2016**
Test/Reference	LOR	Unit				
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	< 20	240	170	210
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10	< 10
Total Alkalinity (as CaCO3)	20	mg/L	< 20	240	170	210
Heavy Metals						
Chromium	0.001	mg/L	0.002	0.015	-	-
Iron	0.05	mg/L	-	-	260	550
Iron (filtered)	0.05	mg/L	5.4	< 0.05	-	-
Manganese	0.005	mg/L	-	-	2.9	34
Manganese (filtered)	0.005	mg/L	0.44	0.79	-	-
Alkali Metals						
Calcium	0.5	mg/L	5.6	18	49	72
Magnesium	0.5	mg/L	12	5.7	12	25
Potassium	0.5	mg/L	8.6	9.2	18	38
Sodium	0.5	mg/L	190	59	52	90

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 13, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 13, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Organochlorine Pesticides	Melbourne	May 13, 2016	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorus Pesticides	Melbourne	May 13, 2016	7 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Chromium (hexavalent)	Melbourne	May 07, 2016	28 Day
- Method: Cr (VI) by MGT 1170A			
Conductivity (at 25°C)	Melbourne	May 09, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	May 07, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Melbourne	May 09, 2016	0 Hours
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	May 07, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Melbourne	May 09, 2016	28 Day
- Method: APHA 4500-P E. Phosphorous			
Suspended Solids	Melbourne	May 07, 2016	7 Day
- Method: LM-LTM-INO-4100 (Suspended Solids @ 103°C - 105°C)			
Total Dissolved Solids	Melbourne	May 07, 2016	7 Day
- Method: LM-LTM-INO-4110 (Total Dissolved Solids @ 178°C - 182°C)			
Total Organic Carbon	Melbourne	May 09, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Melbourne	May 07, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			
Heavy Metals (filtered)	Melbourne	May 07, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Melbourne	May 09, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	May 07, 2016	28 Day
- Method: MGT 1100A			
Nitrate (as N)	Melbourne	May 09, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Melbourne	May 07, 2016	28 Day
- Method: In house MGT1110A (SO4 by Discrete Analyser)			
Alkalinity (speciated)	Melbourne	May 09, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Alkali Metals	Melbourne	May 07, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			

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Project Name: LITHGOW SWF MAY 2016
Project ID: 115659

Order No.:
Report #: 499609
Phone: 8676 1200
Fax: 8676 1201

Received: May 6, 2016 3:32 PM
Due: May 13, 2016
Priority: 5 Day
Contact Name: Ken Douglas-Hill

Eurofins | mgt Analytical Services Manager : Natalie Krasselt

Sample Detail						Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Iron (filtered)	Manganese	Manganese (filtered)	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Dissolved Solids	Total Organic Carbon	Organochlorine Pesticides	Organophosphorus Pesticides	Eurofins | mgt Suite B11A	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																							
External Laboratory																							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																		
1	MB5	May 03, 2016		Water	S16-My07743	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
2	MB6	May 03, 2016		Water	S16-My07744	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
3	MB9	May 03, 2016		Water	S16-My07745	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
4	MB10	May 03, 2016		Water	S16-My07746	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
5	MB12	May 03, 2016		Water	S16-My07747	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
6	MB14	May 03, 2016		Water	S16-My07748	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X
7	SW1	May 02, 2016		Water	S16-My07749		X	X	X	X		X		X	X	X	X		X	X	X	X	X
8	LW1	May 03, 2016		Water	S16-My07750			X	X	X		X		X	X				X			X	
Test Counts						6	7	8	8	2	6	2	6	8	8	7	1	6	8	7	7	8	7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/L	< 0.002			0.002	Pass	
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorfenvinphos	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.02			0.02	Pass	
Chlorpyrifos-methyl	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.02			0.02	Pass	
Demeton-S	mg/L	< 0.02			0.02	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
EPN	mg/L	< 0.002			0.002	Pass	
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Ethyl parathion	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Omethoate	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Pirimiphos-methyl	mg/L	< 0.02			0.02	Pass	
Pyrazophos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Terbufos	mg/L	< 0.002			0.002	Pass	
Tetrachlorvinphos	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Chromium (hexavalent)	mg/L	< 0.001			0.001	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Suspended Solids	mg/L	< 1			1	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Chromium	mg/L	< 0.001			0.001	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	88			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	89			70-130	Pass	
4.4'-DDE	%	110			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDT	%	99			70-130	Pass	
a-BHC	%	120			70-130	Pass	
Aldrin	%	80			70-130	Pass	
b-BHC	%	107			70-130	Pass	
d-BHC	%	82			70-130	Pass	
Dieldrin	%	91			70-130	Pass	
Endosulfan I	%	96			70-130	Pass	
Endosulfan II	%	110			70-130	Pass	
Endosulfan sulphate	%	82			70-130	Pass	
Endrin	%	74			70-130	Pass	
Endrin aldehyde	%	75			70-130	Pass	
Endrin ketone	%	74			70-130	Pass	
g-BHC (Lindane)	%	116			70-130	Pass	
Heptachlor	%	93			70-130	Pass	
Heptachlor epoxide	%	90			70-130	Pass	
Hexachlorobenzene	%	112			70-130	Pass	
Methoxychlor	%	83			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	81			70-130	Pass	
Dimethoate	%	70			70-130	Pass	
Ethion	%	86			70-130	Pass	
Fenitrothion	%	78			70-130	Pass	
Methyl parathion	%	71			70-130	Pass	
Mevinphos	%	112			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	89			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	97			70-130	Pass	
Chloride	%	112			70-130	Pass	
Chromium (hexavalent)	%	81			70-130	Pass	
Nitrate (as N)	%	92			70-130	Pass	
Phenolics (total)	%	104			70-130	Pass	
Phosphate total (as P)	%	104			70-130	Pass	
Sulphate (as S)	%	123			70-130	Pass	
Suspended Solids	%	101			70-130	Pass	
Total Dissolved Solids	%	96			70-130	Pass	
Total Organic Carbon	%	106			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Total Alkalinity (as CaCO3)	%	119			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Chromium	%	94			80-120	Pass	
Iron	%	109			80-120	Pass	
Iron (filtered)	%	109			80-120	Pass	
Manganese	%	97			80-120	Pass	
Manganese (filtered)	%	97			80-120	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	89			70-130	Pass	
Magnesium	%	96			70-130	Pass	
Potassium	%	84			70-130	Pass	
Sodium	%	87			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M16-My06086	NCP	%	121			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M16-My05489	NCP	%	104			70-130	Pass	
4.4'-DDE	M16-My05489	NCP	%	121			70-130	Pass	
Aldrin	M16-My05489	NCP	%	124			70-130	Pass	
b-BHC	M16-Ap24590	NCP	%	100			70-130	Pass	
d-BHC	M16-My05489	NCP	%	105			70-130	Pass	
Dieldrin	M16-Ap24590	NCP	%	125			70-130	Pass	
Endosulfan I	M16-My05489	NCP	%	128			70-130	Pass	
Endosulfan II	M16-My05489	NCP	%	129			70-130	Pass	
Endosulfan sulphate	M16-My05489	NCP	%	96			70-130	Pass	
Endrin	M16-Ap24590	NCP	%	103			70-130	Pass	
Endrin aldehyde	M16-My05489	NCP	%	114			70-130	Pass	
Endrin ketone	M16-Ap24590	NCP	%	108			70-130	Pass	
g-BHC (Lindane)	M16-Ap24590	NCP	%	100			70-130	Pass	
Heptachlor	M16-My05489	NCP	%	76			70-130	Pass	
Heptachlor epoxide	M16-Ap24590	NCP	%	120			70-130	Pass	
Hexachlorobenzene	M16-Ap24590	NCP	%	120			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M16-My06086	NCP	%	122			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-My06380	NCP	%	96			70-130	Pass	
Chloride	B16-My06197	NCP	%	94			70-130	Pass	
Chromium (hexavalent)	M16-My13704	NCP	%	83			70-130	Pass	
Nitrate (as N)	M16-My06380	NCP	%	90			70-130	Pass	
Phosphate total (as P)	M16-My08291	NCP	%	118			70-130	Pass	
Sulphate (as S)	S16-My07739	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Chromium	S16-My07743	CP	%	103			75-125	Pass	
Manganese (filtered)	M16-My05967	NCP	%	103			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M16-My07043	NCP	%	86			70-130	Pass	
Magnesium	M16-My07043	NCP	%	92			70-130	Pass	
Potassium	M16-My07043	NCP	%	82			70-130	Pass	
Sodium	M16-My07043	NCP	%	98			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phenolics (total)	S16-My07744	CP	%	105			70-130	Pass	
Spike - % Recovery									
Alkalinity (speciated)				Result 1					
Bicarbonate Alkalinity (as CaCO3)	S16-My07744	CP	%	126			70-130	Pass	
Total Alkalinity (as CaCO3)	S16-My07744	CP	%	126			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Manganese	M16-My06510	NCP	%	93			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M16-My10212	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M16-My10212	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M16-My10212	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M16-My05487	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M16-My05487	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Toxaphene	M16-My05487	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M16-My10212	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M16-My10212	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M16-My10212	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S16-My07740	NCP	mg/L	0.73	0.70	4.0	30%	Pass	
Chloride	S16-My07739	NCP	mg/L	810	820	2.1	30%	Pass	
Chromium (hexavalent)	M16-My13573	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Conductivity (at 25°C)	S16-My07743	CP	uS/cm	1400	1400	<1	30%	Pass	
Fluoride	B16-My06208	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Nitrate (as N)	S16-My07740	NCP	mg/L	4.2	4.2	1.0	30%	Pass	
pH	S16-My07743	CP	pH Units	6.6	6.6	pass	30%	Pass	
Phenolics (total)	S16-My07743	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Phosphate total (as P)	M16-My08291	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Sulphate (as S)	S16-My07739	NCP	mg/L	33	33	<1	30%	Pass	
Total Dissolved Solids	M16-My12158	NCP	mg/L	2100	2100	<1	30%	Pass	
Total Organic Carbon	S16-My07740	NCP	mg/L	12	13	9.0	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	S16-My07743	CP	mg/L	380	380	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	S16-My07743	CP	mg/L	< 10	< 10	<1	30%	Pass	
Total Alkalinity (as CaCO3)	S16-My07743	CP	mg/L	380	380	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Chromium	S16-My07743	CP	mg/L	0.002	0.001	27	30%	Pass	
Iron (filtered)	M16-My05967	NCP	mg/L	0.27	0.25	6.0	30%	Pass	
Manganese (filtered)	M16-My05967	NCP	mg/L	0.008	0.007	9.0	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-My07043	NCP	mg/L	17	18	3.0	30%	Pass	
Magnesium	B16-My09507	NCP	mg/L	220	220	2.0	30%	Pass	
Potassium	M16-My07043	NCP	mg/L	24	24	1.0	30%	Pass	
Sodium	M16-My07043	NCP	mg/L	490	490	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Suspended Solids	S16-My07711	NCP	mg/L	66	62	6.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron	M16-My08719	NCP	mg/L	1.2	1.2	1.0	30%	Pass	
Manganese	M16-My06510	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
M10	NATA accreditation does not cover the performance of this service in soil matrices

Authorised By

Natalie Krasselt	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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Certificate of Analysis

Meinhardt Infrastucture and Environment Pty Ltd
Level 4, 66 Clarence St
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Ken Douglas-Hill**

Report **492975-W**
Project name LITHGOW LANDFILL
Project ID 115659
Received Date Mar 15, 2016

Client Sample ID			**SW1**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Ma14390**
Date Sampled			**Mar 14, 2016**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	57
Tetrachloro-m-xylene (surr.)	1	%	69

Client Sample ID			SW1
Sample Matrix			Water
Eurofins | mgt Sample No.			S16-Ma14390
Date Sampled			Mar 14, 2016
Test/Reference	LOR	Unit	
Organophosphorus Pesticides (OP)			
Chlorpyrifos	0.002	mg/L	< 0.002
Coumaphos	0.002	mg/L	< 0.002
Demeton (total)	0.004	mg/L	< 0.004
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Dimethoate	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002
Malathion	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Monocrotophos	0.02	mg/L	< 0.02
Parathion	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Profenofos	0.002	mg/L	< 0.002
Prothiofos	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Stirophos	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	83
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Ammonia (as N)	0.01	mg/L	0.05
Chemical Oxygen Demand (COD)	20	mg/L	92
Chloride	1	mg/L	32
Chromium (hexavalent)	0.005	mg/L	< 0.005
Conductivity (at 25°C)	1	uS/cm	380
Fluoride	0.5	mg/L	< 0.5
Nitrate (as N)	0.02	mg/L	0.12
pH	0.1	pH Units	7.9
Phenolics (total)	0.05	mg/L	< 0.05
Phosphate total (as P)	0.05	mg/L	< 0.05
Sulphate (as S)	2	mg/L	17
Suspended Solids	5	mg/L	250
Total Organic Carbon[M10]	5	mg/L	16
Alkalinity (speciated)			
Bicarbonate Alkalinity (as CaCO3)	5	mg/L	95
Carbonate Alkalinity (as CaCO3)	5	mg/L	< 5
Total Alkalinity (as CaCO3)	5	mg/L	95

Client Sample ID			SW1
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S16-Ma14390**
Date Sampled			**Mar 14, 2016**
Test/Reference	LOR	Unit	
Heavy Metals			
Aluminium	0.05	mg/L	2.0
Chromium	0.005	mg/L	< 0.005
Iron	0.05	mg/L	2.3
Manganese	0.005	mg/L	0.31
Alkali Metals			
Calcium	0.5	mg/L	29
Magnesium	0.5	mg/L	10
Potassium	0.5	mg/L	16
Sodium	0.5	mg/L	37

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Mar 16, 2016	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Mar 16, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Mar 16, 2016	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Eurofins | mgt Suite B14			
Organochlorine Pesticides	Sydney	Mar 16, 2016	7 Day
- Method: E013 Organochlorine Pesticides (OC)			
Organophosphorus Pesticides (OP)	Sydney	Mar 16, 2016	7 Day
- Method: E014 Organophosphorus Pesticides (OP)			
Eurofins | mgt Suite B11A			
Ammonia (as N)	Sydney	Mar 16, 2016	28 Day
- Method: E036/E050 Ammonia as N			
Chloride	Sydney	Mar 21, 2016	28 Day
- Method: E033 /E045 /E047 Chloride			
Nitrate (as N)	Melbourne	Mar 17, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Sydney	Mar 21, 2016	28 Day
- Method: E045 Sulphate			
Alkalinity (speciated)	Sydney	Mar 22, 2016	0 Day
- Method: E035 Alkalinity			
Alkali Metals	Sydney	Mar 16, 2016	180 Day
- Method: E022/E030 Unfiltered Cations in Water			
Chemical Oxygen Demand (COD)	Melbourne	Mar 16, 2016	28 Day
- Method: APHA 5220 COD Open Reflux Method			
Chromium (hexavalent)	Sydney	Mar 16, 2016	28 Day
- Method: E043 /E057 Total Speciated Chromium			
Conductivity (at 25°C)	Sydney	Mar 17, 2016	28 Day
- Method: LTM-INO-4030			
Fluoride	Melbourne	Mar 22, 2016	28 Day
- Method: LM-LTM-INO-4300 (Fluoride by Ion Chromatography)			
pH	Sydney	Mar 16, 2016	1 Day
- Method: LTM-GEN-7090 pH in water by ISE			
Phenolics (total)	Melbourne	Mar 17, 2016	7 Day
- Method: APHA 5530B & D Phenols			
Phosphate total (as P)	Sydney	Mar 21, 2016	28 Day
- Method: E038 /E052 Total Phosphate (as P)			
Suspended Solids	Sydney	Mar 16, 2016	7 Day
- Method: 4100 Total Suspended Solids dried at 103-105°C			
Total Organic Carbon	Melbourne	Mar 17, 2016	28 Day
- Method: APHA 5310B Total Organic Carbon			
Heavy Metals	Sydney	Mar 16, 2016	180 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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Company Name: Meinhardt Infrastucture and Environment Pty Ltd
Address: Level 4, 66 Clarence St
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NSW 2000

Project Name: LITHGOW LANDFILL
Project ID: 115659

Order No.:
Report #: 492975
Phone: +61 2 8252 0406
Fax: +61 2 9319 7508

Received: Mar 15, 2016 5:08 PM
Due: Mar 22, 2016
Priority: 5 Day
Contact Name: Ken Douglas-Hill

Eurofins | mgt Client Manager: Andrew Black

Sample Detail					Aluminium	Chemical Oxygen Demand (COD)	Chromium	Chromium (hexavalent)	Conductivity (at 25°C)	Fluoride	Iron	Manganese	pH	Phenolics (total)	Phosphate total (as P)	Suspended Solids	Total Organic Carbon	Eurofins | mgt Suite B11A	Eurofins | mgt Suite B14	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted																				
Melbourne Laboratory - NATA Site # 1254 & 14271						X				X				X			X	X		
Sydney Laboratory - NATA Site # 18217					X		X	X	X		X	X	X		X	X		X	X	X
Brisbane Laboratory - NATA Site # 20794																				
External Laboratory																				
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																
SW1	Mar 14, 2016		Water	S16-Ma14390	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

mg/l: milligrams per litre

ug/l: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100ml: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (Eurofins | mgt uses NATA accredited in-house method LTM-GEN-7010)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorus Pesticides (OP)							
Chlorpyrifos	mg/L	< 0.002			0.002	Pass	
Coumaphos	mg/L	< 0.002			0.002	Pass	
Demeton (total)	mg/L	< 0.004			0.004	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Dimethoate	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Methyl azinphos	mg/L	< 0.002			0.002	Pass	
Malathion	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Monocrotophos	mg/L	< 0.02			0.02	Pass	
Parathion	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phorate	mg/L	< 0.002			0.002	Pass	
Prothiofos	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Chemical Oxygen Demand (COD)	mg/L	< 20			20	Pass	
Conductivity (at 25°C)	uS/cm	< 1			1	Pass	
Fluoride	mg/L	< 0.5			0.5	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Phenolics (total)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 2			2	Pass	
Suspended Solids	mg/L	< 5			5	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Total Alkalinity (as CaCO3)	mg/L	< 5			5	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/L	< 0.05			0.05	Pass	
Chromium	mg/L	< 0.005			0.005	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Manganese	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	107			70-130	Pass	
TRH C10-C14	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	96			70-130	Pass	
TRH C6-C10	%	113			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	112			70-130	Pass	
4.4'-DDD	%	126			70-130	Pass	
4.4'-DDE	%	99			70-130	Pass	
4.4'-DDT	%	89			70-130	Pass	
a-BHC	%	74			70-130	Pass	
Aldrin	%	82			70-130	Pass	
b-BHC	%	83			70-130	Pass	
d-BHC	%	73			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin	%	99			70-130	Pass	
Endosulfan I	%	93			70-130	Pass	
Endosulfan II	%	103			70-130	Pass	
Endosulfan sulphate	%	93			70-130	Pass	
Endrin	%	84			70-130	Pass	
Endrin aldehyde	%	93			70-130	Pass	
Endrin ketone	%	73			70-130	Pass	
g-BHC (Lindane)	%	82			70-130	Pass	
Heptachlor	%	88			70-130	Pass	
Heptachlor epoxide	%	93			70-130	Pass	
Hexachlorobenzene	%	90			70-130	Pass	
Methoxychlor	%	82			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides (OP)							
Chlorpyrifos	%	84			70-130	Pass	
Coumaphos	%	97			70-130	Pass	
Diazinon	%	72			70-130	Pass	
Dichlorvos	%	71			70-130	Pass	
Dimethoate	%	81			70-130	Pass	
Disulfoton	%	70			70-130	Pass	
Fenitrothion	%	99			70-130	Pass	
Fenthion	%	87			70-130	Pass	
Methyl azinphos	%	89			70-130	Pass	
Malathion	%	131			70-130	Fail	
Methyl parathion	%	81			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	109			70-130	Pass	
LCS - % Recovery							
Ammonia (as N)	%	89			70-130	Pass	
Chemical Oxygen Demand (COD)	%	104			70-130	Pass	
Chromium (hexavalent)	%	81			70-130	Pass	
Conductivity (at 25°C)	%	106			70-130	Pass	
Nitrate (as N)	%	94			70-130	Pass	
Phenolics (total)	%	113			70-130	Pass	
Phosphate total (as P)	%	82			70-130	Pass	
Sulphate (as S)	%	98			70-130	Pass	
Total Organic Carbon	%	103			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO3)	%	118			70-130	Pass	
Total Alkalinity (as CaCO3)	%	118			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	93			70-130	Pass	
Chromium	%	88			70-130	Pass	
Iron	%	92			70-130	Pass	
Manganese	%	96			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	109			70-130	Pass	
Magnesium	%	110			70-130	Pass	
Potassium	%	104			70-130	Pass	
Sodium	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S16-Ma15668	NCP	%	81			70-130	Pass	
TRH C10-C14	S16-Ma14362	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S16-Ma15668	NCP	%	92			70-130	Pass	
TRH C6-C10	S16-Ma15668	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S16-Ma14362	NCP	%	101			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	S16-Ma17123	NCP	%	104			70-130	Pass	
Chemical Oxygen Demand (COD)	M16-Ja17442	NCP	%	96			70-130	Pass	
Chromium (hexavalent)	S16-Ma14390	CP	%	76			70-130	Pass	
Nitrate (as N)	M16-Ma15006	NCP	%	91			70-130	Pass	
Phenolics (total)	S16-Ma11723	NCP	%	111			70-130	Pass	
Phosphate total (as P)	S16-Ma16997	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	S16-Ma14229	NCP	%	90			70-130	Pass	
Chromium	S16-Ma14229	NCP	%	80			70-130	Pass	
Iron	S16-Ma14229	NCP	%	90			70-130	Pass	
Manganese	S16-Ma14229	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Calcium	M16-Ma14816	NCP	%	110			70-130	Pass	
Magnesium	M16-Ma14816	NCP	%	108			70-130	Pass	
Potassium	M16-Ma14816	NCP	%	99			70-130	Pass	
Sodium	M16-Ma14816	NCP	%	100			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S16-Ma15667	NCP	mg/L	0.23	0.23	1.0	30%	Pass	
TRH C10-C14	S16-Ma14361	NCP	mg/L	1.6	1.6	5.0	30%	Pass	
TRH C15-C28	S16-Ma14361	NCP	mg/L	0.2	0.2	32	30%	Fail	Q15
TRH C29-C36	S16-Ma14361	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S16-Ma15667	NCP	mg/L	0.02	0.02	3.0	30%	Pass	
TRH C6-C10	S16-Ma15667	NCP	mg/L	0.34	0.34	1.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S16-Ma14361	NCP	mg/L	1.6	1.6	3.0	30%	Pass	
TRH >C16-C34	S16-Ma14361	NCP	mg/L	0.1	< 0.1	53	30%	Fail	Q15
TRH >C34-C40	S16-Ma14361	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	S16-Ma16262	NCP	mg/L	0.12	0.11	4.0	30%	Pass	
Chemical Oxygen Demand (COD)	M16-Ma13463	NCP	mg/L	3800	4000	5.0	30%	Pass	
Chromium (hexavalent)	S16-Ma14390	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Conductivity (at 25°C)	S16-Ma14390	CP	uS/cm	380	390	1.0	30%	Pass	
Nitrate (as N)	M16-Ma15334	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Phenolics (total)	S16-Ma11723	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Phosphate total (as P)	S16-Ma16897	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Suspended Solids	S16-Ma16171	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Total Organic Carbon	M16-Ma14919	NCP	mg/L	13	16	15	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	S16-Ma14390	CP	mg/L	95	100	5.0	30%	Pass	
Carbonate Alkalinity (as CaCO3)	S16-Ma14390	CP	mg/L	< 5	< 5	<1	30%	Pass	
Total Alkalinity (as CaCO3)	S16-Ma14390	CP	mg/L	95	100	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	S16-Ma12194	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Chromium	S16-Ma12194	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Iron	S16-Ma12194	NCP	mg/L	0.33	0.34	2.0	30%	Pass	
Manganese	S16-Ma12194	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Ma14815	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Magnesium	M16-Ma14815	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Potassium	M16-Ma14815	NCP	mg/L	< 1	< 1	<1	30%	Pass	
Sodium	M16-Ma14815	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
M10	NATA accreditation does not cover the performance of this service in soil matrices
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Bob Symons	Senior Analyst-Inorganic (NSW)
Huong Le	Senior Analyst-Inorganic (VIC)
Ivan Taylor	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1616239**	Page	: 1 of 7
Client	: **ACIRL PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: LITHGOW ENVIRO	Contact	:
Address	: UNIT 3 16 DONALD STREET LITHGOW NSW, AUSTRALIA 2790	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6350 7400	Telephone	: +61-2-8784 8555
Project	: LITHGOW CITY COUNCIL - SPECIAL	Date Samples Received	: 26-Jul-2016 08:45
Order number	: ----	Date Analysis Commenced	: 26-Jul-2016
C-O-C number	: ----	Issue Date	: 28-Jul-2016 15:23
Sampler	: MD		
Site	: ACIRL LITHGOW		
Quote number	: ----		
No. of samples received	: 1		
No. of samples analysed	: 1		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW1	----	----	----	----
				Client sampling date / time	[22-Jul-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1616239-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**64**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**64**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**46**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**23**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**30**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**7**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**22**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**8**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**3.41**	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.003**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.070**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**3.81**	----	----	----	----
EG050G: Hexavalent Chromium by Discrete Analyser									
Hexavalent Chromium	18540-29-9	0.01	mg/L		<0.01	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.74**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.12**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**6.29**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**6.41**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.21**	----	----	----	----
EN055: Ionic Balance									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW1	----	----	----	----
			Client sampling date / time	[22-Jul-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1616239-001	--------	--------	--------	--------
				Result	----	----	----	----
EN055: Ionic Balance - Continued								
Total Anions	----	0.01	meq/L	**3.33**	----	----	----	----
Total Cations	----	0.01	meq/L	**3.23**	----	----	----	----
Ionic Balance	----	0.01	%	**1.50**	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	**10**	----	----	----	----
EP026SP: Chemical Oxygen Demand (Spectrophotometric)								
Chemical Oxygen Demand	----	10	mg/L	**29**	----	----	----	----
EP035G: Total Phenol by Discrete Analyser								
Phenols (Total)	----	0.05	mg/L	<0.05	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4.4`-DDT	50-29-3	2	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.5	µg/L	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW1	----	----	----	----
				Client sampling date / time	[22-Jul-2016]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1616239-001	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.5	µg/L		<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	----	----	----
Monocrotophos	6923-22-4	2	µg/L		<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	----	----	----
Parathion-methyl	298-00-0	2	µg/L		<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	----	----	----
Parathion	56-38-2	2	µg/L		<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**SW1**	----	----	----	----
				Client sampling date / time	[22-Jul-2016]	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1616239-001**	--------	--------	--------	--------
					Result	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate - Continued									
Dibromo-DDE	21655-73-2	0.5	%		**84.0**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**88.1**	----	----	----	----

Surrogate Control Limits

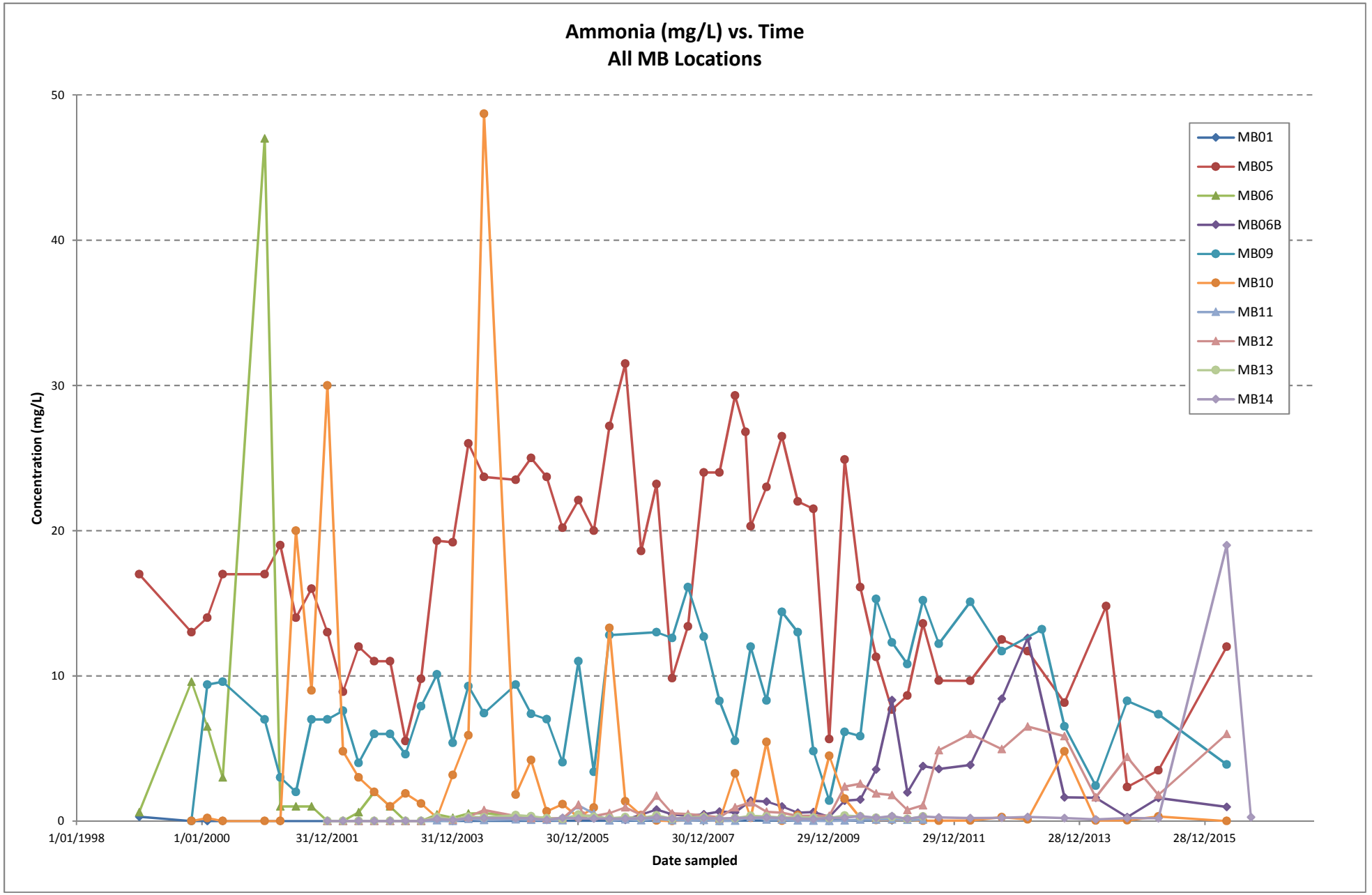
Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	30	120
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	27	129

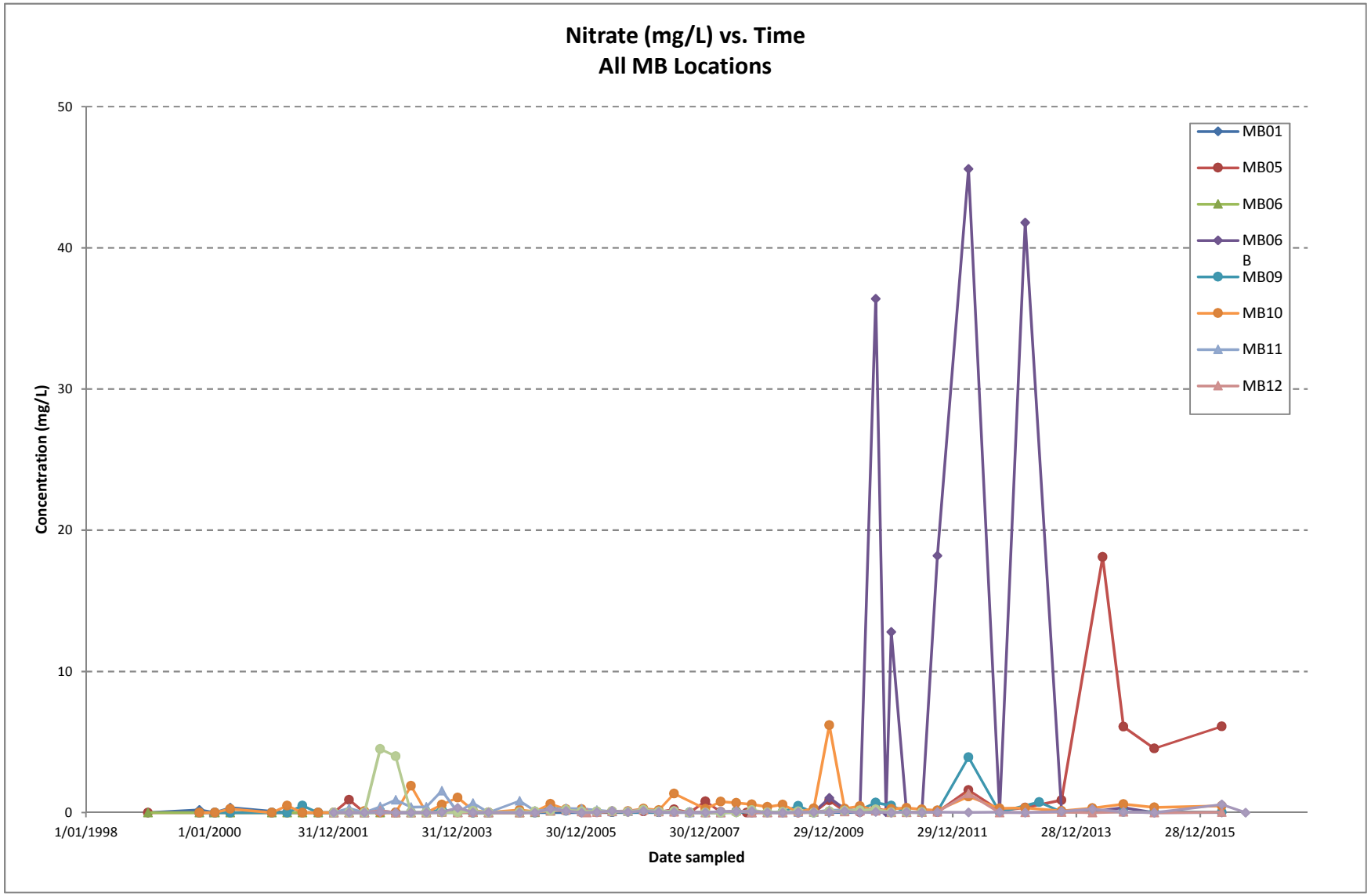
Report No:	24005776							
Sample ID	**Site Reference**	**Date of Sample**	**Sampled by**	**Time**	**pH**	**TSS (mg/L)**		
					pH units	(mg/L)		
SW1		19/09/2016	Client	8:00	6.55	22		

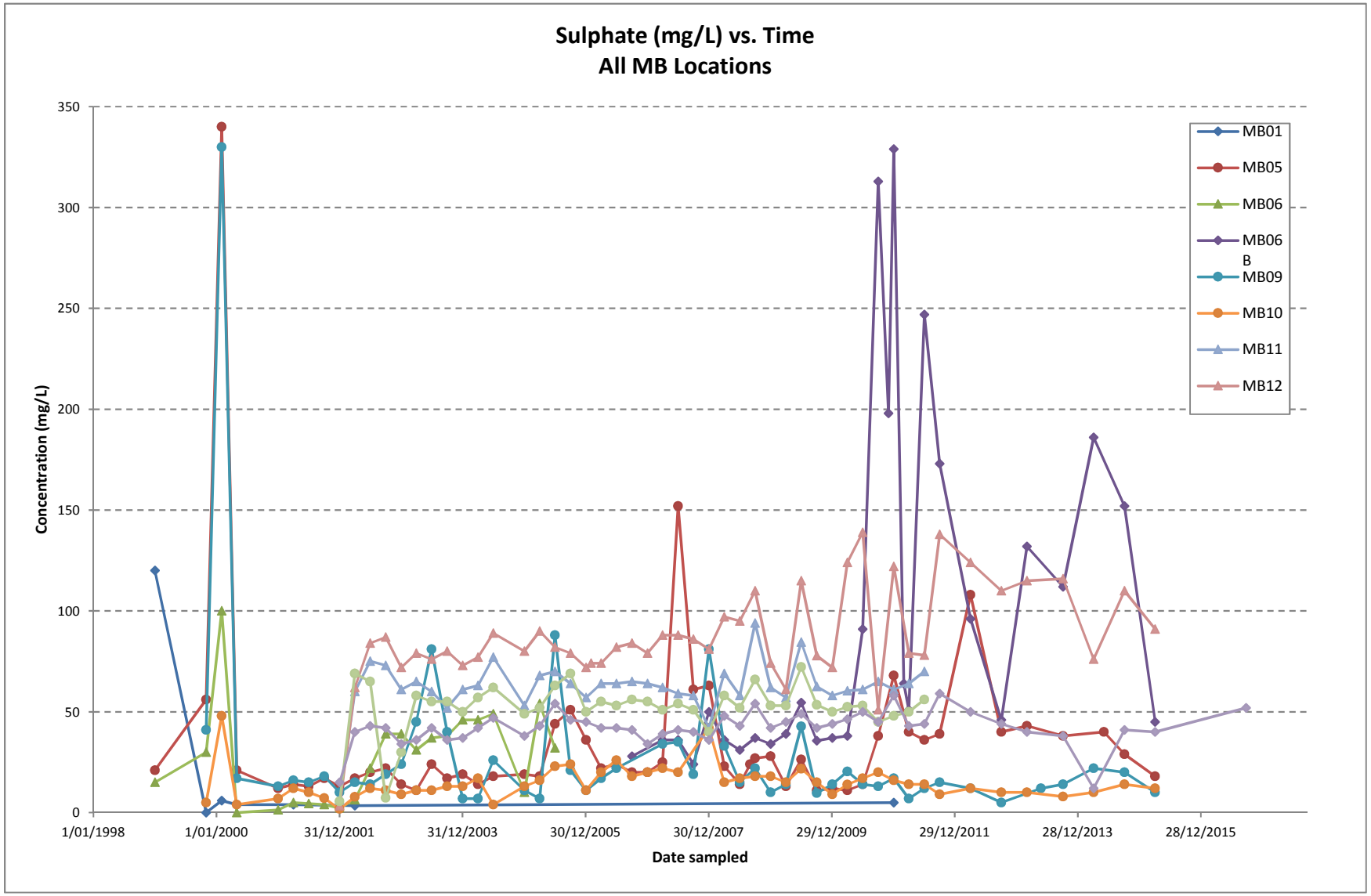
Report No:	24005776-01							
Sample ID	**Site Reference**	**Date of Sample**	**Sampled by**	**Time**	**pH**	**TSS (mg/L)**		
					pH units	(mg/L)		
SW1		23/09/2016	Client		6.09	12		

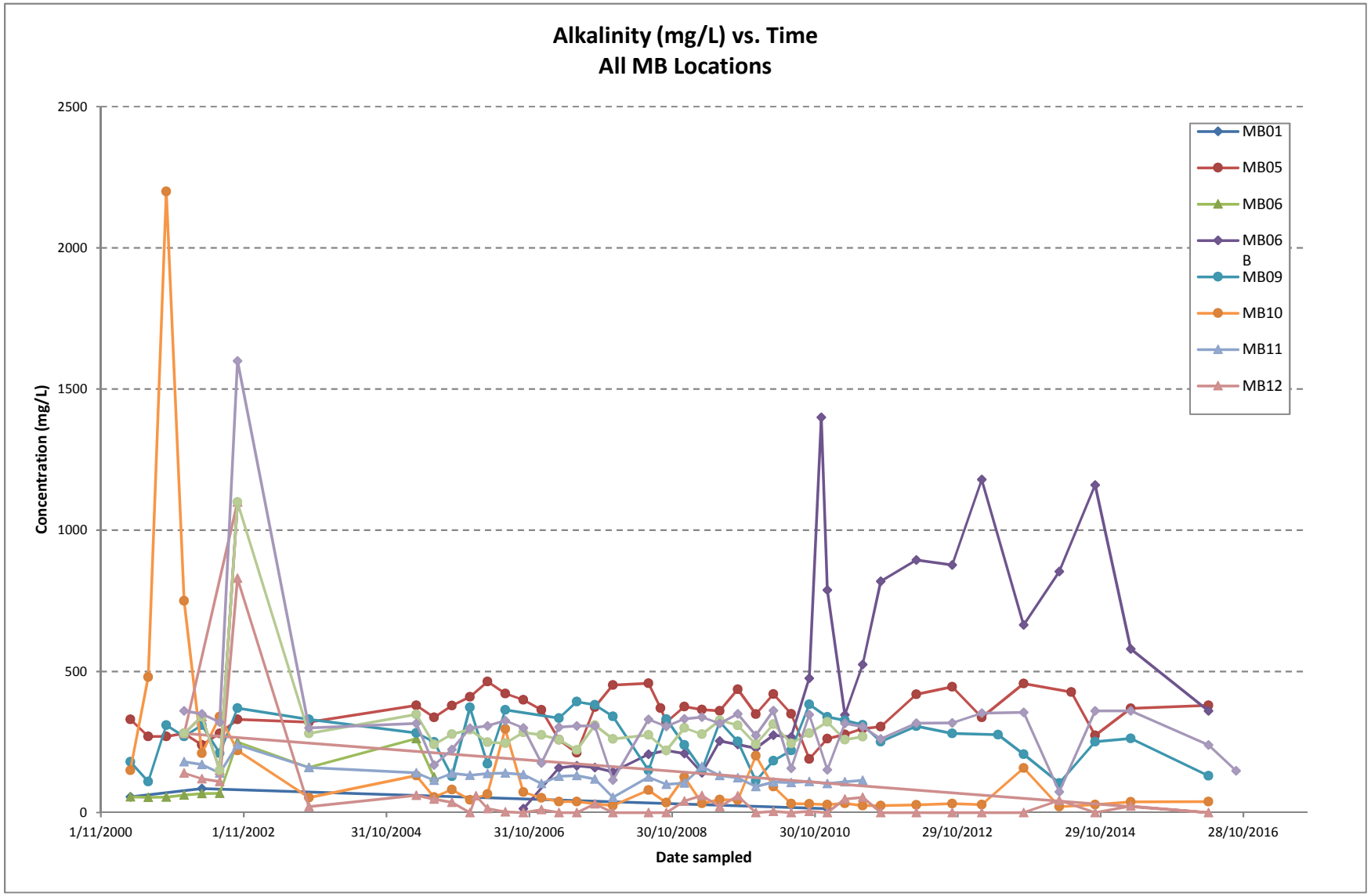
APPENDIX F SUMMARY OF RESULTS

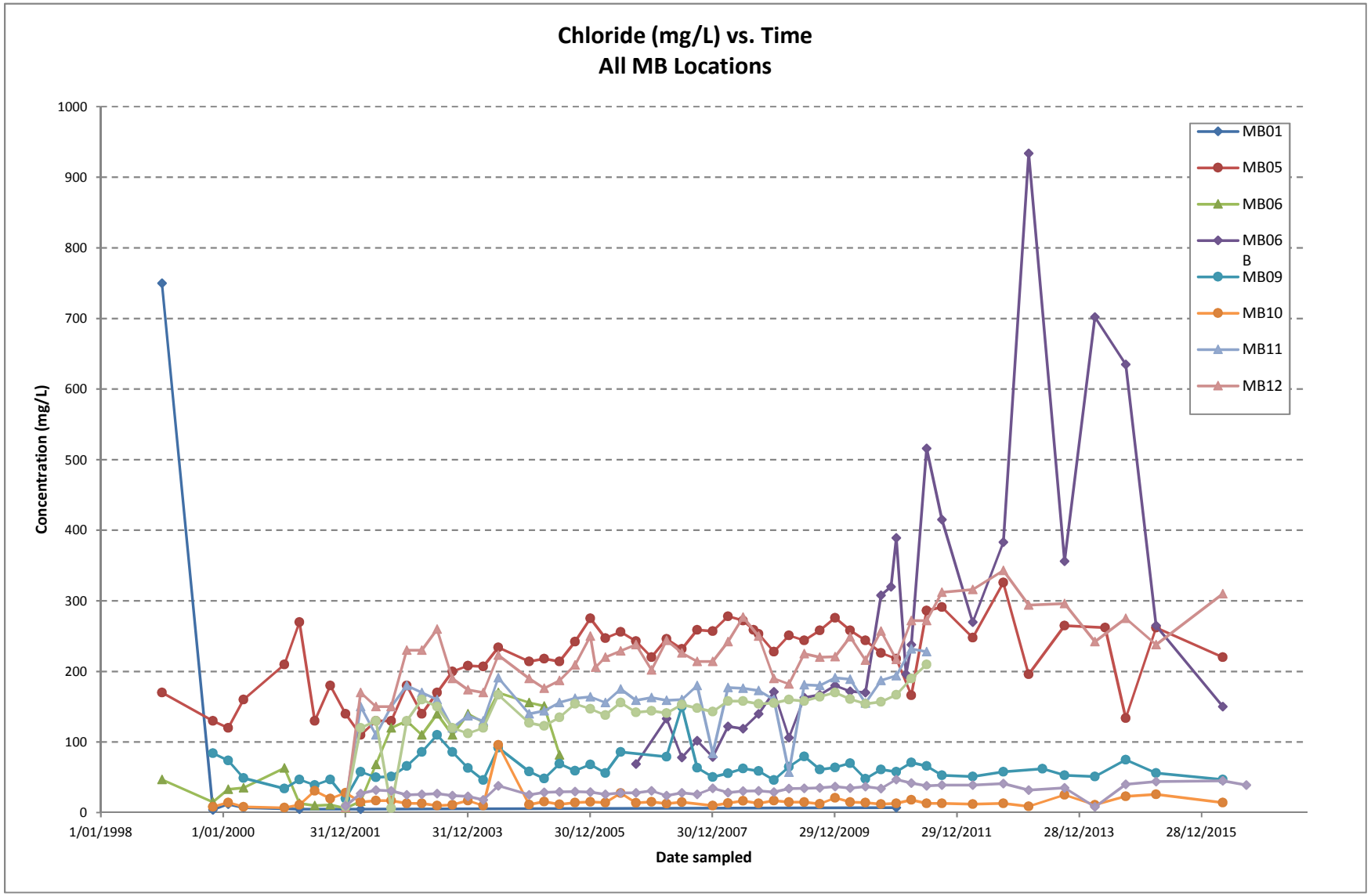
APPENDIX G GROUNDWATER TREND GRAPHS

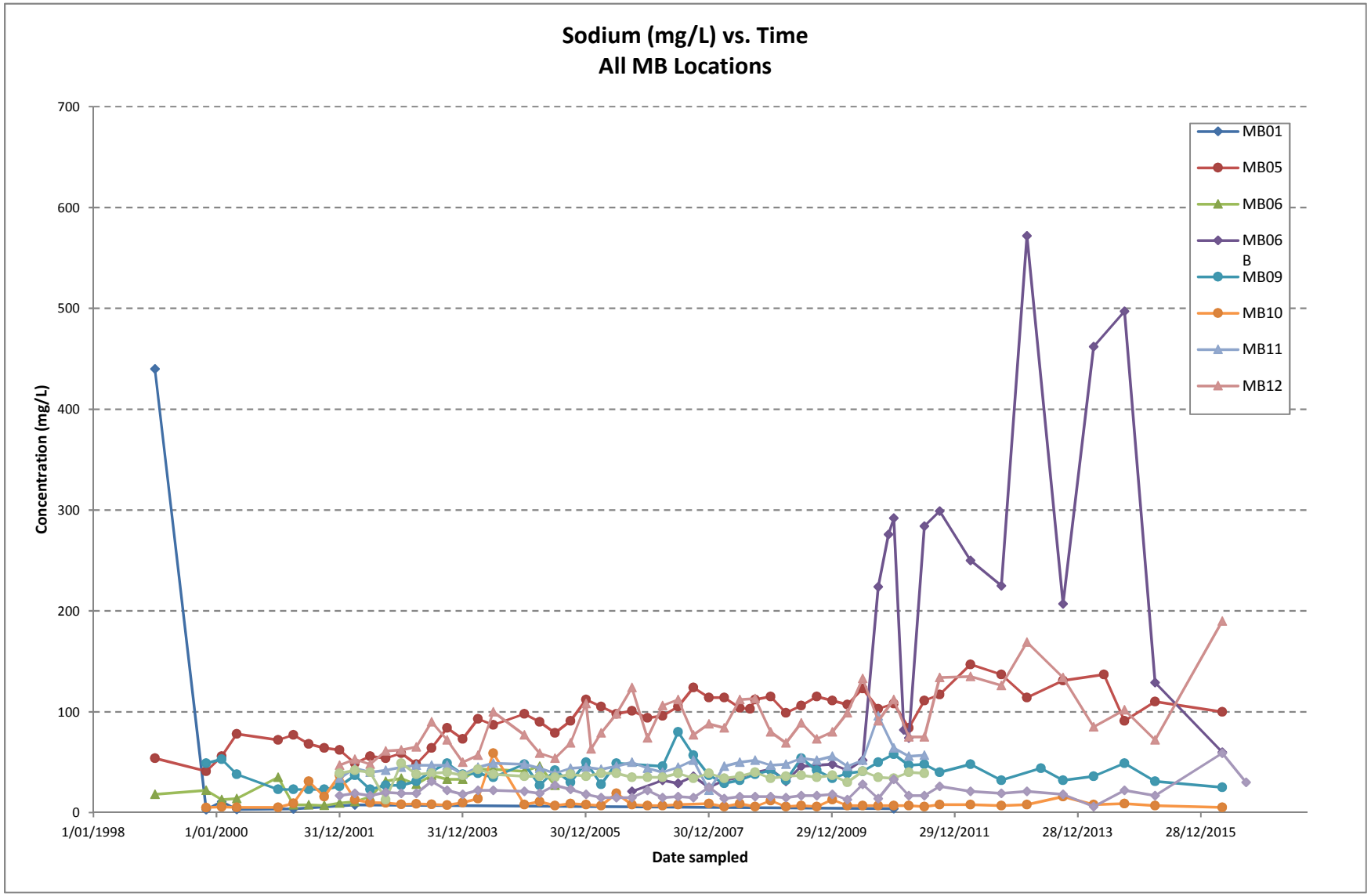

Ammonia (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
50
40
30
20
10
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12
MB13
MB14

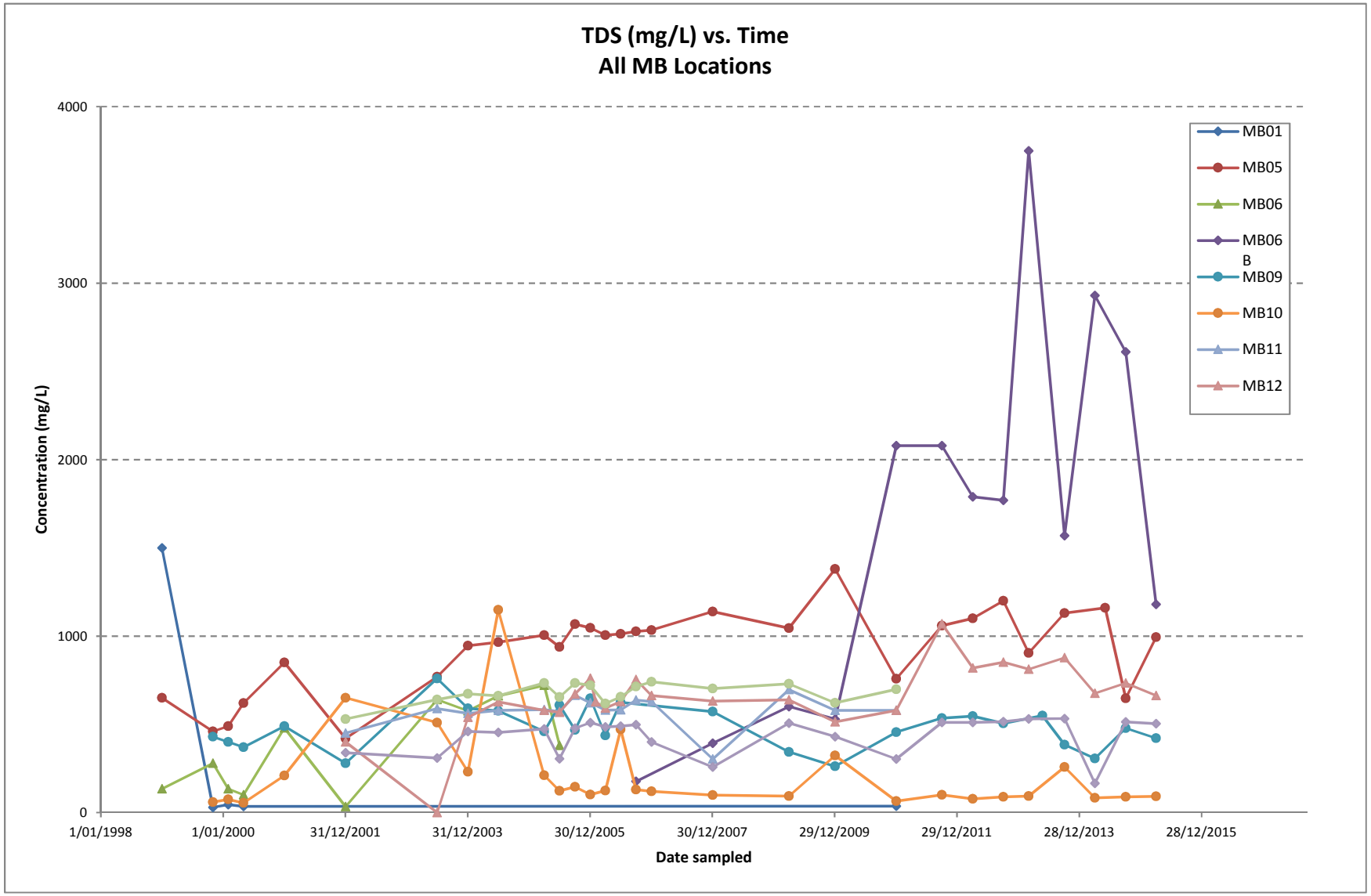

Nitrate (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
50
40
30
20
10
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

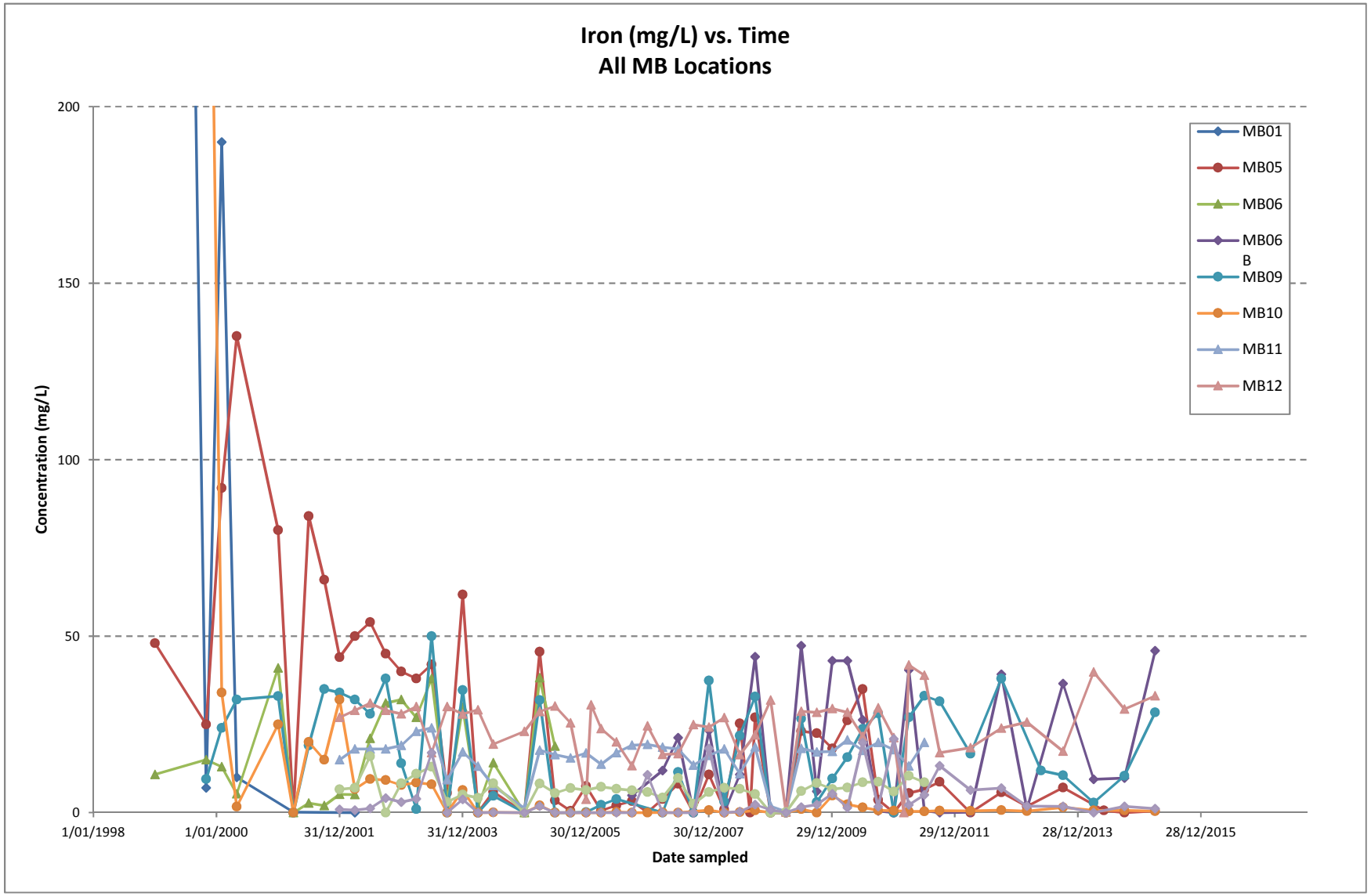

Sulphate (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
350
300
250
200
150
100
50
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

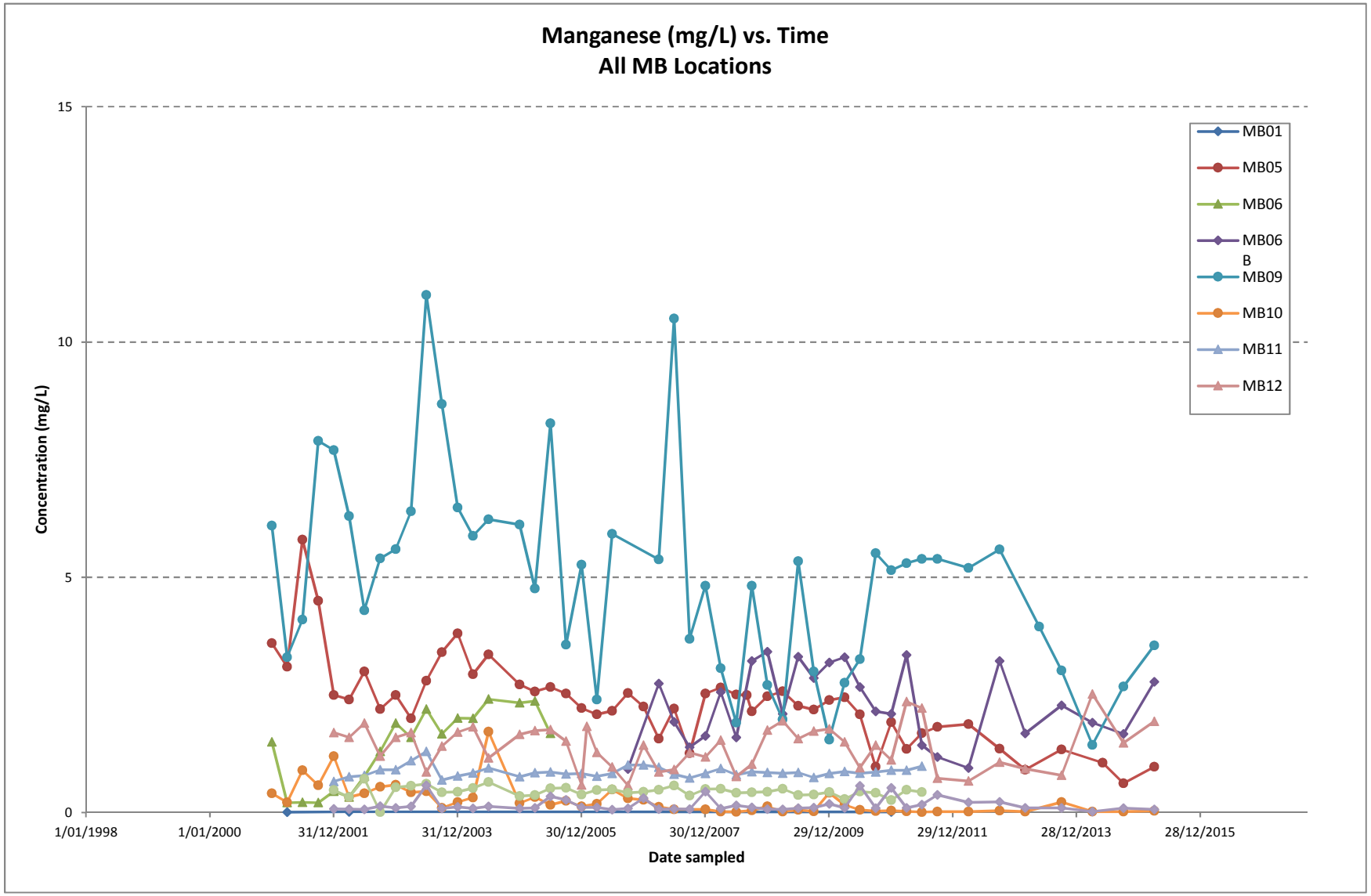

Alkalinity (mg/L) vs. Time
All MB Locations
2500
2000
1500
1000
500
0
Concentration (mg/L)
1/11/2000
1/11/2002
31/10/2004
31/10/2006
30/10/2008
30/10/2010
29/10/2012
29/10/2014
28/10/2016
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

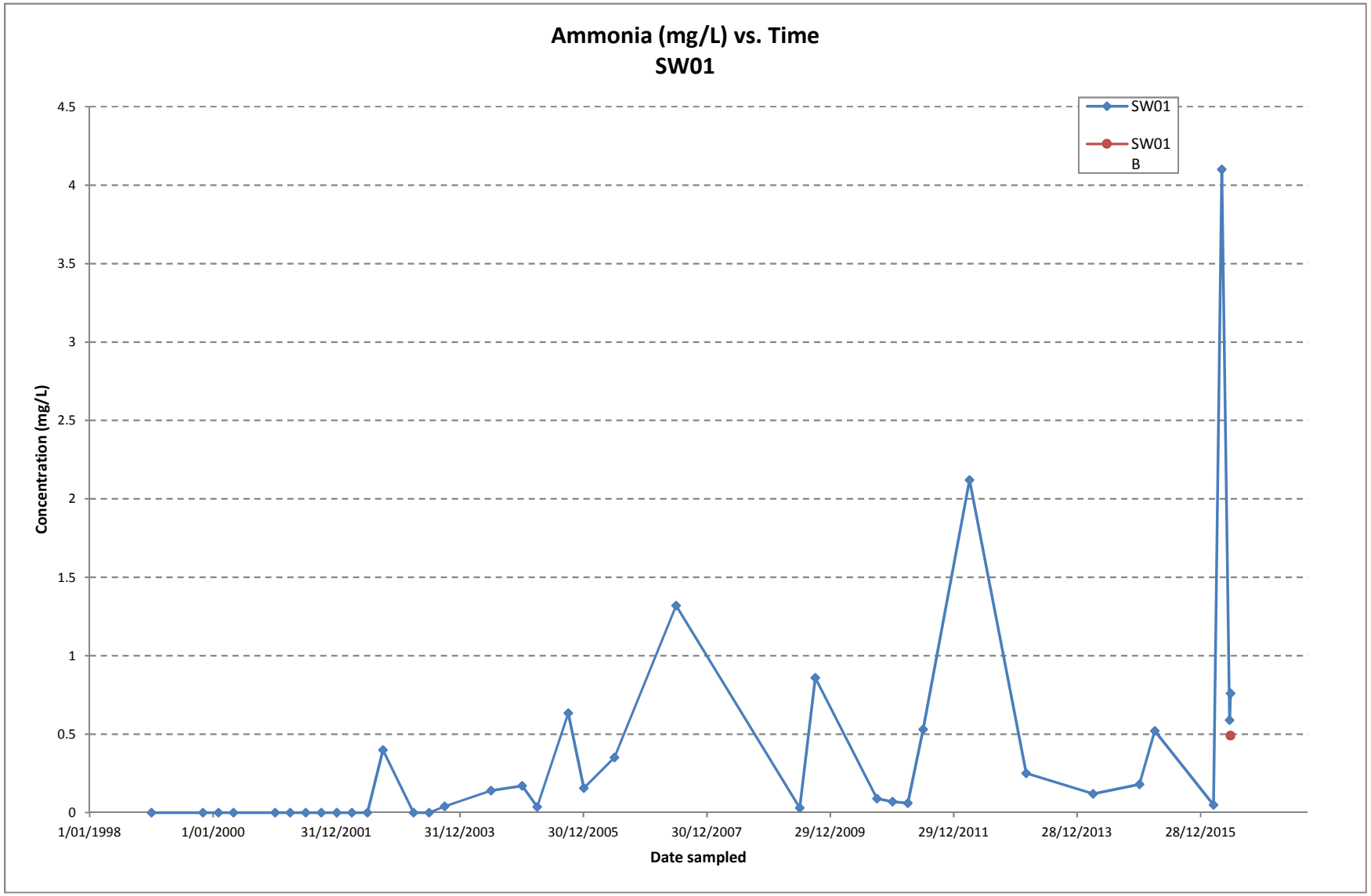

Chloride (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

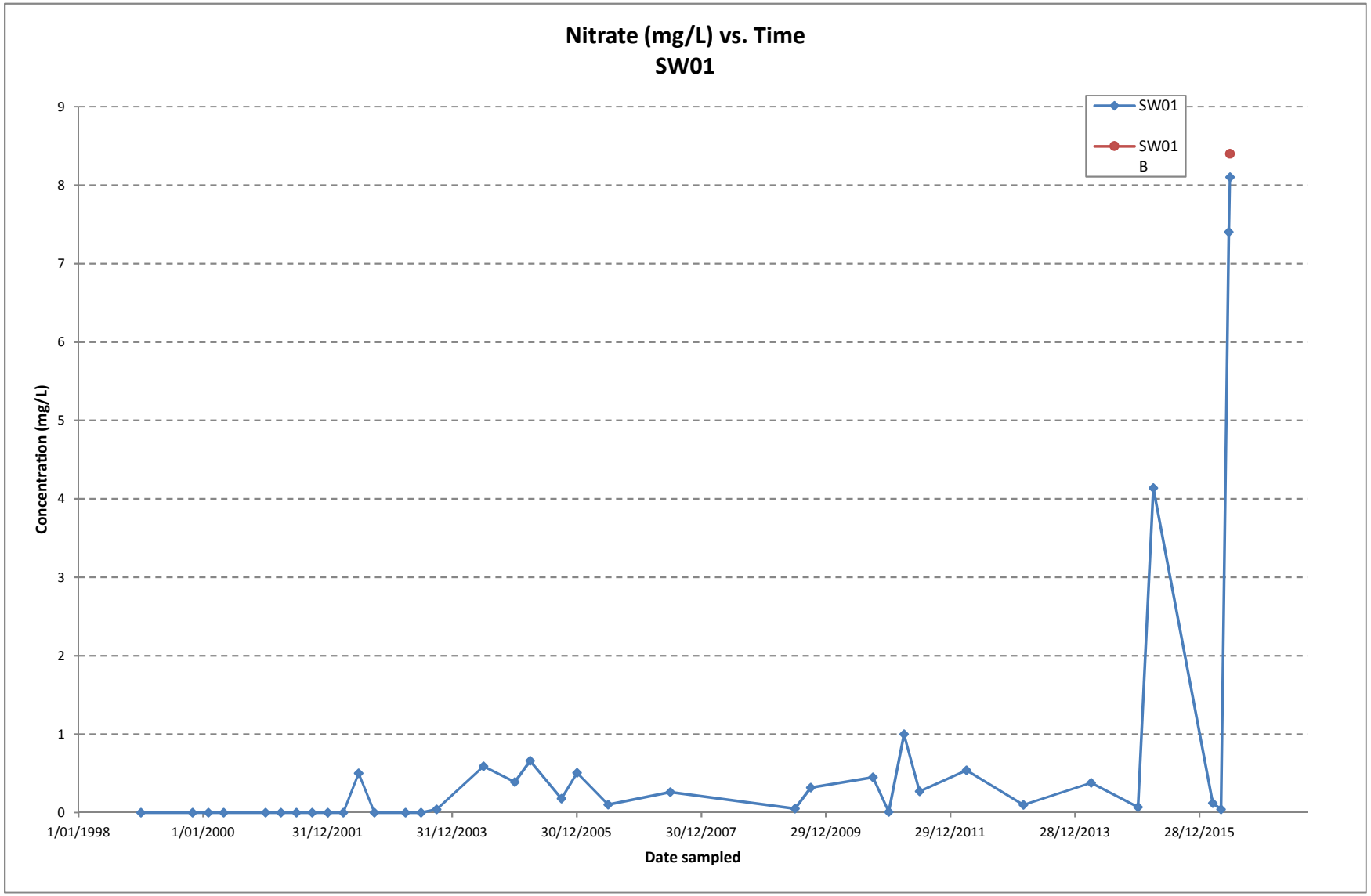

Sodium (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
700
600
500
400
300
200
100
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

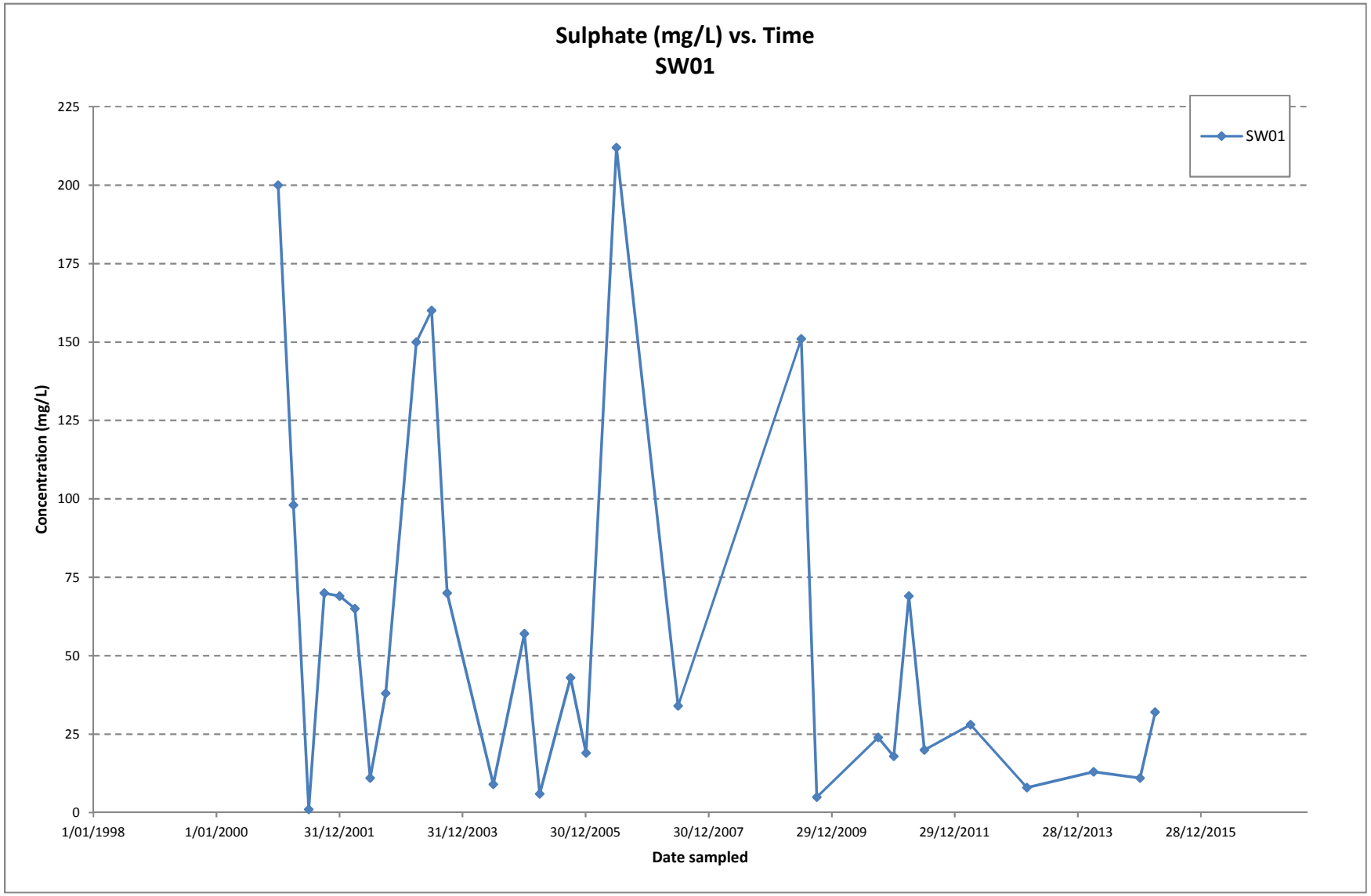

TDS (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
4000
3000
2000
1000
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06 B
MB09
MB10
MB11
MB12

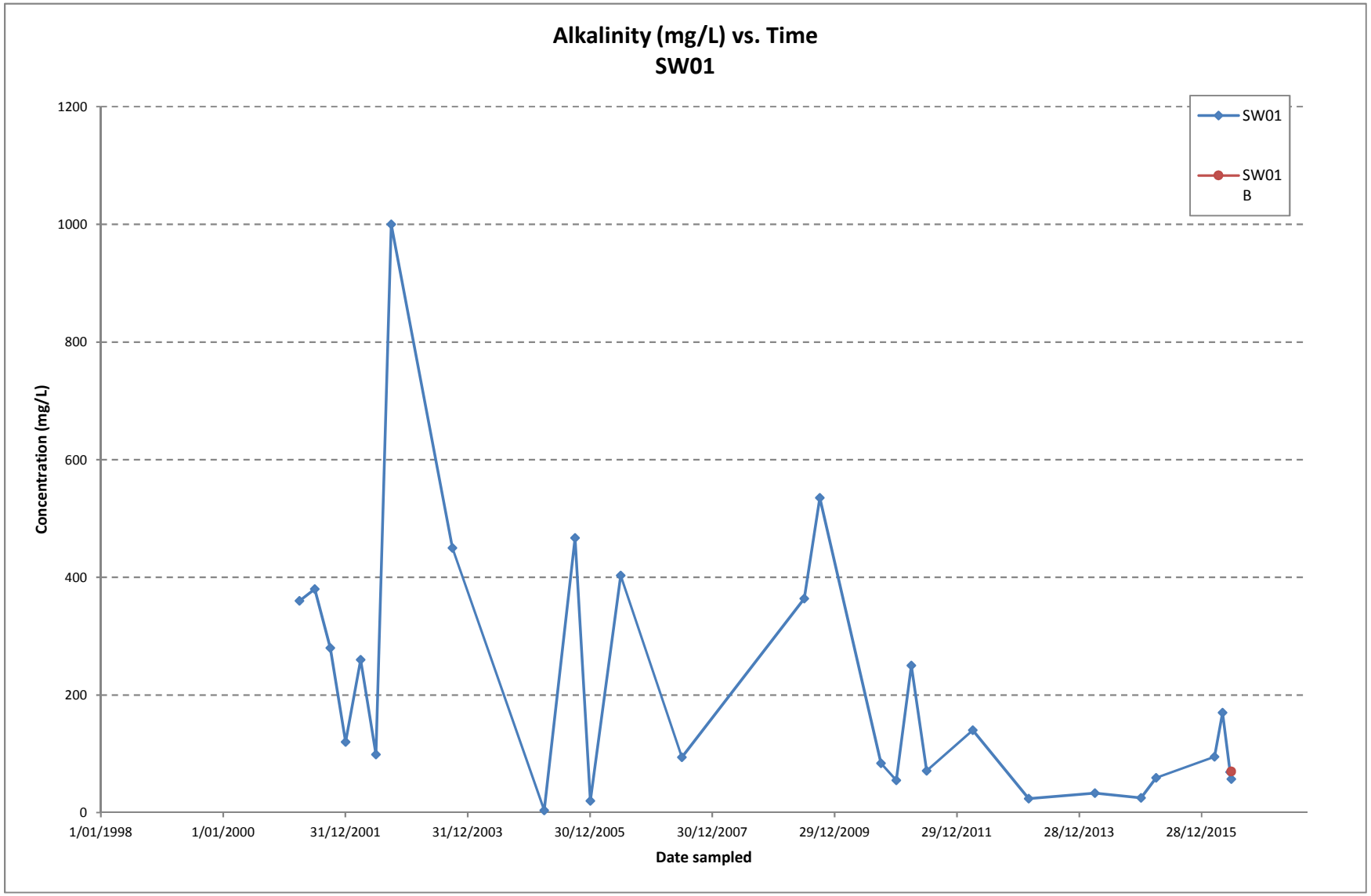

Iron (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
200
150
100
50
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

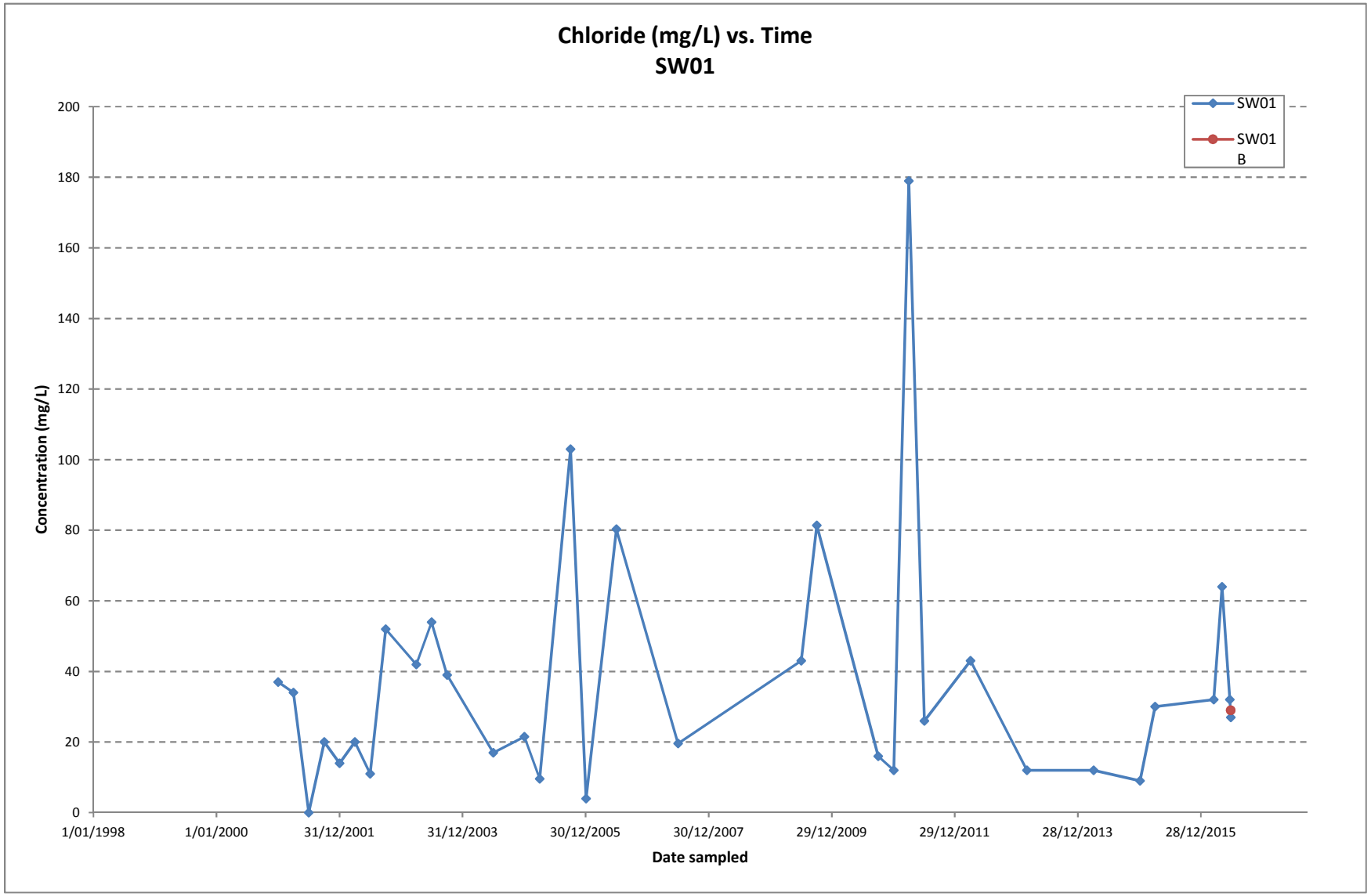

Manganese (mg/L) vs. Time
All MB Locations
Concentration (mg/L)
15
10
5
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
MB01
MB05
MB06
MB06B
MB09
MB10
MB11
MB12

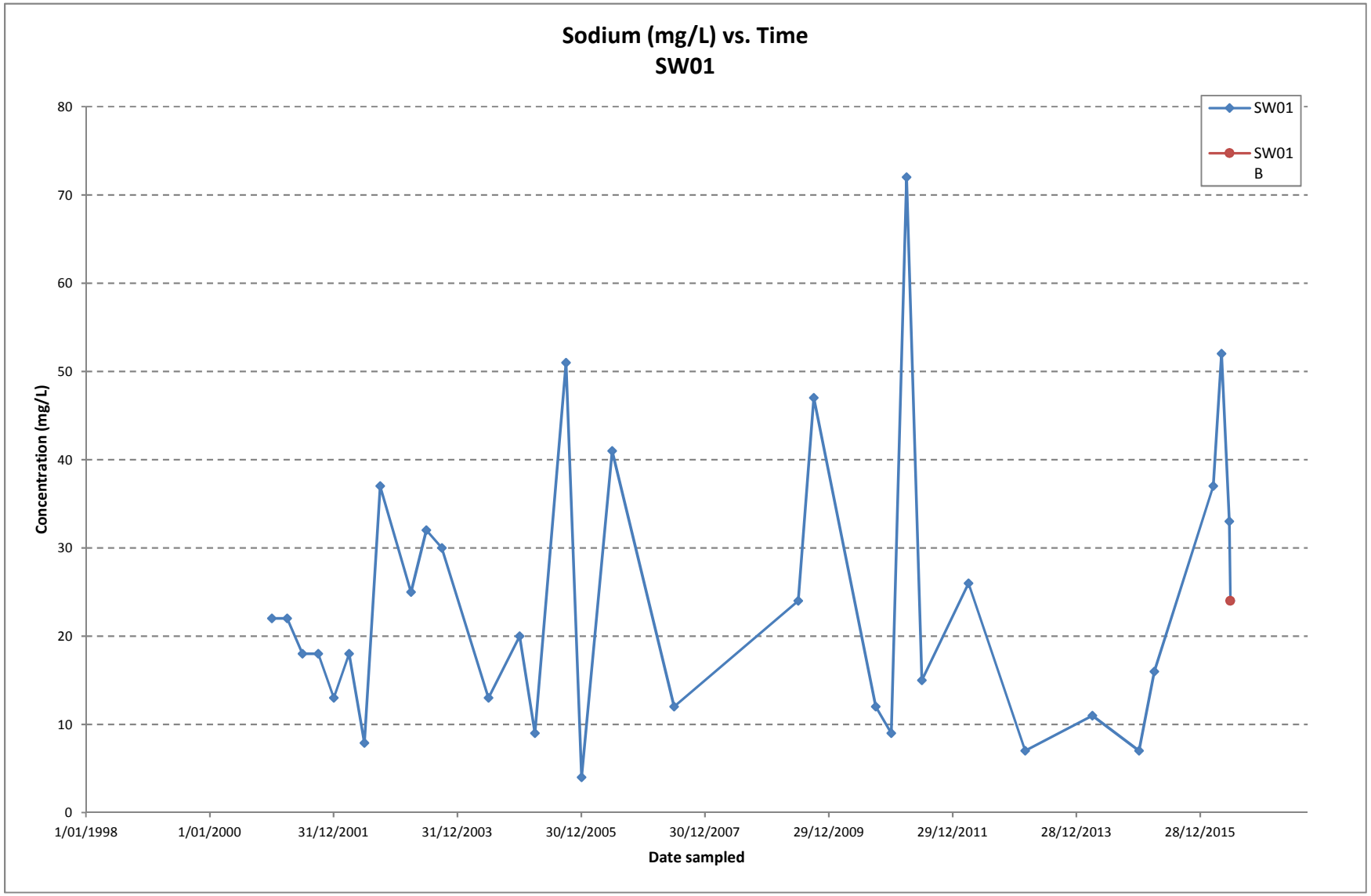

Ammonia (mg/L) vs. Time
SW01
SW01
SW01 B
Concentration (mg/L)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

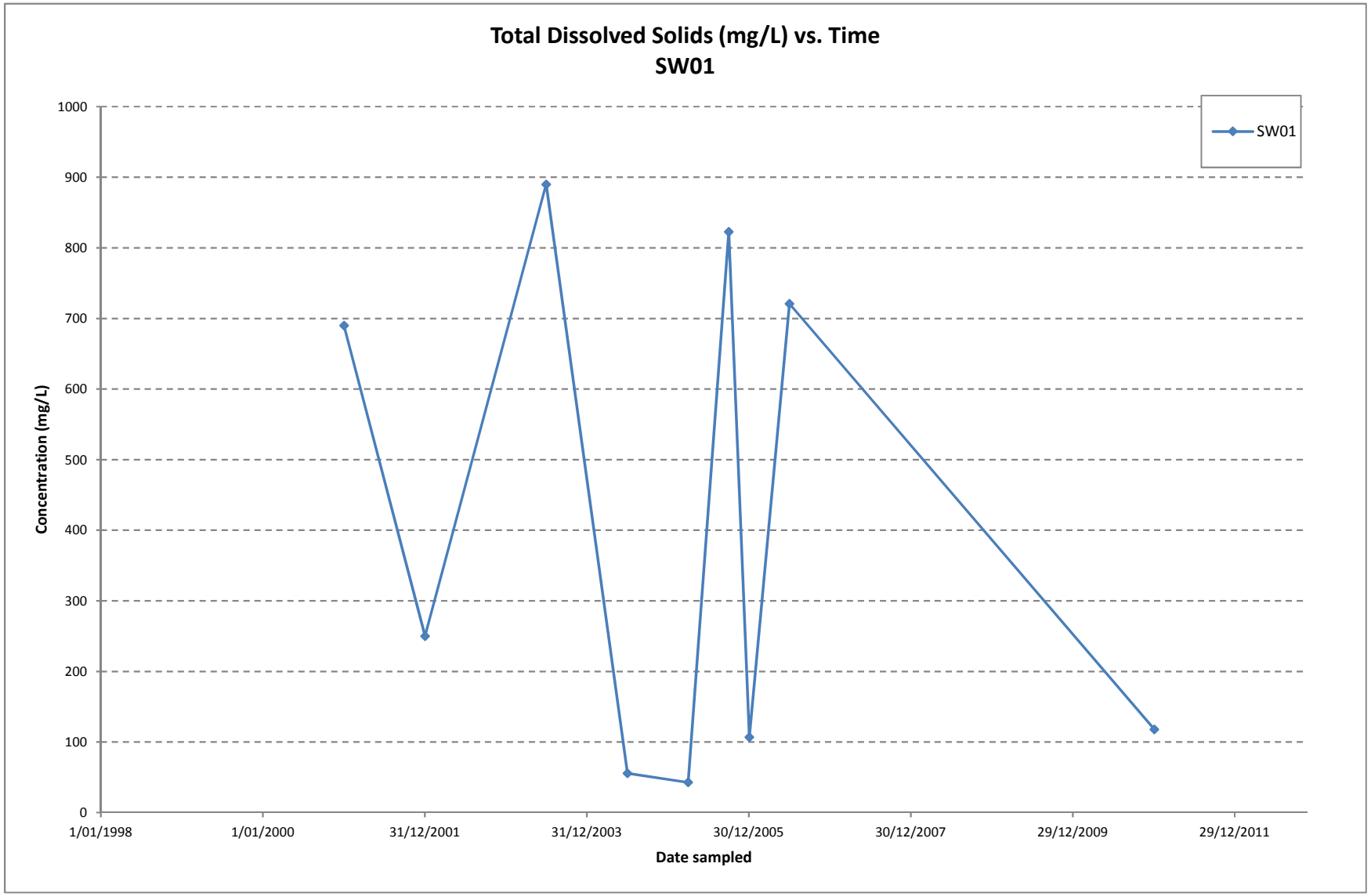

Nitrate (mg/L) vs. Time
SW01
SW01
SW01 B
Concentration (mg/L)
0
1
2
3
4
5
6
7
8
9
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

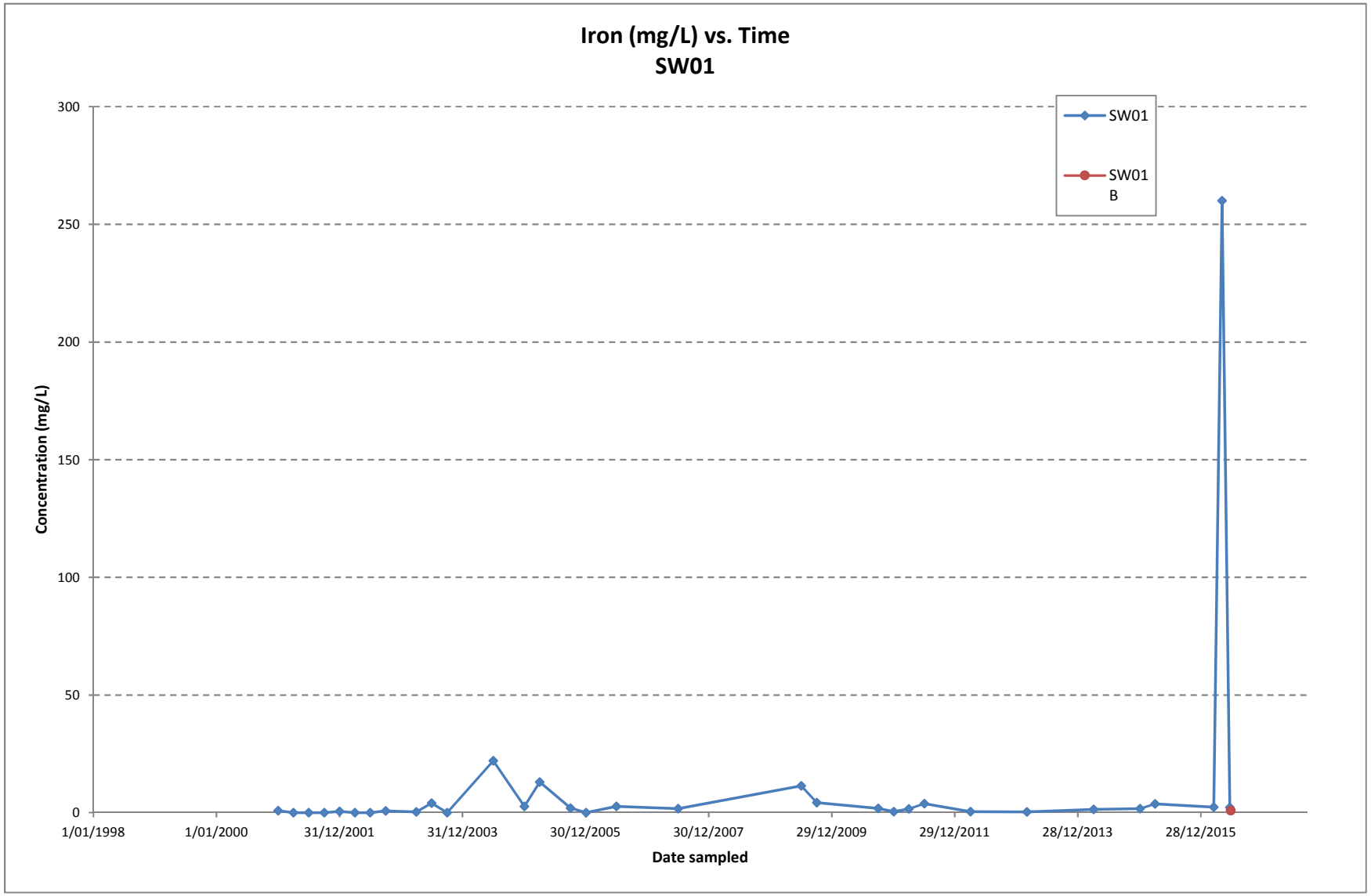

Sulphate (mg/L) vs. Time
SW01
SW01
Concentration (mg/L)
225
200
175
150
125
100
75
50
25
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

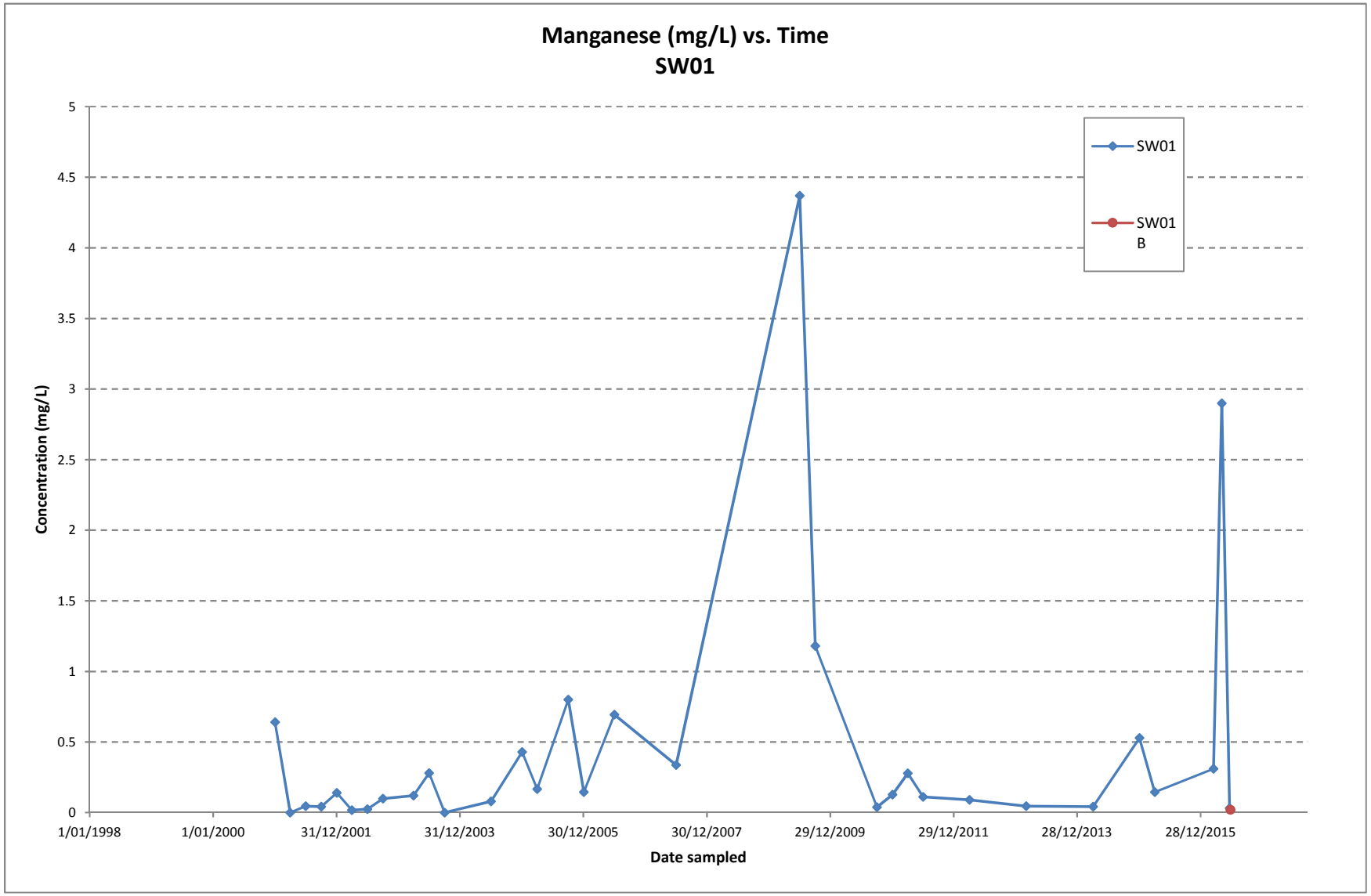

Alkalinity (mg/L) vs. Time
SW01
1200
1000
800
600
400
200
0
Concentration (mg/L)
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
SW01
SW01 B

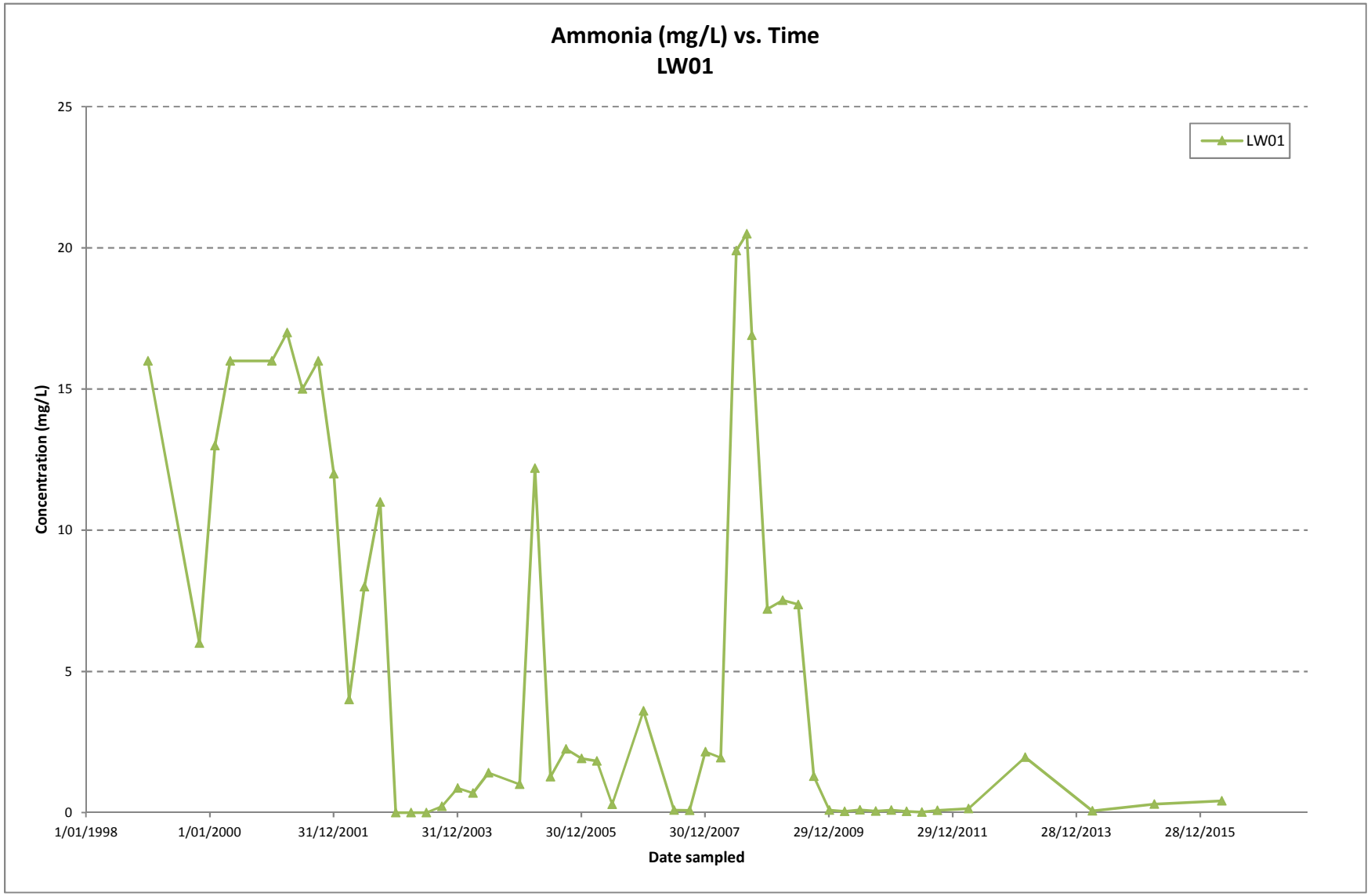

Chloride (mg/L) vs. Time
SW01
SW01
SW01 B
Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

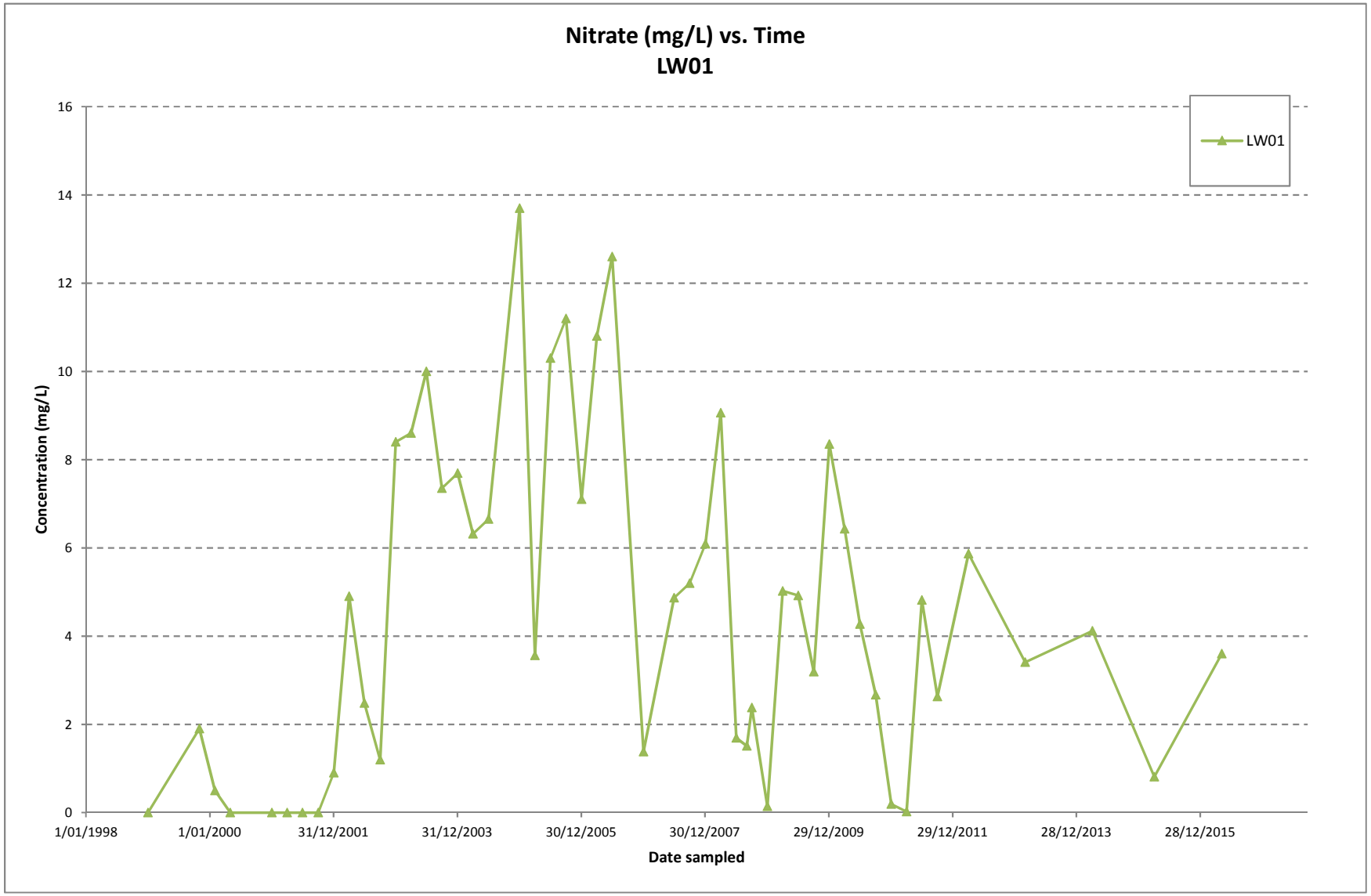

Sodium (mg/L) vs. Time
SW01
SW01
SW01 B
Concentration (mg/L)
0
10
20
30
40
50
60
70
80
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

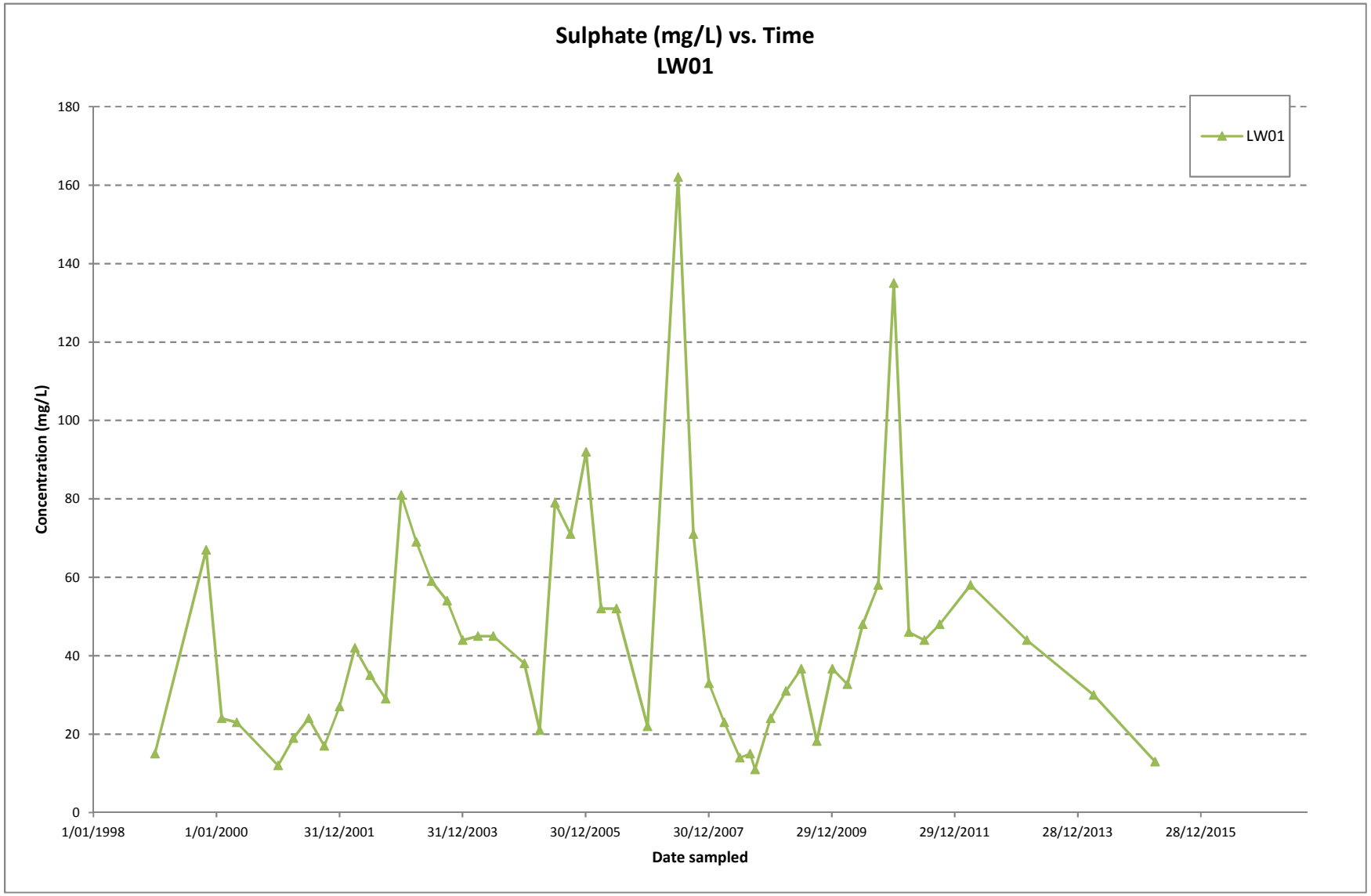

Total Dissolved Solids (mg/L) vs. Time
SW01
SW01
Concentration (mg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
Date sampled

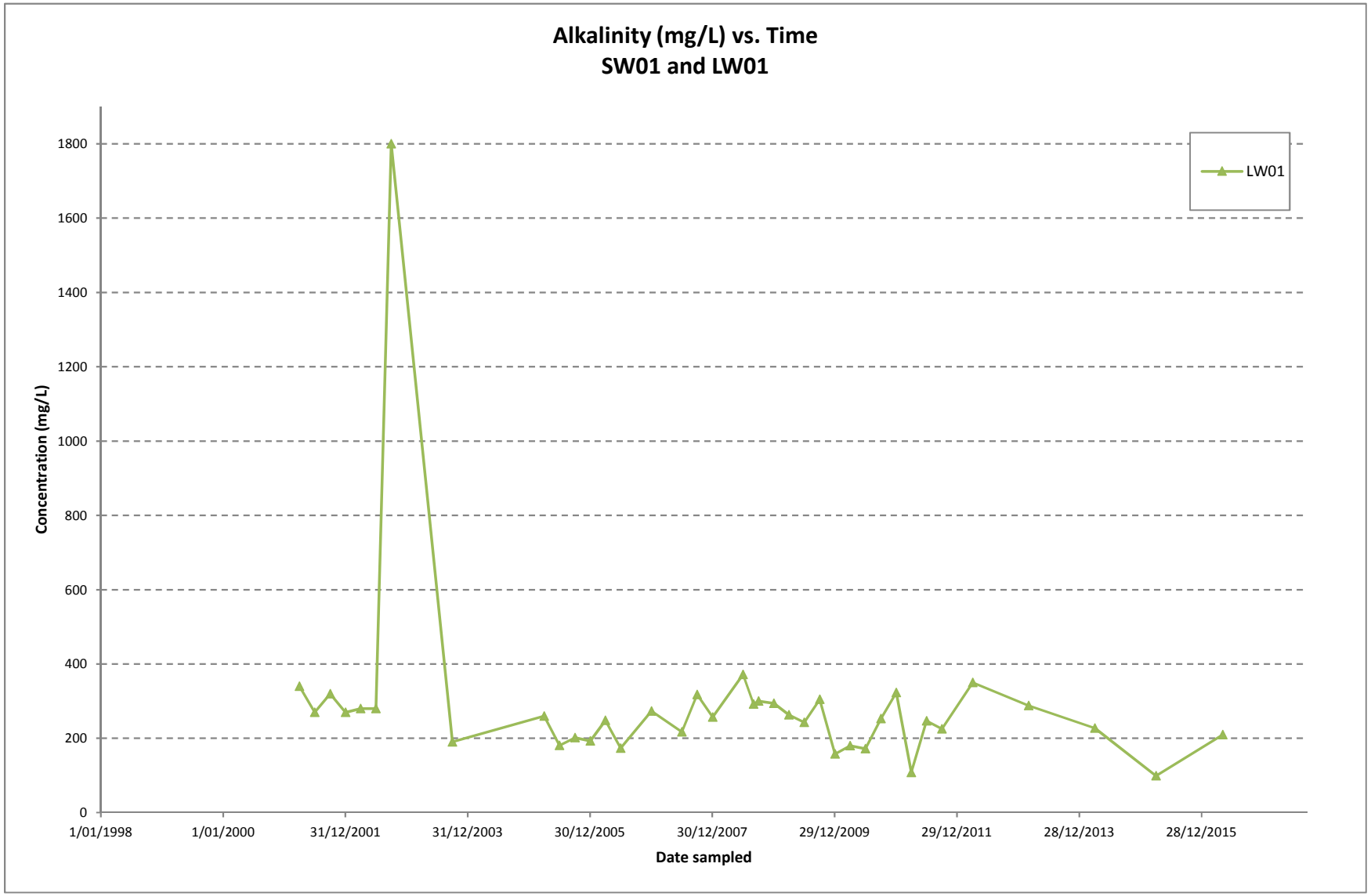

Iron (mg/L) vs. Time
SW01
SW01
SW01 B
300
250
200
150
100
50
0
Concentration (mg/L)
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

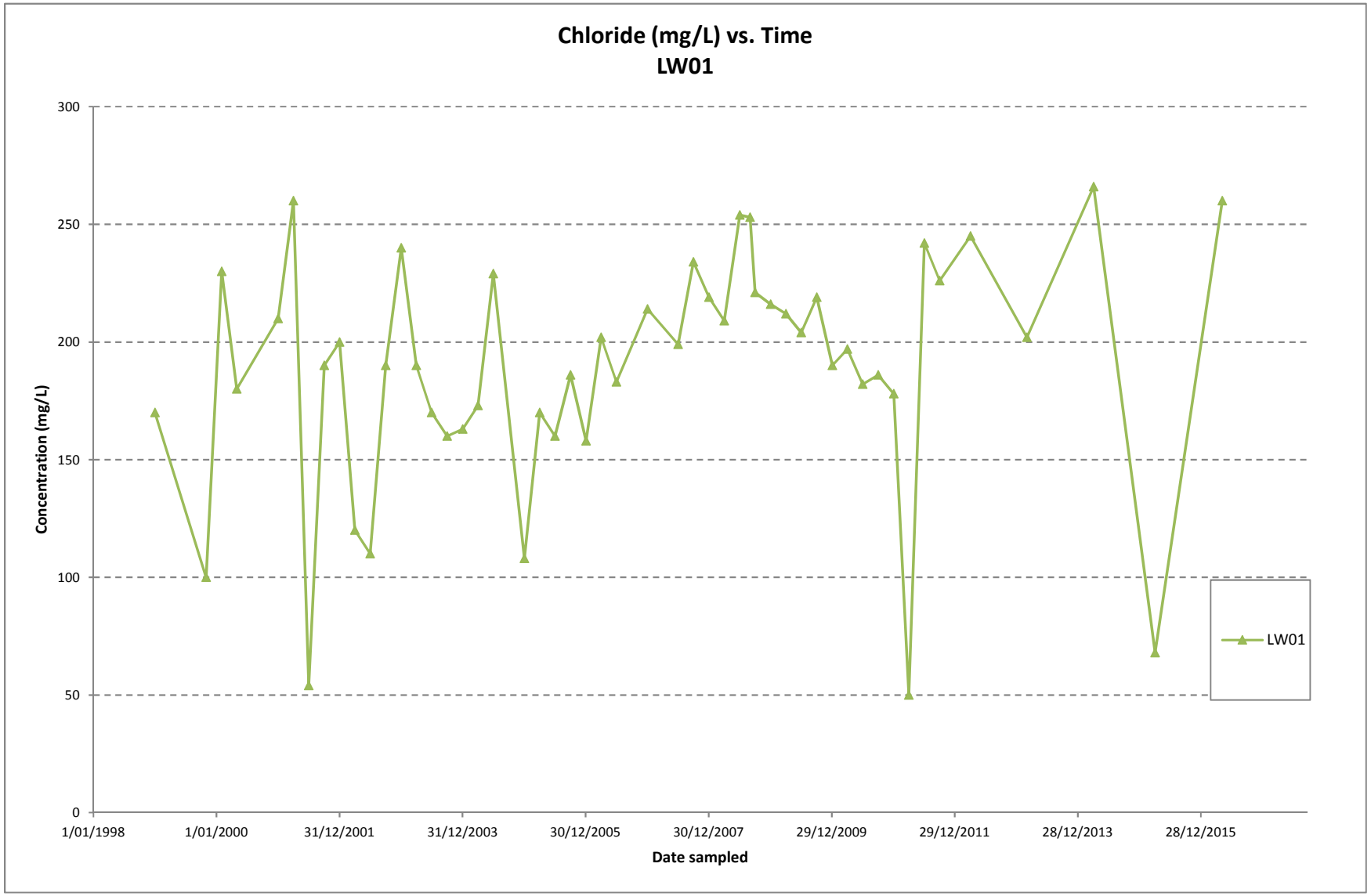

Manganese (mg/L) vs. Time
SW01
Concentration (mg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
SW01
SW01 B

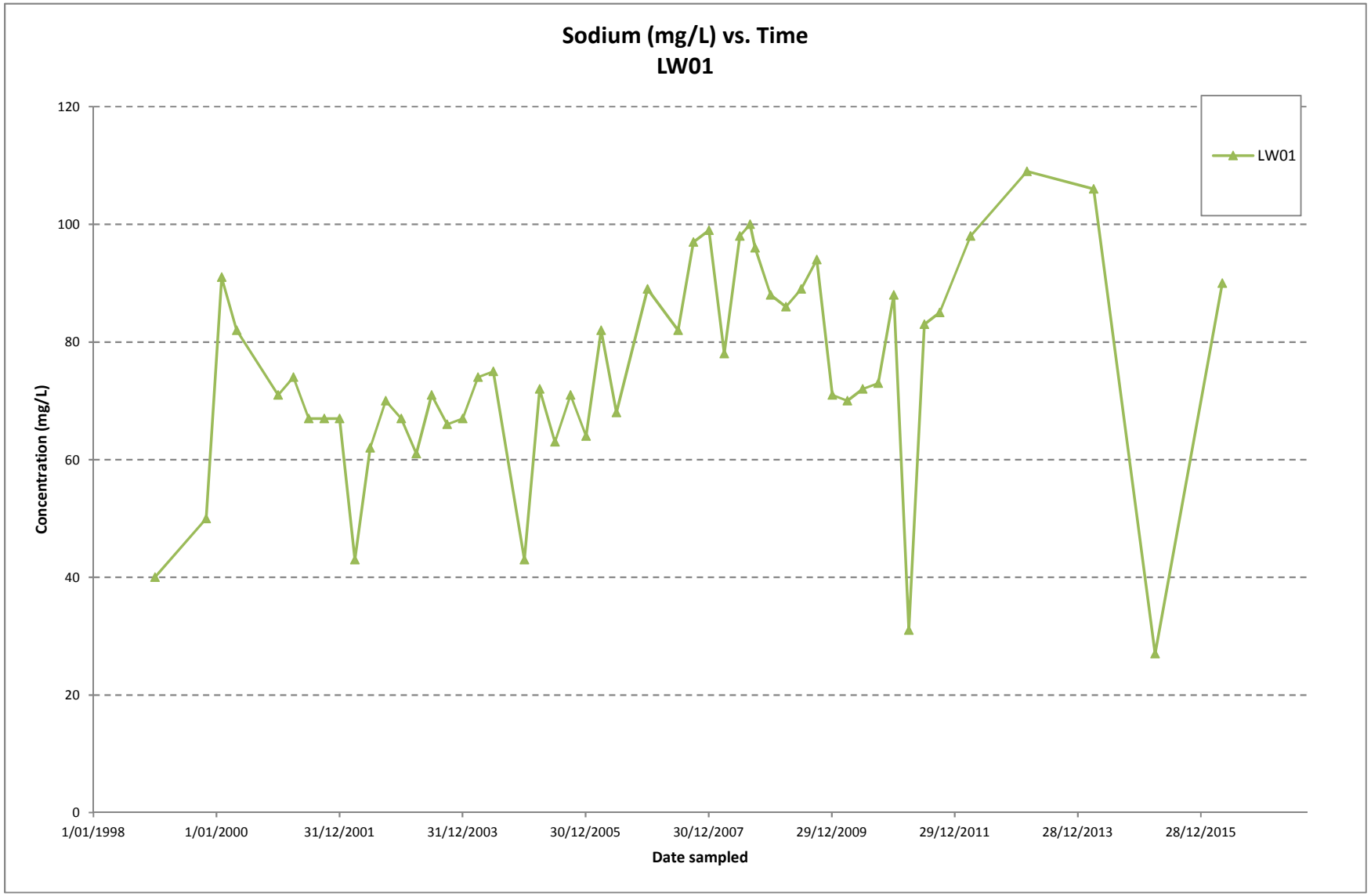

Ammonia (mg/L) vs. Time
LW01
LW01
Concentration (mg/L)
25
20
15
10
5
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

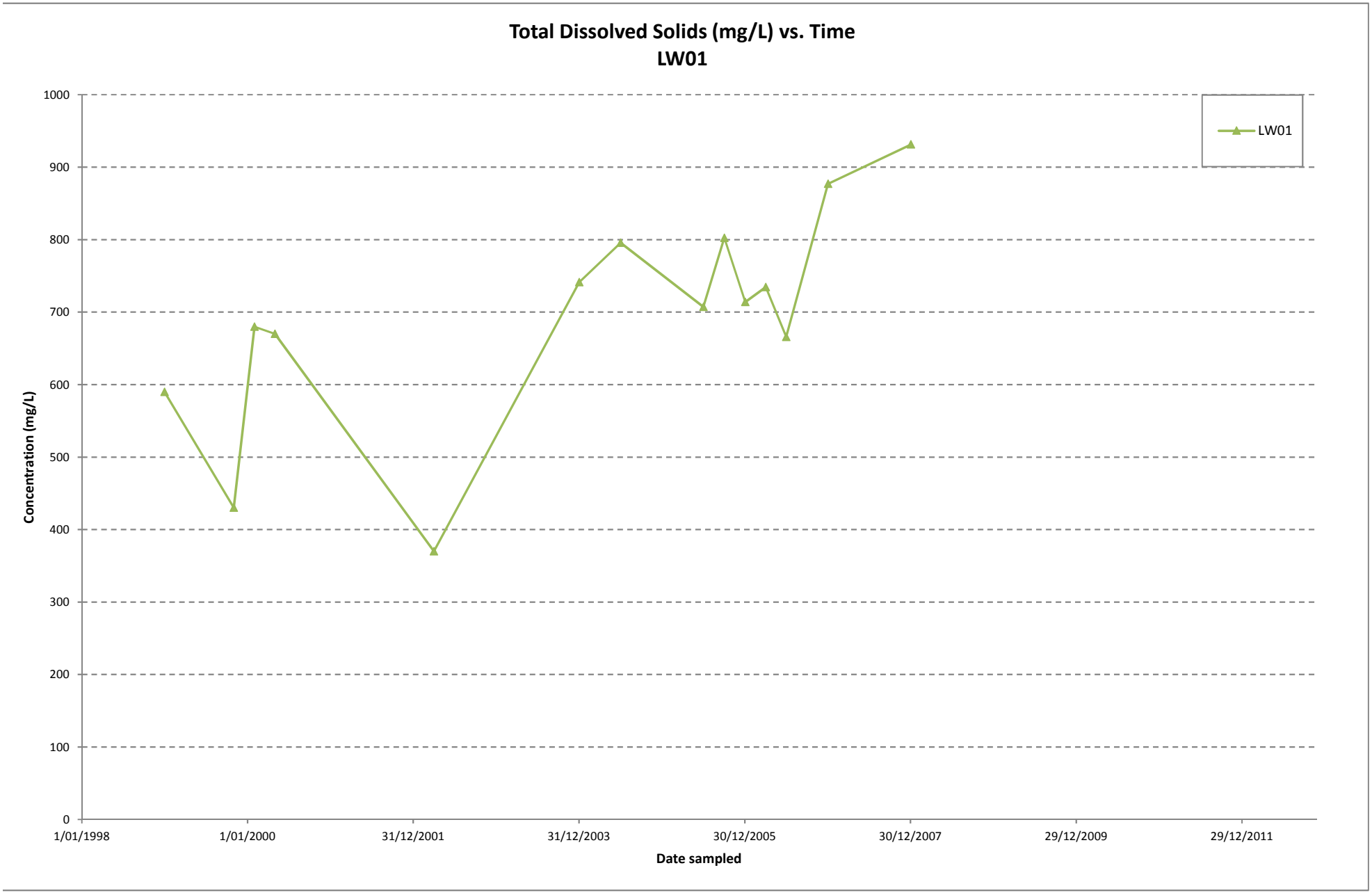

Nitrate (mg/L) vs. Time
LW01
LW01
Concentration (mg/L)
0
2
4
6
8
10
12
14
16
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

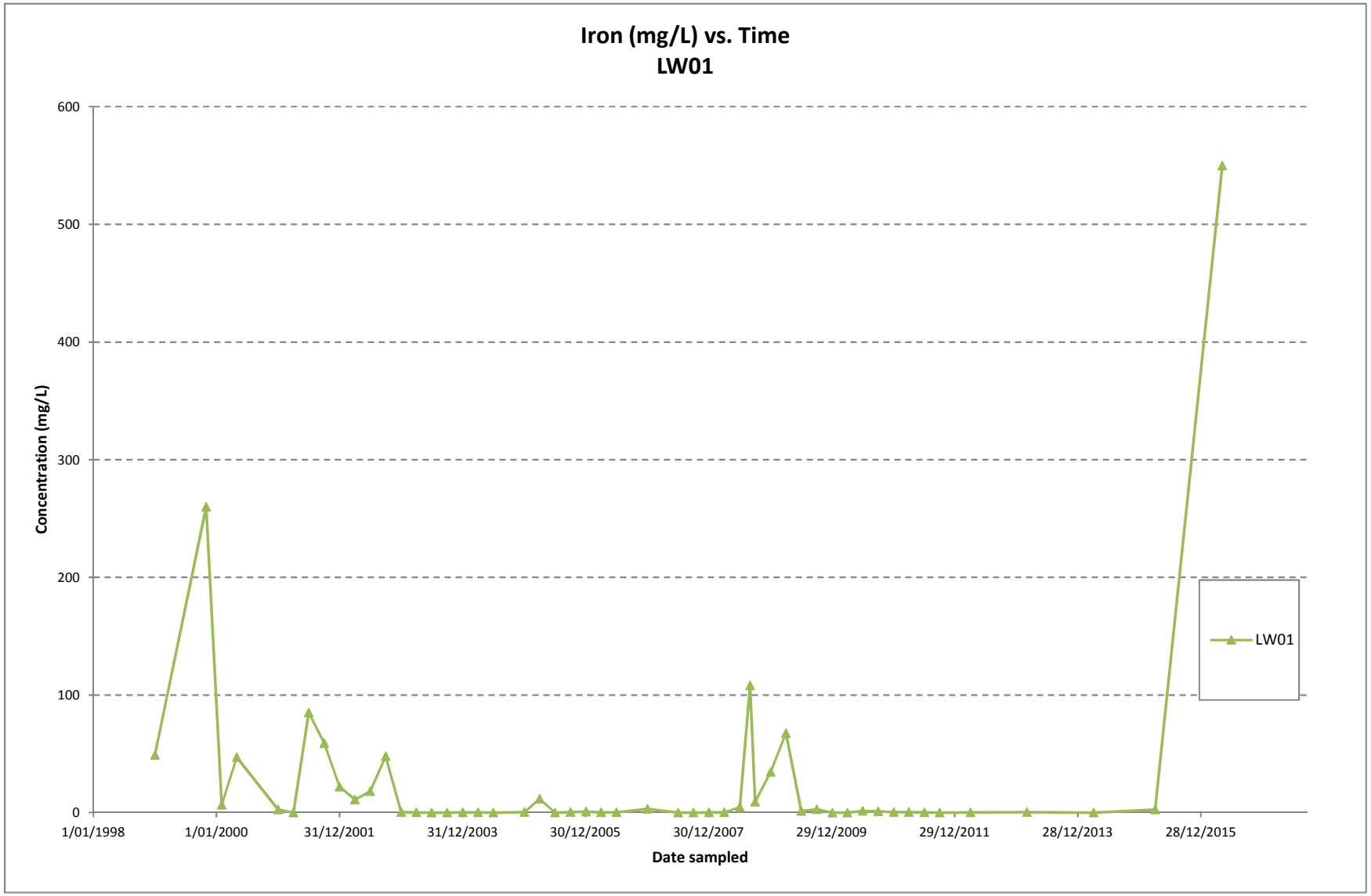

Sulphate (mg/L) vs. Time
LW01
LW01
Concentration (mg/L)
0
20
40
60
80
100
120
140
160
180
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled

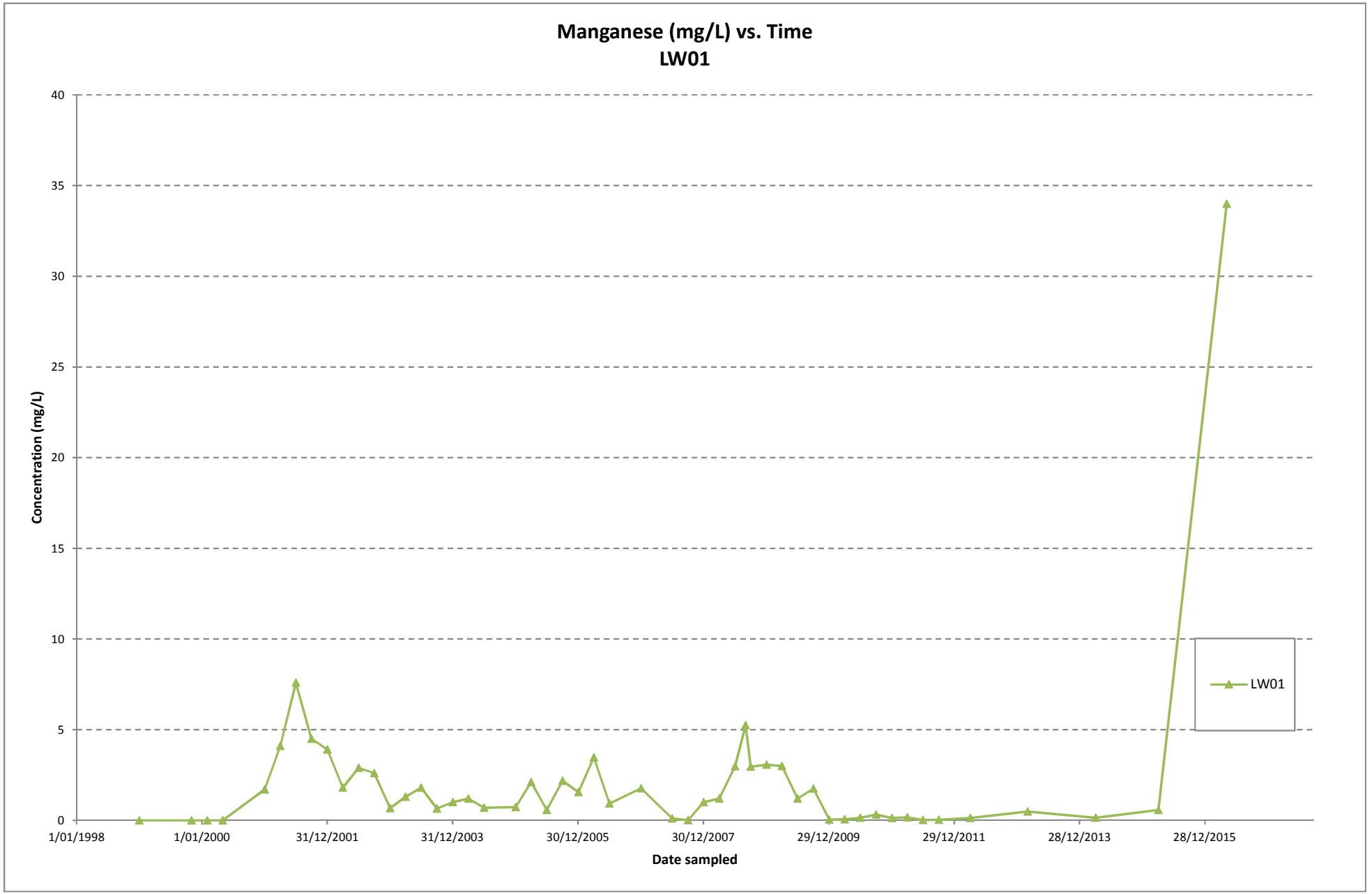

Alkalinity (mg/L) vs. Time
SW01 and LW01
LW01
Concentration (mg/L)
0
200
400
600
800
1000
1200
1400
1600
1800
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled


Chloride (mg/L) vs. Time
LW01
Concentration (mg/L)
300
250
200
150
100
50
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
LW01


Sodium (mg/L) vs. Time
LW01
120
100
80
60
40
20
0
Concentration (mg/L)
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
LW01


Total Dissolved Solids (mg/L) vs. Time
LW01
LW01
Concentration (mg/L)
1000
900
800
700
600
500
400
300
200
100
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
Date sampled


Iron (mg/L) vs. Time
LW01
600
500
400
300
200
100
0
Concentration (mg/L)
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
LW01


Manganese (mg/L) vs. Time
LW01
Concentration (mg/L)
40
35
30
25
20
15
10
5
0
1/01/1998
1/01/2000
31/12/2001
31/12/2003
30/12/2005
30/12/2007
29/12/2009
29/12/2011
28/12/2013
28/12/2015
Date sampled
LW01

APPENDIX H LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

LITHGOW SOLID WASTE FACILITY
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

AUGUST 2016

LITHGOW CITY COUNCIL

VERSION 6

Final

Contents

Introduction

Council has prepared a Landfill Environmental Management Plan ("LEMP") for the Lithgow Solid Waste Facility (LSWF) as part of Council's commitment to improving management operations generally at the facility through the adoption and implementation of sound environmental management practices and development of supporting infrastructure. This LEMP provides a general framework for Council to:

(i) undertake staged landfilling over previously filled areas and expansion into natural areas;

(ii) define and continually improve existing environmental management practices at the landfill in accordance with industry best practice and legislative requirements

(iii) improve the landform shape to facilitate final capping and closure

(iv) minimise any future impact on the natural environment caused by the landfill operations.

This LEMP is integral to the planning phase at the landfill ensuring that existing and future activities at the site are sustainable, performed in an environmentally sound and appropriate manner and in accordance with the conditions prescribed under Council's Environmental Protection Licence (EPL).

Structure

This **LEMP** is structured as follows:

- **Section 1** provides an overview
- **Section 2** defines the purpose and context
- **Section 3** details the operational techniques to be employed to meet the required outcomes
- **Section 4** provides a Schedule of Drawings and Accompanying Notes.

SECTION 1

Overview

The primary landfill site for the Lithgow Local Government Area (LGA) is the Lithgow Solid Waste Facility (LSWF) located off Geordie Street. This site has been in continuous use as a landfill for over sixty (60) years.

A review of the potential to extend the operational life of landfilling at the LSWF was undertaken in 2010. The review was based on landfill surveys and volume calculations completed between July 2008 and April 2010 to determine the average annual filling rate at the LSWF, it being determined at around 33,310m^3/year. However, since this determination was made, a weighbridge has been installed at the site and the average annual quantity of material being landfilled is around 25,000 cubic metres, based on the 2012 Geolyse report.

A subsequent review and development of a final landform design and staged filling was undertaken in July 2016 by Robert Amaral Geotechnical Landfill Engineer with the objectives of maximising the residual life of the landfill, providing a consistent final shape and addressing existing excessively steep side slopes and batters. The results of this latest review demonstrated that there is capacity to significantly extend the operational life of the LSWF for an additional 22 years or so from August 2016.

A four stage landfilling plan was prepared as part of the latest review. The landfill volume provided by each stage of the proposed four stages was determined modeling by calculation, with the operational period of each stage then determined using the validated average annual filling rate.

Table 1.1 provides the estimate of the landfill life for each of the four stages.

Table 1.1 – Landfill extension

Stage	Gross Volume (m^3)	Cover Requirement (m^3)*	Net Volume (m^3)	Intake (m^3)**	Life (years)
1	153,000	38,250	114,750	25,000	4.6
2	368,000	92,000	276,000	25,000	11
3	94,000	23,500	70,500	25,000	2.8
4	136,000	34,000	102,000	25,000	4
Total	751,000	187,750	563,250		22.4

* assumes a cover requirement of 25% of total void
**from Geolyse Report

It is noted that the operational life of each stage would be subject to some variance based on changes in population, waste generation, diversion resulting from resource recovery and the return of waste from closed rural landfills, where small vehicle waste transfer stations are to be constructed as an alternative waste disposal service for village communities.

In broad terms, the four stage plan extended the life of the LSWF to the year 2038; providing for another 22 years or so of land filling operations at this location.

The **Schedule of Drawings** as shown in Section 4 provide detail on four (4) stages of land filling and sub stages for stage 1 and part stage 2, with key features of each stage discussed below.

Stage 1 extension would be located over the top of a segment of the existing landfill area to a crown height of RL 973 (southern end) and base RL 950m (eastern side intersection with the diversion drain). Associated works would include:

- construction of a diversion drain to direct overland flow away from the disposal area
- relocating the existing access track;
- providing progressive final cover and capping in accordance with the conditions of the EPL

Stage 1 would deliver approximately 114,750m^3 for filling and provide service for 4.6 years (from 2016 to 2020).

Stage 2 extension would be located over the top of the previously landfilled area to the north and linking with stage 1(including the "borrow"area). Associated works would include:

- construction of a new access track;
- construction of a diversion drain to direct overland flow away from the disposal area ;
- in part, leachate drains and a de-leaching well
- providing final cover and capping in accordance with the conditions of the EPL

Stage 2 would deliver approximately 276,000m^3 for filling and provide service for 11 years (from 2020 to 2031).

Stage 3 extension would link with stage 1 and entail filling of the west of the current landfill area. Associated works would include:

- constructing a new access track;
- providing final cover and capping in accordance with the conditions of the EPL

Stage 3 would deliver approximately 70,500m^3 for filling and provide service for 2.8 years (from 2031 to 2034).

Stage 4 extension would entail filling to the north-west to complete the final landform. Associated works would include:

- constructing a new access track;
- providing final cover and capping in accordance with the conditions of the EPL

Stage 4 would deliver approximately 102,000m^3 for filling and provide service for 4 years (from 2034 to 2038).

Purpose

Landfill operations proposed in Stage 1, part Stage 2, Stage 3 and Stage 4 would be undertaken within areas previously used for landfilling. Part of Stage 2 will entail a lateral expansion into the existing “borrow area” where landfilling has not previously been undertaken. It is within part of Stage 2 that a leachate management system will be installed.

The landfill has existed on the site since the 1940's and as such enjoys 'existing use rights' in accordance with the provisions of the Environmental Planning and Assessment Act 1979. Whilst this negates the necessity to obtain development consent for operation or 'expansion' within the existing facility, the landfill must be operated within the terms of an Environment Protection Licence issued under the Protection of the Environment Operations Act 1997. The licence provides at clause O6.10 that "the licensee must manage the disposal of waste at the premises in accordance with the progressive filling plan within the Landfill Environmental Management Plan (LEMP)." As landfilling in areas identified as Stages 1 to 4 has changed from that shown in the current LEMP, this new Version (Version 6) has been prepared to reflect these design changes and to align with the introduction in 2016 of the 2nd edition of the EPA Guidelines: Solid Waste Landfills.

Version

This version of Council’s LEMP is that dated August 2016 (Version 6) and supersedes four preceding versions, the previous being V5 dated September 2012.

Environmental Guidelines

The revision of the Lithgow Waste Facility LEMP represents a transition from alignment with the 1996 edition EPA Environmental Guidelines: Solid Waste Landfills to that of the 2nd edition EPA Environmental Guidelines: Solid Waste Landfills 2016 and is reflective of changes proposed to the final landform design, filling stages and surface water management

According to the EPA, with the adoption of the new landfill guidelines there will be no immediate changes to landfill licences. The new guidelines will be implemented progressively, for example as new sites are proposed or existing sites reach new stages in their development. The EPA will advise licensees whenever changes are necessary to licence conditions in each case. It is not expected that licensees will have to resubmit existing landfill environmental management plans (LEMPs) to the EPA for formal approval, however, licensees should regularly update landfill environmental management plans to ensure they are consistent with their licence conditions and with the EPA guidelines.

The 1996 EPA Environmental Guidelines: Solid Waste Landfills was a performance based approach to promote and achieve the best environmental outcomes in the development and operation of landfills. These Guidelines did not prescribe actions, design specifications or standards and it was considered that the performance based approach would reward occupiers of landfills for judicious site selection and innovation in landfill operations and management. Performance outcomes were defined as environmental goals and included benchmark techniques deemed to achieve these goals.

The EPA Environmental Guidelines: Solid Waste Landfills, second edition 2016 provides guidance for the environmental management of landfills in NSW by specifying a series of ‘Minimum Standards’. These minimum standards involve a mix of design and construction techniques, effective site operations,

monitoring and reporting protocols, and post-closure management. It is essentially a prescriptive document defining actions required to achieve these minimum standards.

Minimum standards apply to the design, construction and operation of landfills and for each issue listed in the 2nd edition Guidelines there is a set of required outcomes, followed by a description of acceptable measures for addressing the issue. These acceptable measures are well-established and reliable techniques for meeting the required outcomes. Alternative approaches may be proposed if it can be demonstrated that the alternative can meet the required outcomes.

The format, structure and scope of this LEMP have been prepared having regard to the Environment Protection Authority's *Environmental Guidelines: Solid Waste Landfills 2nd edition*. These *Guidelines* identify the five broad goals in relation to landfilling in NSW. These are:

- landfills should be sited, designed, constructed and operated to cause minimum impacts to the environment, human health and amenity
- the waste mass should be stabilised, the site progressively rehabilitated, and the land returned to productive use as soon as practicable.
- wherever feasible, resources should be extracted from the waste and beneficially reused
- adequate data and other information should be available about any impacts from the site, and remedial strategies should be put in place when necessary
- all stakeholders should have confidence that appropriately qualified and experienced personnel are involved in the planning, design and construction of landfills to high standards.

The *Guidelines* then identify eleven issues where minimum standards are to apply

This LEMP identifies procedures and responsibilities for achieving these broad goals.

Regulatory Licence

Notwithstanding the importance of the LEMP in defining acceptable operational techniques to be employed at the LSWF, operations at the LSWF are also regulated by Environmental Protection Licence (EPL) No 6004. This LEMP has been prepared to complement the EPL and comply with all of the requirements of the EPL

This LEMP does not negate the need for the licencee (Council) to satisfy all statutory obligations pursuant to the EPL, including:

- Protection of the Environment Operations Act 1997
- Protection of the Environment Operations (Waste) Regulation 2005
- Clean Energy Act 2011
- Protection of the Environment Operations (General) Regulation 2009
- Soil Conservation Act 1938
- Dangerous Goods Act 1975
- Waste Minimisation and Management Act 1995
- Heritage Act 1977
- Bushfire Act 1949
- Native Vegetation Act 2003
- Threatened Species Conservation Act 1995

- Environmental Planning and Assessment Act 1979
- Fisheries Management Act 1998
- Waste Management Act 2000
- Waste Avoidance and Resource Recovery Act 2001

SECTION 2

Landfill Site

Landfilling at the LSWF has been undertaken on the following land parcels; all located in the Parish of Marrangaroo, County of Cook.

- Lot 102 DP 1109194
- Lot 1 DP 190934
- Lot 44 DP 751655
- Lot 1 DP 947828 and
- a section of Crown Land.

Drawing EV03 in Section 4 identifies the spatial extent of the landfill footprint

Existing Operation

The LSWF has operated as a landfill at this location since the 1940s. As such the development pre-dates the *Environmental Planning and Assessment Act 1979*.

The land is zoned Rural (General) 1(a) under the Lithgow City *Local Environmental Plan 1994*. A landfill is not prohibited in the Rural (General) 1(a) zoning. Accordingly, although the LSWF does not operate under the auspices of an issued Development Consent, the LSWF operates under 'existing use rights'.

Land to the north, east and west is mapped as Environmentally Sensitive under the Local Environmental Plan.

Licensed Premise

The LSWF operates legally and as a scheduled activity (waste disposal – application to land) the premise is regulated by an Environment Protection Licence (EPL No: 6004). The City of Lithgow City Council is the licensee.

The existing layout at the landfill consists of:

- A single weighbridge and office at the site entrance;
- A recycling drop off area
- A chemical storage area
- Green waste stockpile area
- A metals stockpile area
- A “borrow area” where daily cover material is sourced
- A truck wash down bay (to be de-commissioned in the near term)
- The active landfill cell
- A concrete stockpile area

Council has prepared a concept plan for a small vehicle waste transfer station to be constructed within the LSWF which will include stockpile areas for metals, concrete and green waste together with the construction of a Community Recycling Centre (CRC) for the aggregation of problem wastes, such as gas cylinders, paints, fluorescent tubes/globes and batteries. The timing for the construction of this small vehicle waste transfer station is yet to be determined.

Permitted Wastes

The LSWF is permitted to dispose of the following waste types:

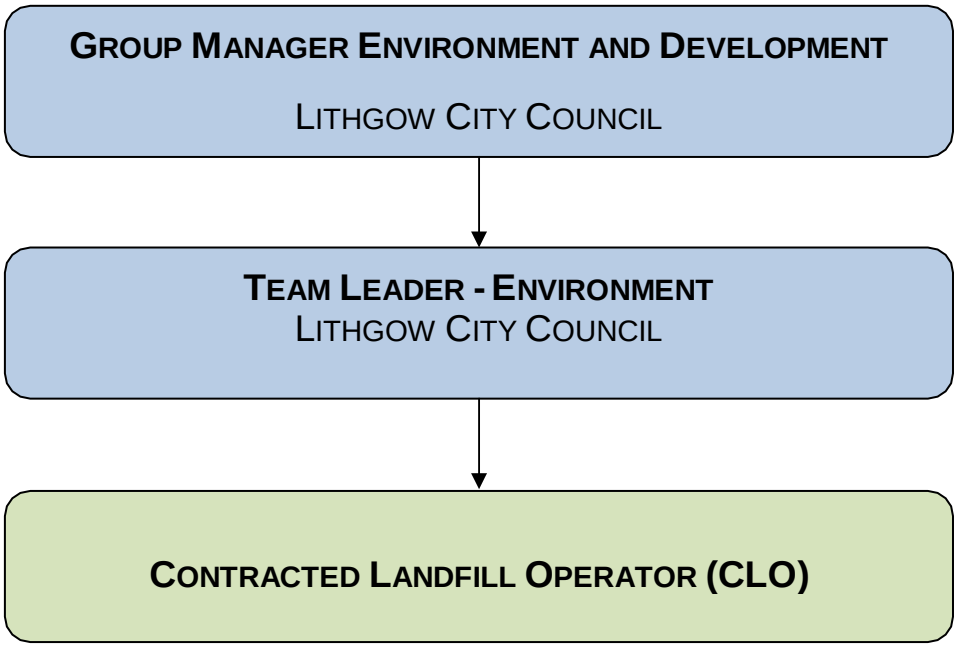
- General solid waste (putrescible)
- General solid waste (non-putrescible)
- Tyres (with limitations)
- Asbestos
- Clinical and related waste.

The EPL stipulates that the total amount of all waste disposed at the premises must not exceed 50,000 tonnes per annum, including no more than 5 tonnes per annum of clinical waste.

Responsibilities

Operations at the LSWF are conducted under a contractual arrangement between Lithgow City Council and a Contracted Landfill Operator (CLO).

The management structure is detailed below.



Both Council and the CLO share environmental responsibilities. From a legislative perspective, s.257 of the *Protection of the Environment Operations Act 1997* clarifies the situation as follows;

> *257 Occupier of premises responsible for pollution from premises*
>
> *(1) In any proceedings under this Act, the occupier of premises at or from which any pollution occurs is taken to have caused the pollution, unless it is established that:*
>
> *(a) the pollution was caused by another person, and*
>
> *(b) the other person was not associated with the occupier at the time the pollution occurred, and*
>
> *(c) the occupier took all reasonable steps to prevent the pollution.*
>
> *A person is associated with the occupier for the purposes of paragraph (b) (but without limiting any other circumstances of association) if the person is an employee, agent, licensee, contractor or sub-contractor of the occupier.*
>
> *(2) Subsection (1) does not prevent proceedings being taken under this Act against the person who actually caused the pollution.*

Site Supervision and Staffing

The LSWF is to be supervised by suitably trained staff at all times during operating hours. The Contracted Landfill Operator will provide up to four staff members on site any given time to ensure that the overall management, supervision, operation and maintenance of the site and operations at the landfill are achieved such as:

- Directing the public to designated areas
- Supervision of all active tipping areas and stockpile areas
- Maintenance and construction of access roads, berms, and associated drainage works
- Litter monitoring and management
- Waste placement, compaction and covering
- Waste screening and record keeping
- Recording of waste data such as tonnages, waste types including hazardous materials and asbestos;
- Ensuring that monitoring bores are maintained and accessible;
- Weed, vermin, fire and litter management practices are undertaken by staff appropriately and in accordance with this LEMP; and
- Security of the site preventing unauthorised entry and illegal dumping.

The EPA considers that the ability for Council to show due diligence in managing its Contractor's performance is pivotal to the effective operations of the site

Plant and Equipment

The Contracted Landfill Operator will maintain, hire or purchase all machinery, plant and equipment sufficient to undertake the following tasks:

- Maintaining stockpiles of metals, tyres, timber, concrete and other recovered wastes
- Application of daily cover to exposed waste;
- Landforming and shaping the site in accordance with the Amaral designs
- Construction of new stages and associated drainage works
- Placement, spreading and compaction of waste
- Constructing berms, pits, swales and channels
- Applying capping and revegetation materials.

All plant and equipment will be maintained in accordance with relevant Australian Standards. Maintenance and monitoring of equipment will be undertaken by on-site staff daily. Servicing of equipment and machinery will be performed regularly as part of a plant maintenance program.

SECTION 3

Minimum Standards for Landfills

Minimum standards prescribed within the EPA Guidelines (2nd edition) apply to the design, construction and operation of landfills in New South Wales and relate to the eleven issues identified in the Guidelines. These eleven issues come under the following headings:

3.1 Leachate Barrier System

3.2 Leachate Storage and Disposal

3.3 Stormwater Management

3.4 Water Quality Monitoring

3.5 Landfill Gas Management and Monitoring

3.6 Amenity Issues: Odour, Dust, Noise, Litter and Fire Control

3.7 Waste Acceptance and Site Security Procedures

3.8 Covering of Waste

3.9 Final Capping and Re-vegetation

3.10 Closure

3.11 Quality Assurance

3.1 Leachate Barrier System

Required Outcomes

- The landfill must have a leachate barrier system to contain leachate and prevent the contamination of surface water and groundwater over the life of the landfill.
- Pollutants with the potential to degrade the quality of groundwater must not migrate through the strata to any point beyond the boundary of the premises or beyond 150 metres from the landfill footprint, whichever is smaller

Stage 1, part stage 2 and stages 3 and 4 of the existing landfill footprint do not entail lateral expansion over any area that has not previously been used as landfill. Accordingly, no new liner system is required to form a barrier between groundwater, soil and substrate, and the waste contained in these stages. However, part stage 2 will expand into the current “borrow” area where landfilling has not previously been undertaken and therefore will require the installation of a leachate barrier as prescribed by the Guidelines. Given this expanded area will represent less than 10% of the total final landfill footprint, Council may choose to examine monitoring records, undertake site investigations and, together with knowledge of the site geology types, prepare an alternative proposal to support not lining this part stage 2 and present it to the EPA for consideration.

Compliance

The **required outcomes for the leachate barrier system** are being achieved for the leachate barrier system given there is no evidence from monitoring and inspection that leachate is migrating off site. Monitoring and testing will be on-going with suitable response actions to be conducted in the event that leachate migration is detected. Progressive capping and final covering as the landfill stages progress will contribute to leachate mitigation measures.

A leachate barrier has been designed where the landfill footprint expands (part stage 2) into the current "borrow" area. (see Section 4 for details)

Based on the monitoring data compiled to date, no leachate barrier system is proposed beyond the existing (apparently effective) geological liner.

3.2 Leachate Storage and Disposal

Required Outcomes

- Collected leachate must be stored in appropriately sized dams or tanks and disposed of so as not to cause environmental harm.
- There must be sufficient leachate disposal capacity to prevent the build-up of leachate and an increase in the risks of water pollution and offensive odours.
- Untreated leachate must not be disposed of to off-site water or land, used for dust suppression, or used to supply the water needs of any process conducted at the landfill, such as composting.

The landfill was subject to a detailed hydro geological investigation and assessment in 2001.This study concluded that leachate from the landfill is unlikely to pose a significant risk of harm to human health or the environment (CM Jewell and Associates, 2001).

The existing landfill does not have a constructed leachate barrier system nor leachate drainage collection system. Rather, it relies on the natural geology for leachate containment. A discharge, thought perhaps to be landfill leachate, appears in a cutting near the trickling filters of the adjoining Sewage Treatment Plant (STP) immediately adjacent to the landfill. A recent analysis of the leachate sampled from this sump (16.06.16) indicated elevated levels of Ammonia (7.04 mg/L) and Nitrate (2.29 mg/L) which are indicative of leachate contamination. However, no discernable BOD (<2 mg/L) was detected and an Electrical Conductivity of 1450 us/cm was measured which equates to a TDS of about 1,000 mg/L and represents borderline potable water.

Leachate collected in this sump is discharged by spray irrigation over the upper area of the existing landfill landform. This collection system is to be upgraded to segregate the collected leachate discharge from surface water which currently enters the sump and to pump it either to reinjection dry wells towards the upper area of the landfill, to a locally bunded spray irrigation area towards the upper area of the landfill or directly to the adjacent STP, depending on the volume of leachate collected.

Leachate generated within the proposed new excavated area (part stage 2) will be collected by a network of leachate collection pipes and delivered by gravity to a deleaching well (DW) at its lowest point

for removal to a reinjection well towards the top of the landfill landform, to a locally bunded spray irrigation area, to the STP for treatment or a combination of these, depending on the volume of leachate collected. Concepts of these works are provided in Section 4.

Compliance

The **required outcomes** for leachate storage and disposal will be achieved as the above measures are formalised

3.3 Stormwater Management

Required Outcomes

- Controls must be implemented to minimise erosion and reduce the sediment load (suspended solids) of stormwater discharged from the site

Surface water controls must prevent surface water from mixing with waste to avoid the generation of excessive leachate, erosion of cover material and/or waste from the landfill, and sediment or contaminants from being carried off the landfill site. A detailed surface water management system was designed and built in 2004 to 2006. This system includes upslope diversion drains, surface water collection drains and sedimentation basin to manage surface water at the landfill.

In addition, a surface water interceptor drain has been designed for construction along the eastern intersection with the landfill to catch and discharge surface water emanating from up gradient and direct the flow around the landfill footprint. Drawing E668-16M in Section 4 provides details of the drain location and construction. This diversion drain with be developed progressively as landfilling of stages 1 and 2 are undertaken. These works will comprise –

- constructing a re-graded southern clean water surface drain to divert a larger portion of the catchment area above the southern end of the site to the southwest, away from the eastern drain;
- constructing a new eastern clean water surface drain in parent bedrock in concert with the staged filling down the eastern side of the landfill;
- progressively constructing and finally capping sections of the landfill such that surface water runoff from these capped and vegetated stages will flow directly to the newly installed clean water drains
- temporarily re-grading and providing intermediate cover to existing uneven landfilled surfaces such that surface water is diverted off the landfill until the landform reaches its final height (in stages) and can be finally capped;
- de-commissioning the current truck wash down pad and associated pond by filling, re-grading and capping until it is eventually overtopped. This facility (currently used by a single street sweeping delivery truck) will be closed and the truck washed down at a separate off site Council depot

In order to limit the quantity of surface water impacting on landfilled waste and creating leachate, Council has adopted best practice landfill operating procedures, which include keeping the active tipping face to a minimum size, diverting surface water away from the active tipping area, placing and compacting intermediate cover (intermediate cover is required to be placed to a depth of 300 mm over

surfaces that will be exposed for more than 90 days), applying daily cover and achieving compaction rates greater than 650 kgs per cubic metre.
The progressive application of final cover, capping and re-vegetation will contribute to the reduction of water borne sediment, will sheet water flows off the site and limit erosion.

Compliance

The required outcomes for stormwater management will be achieved through the measures to be employed

3.4 Water Quality Monitoring

Required outcomes

A water quality monitoring program must be implemented. It must:

- characterise the quality and quantity of wastewater (leachate and stormwater) generated at the site
- detect any pollution of off-site surface water and groundwater
- ensure that appropriate notification, investigation and remedial procedures are followed when monitoring indicates that pollution may have occurred
- ensure that appropriate sampling and analysis methods are used in accordance with Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (NSW DEC, 2004a) and other recognised guidelines for matters not covered by the Approved Methods.

The table below identifies the analytes monitored for the detection of leachate.

Table– Leachate Monitoring Program

Pollutant	Units of Measures	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	Milligrams per litre	Special Frequency 1	Grab sample
Ammonia	Milligrams per litre	Special Frequency 1	Grab sample
Calcium	Milligrams per litre	Special Frequency 1	Grab sample
Chloride	Milligrams per litre	Special Frequency 1	Grab sample
Fluoride	Milligrams per litre	Special Frequency 1	Grab sample
Iron	Milligrams per litre	Special Frequency 1	Grab sample
Magnesium	Milligrams per litre	Special Frequency 1	Grab sample
Manganese	Milligrams per litre	Special Frequency 1	Grab sample
Nitrate	Milligrams per litre	Special Frequency 1	Grab sample
pH	pH	Special Frequency 1	Grab sample
Potassium	Milligrams per litre	Special Frequency 1	Grab sample
Sodium	Milligrams per litre	Special Frequency 1	Grab sample
Sulfate	Milligrams per litre	Special Frequency 1	Grab sample
Total organic carbon	Milligrams per litre	Special Frequency 1	Grab sample
Total phenolics	Milligrams per litre	Special Frequency 1	Grab sample

Note Special Frequency 1: Inspect every six months and sample for analysis where liquid is present.

Source: EPL:6004, Condition M2

GROUNDWATER MONITORING NETWORK

The groundwater monitoring network comprises seven (7) piezometers as required by Environment Protection Licence (EPL:6004).

Drawing EV04 shows the configuration of the groundwater monitoring network.

The design, number and location of these monitoring piezometers can demonstrate that groundwater or subsoil is not contaminated, and ensure early detection of any contamination by means of regular representative samples.

GROUNDWATER MONITORING PROGRAM

The groundwater monitoring program includes monitoring at all seven (7) piezometers for the suite analytes as detailed below, consistent with (and in excess of) EPL:6004 requirements.

Table – Groundwater Monitoring Program

Pollutant	Units of Measures	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	Milligrams per litre	Special Frequency 1	Grab Sample
Aluminium	Milligrams per litre	Special Frequency 1	Grab Sample
Ammonia	Milligrams per litre	Special Frequency 1	Grab Sample
Barium	Milligrams per litre	Special Frequency 1	Grab Sample
Calcium	Milligrams per litre	Special Frequency 1	Grab Sample
Chemical oxygen demand	Milligrams per litre	Special Frequency 1	Grab Sample
Chloride	Milligrams per litre	Special Frequency 1	Grab Sample
Chromium (hexavalent)	Milligrams per litre	Special Frequency 1	Grab Sample
Chromium (total)	Milligrams per litre	Special Frequency 1	Grab Sample
Cobalt	Milligrams per litre	Special Frequency 1	Grab Sample
Conductivity	Microsiemens per centimetre	Special Frequency 1	Grab Sample
Fluoride	Milligrams per litre	Special Frequency 1	Grab Sample
Iron	Milligrams per litre	Special Frequency 1	Grab Sample
Magnesium	Milligrams per litre	Special Frequency 1	Grab Sample
Manganese	Milligrams per litre	Special Frequency 1	Grab Sample
Nitrate	Milligrams per litre	Special Frequency 1	Grab Sample
Pesticides	Milligrams per litre	Special Frequency 1	Grab sample

Table (continued) – Groundwater Monitoring Program

Pollutant	Units of Measures	Frequency	Sampling Method
pH	pH	Special Frequency 1	Grab Sample
Phosphorus	Milligrams per litre	Special Frequency 1	Grab sample
Potassium	Milligrams per litre	Special Frequency 1	Grab sample
Sodium	Milligrams per litre	Special Frequency 1	Grab sample
Standing Water Level	As approp.	Special Frequency 1	Grab sample
Sulfate	Milligrams per litre	Special Frequency 1	Grab sample
Total dissolved solids	Milligrams per litre	Special Frequency 1	Grab sample
Total organic carbon	Milligrams per litre	Special Frequency 1	Grab sample
Total petroleum hydrocarbons	Milligrams per litre	Special Frequency 1	Grab sample
Total Phenolics	Milligrams per litre	Special Frequency 1	Grab sample

Note: Special Frequency 1: Inspect every six months and sample for analysis where liquid is present.

Source: EPL:6004, Condition M2

GROUNDWATER ASSESSMENT PROGRAM

Should the groundwater monitoring program detect a possible failure of the leachate containment system, a Groundwater Assessment Program (GAP) should be established to determine the extent of that failure.

Any impact on groundwater is currently detected through checking monitoring results, established background groundwater quality results as well as against recorded historical ranges and ANZECC guidelines (livestock drinking water, crop irrigation and drinking water). If the established control range is substantially exceeded and monitoring results indicate potential pollution, groundwater at the affected monitoring point will be sampled and tested again as soon as possible to confirm the results. If re-sampling confirms the anomaly, the EPA will then be notified as soon as practicable after it becomes known, by telephone, and in writing within 14 days of confirmation.

Contingent on requirements of the EPA, a GAP will then be prepared.

The GAP would be expected to:

- Identify the specific groundwater contaminants.
- Establish the extent of the pollution.
- Provide a justified list of proposed analytes for evaluation.
- Assess the impacts of the groundwater pollution.
- Outline a proposed sampling plan to obtain sufficient information to prepare a Water Remediation Plan.

SURFACE WATER MONITORING PROGRAM

Surface water monitoring is undertaken at a dedicated sampling location. **Drawing EV04** shows the location of the surface water sampling site.

The surface water monitoring point is an on-site surface water collection pond (SW1), which is sampled during discharge. The nature of this sampling site demonstrates that surface water leaving the site is not polluted by the landfill. SW1 is analysed for the suite of parameters detailed below.

Table – Surface Water Monitoring Program

Pollutant	Units of Measures	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	Milligrams per litre	Special Frequency 2	Grab Sample
Aluminium	Milligrams per litre	Special Frequency 2	Grab Sample
Ammonia	Milligrams per litre	Special Frequency 2	Grab Sample
Barium	Milligrams per litre	Special Frequency 2	Grab Sample
Calcium	Milligrams per litre	Special Frequency 2	Grab Sample
Chemical oxygen demand	Milligrams per litre	Special Frequency 2	Grab Sample
Chloride	Milligrams per litre	Special Frequency 2	Grab Sample
Chromium (hexavalent)	Milligrams per litre	Special Frequency 2	Grab Sample
Chromium (total)	Milligrams per litre	Special Frequency 2	Grab Sample
Cobalt	Milligrams per litre	Special Frequency 2	Grab Sample
Conductivity	Microsiemens per centimetre	Special Frequency 2	Grab Sample
Fluoride	Milligrams per litre	Special Frequency 2	Grab Sample
Iron	Milligrams per litre	Special Frequency 2	Grab Sample
Magnesium	Milligrams per litre	Special Frequency 2	Grab Sample
Manganese	Milligrams per litre	Special Frequency 2	Grab Sample
Nitrate	Milligrams per litre	Special Frequency 2	Grab Sample
Pesticides	Milligrams per litre	Special Frequency 2	Grab Sample
pH	pH	Special Frequency 2	Grab sample
Phosphorus	Milligrams per litre	Special Frequency 2	Grab Sample
Potassium	Milligrams per litre	Special Frequency 2	Grab Sample
Sodium	Milligrams per litre	Special Frequency 2	Grab Sample
Sulfate	Milligrams per litre	Special Frequency 2	Grab Sample
Total organic carbon	Milligrams per litre	Special Frequency 2	Grab Sample
Total petroleum hydrocarbons	Milligrams per litre	Special Frequency 2	Grab Sample
Total phenolics	Milligrams per litre	Special Frequency 2	Grab Sample
Total suspended solids	Milligrams per litre	Special Frequency 2	Grab Sample

Note: Special Frequency 1: Inspect quarterly and sample for analysis where liquid is present.
Special Frequency 2: Sample every six months during a discharge event.

Source: EPL:6004, Condition M2

If the established control range is substantially exceeded and/or monitoring results indicate pollution, surface water will be sampled and tested again as soon as possible to confirm the results. If re-sampling confirms the anomaly, the EPA will be notified as soon as practicable after it becomes known, by telephone and in writing within 14 days of confirmation.

Contingent on requirements of the EPA a Surface Water Assessment Plan (SWAP) will then be prepared. The SWAP would be expected to:

- Identify the specific surface water contaminants.
- Establish the extent of the pollution.
- Provide a justified list of proposed analytes for evaluation.
- Assess the impacts of the surface water pollution.
- Outline a proposed sampling plan to obtain sufficient information to prepare a Surface Water Contamination Remediation Plan.

RESPONSIBILITIES

Contract Landfill Operator

- Protect the integrity of the monitoring network.

Lithgow City Council

- Undertake requisite monitoring.
- Liaise with EPA in the event that the need for either a Groundwater or Surface Water Assessment Program is triggered.

Compliance

The **required outcomes** for water quality monitoring will be achieved through the measures to be employed

REMEDIATING WATER POLLUTION

GROUNDWATER CONTAMINATION REMEDIATION PLAN

If required, as determined by a Groundwater Assessment Program, a Groundwater Contamination Remediation Plan will be prepared.

The Groundwater Contamination Remediation Plan will need to describe the process to protect the groundwater resource from further contamination, and nominate a means to return the resource to the original quality down hydraulic gradient from the landfill.

The Groundwater Contamination Remediation Plan will be submitted to the EPA for approval prior to implementation.

SURFACE WATER POLLUTION CONTAINMENT

If surface water pollution is detected, immediate action should be undertaken to contain the pollution.

SURFACE WATER CONTAMINATION REMEDIATION PLAN

Contingent on requirements of the EPA and any Surface Water Assessment Plan (SWAP), a Surface Water Contamination Remediation Plan will be submitted to the EPA for approval prior to implementation.

When the future actions are approved by the EPA, these should be carried immediately.

RESPONSIBILITIES

Contract Landfill Operator

- Containment of a surface water pollution event and immediate notification to Council.

Lithgow City Council

- EPA notification and coordinating and implementing any water remediation plan.

COMPLIANCE- the **required outcomes** for contamination remediation are being achieve through the monitoring program

3.5 Landfill Gas Management and Monitoring

Required outcomes

Landfill gas management practices must be adopted to:

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

LANDFILL GAS CONTAINMENT SYSTEM

Landfill gas generated in the landfill is mitigated through diversion of green waste, limiting the amount of water entering the active landfill area through surface water drainage controls, providing daily and intermediate cover and, upon closure in the future, final site capping and vegetation.

EXTRACTION AND DISPOSAL OF LANDFILL GAS

The landfill does not provide for a gas extraction system and/or the controlled combustion of landfill gas.

COMPLIANCE – not all of the **required outcomes** for landfill gas management are being achieved based on landfill gas readings.

SUB-SURFACE GAS MONITORING DEVICES

Suitable monitoring wells are not installed at the landfill.

SUB-SURFACE GAS MONITORING PROGRAM

Subsurface monitoring of gas is not undertaken.

SURFACE GAS EMISSION MONITORING

Surface gas monitoring is required by EPL:6004. Specifically, landfill gas monitoring is required inside all buildings on the premises within 250 metres of waste filled areas. Monitoring is required on a monthly basis.
The pollutant monitored is methane (percent by volume).

The threshold level for closer investigation and potential action is 500 parts per million (v/v) of methane at any point on the landfill surface.

GAS ACCUMULATION MONITORING

Buildings on the premises within 250 metres of waste filled areas are monitored for gas accumulation on a monthly basis in conjunction with surface gas monitoring.

Buildings are not to have gas concentrations exceeding 1.25% methane (v/v).

If methane is detected above this limit, daily testing will be required until ventilation or other measures have controlled the methane concentration.

NOTIFICATION OF GAS EMISSIONS

The DEC will be notified within 24 hours if the surface and building gas monitoring detects methane concentrations exceeding the threshold level.

A written assessment of the emissions and management controls implemented or proposed to be implemented to prevent further emissions will be provided to the DEC within 14 days of the incident.

RESPONSIBILITIES

Contract Landfill Operator

- Implementation of procedures detailed in this Landfill Environmental Management Plan (LEMP) so as to minimise the generation of landfill gas.

Lithgow City Council

- Commission monitoring and instigate corrective action if the thresholds are exceeded.
- Immediately notify the CLO in the event of a threshold exceedance.

COMPLIANCE – not all of the **required outcomes** for sub surface gas monitoring are being achieved

REMEDIATING LANDFILL GAS EMISSIONS

REMEDIATION OF UNCONTROLLED LANDFILL GAS EMISSIONS

The EPA must be notified within 24 hours of detection of methane at concentrations greater than 1.25% (v/v) in the landfill surface or buildings within 250 m of the landfill.

A written assessment of the emissions and management controls implemented or proposed to be implemented to prevent further emissions will be provided to the DEC within 14 days of the incident.

RESPONSIBILITIES

Contract Landfill Operator

- Adhere to Council instruction.

Lithgow City Council

- Notify the EPA if required and coordinate written assessment.

3.6 Amenity Issues: Odour, Dust, Noise, Litter and Fire Control

Required outcomes

The landfill must not adversely affect amenity in the locality, in particular:

- offensive odour impacts must not occur at off-site locations
- emission of nuisance dust and other particulate matter beyond the landfill boundaries must be minimised
- excessive noise must not be generated by activities at the site
- local amenity must not be degraded by litter from the landfill or by mud or litter attached to vehicles leaving the landfill
- the risk of fire at the site must be minimised and the site must be adequately prepared in the event of fire.

ODOUR CONTROLS

- Prompt covering of particularly odorous wastes (as required).
- Examination of incoming loads to ensure only permitted wastes are accepted
- Daily cover (VENM) is place over any exposed waste at the conclusion of the days operations
- Intermediate cover is placed over waste exposed for more than 90 days to a depth of 300 mm
- Animal carcasses are buried within the waste mass

DUST CONTROLS

Dust generation will be controlled by:

- Maintaining gravel seals on access roads.
- Posting speed restrictions within the site.
- Minimising exposed areas.
- Watering unsealed roads as necessary.

PEST, VERMIN & NOXIOUS WEED CONTROLS

- Intermediate cover will be applied to compacted waste to keep the amount of exposed waste to a minimum.
- Surface water controls will be maintained as designed and approved to ensure surfaces are adequately drained to prevent ponds of water forming on the site.
- Noxious weeds will be reported to Council for treatment.
- Pest and vermin numbers will be routinely monitored and any spike in numbers will be reported to Council.

PREVENTING NOISE POLLUTION

DAYTIME ACTIVITIES

Plant and equipment will only operate between 8:00 am and 5:00 pm seven days per week and 8:00 am to 6:00 pm during daylight savings.

Operation of equipment outside of these hours will be subject to approval of Council.

NOISE LIMITS

The level of noise emanating from the landfill must not exceed:

- an $L_{A10\ (15\ minute)}$ noise emission criterion of 45 dB(A) during the daytime (7.00am to 10.00pm); and
- an $L_{A10\ (15\ minute)}$ noise emission criterion of 35 dB(A) during the night-time (10.00pm to 7.00am).

Noise from the premises is to be measured at any point within six (6) metres of the nearest effected residence or other noise sensitive area to determine compliance.

LITTER CONTROL

In the absence of daily cover, the CLO must implement procedures to prevent windblown litter escaping the active landfill cell. These procedures must include:

- Appropriate compaction of waste material on a daily basis.
- Use of litter control fencing around the active landfill cell.
- Litter patrols to retrieve windblown litter.
- Ensuring all incoming loads are covered

All litter fences, perimeter fences and diversion drains must be inspected daily and cleared of litter as required.

FIRE PREVENTION

- Signage will be installed advising that flammable liquids are not permitted on the site. This will be reinforced by advice to customers at the weighbridge and inspection of loads at the landfill face.
- Suitable separation distances between stockpiles of combustible materials recovered for recycling will be maintained.
- Cell construction and compaction will be undertaken in a manner conducive to the prevention of a landfill fire.

CONTROLLED BURNING

No controlled burning will be undertaken without the permission of the EPA and the Rural Fire Service.

PREVENTATIVE MEASURES

The potential for fires to occur at the site will be minimised by:

- a security fence to prevent unauthorised access from public road access;
- maintaining machinery in a good working order to minimise the risk of sparks;
- adequate compacting and covering waste;
- conducting regular litter patrols; and
- ensuring fire breaks are maintained around temporary stockpile of combustibles.

FIRE FIGHTING EQUIPMENT

In addition to the above preventative measures, appropriate fire fighting equipment will be available on-site. Specifically, this will involve:

- ensuring that a water tanker permanently located at the facility is full, at all times, and that it is positioned in a readily accessible location;
- weekly testing of both the tanker pump and quick-fill portable pump.

RESPONDING TO A FIRE

In the event that a fire occurs on-site, the first action to be taken is a determination by either the CLO, or in their absence his/her nominee, as to whether staff can contain and extinguish the fire without compromising their safety. In the event that a fire can be safely handled by site staff, the fire will be smothered by covering it with soil.

If there is any doubt as to the ability to safely deal with the fire, then the CLO must take the following actions.

Step 1: Immediately ring **000** and report the fire.

Step 2: Listen to and act on the instructions issued by the Fire Service.

Step 3: Organise for the evacuation from the facility of all members of the public. To this end, an operator will man the access gate to expedite a quick but safe exit, as well as divert any more of the public from entering the facility.

Step 4: Prepare for the arrival of the Fire Service by mobilising the earth moving equipment and water tanker such that it is readily available for use, as directed by the Fire Service.

Step 5: As soon as practicable to do so, contact Council's Team Leader - Environment, or Group Manager Environment and Development.

Step 6: On the Fire Service's arrival at the facility follow all instructions issued by the *Officer in Charge.*

RESPONSIBILITIES

Contract Landfill Operator

- Ensure appropriate compaction of waste material on a daily basis.
- Use litter control fencing around the active landfill cell.
- Retrieve windblown litter.
- Inspect daily and maintain all litter fences, perimeter fences and diversion drains and clear these of litter as required.
- Maintaining gravel seals on access roads.
- Posting speed restrictions within the site.
- Minimising exposed areas.
- Watering unsealed roads as necessary.
- Maintain surface water controls to ensure surfaces are adequately drained to prevent ponds of water forming on the site.
- Report noxious weeds will be reported to Council.
- Routinely monitor pest and vermin numbers and report any spike in numbers to Council.
- Advise customers at the weighbridge and at the landfill face that flammable liquids are not permitted on the site.
- Divide stockpiles of combustible materials for recycling into small piles.
- Construct and compact the active waste cell in a manner conducive to the prevention of a landfill fire.

Lithgow City Council

- Undertaking routine inspections to evaluate the effectiveness of litter management controls.
- Treat noxious weeds.
- Monitor spikes in vermin/pest numbers and, if required, formulate an eradication program in consultation with the CLO.
- Erecting signage advising that flammable liquids are not permitted on the site.

Compliance

The **required outcomes** for amenity issues will be achieved by the adopted measures

3.7 Waste Acceptance and Site Security Procedures

Required outcomes

- Only authorised wastes must be received at the site.
- Any unauthorised wastes delivered to the site must be appropriately managed and disposed of lawfully.
- Statutory record-keeping and reporting requirements must be complied with.

SCREENING OF WASTES RECEIVED

Waste is delivered to the LSWF by:

- Council's garbage collection service vehicles;
- residents;
- approved waste service providers;
- some major industries; and
- commercial/industrial businesses.

The CLO is to have in place waste acceptance and screening procedures to ensure that the site only accepts permitted wastes.

Permitted Wastes

Council and the CLO must not cause, permit or allow any waste to be received at the facility; except the wastes expressly detailed below (and defined in Schedule 1 of the *Protection of the Environment Operations Act, 1997*.

General Solid Waste (putrescible)

Meaning waste (other than special waste, hazardous waste, restricted solid waste or liquid waste) that includes any of the following:

(a) household waste containing putrescible organics,

(b) waste from litter bins collected by or on behalf of local councils,

© manure and nightsoil,

(d) disposable nappies, incontinence pads or sanitary napkins,

(e) food waste,

(f) animal waste,

(g) grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids,

(h) anything that is classified as general solid waste (putrescible) pursuant to an EPA Gazettal notice,

(i) anything that is general solid waste (putrescible) within the meaning of the Waste Classification Guidelines,

(j) a mixture of anything referred to in (a)–(i) above.

General Solid Waste (non-putrescible)

Meaning waste (other than special waste, hazardous waste, restricted solid waste, general solid waste (putrescible) or liquid waste) that includes any of the following:

(a) *glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal,*
(b) paper or cardboard,
(c) household waste from municipal clean-up that does not contain food waste,
(d) waste collected by or on behalf of local councils from street sweeping,
(e) grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices or stormwater management systems, that has been dewatered so that it does not contain free liquids,
(f) grit and screenings from potable water and water reticulation plants that has been dewatered so that it does not contain free liquids,
(g) garden waste,
(h) wood waste,
(i) waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions,
(j) containers, having previously contained dangerous goods, from which residues have been removed by washing or vacuuming,
(k) drained oil filters (mechanically crushed), rags and oil absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids,
(l) drained motor oil containers that do not contain free liquids,
(m) non-putrescible vegetative waste from agriculture, silviculture or horticulture,
(n) building cavity dust waste removed from residential premises, or educational or child care institutions, being waste that is packaged securely to prevent dust emissions and direct contact,
(o) synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) being waste that is packaged securely to prevent dust emissions, but excluding asbestos waste,
(p) virgin excavated natural material,
(q) building and demolition waste,
(r) asphalt waste (including asphalt resulting from road construction and waterproofing works),
(s) biosolids categorised as unrestricted use, or as restricted use 1, 2 or 3, in accordance with the criteria set out in the Biosolids Guidelines,
(t) cured concrete waste from a batch plant,
(u) fully cured and set thermosetting polymers and fibre reinforcing resins,
(v) fully cured and dried residues of resins, glues, paints, coatings and inks,
(w) anything that is classified as general solid waste (non-putrescible) pursuant to an EPA Gazettal notice,
(x) anything that is general solid waste (non-putrescible) within the meaning of the Waste Classification Guidelines,
(y) any mixture of anything referred to in (a)–(x) above.

Special Waste

Special wastes include clinical and related waste, asbestos waste and waste tyres. Specific requirements apply to these waste types.

Asbestos Waste

The disposal of asbestos is restricted to a dedicated area at the LSWF and requires immediate covering with 300 mm soil and establishment of a final cover of 2 m.

Tyres

The landfill must not receive tyres which:

- were generated within the Sydney Metropolitan Area; or
- are delivered in a load containing more than 5 whole tyres.

The landfill must not dispose of any tyres on the premises which:

- have a diameter greater than 1.2 metres; or
- have not been shredded so that the pieces measure no more than 250 millimetres in any direction; or
- have not had their walls removed.

Tyres stockpiled on the premises must:

- not exceed fifty (50) tonnes of tyres at any one time;
- be located in a clearly defined area away from the tipping face;
- be managed to control vermin; and
- be managed to prevent any tyres from catching fire.

CONTROLS

Signage

Signs clearly indicating the types of wastes that are accepted and those that are not to be accepted must be prominently displayed at the point of entry.

Screening

The following practices apply to screening of incoming wastes:

- The CLO will have two personnel present in the vicinity of the active tipping face at all times.
- Public access will only be permitted during opening hours.
- Drivers will be asked to describe the type of waste to be deposited on entry to the facility.
- An inspection of waste loads will be made as required.
- Drivers will be directed to the correct area of the facility for disposal of specific loads (eg. builder's wastes, greens, whitegoods, tyres, derelict cars, etc.).
- Wastes will be monitored and inspected as they are being discharged to ensure excluded non-approved wastes are not being disposed.
- For vehicles suspected of containing excluded wastes the vehicle will be refused permission to deposit waste until the waste is verified as being acceptable.

Site Security

Unauthorised access to the site is discouraged through the installation and use of lockable security gates and perimeter fencing.

Staffing

The CLO must provide adequate staff to ensure that the during operating hours all continuous tasks (including waste reception and security, compaction and covering) are completed in compliance with the EPL:6004 and this LEMP.

Training

At a minimum, the CLO is to provide training to ensure that:

- operators of earth moving equipment are skilled at undertaking the tasks assigned to them;
- staff must be capable of using the fire fighting equipment; and
- staff must be capable of inspecting and directing the placement of incoming wastes; accurate data recording; and skilled at identifying wastes that are unacceptable.

EPA Reporting

The Regional Office of the EPA should be contacted if any unauthorised hazardous wastes are found on-site

WASTE RECORDING

Council must provide the EPA with information on the quantity of waste received at the facility and the quantity of waste transported from the facility each quarter. The information in respect of a particular quarter is to be provided on an approved form and must be received by the EPA within 60 days of the end of the quarter.

For the purposes of this requirement, the following periods is a quarter:

- Quarter 1 (1 January – 31 March)
- Quarter 2 (1 April – 30 June)
- Quarter 3 (1 July – 30 September)
- Quarter 4 (1 October – 31 December)

WEIGHBRIDGE

Council has installed a weighbridge which has a valid Calibration Certificate and is operational at all times of landfill activity. Should the weighbridge become inoperative, the EPA will be notified immediately and the weighbridge will be repaired as soon as practicable.

Whilst ever the weighbridge is inoperable, all vehicles will be recorded and tonnages calculated.

ANNUAL SURVEY

On an annual basis a survey of the site, compiled by a registered surveyor, should be undertaken to confirm the volume of landfill space consumed in the preceding 12 months.

RESPONSIBILITIES

Contract Landfill Operator

- Ensuring appropriate use of the weighbridge.
- Ensuring controls are in place that prevents vehicles from entering and exiting the site without

generating a permanent record.

- Ensuring all wastes are deposited in the correct area.
- Monitoring and inspecting wastes as they are being discharged, spread and compacted, to ensure excluded non-approved wastes are not being disposed.
- Advising Council if excluded wastes are identified at the active tipping area.
- Ensuring two (2) personnel are present in the vicinity of the active tipping face at all times.
- Asking drivers to describe the type of waste to be deposited on entry to the facility.
- Refusing permission to deposit waste until the waste is verified as being acceptable (if necessary).
- Directing vehicles to the appropriate area.
- Ensuring signs defining excluded wastes and penalties for the deposition of excluded wastes are prominently displayed.
- Ensure adequate training of landfill staff to recognise and handle hazardous or other unapproved wastes.
- The training of staff

Lithgow City Council

- Installation and maintenance of weighbridge.
- Reporting waste quantities to the EPA.
- Commissioning the annual survey of airspace.
- Approving access to the facility outside of normal hours;
- In the event that excluded wastes have been identified during compaction or spreading make all practicable efforts to identify the source of the wastes, contacting the EPA for advice on the proper disposal, or in the event that the EPA cannot be contacted, instructing the Contract Landfill Operator to temporarily relocate wastes to the nominated area.

Compliance

The **required outcomes** are being achieved

3.8 Covering of waste

Required outcomes

- Landfilled waste must be covered regularly during operations with a suitable material to minimise odour, dust, litter, vermin, the risk of fire, rainwater infiltration into the waste (and therefore the amount of leachate generated) and the emission of landfill gas.

COMPACTION OF WASTE

The amount of landfill space used to dispose of waste can be minimised by proper compaction.

Compaction also improves the stability of the landfill and minimises voids that can encourage vermin, fires and excess generation of leachate.

Landfill occupiers are expected to ensure that the maximum compaction is achieved for the capacity of the machines used. For landfills receiving less than 50,000 tonnes per annum, the waste compaction goal is 650 kg/m^3; excluding cover material.

In November 2005 the calculated landfill compaction rate was determined to be 1,350 kg/m^3. This compaction rate was achieved on the basis of using a Cat 26 compactor (32 tonnes) and a minimum of six (6) passes.

The CLO will place and compact wastes using the ramp method; compacting the horizontal face continually to allow access to the tipping face and applying an intermediate cover layer as soon as practicable after reaching the final design level.

WASTE PLACEMENT AND COMPACTION

All wastes will be deposited, spread and compacted in lifts not exceeding two metres depth. Each lift will be comprised of layers, generally not exceeding 600 millimetres depth to achieve compaction.

Deposited waste will be placed and compacted to achieve a minimum effective density of 650 kilograms of waste per cubic metre of landfill space.

FILLING PLAN

The Filling Plan and finished contours will be undertaken consistent with the details provided in the Stage 1, Stage 2, Stage 3 and Stage 4 Filling Plans (refer Amaral drawings in Section 4).

COVERING OF WASTE

Landfill space will also be protected through minimal application of cover material. It is recognized that there is a balance to be maintained using this technique, and that it requires improved monitoring and application by the CLO.

Covering waste performs environmental functions. Use of cover material helps to protect the full range of environmental management objectives by limiting run-on and infiltration of water, controlling and minimising risk of fire, minimising emission of landfill gas, suppressing site odour, reducing fly propagation and rodent attraction, and decreasing litter generation.

Cover material is classified as daily, intermediate or final, depending on operation phase and function. Intermediate cover is used to close off a cell that will not receive additional lifts of refuse of final cover for some time. Final cover forms a low permeability barrier to control water entering the site and gas emissions, and promote re-vegetation.

Landfill occupiers are free to specify any alternative cover material provided they can demonstrate compliance with the performance goals.

Access to daily cover is also important in controlling the movement of litter from the landfill face. This has remained a constant challenge for the facility but is still considered to be feasible. However, other programs have been put in place including regular litter pick-ups and construction of a trial litter fence to reduce the collection of litter in clean water diversion drains and adjacent bushland.

There are exceptions to the normal cover protocols in relation to hospital wastes, animal carcasses and asbestos. In these instances special procedures are put in place having regard to the Protection of the Environment Operations (Waste) Regulation 2005.

The history of operations at LSWF indicates that cover material is most relevant to the issue of litter control. Landfill gas emissions are monitored, as is the local groundwater system. Adverse impacts have not been detected and it is apparent that the surface water controls installed are effective in preventing problems with leachate or methane production. The site does not have a history of odour complaints.

RESPONSIBILITIES

Contract Landfill Operator

- Compacting waste to achieve an effective density of at least 650 kilograms of waste per cubic metre.
- Actively monitoring site litter generation and, as required, compacting and covering waste to prevent localised litter beyond the active landfill cell.
- Immediate covering of all special wastes.
- Ensuring a stockpile of cover material is readily accessible on-site.

Lithgow City Council

- Commission annual surveys to validate consumed landfill space and remaining capacity.

Compliance

The **required outcomes** for waste acceptance and site security are being achieved

3.9 Final capping and revegetation

Required outcomes

All completed landfill cells must be capped and revegetated as soon as practicable after the final delivery of waste to the cell. The final capping must:

- reduce rainwater infiltration into the waste and thus minimise the generation of leachate (infiltration from the base of the final cap should be less than 5% of the annual rainfall)
- stabilise the surface of the completed part of the landfill
- reduce suspended sediment and contaminated runoff
- minimise the escape of untreated landfill gas

Final capping will be applied as prescribed in the EPL and undertaken progressively as the stages are being completed. The EPL specifies –
O6.18 Final capping must comprise two layes in the order of installation as follows:
a) a seal bearing surface (600mm think); and
b) a revegetation layer (150mm thick).

COMPLIANCE - the **required outcomes** for final capping and re-vegetation will be achieved as the final capping is undertaken

3.10 Closure

Required outcomes

- The landfill must continue to be non-polluting and not cause environmental harm after site closure.
- The occupier must prepare a closure plan, setting out a program for making sure that the site does not cause environmental harm after closure. The occupier must implement the approved closure plan.

SITE CLOSURE

When appropriate, the Closure Plan prepared for the landfill will incorporate measures to reduce to a minimum the emission of landfill gases.

CLOSURE PLAN

Operations at the landfill would be expected to continue to 2038 with the completion of Stages 1 to 4 of the Amaral designs. Council will monitor the filling that occurs at the landfill on an annual basis and will provide the EPA with a Closure Plan for approval at least 12 months before ceasing operations at the facility.

CLOSURE AND POST CLOSURE MONITORING/MAINTENANCE

Council commits to submission of a Closure Plan at least 12 months prior to proposed cessation of landfill activities at the site.

To ensure that the landfill continues to be non-polluting and does not cause environmental harm after site closure, the Closure Plan will include putting into place a post-closure monitoring and maintenance program to protect the long term integrity of the landfill.

The monitoring and maintenance must be provided until the landfill does not pose a threat to the environment.

FINANCIAL ASSURANCE

Financial assurance is the means of ensuring that Council adequately plans for the closure, remediation and post closure care, by providing a specific mechanism to accumulate requisite funding during the life of the landfill. If required, Council will consult with the EPA on the matter of financial assurance.

COMPLIANCE - the **required outcomes** for closure will be achieved with the preparation of a closure plan in advance of the site being closed

3.11 Quality Assurance

Required outcomes

• Quality assurance measures must be implemented to make sure that all critical features of the landfill are constructed according to the approved designs and specifications.
• Before major construction works, the occupier must prepare a Construction Quality Assurance Plan. This must set out the proposed testing, inspection and other verification procedures to be implemented during construction of the landfill works.
• Following construction, the occupier must prepare a Construction Quality Assurance Report on the quality assurance that was implemented to ensure that the works comply with the approved designs and specifications.
• In the case of a new landfill or cell, a satisfactory Construction Quality Assurance Report must be submitted to the EPA before the EPA can issue an approval to dispose of waste in the new landfill or cell.
• In the case of final capping works under a Closure Plan, a satisfactory Construction Quality Assurance Report must be submitted to the EPA before the EPA can approve the surrender of the licence

QUALITY SYSTEM

To minimise the risk of the landfill having deleterious effects on the surrounding environment, the LSWF will be constructed and operated consistent with requirements specified within this LEMP and in compliance with all conditions of EPL: 6004.

The LSWF is not operated in compliance with:

- A fully documented Construction Quality Assurance System developed in accordance with *Australian Standard 3905.2*.
- A fully documented Environmental Management Quality System consistent with *Australian Standard 9001/9004* or *Australian Standard 14001*.

RESPONSIBILITIES

Contract Landfill Operator

- Constructing and operating the LSWF consistent with requirements specified within this LEMP and in compliance with all conditions of EPL: 6004.

Lithgow City Council

- Ensuring the LSWF is constructed and operated by the CLO consistent with requirements specified within this LEMP and in compliance with EPL: 6004.

Compliance

The **required outcomes** for quality assurance are not being achieved given there are no quality assurance programs in operation. This can be re-dressed in the future where quality assurance will become part of the requirement for the contract management of the LSWF and written into the contract specification.

SECTION 4

Schedule of Drawings

Appendix 1 - Geolyse Location Maps and Plans

Appendix 2 - Amaral Concept Designs Stages 1 to 4 and Accompanying Notes

Appendix 3 - Amaral Filling Plans for Stages 1 and 2

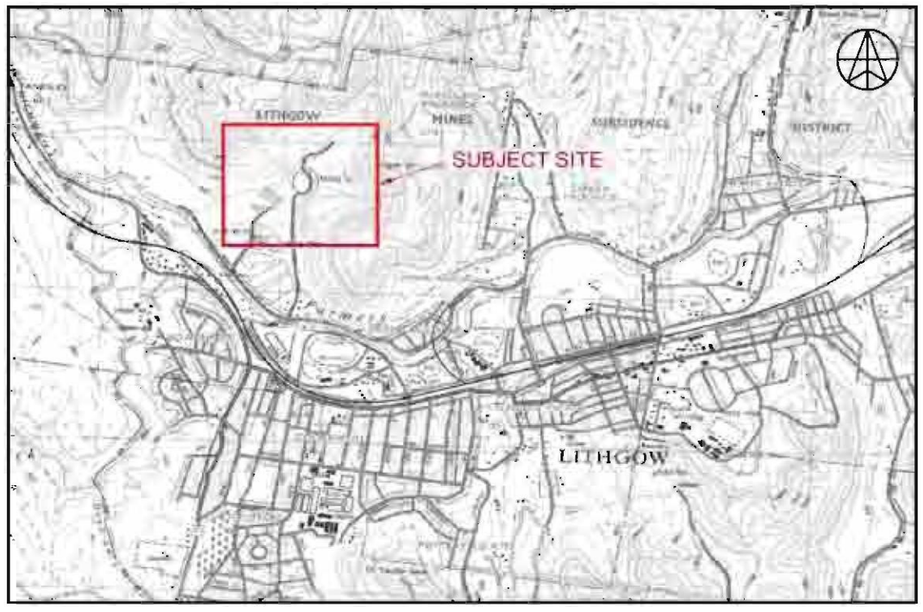
Appendix 4 – Surface Water Diversion Drain (Drawing E668-16M)

LITHGOW SOLID WASTE FACILITY

LANDFILL ENVIRONMENTAL MANAGEMENT PLAN (VERSION 6)

SCHEDULE OF DRAWINGS

SHEET	TITLE	REV.	DATE
01B_EV01	TITLE SHEET, DRAWING LIST, AND SITE LOCALITY	B	08/02/2012
01B_EV02	EXTENT OF PAST LANDFILLING - AERIAL IMAGE	B	08/02/2012
01B_EV03	DEVELOPMENT SITE	B	08/02/2012
01B_EV04	ENVIRONMENTAL MONITORING POINTS	B	08/02/2012



SITE LOCALITY

GEO VSE ORANGE

NO	DATE	DRAFTING CHECK	PM CHECK	
			R	
			A	

LITHGOW SOLID WASTE FACILIITY
LANDFILL ENVIRONMENTAL
MANAGEMENT PLAN

APPROVAL AUTHORITY

ENVIRONMENT PROTECTION AUTHORITY
EPL : 6004

CLIENT

LITHGOW CITY COUNCIL

DRAWING

TITLE SHEET, DRAWING LIST,
AND SITE LOCALITY

211109 01B_EV01 REV B

APPROXIMATE SCALE 16000(A4)

APPROXIMATE SCALE 112000(A3)

GEOLYSE

ORANGE

PRESLEY STREET
P.O. BOX 1963
ORANGE NSW 2800
PH: (02) 6393 8000
FX: (02) 6362 5022

No	DATE	DRAFTING CHECK	DM CHECK	DETAILS
0.		TD		WORKING COPY

LITHGOW SOLID WASTE FACILIITY
LANDFILL ENVIRONMENTA L
MA NAGEMENT PLAN

FILE REFERENCE: 21109_STB_EMP_R01B.docx

APPROVAL AUTHORITY

ENVIRONMENTAL PROTECTION AUTHORITY
EPL : 6004

QJENT

trrin

LITHGOW CITY COUNCIL

DRAWING

EXTENT OF PAST LANDFILLING

211109 | 01B_EV02 | REV B

Department of Lands
Rri{OU/1f,a,r, lmr QIOLIMup

Cadastral Records Enquiry Report

Ref:surv:epln-dawsonsr

Requested Parcel : Lot 1 DP 190934

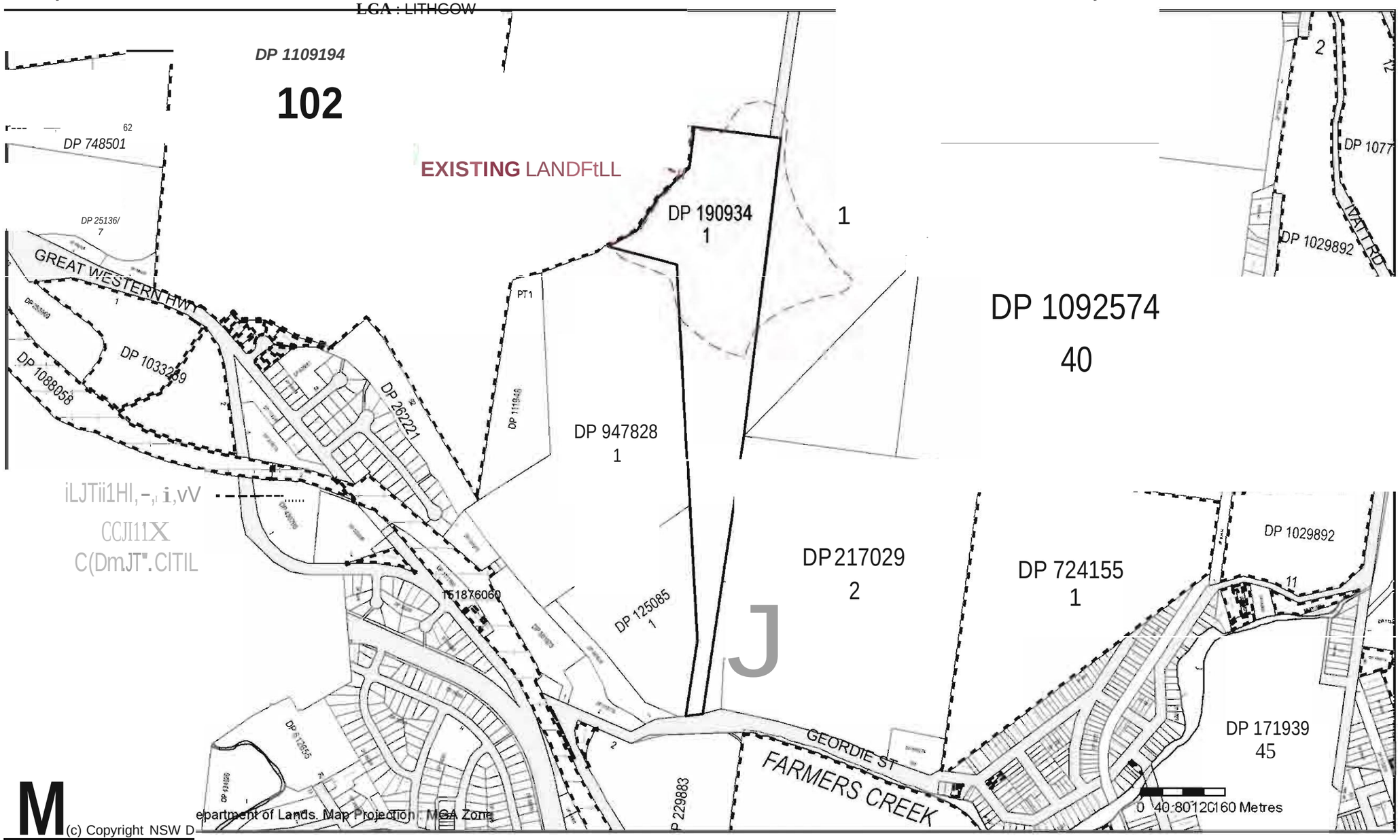
Identified Parcel :Lot 1 DP 190934

Locality : BOVVENFELS

Parish : MAR RANGAROO

County :COOK

LGA : LITHGOW



Report Generated 3:04:35 PM, 17 November, 2008

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

f.1GEOL
orange@geolyse.com
www.geolyse.com

No	DATE	DRAFTING CHECK	PM CHECK
A	27/06/11	LP	AB
B	[illegible]	LP	AB

ORANGE

APPROVAL AUTHORITY

LITHGOW SOLID WASTE FACILIITY LANDFILL ENVIRONMENTAL MA NAGEMENT PLAN

LITHGOW CITY COUNCIL

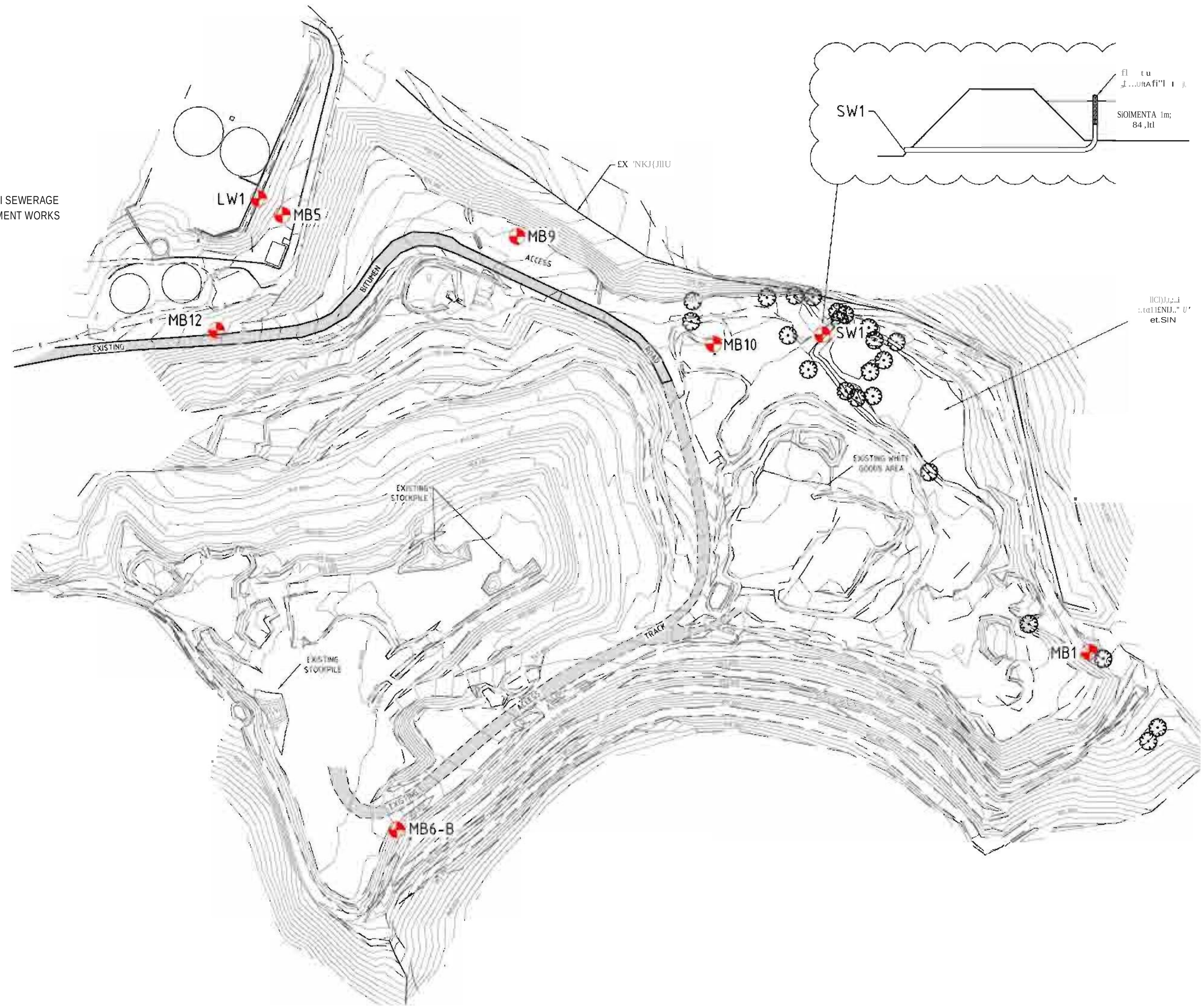
DRAWING

DEVELOPMENT SITE

211109 01B_EV03 REV B

MB14

LITHGOW SEWERAGE TREATMENT WORKS



EPL ID No	LOCATION	TYPE
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[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]

[illegible]

THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN

EXISTING TOP OF BANK

EXISTING BOTTOM OF BANK

EXISTING TRACK

EXISTING ELECTRICITY

EXISTING FENCE

EXISTING VEGETATION

EXISTING ACCESS ROAD

SCALE 1:1500 (A1)

SCALE 1:3000 (A3)

GEOLYSE

ORANGE

orange@geolyse.com

www.geolyse.com

No	DATE	DRAFTED	CHECKED	DETAILS
			AB	WORKING DRAFT
B	[illegible]	[illegible]	AB	[illegible]

LITHGOW SOLID WASTE FACILITY
LANDFILL ENVIRONMENTAL
MANAGEMENT PLAN

FILE REFERENCE: [illegible]

APPROVAL AUTHORITY

ENVIRONMENTAL PROTECTION AUTHORITY

EPL:6004

CLIENT

LITHGOW CITY COUNCIL

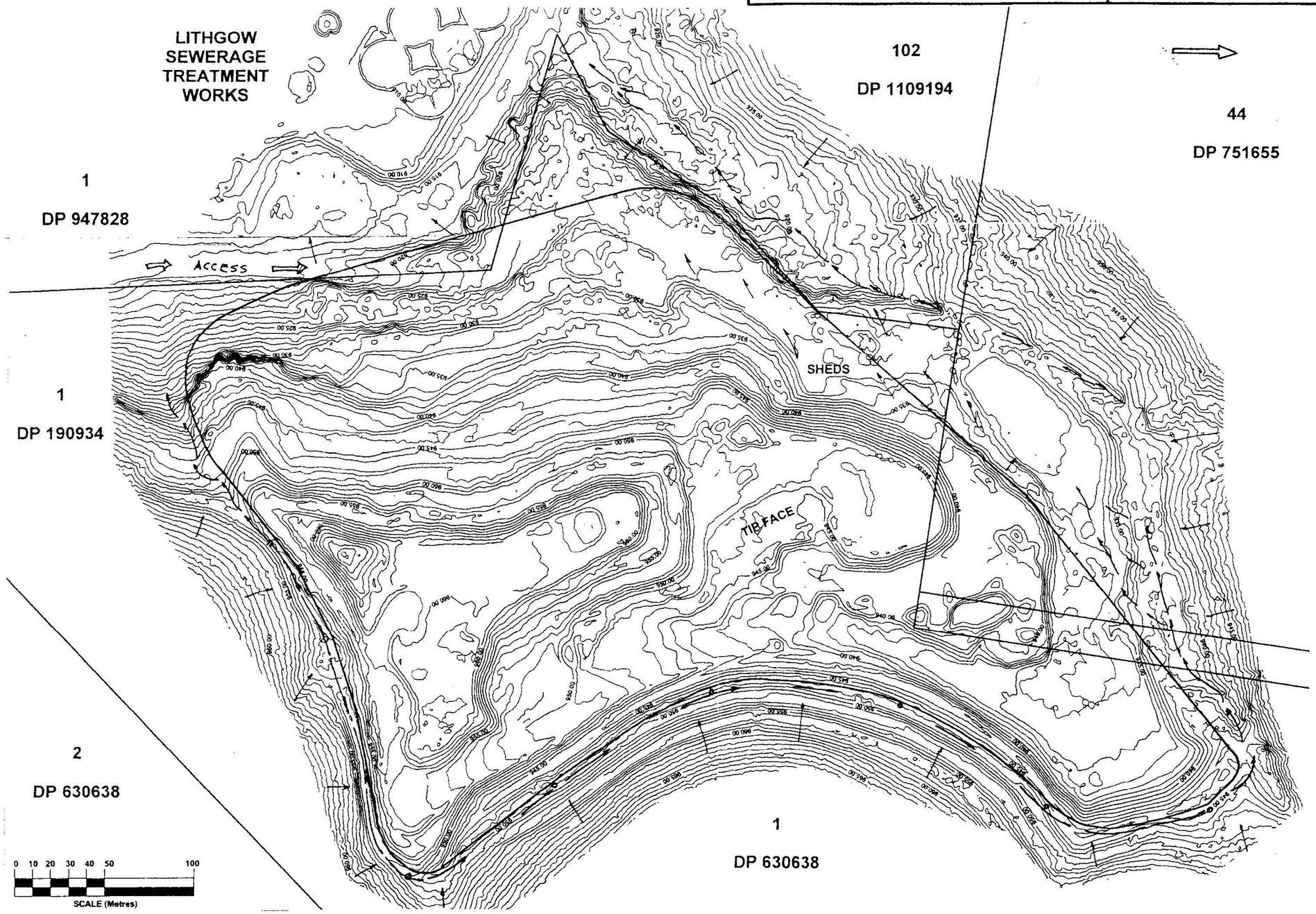
DRAWING

ENVIRONMENTAL
MONITORING POINTS

211109 01B EV04 REV B

RECOMMENDED LANDFILL FOOTPRINT

FIGURE 1

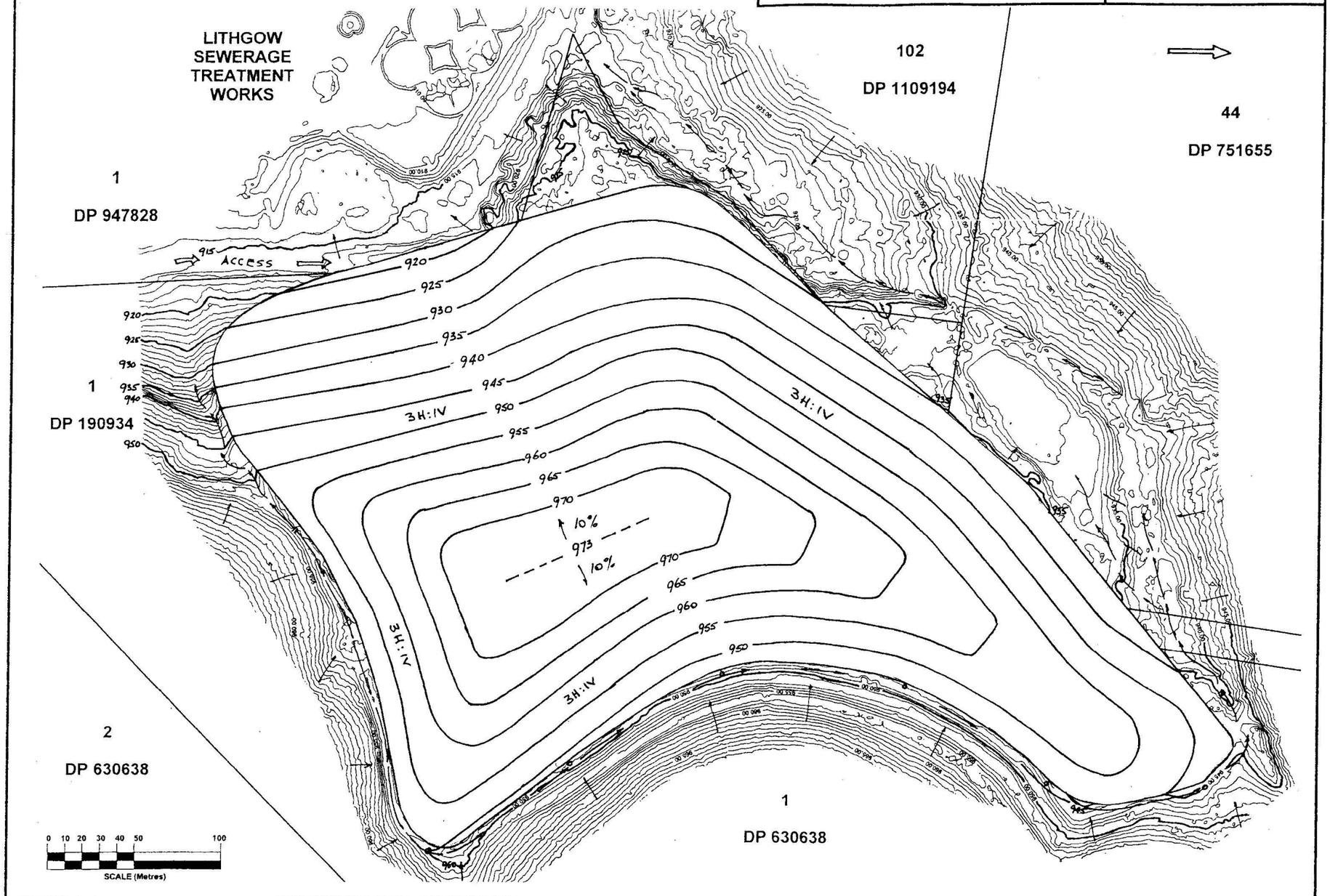


REFERENCE : CEH SURVEY ENTITLED "CITY OF LITHGOW LITHGOW WASTE DEPOT SURVEY 18th FEBRUARY 2016 " (REFER APPENDIX 1)

AMARAL

FINAL LANDFILL LANDFORM

FIGURE 2



REFERENCE : CEH SURVEY ENTITLED "CITY OF LITHGOW. LITHGOW WASTE DEPOT SURVEY - 18th FEBRUARY 2016 " (REFER APPENDIX 1)

AMARAL

STAGE 1 COMPLETION

FIGURE 3

LITHGOW SEWERAGE TREATMENT WORKS

1
DP 947828

1
DP 190934

2
DP 630638

102
DP 1109194

44
DP 751655

SHEDS

TIP FACE

1:1 (TEMP.)

10%

973

10%

970

965

960

955

950

3H:1V

1:1 (TEMP.)

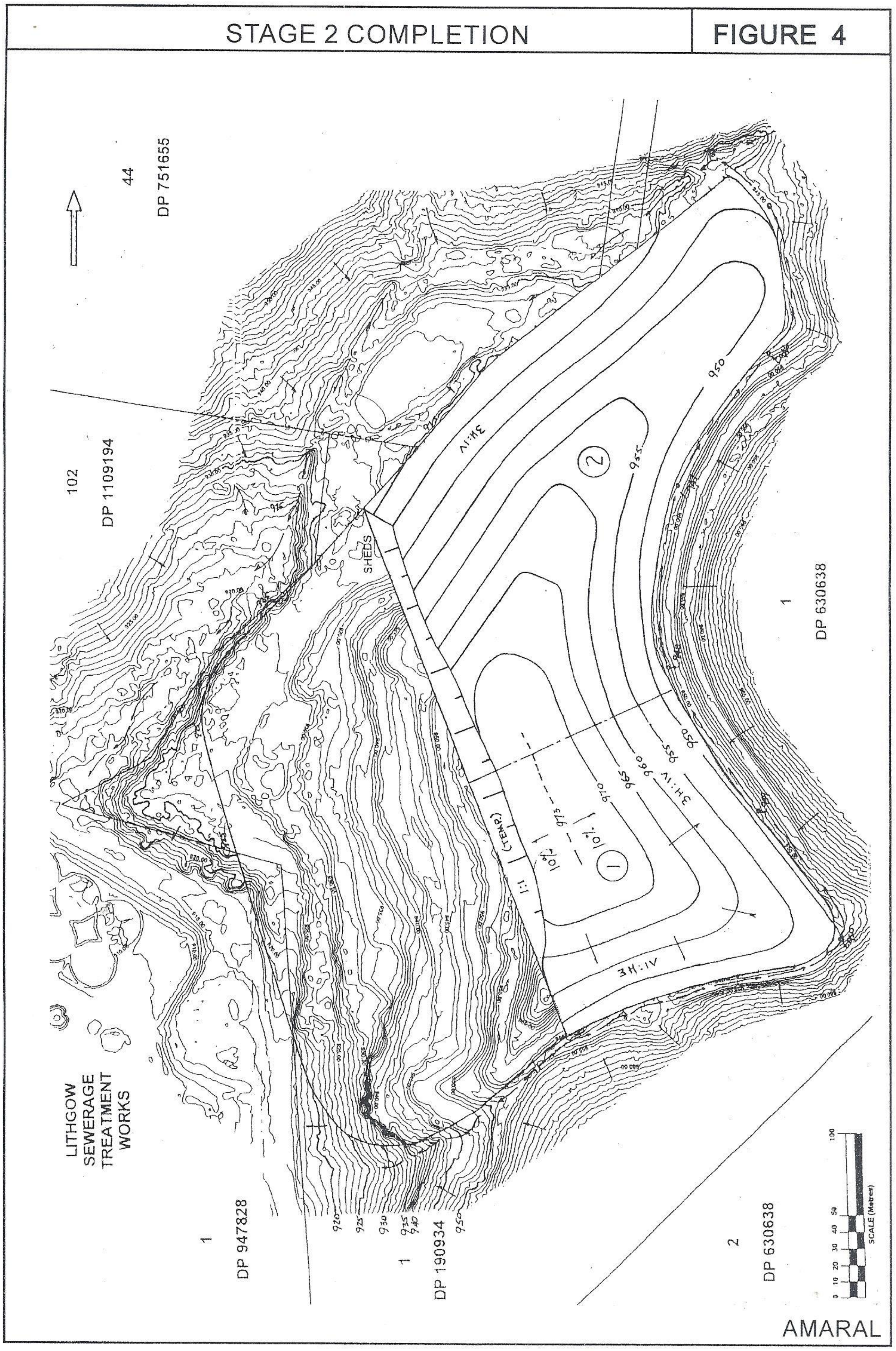
1:1

3H:1V

1
DP 630638

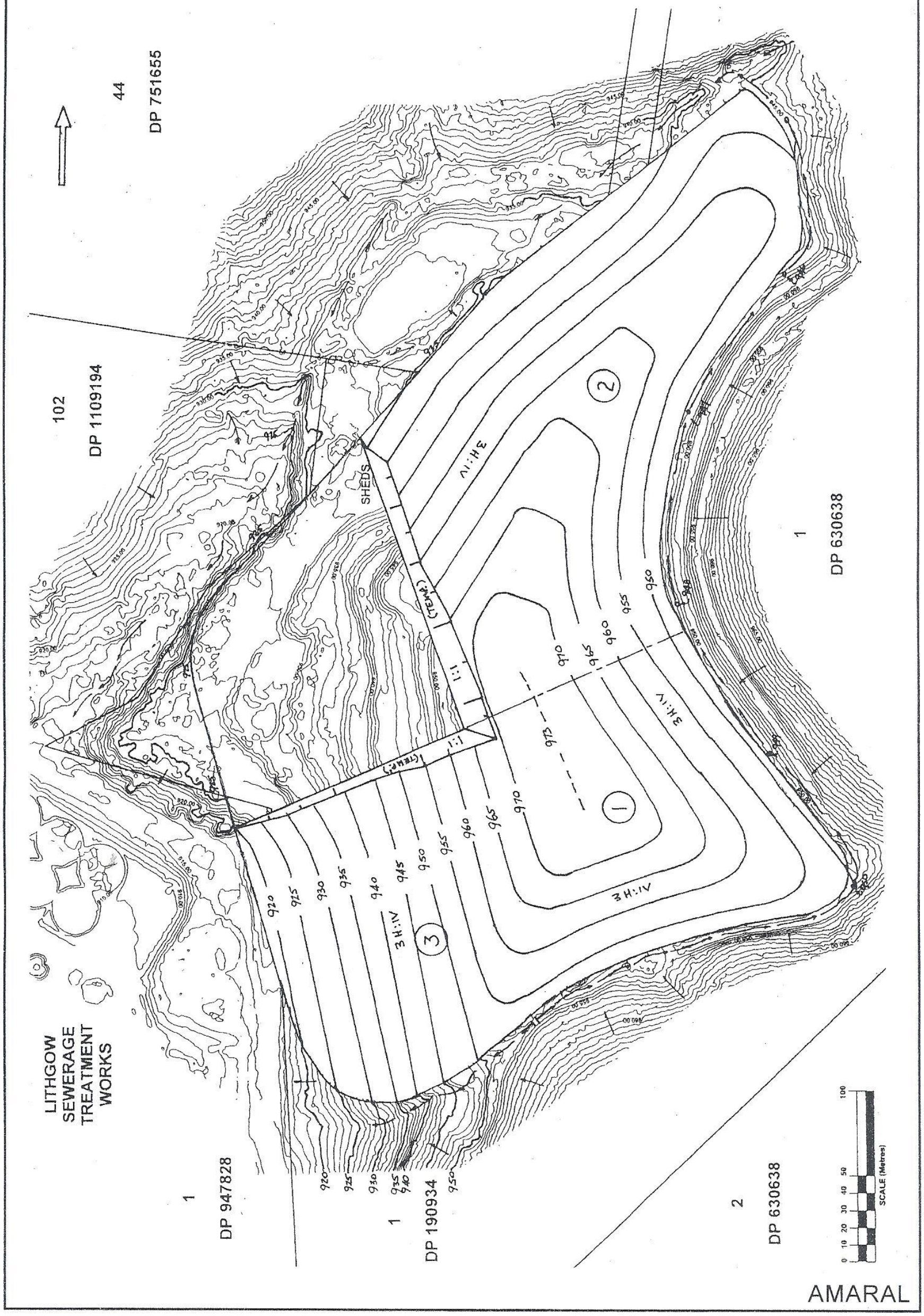
0 10 20 30 40 50 100
SCALE (Metres)

AMARAL


STAGE 2 COMPLETION
FIGURE 4
44
DP 751655
102
DP 1109194
SHEDS
3H:1V
950
955
960
965
970
973
10%
(TEMP.)
1:1
1
2
1
DP 630638
LITHGOW
SEWERAGE
TREATMENT
WORKS
1
DP 947828
1
DP 190934
920
925
930
935
940
950
2
DP 630638
0 10 20 30 40 50 100
SCALE (Metres)
AMARAL

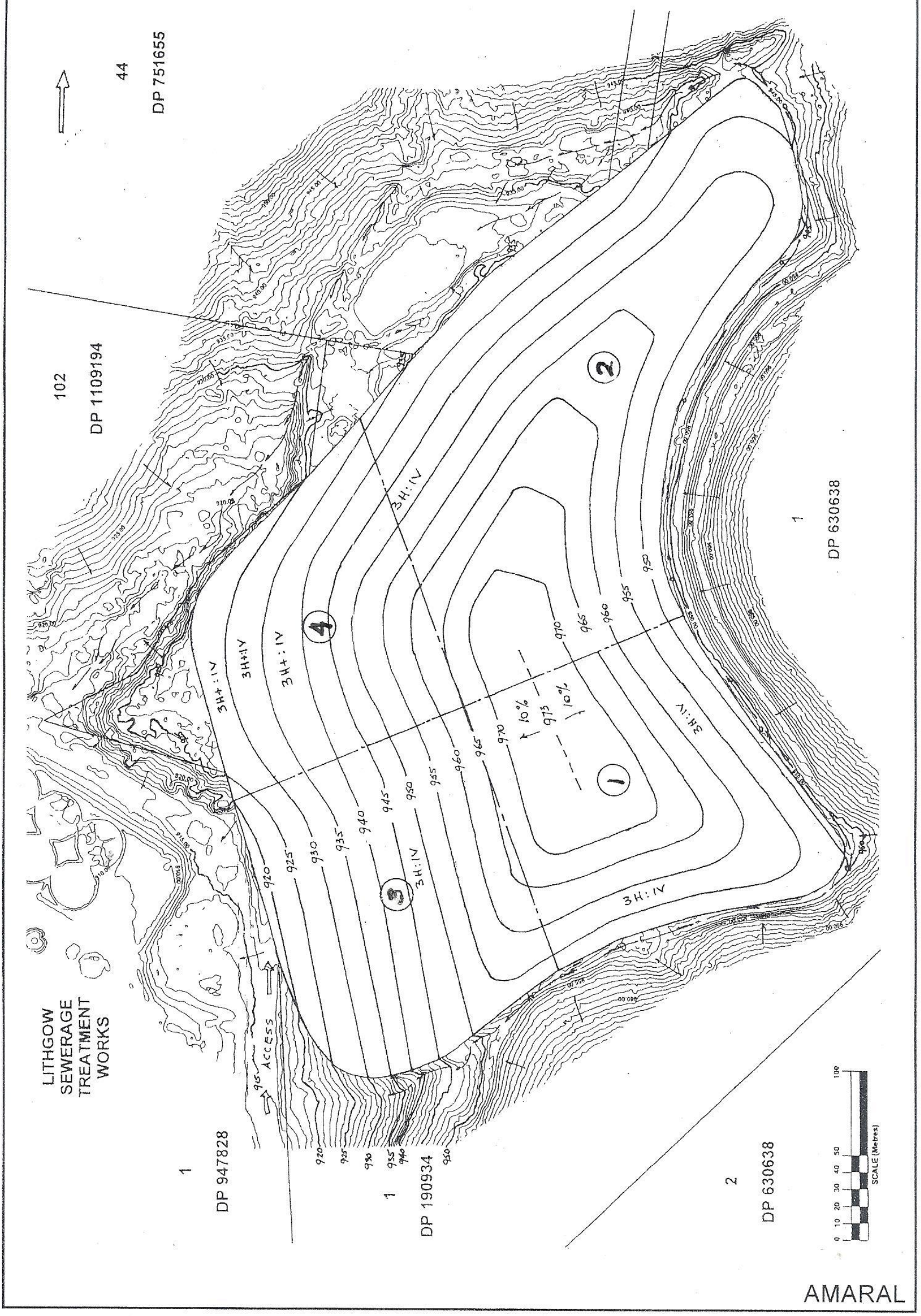
STAGE 3 COMPLETION

FIGURE 5



STAGE 4 COMPLETION

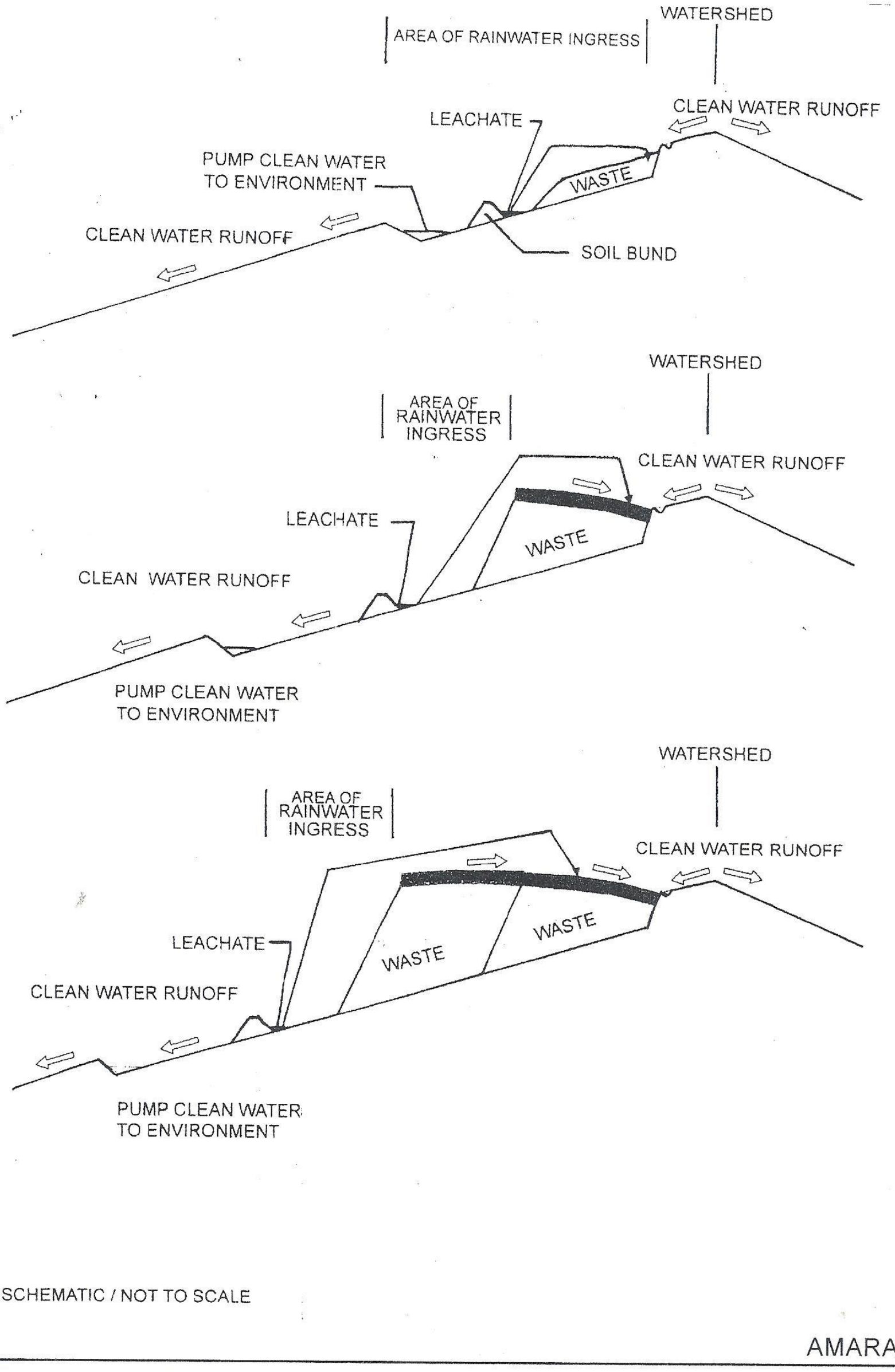
FIGURE 6



AMARAL

FILLING UPGRADIENT TO DOWNGRADIENT

FIGURE 9

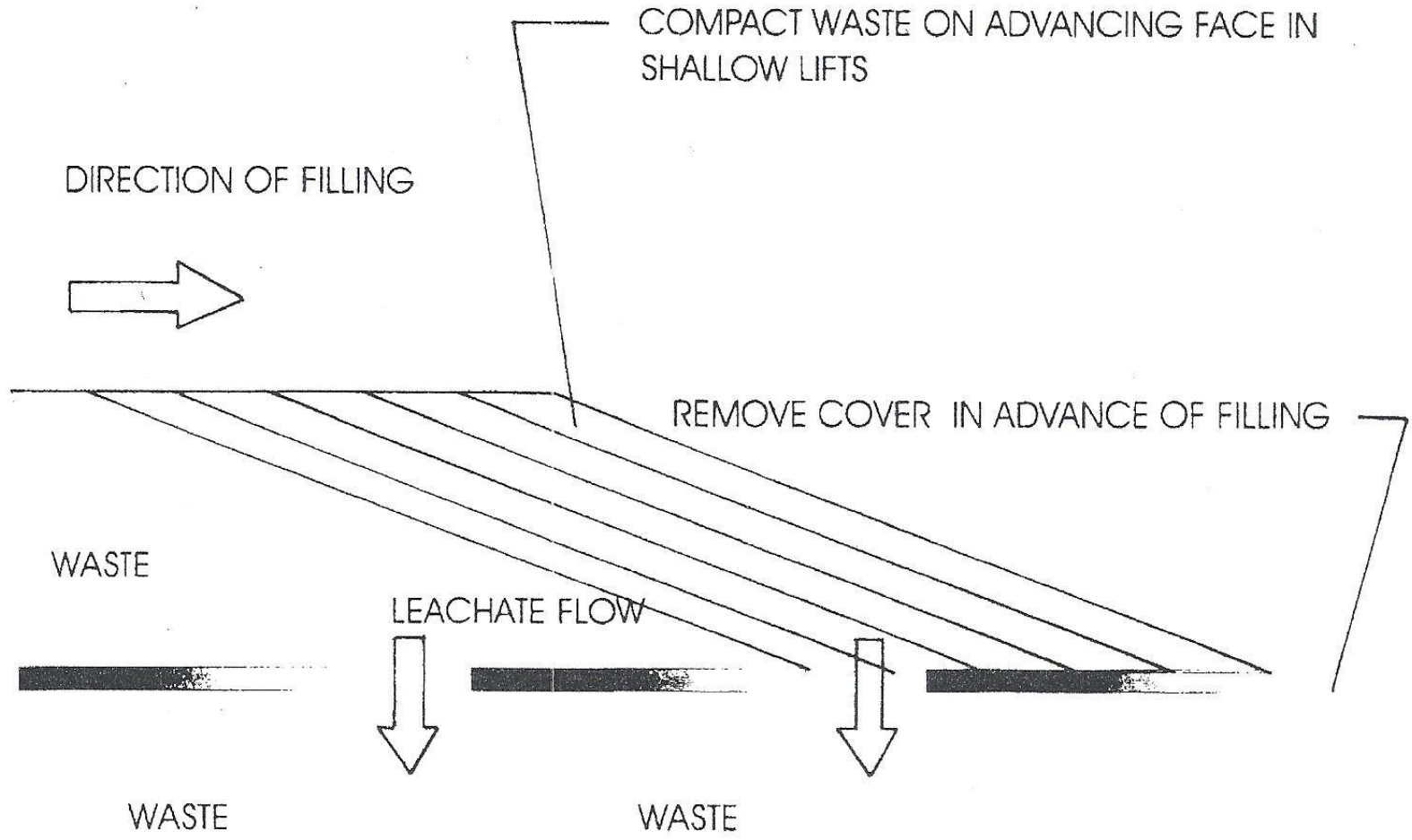


SCHEMATIC / NOT TO SCALE

AMARAL

REMOVE COVER IN ADVANCE OF FILLING

FIGURE 10

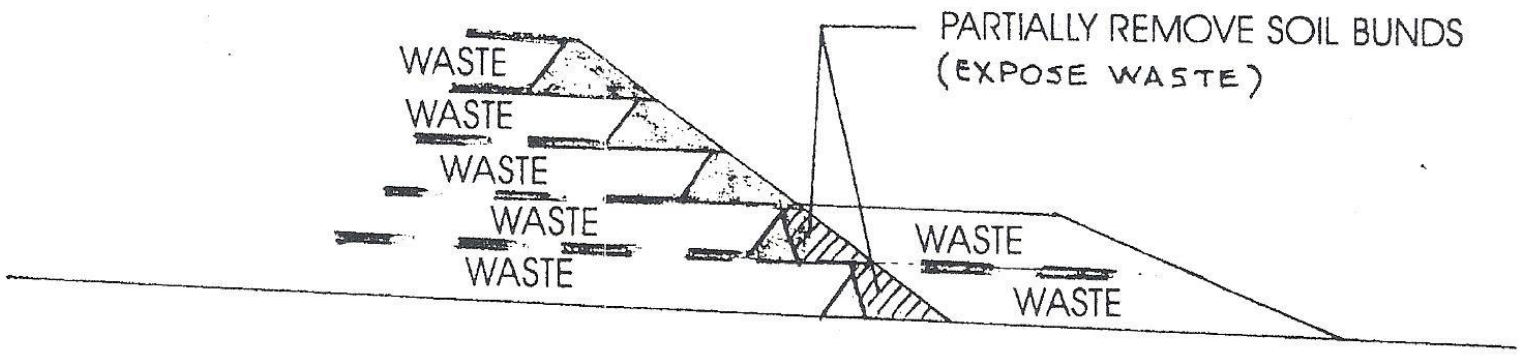


SCHEMATIC / NOT TO SCALE

AMARAL

PARTIALLY REMOVE INTERNAL BUNDS

FIGURE 11



SCHEMATIC / NOT TO SCALE

AMARAL

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Balgowlah NSW 2758
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Mob. 0419 683 114
Email bobamaral@bigpond.com.au

Conceptual Design Drawings

Lithgow Landfill

16003 March 2016
(updated to July 2016)

Robert Bailey Consulting/RH Amaral Consulting

ROBERT H. AMARAL BA. BASc. MASc.
Consulting Geotechnical/Landfill Engineer

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Balgowlah NSW 2093
(ABN/GST Reg. No. 63323 393709)

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Notes to Accompany Conceptual Landfill Design Drawings

FIGURE 1 Recommended Landfill Footprint

The base contour plan used to determine the recommended landfill footprint is given in **Appendix 1**.

This contour plan is based on survey work carried out on the existing landform in mid February 2016.

The footprint outlined has been selected to enclose existing waste where feasible but does not propose enclosing the already placed waste on Lot 102 (DP1109194) which is not licenced to accept waste.

It is recommended that the existing waste in this area be graded uniformly to shed surface water, be properly covered and vegetated to allow slashing.

The footprint does not include the triangular area to the west as it would create an unfavourable valley feature in the southwest corner which would create concentrated surface water flows.

The footprint in this area has been made quite straight to improve the overall final landform shape and shed surface water in a sheet flow.

The access road in this area will need to be modified by the end of Stage 2 filling in several years' time.

The eastern landfill footprint has been moved uphill to remove the open drain which currently is bounded on its western side by the landfill. The replacement of this drain further to the east (uphill) will allow it to be developed in bedrock which will provide long term stability, provide additional cover material and increase the capacity of the landfill.

The northern "borrow" area has been included to provide additional cover material and substantial additional capacity.

It should be noted that the existing site contours bear little relationship to the Geolyse design extension Stages 1 and 2.

FIGURE 2 Final Landfill Landform

This figure illustrates the final landform based on the selected modified landfill footprint, side batters of 3H:1V with local flatter slopes to improve the overall shape of the landform.

The top of the landform (40 to 70m wide) has been designed at a 10% gradient to ensure a final (post settlement) gradient of 5%.

These gradients will allow final capping (placed progressively), mulching, seeding and slashing to maintain a well vegetated cover.

FIGURE 3 Stage 1 Completion

This figure illustrates the completed Stage 1 filling area.

A large part of this stage will be finally capped and move into maintenance mode, reducing rainfall infiltration and leachate generation.

The internal (temporary) batters are shown at 1:1.

These should be constructed in rising stages behind soil bunds as illustrated in **Figures 8 and 11**.

These batters (1:1) may be steepened or flattened at the discretion of the landfill operator but are more conducive to bund removal during filling of adjacent areas when steep.

The existing southern drain is to be modified (deepened) to divert runoff water from the southern catchment to discharge to the southwest.

FIGURE 4 Stage 2 Completion

This figure illustrates the completed Stage 1 and 2 filling areas.

The construction of these very large stages will be developed through a large number of sub-stages which follow the same principles of filling behind soil containment bunds in controlled, compacted lifts shaped to shed surface water as a “sheet” flow.

Prior to filling Stage 2 it should be excavated further to a design plan to increase the landfill capacity, provide additional cover material and allow the installation of a leachate collector system with a deleaching well independent of the remainder of the landfill.

Once Stages 1 and 2 are completed, the eastern half of the landform will be finally capped and under maintenance.

FIGURE 5 Stage 3 Completion

This figure illustrates the completed Stage 3 filling area.

As before, the internal temporary batters have a 1:1 gradient while the final external batters have a 3H:1V gradient or flatter.

FIGURE 6 Stage 4 Completiion

Figure 6 illustrates the completed Stage 4 filling area which will be developed against the 1:1 temporary internal batters of the Stage 2 and Stage 3 filling areas.

FIGURE 7 Stage 1A Filling

This figure illustrates the necessary approach to preparing the current highly irregular landform to a more regular and manageable shape so that broader areas of the site can be raised sequentially to final height in relatively level stages.

This example illustrates how difficult it will be to acces, unload, push and cover waste and dictates that the general public cannot be allowed to access such areas.

Access to many of the sub-stages will need to be restricted to Contract Delivery vehicles only.

Due to the very poor current operational conditions on site it is recommended that the general public deliver their waste to a transfer station and be excluded from all operational areas of the site.

This is considered highly desirable, particularly in view of the fact of the potential long life of this landfill.

FIGURE 8 Sections A-A and B-B

These sections illustrate conceptually the recommended interceptor drain along the eastern side of the proposed landform as well as the method of filling the existing drain and providing a suitable 3H:1V final landfill batter.

FIGURE 9 Filling Upgradient to Downgradient

This figure illustrates the principle of filling from upgradient to downgradient and progressively excluding surface water intrusion and decreasing leachate production.

FIGURE 10 Remove Cover in Advance of Filling

Prior to the advance of a new lift of waste, the cover over previously placed waste should be largely removed to allow vertical migration of leachate.

FIGURE 11 Partially Remove Internal Bunds

Before waste is placed against a temporary internally bunded waste batter it should be removed as far as is practicable in stages as the new waste lifts are placed.

Calculated Life of the Extended Landfill

Table 1

Stage	Gross Volume (m^3)	Cover Requirement (m^3)*	Net Volume (m^3)	Intake (m^3)**	Life (years)
1	153,000	38,250	114,750	25,000	4.6
2	368,000	92,000	276,000	25,000	11
3	94.000	23,500	70.500	25,000	2.8
4	136,000	34,000	102,000	25,000	4
Total	751,000	187,750	563,250		22.4

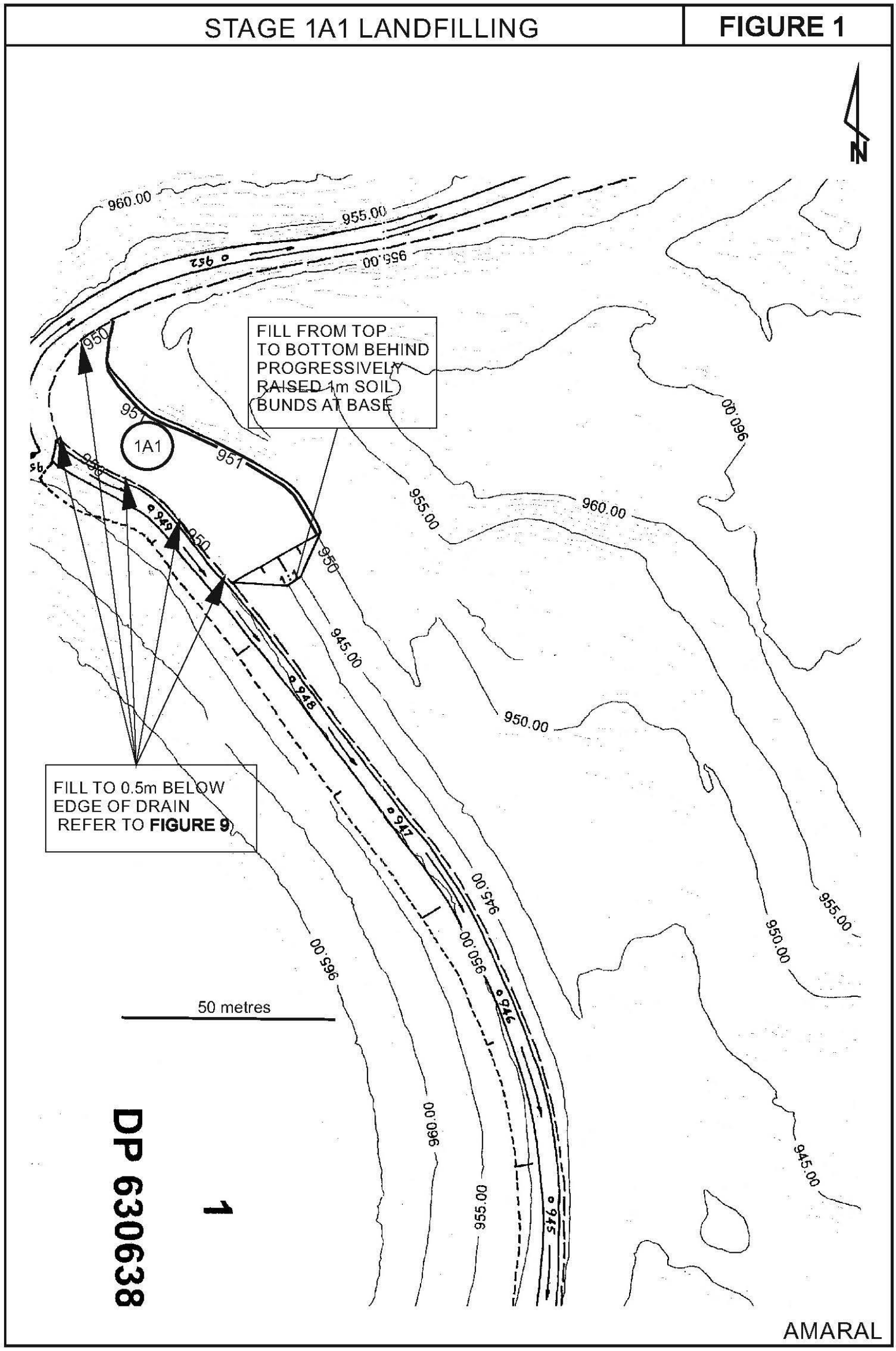
* assumes a cover requirement of 25% of total void
**from Geolyse Report

The excavation of a suitably sloped/graded base beneath much of the Stage 2 filling area will provide additional cover material.

The likely cover shortfall will be reduced by recovering the excavated weathered rock along the eastern drainage line.

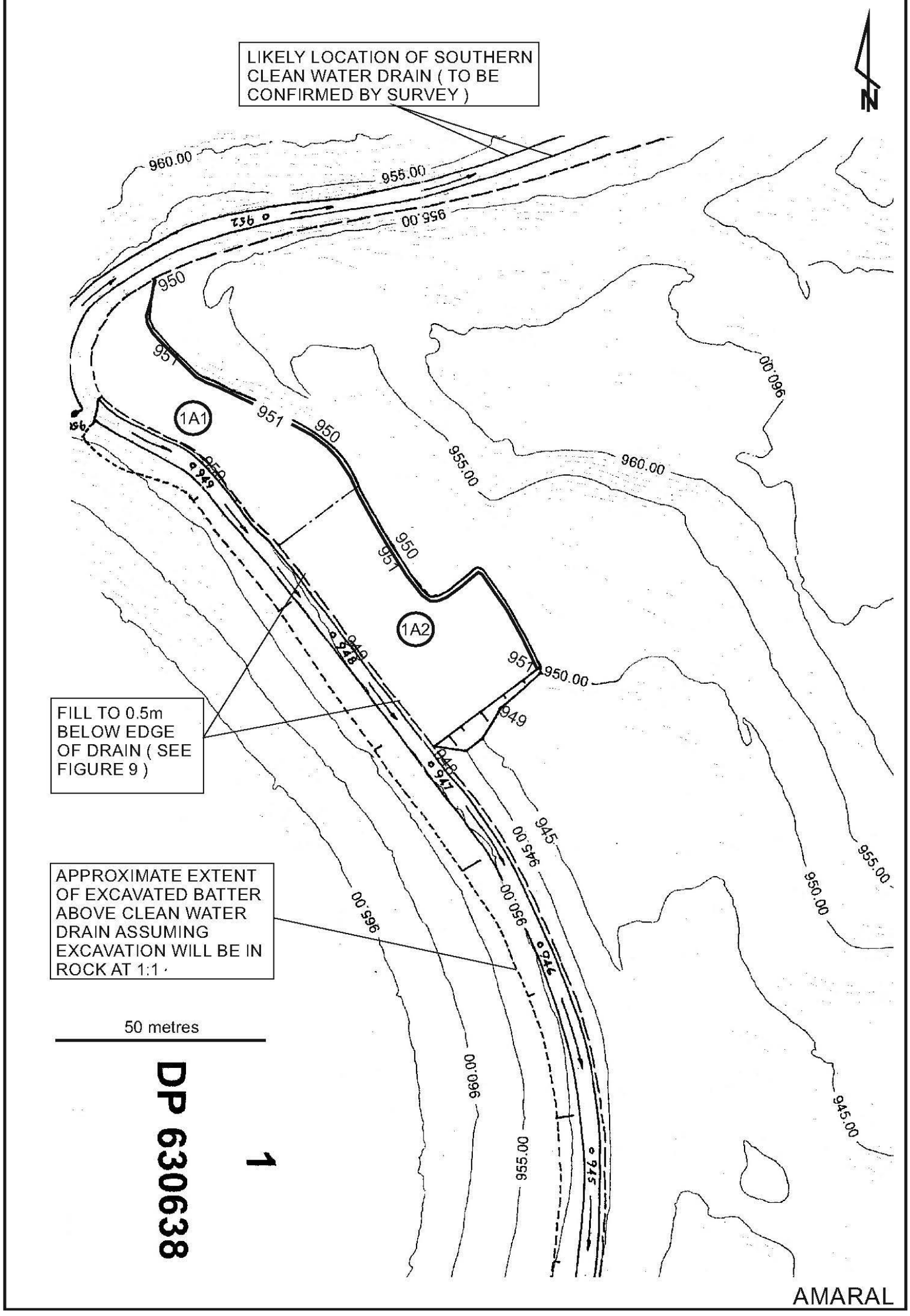
Filled Areas Outside of the Recommended Landfill Footprint

The filled areas outside of the recommended landfill footprint should be graded to encourage surface water flow (sheet flow) off site and be capped, mulched, seeded and slashed to provide a vegetated cover.

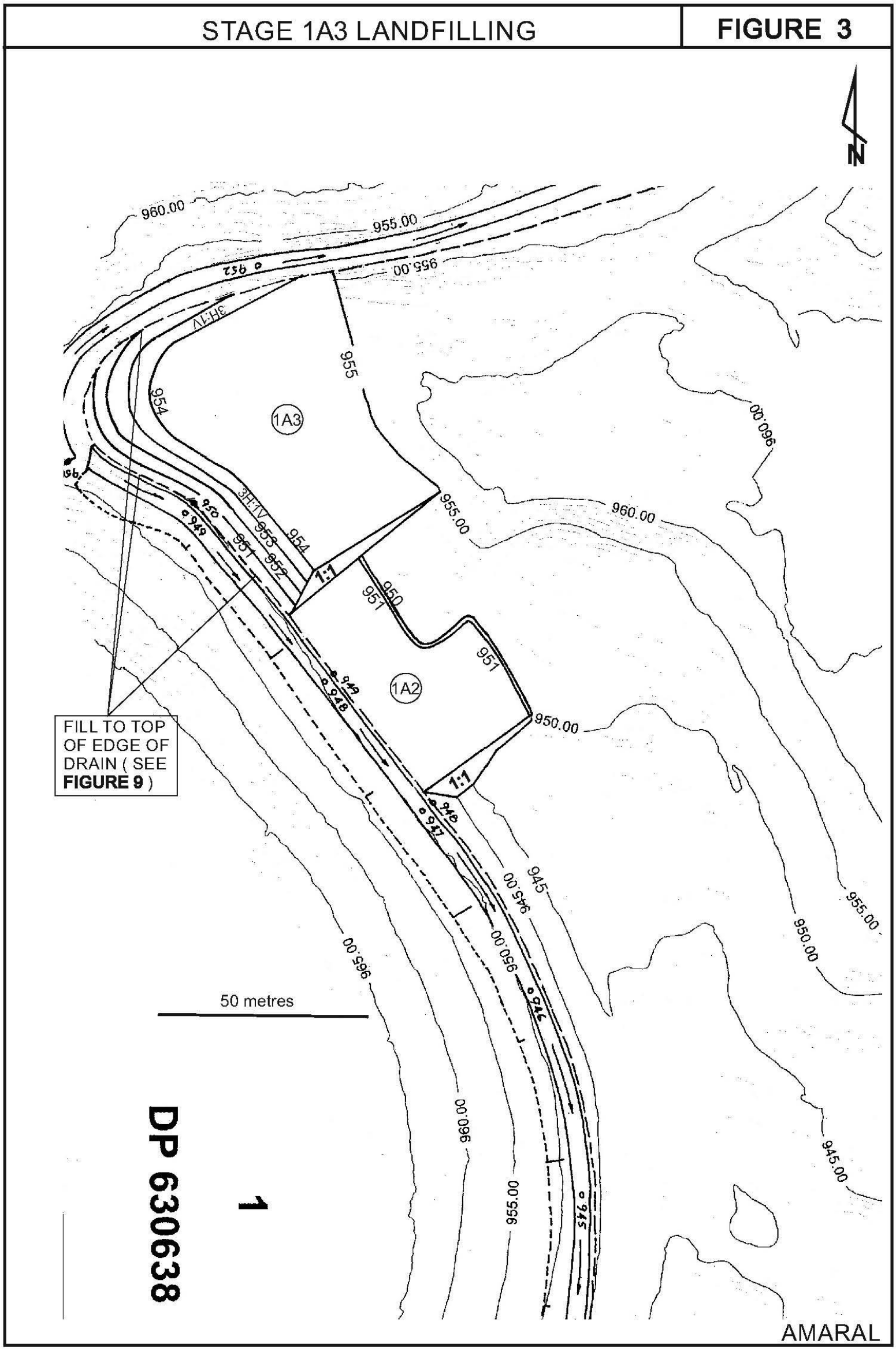

STAGE 1A1 LANDFILLING
FIGURE 1
N
960.00
955.00
950
FILL FROM TOP TO BOTTOM BEHIND PROGRESSIVELY RAISED 1m SOIL BUNDS AT BASE
1A1
951
949
950
1:1
948
947
946
945.00
950.00
965.00
FILL TO 0.5m BELOW EDGE OF DRAIN REFER TO **FIGURE 9**
50 metres
DP 630638
1
AMARAL

STAGE 1A2 LANDFILLING

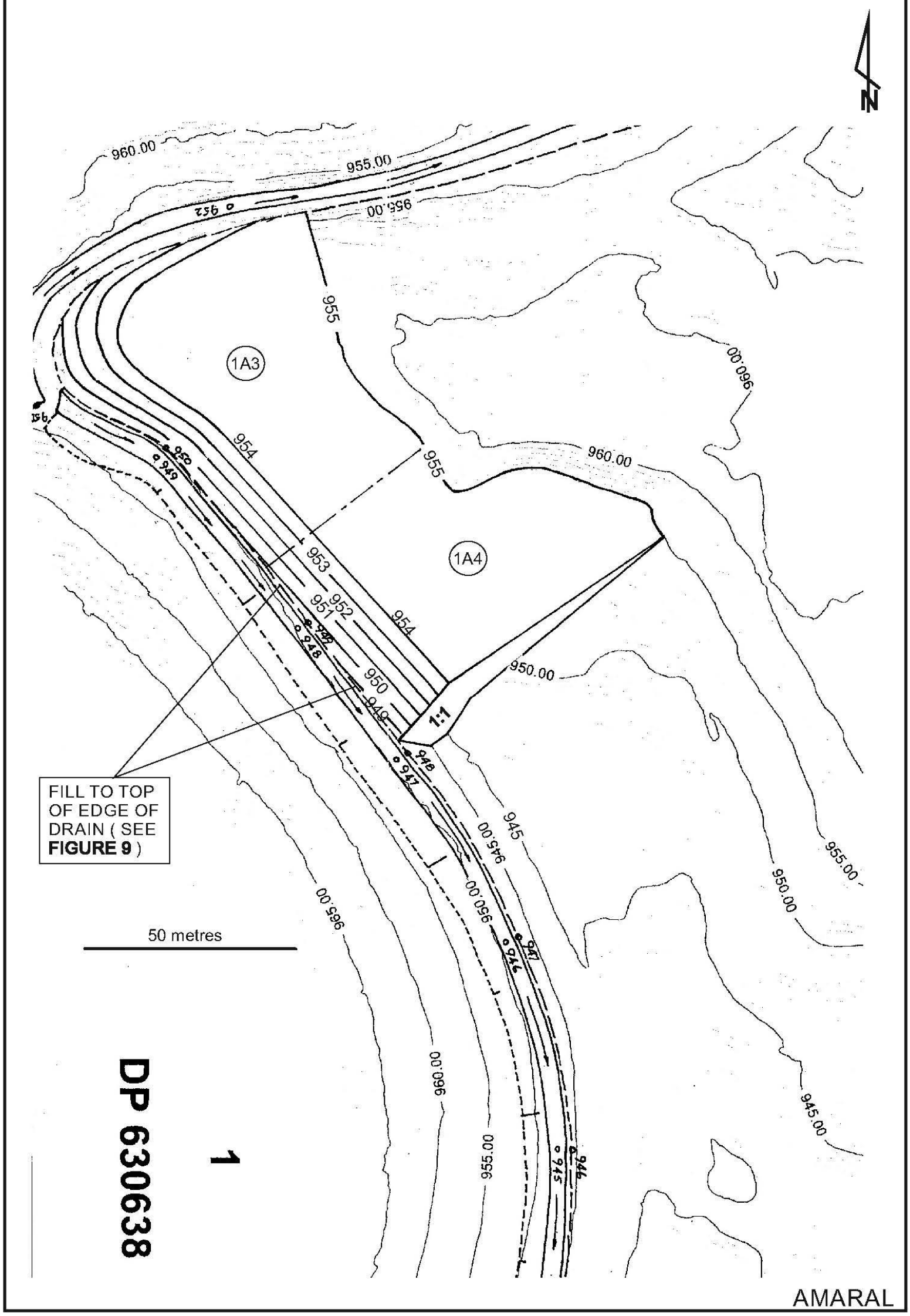
FIGURE 2



Appendix 3 - Amaral Filling Plans for Stages 1 and 2



STAGE 1A4 LANDFILLING | **FIGURE 4**



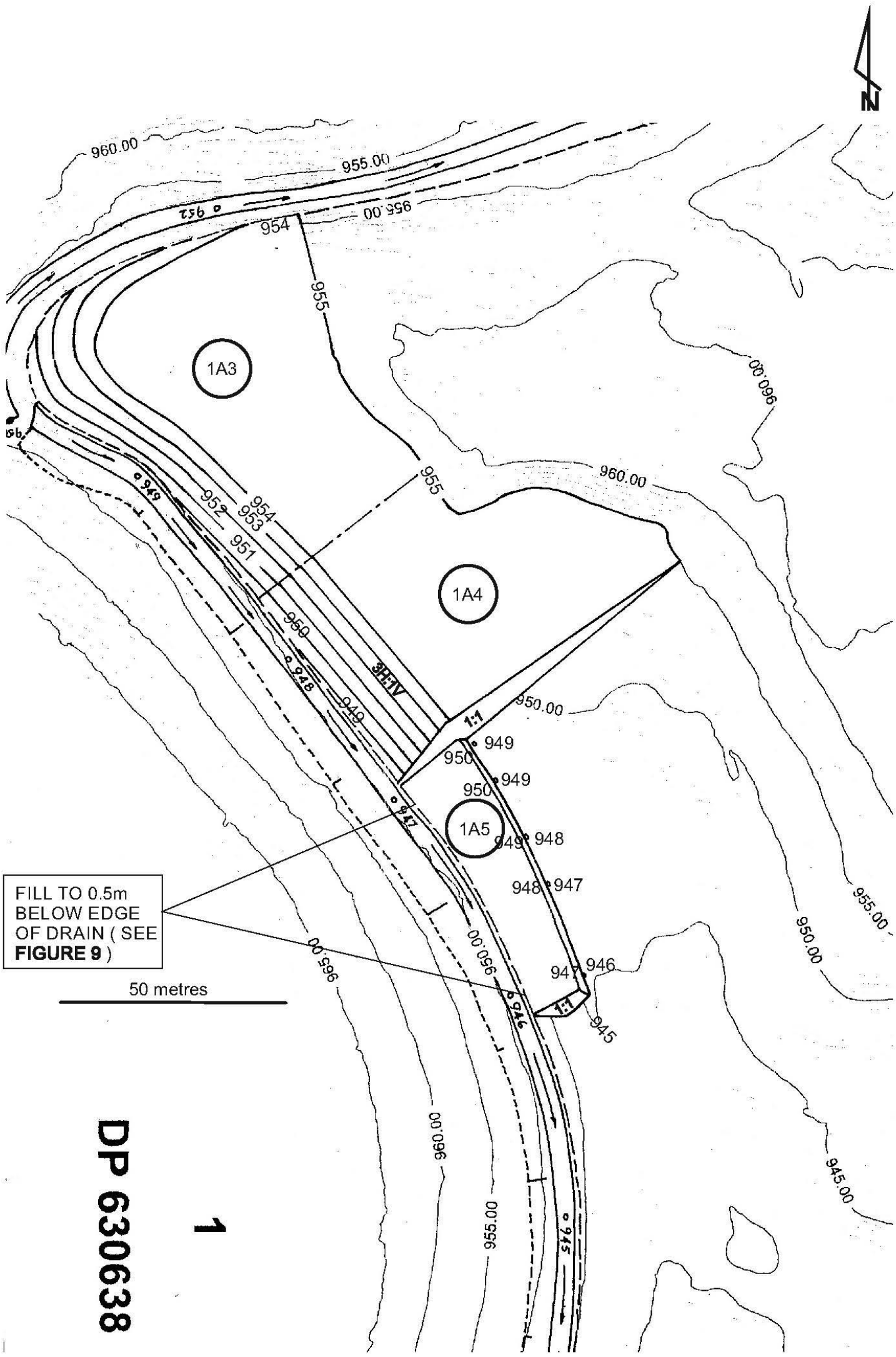
DP 630638

1

AMARAL

STAGE 1A5 LANDFILLING

FIGURE 5

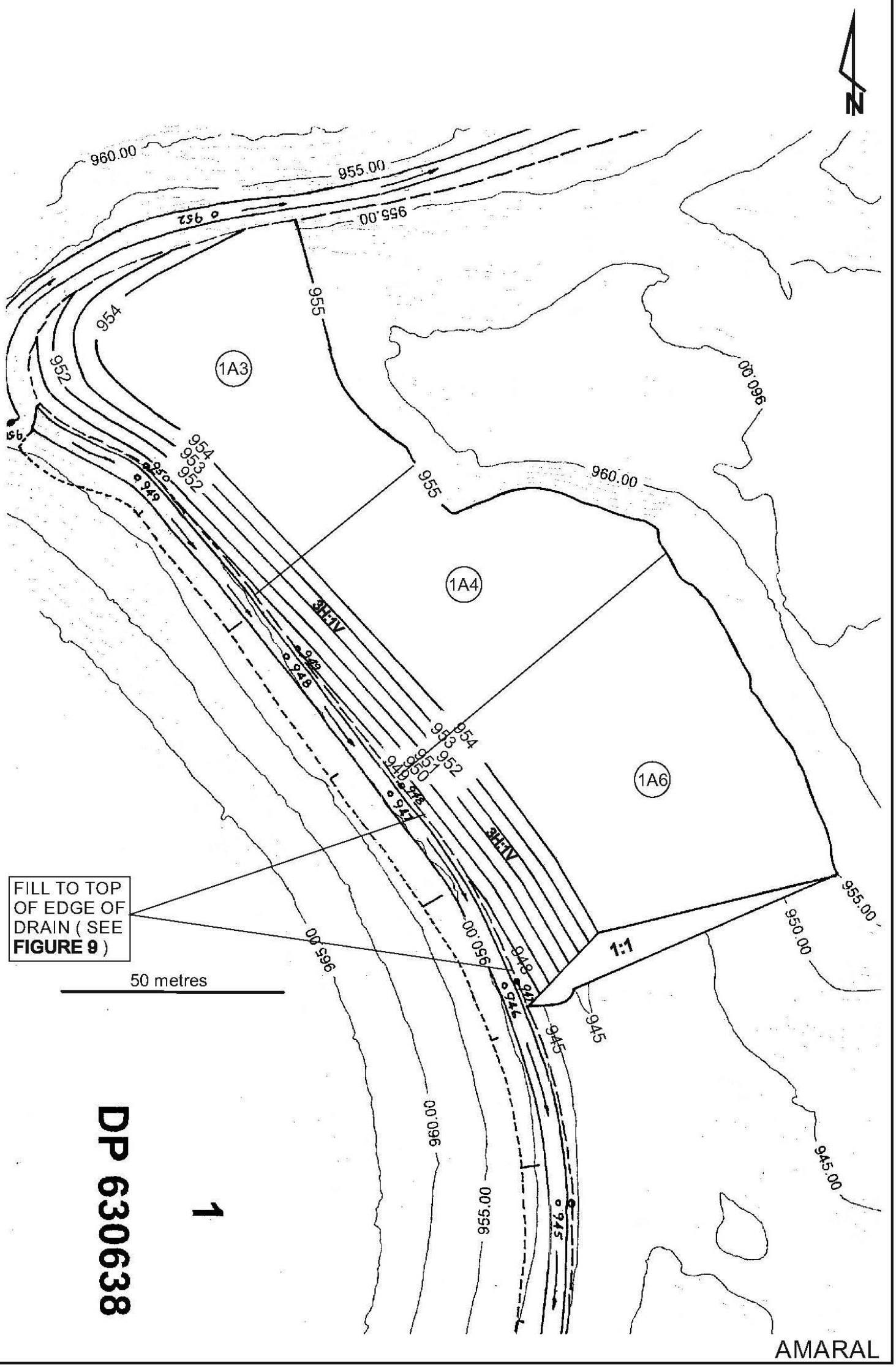


DP 630638

1

AMARAL

STAGE 1A6 LANDFILLING | **FIGURE 6**

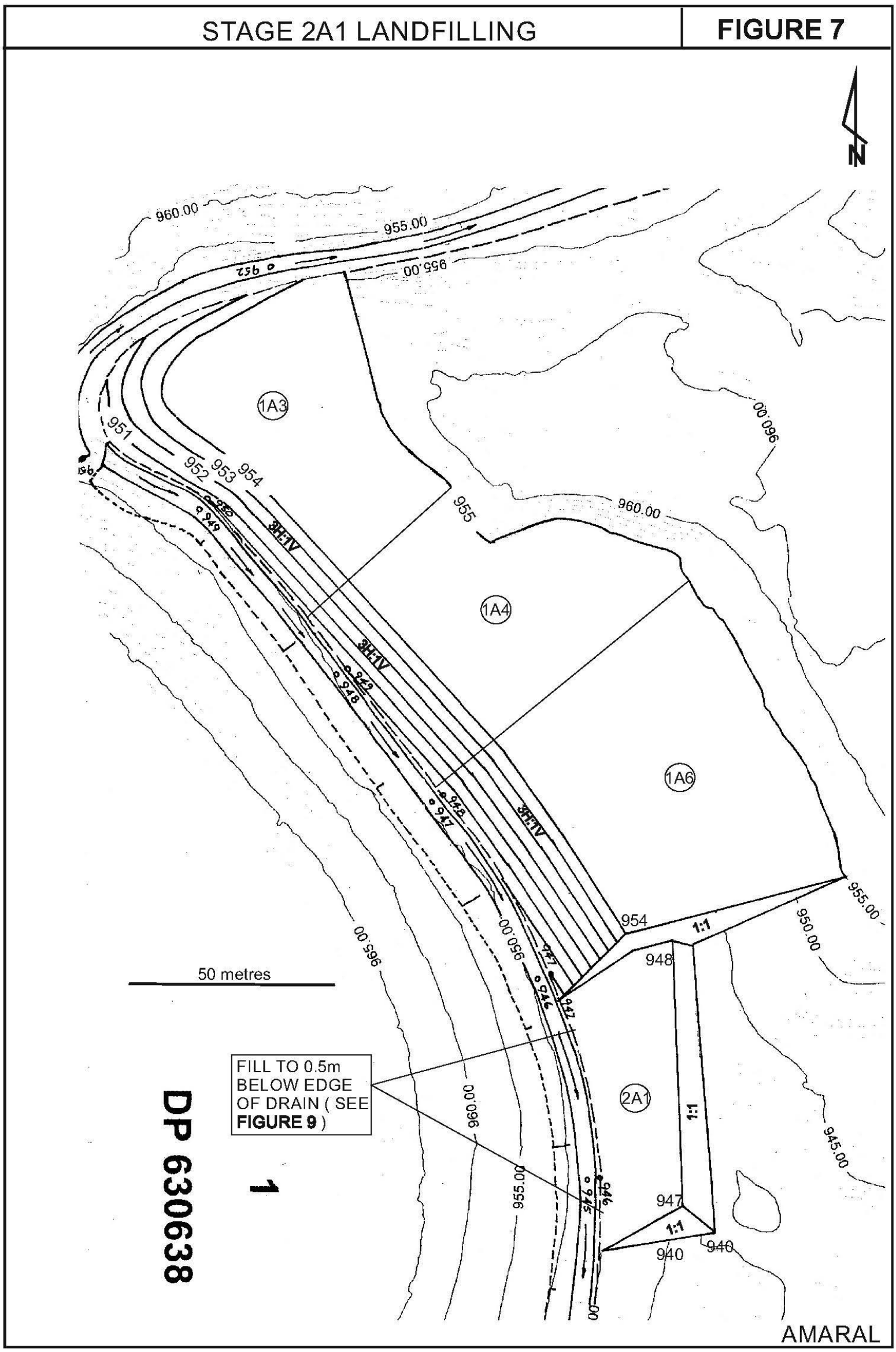


DP 630638

1

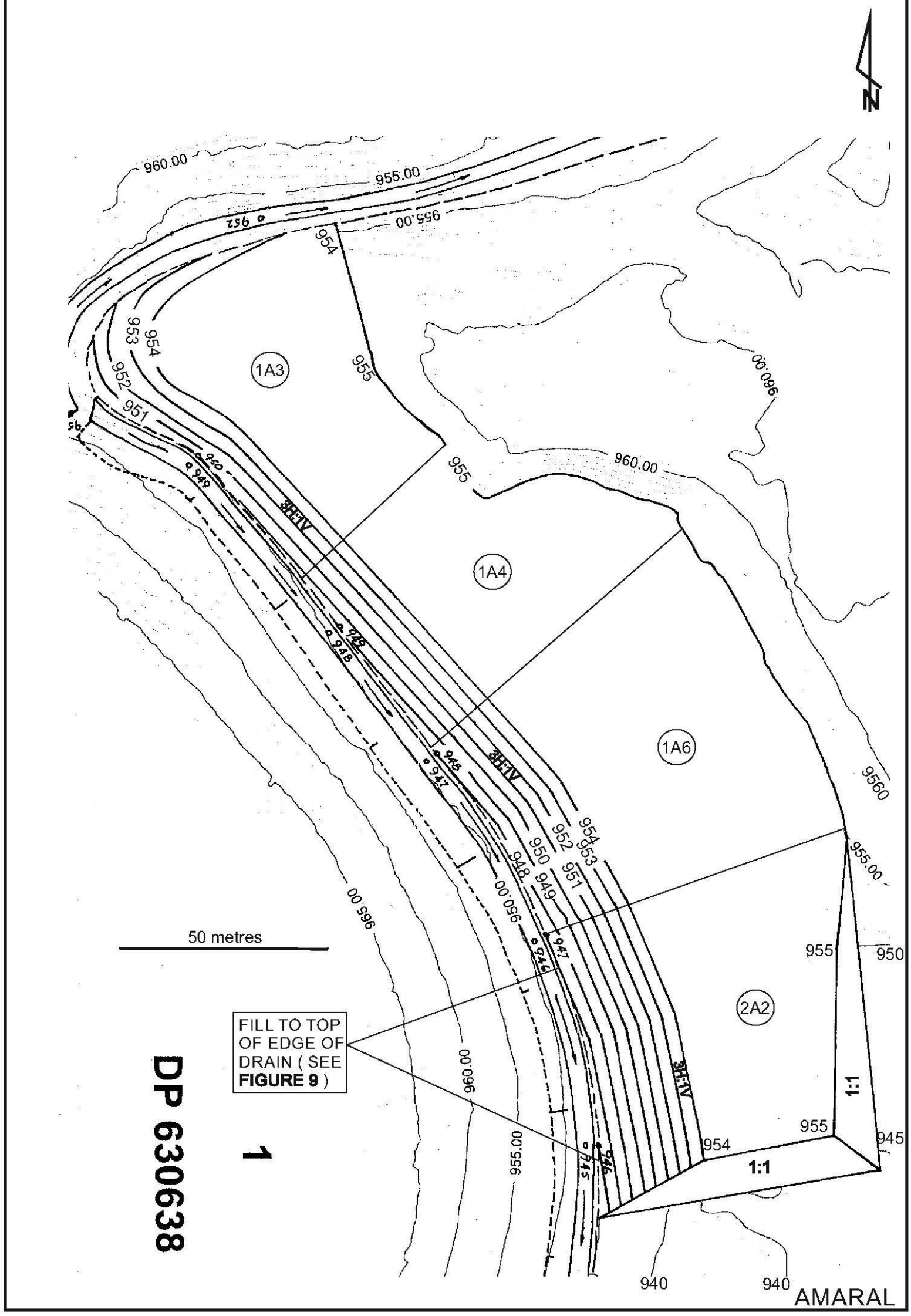
AMARAL

STAGE 2A1 LANDFILLING | **FIGURE 7**

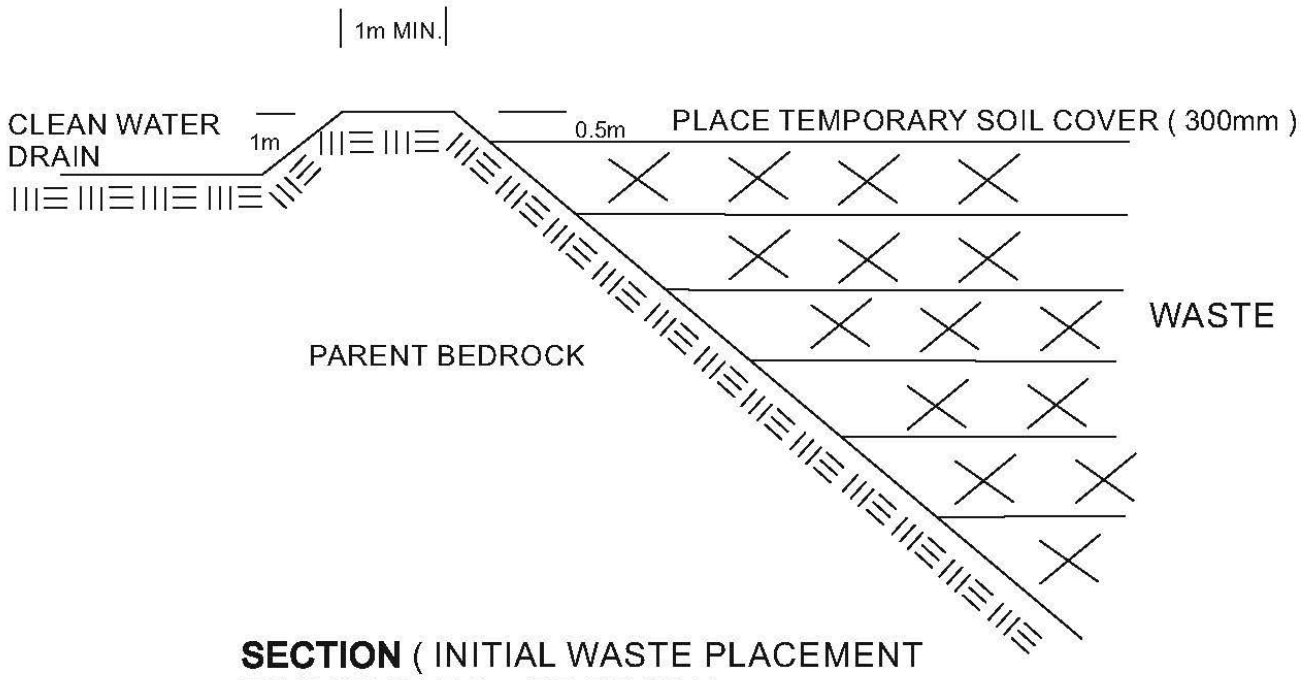


Appendix 3 - Amaral Filling Plans for Stages 1 and 2

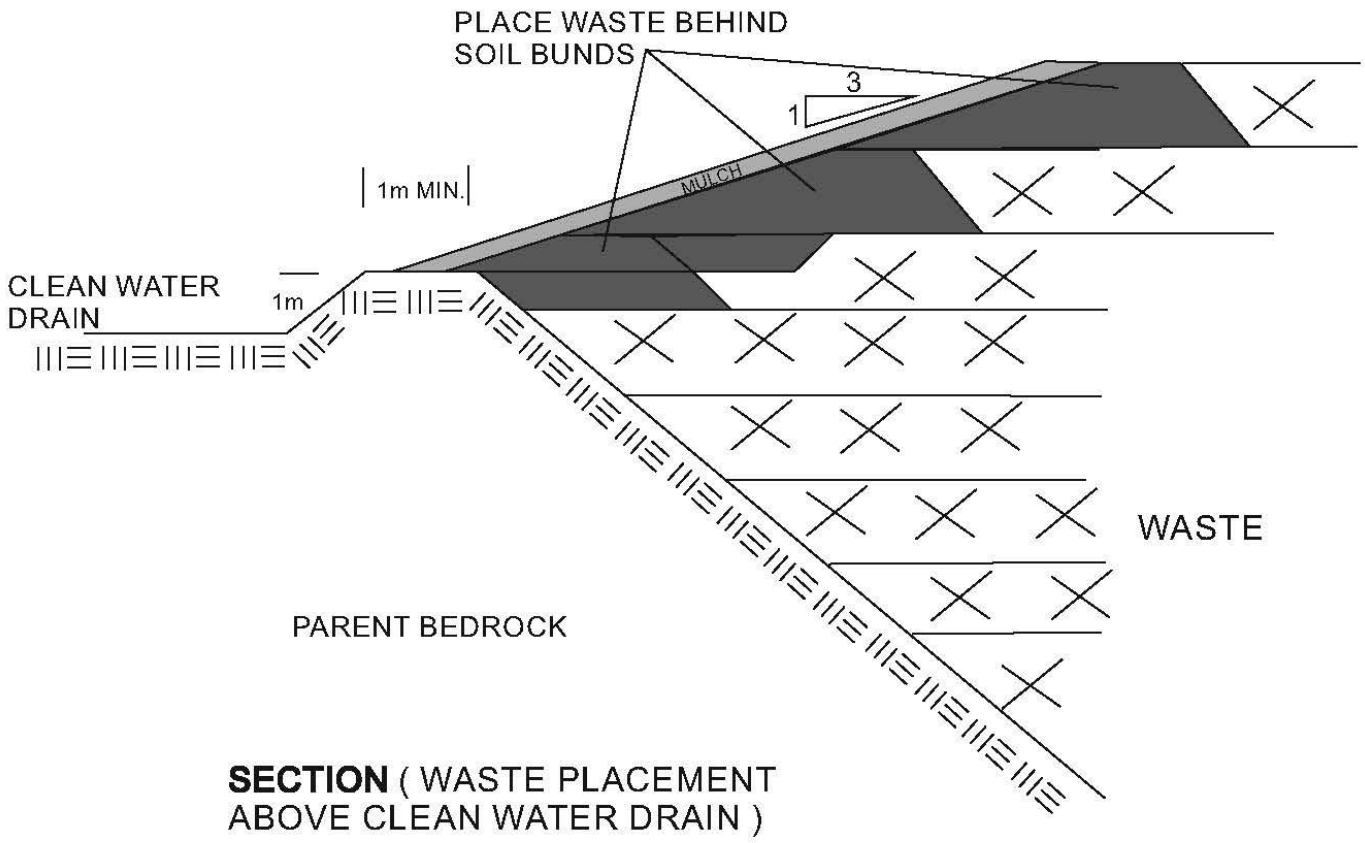
STAGE 2A2 LANDFILLING | **FIGURE 8**



SCHEMATIC SECTIONS AT EDGE OF EASTERN DRAIN | **FIGURE 9**



SECTION (INITIAL WASTE PLACEMENT TO WITHIN 0.5m OF DRAIN)



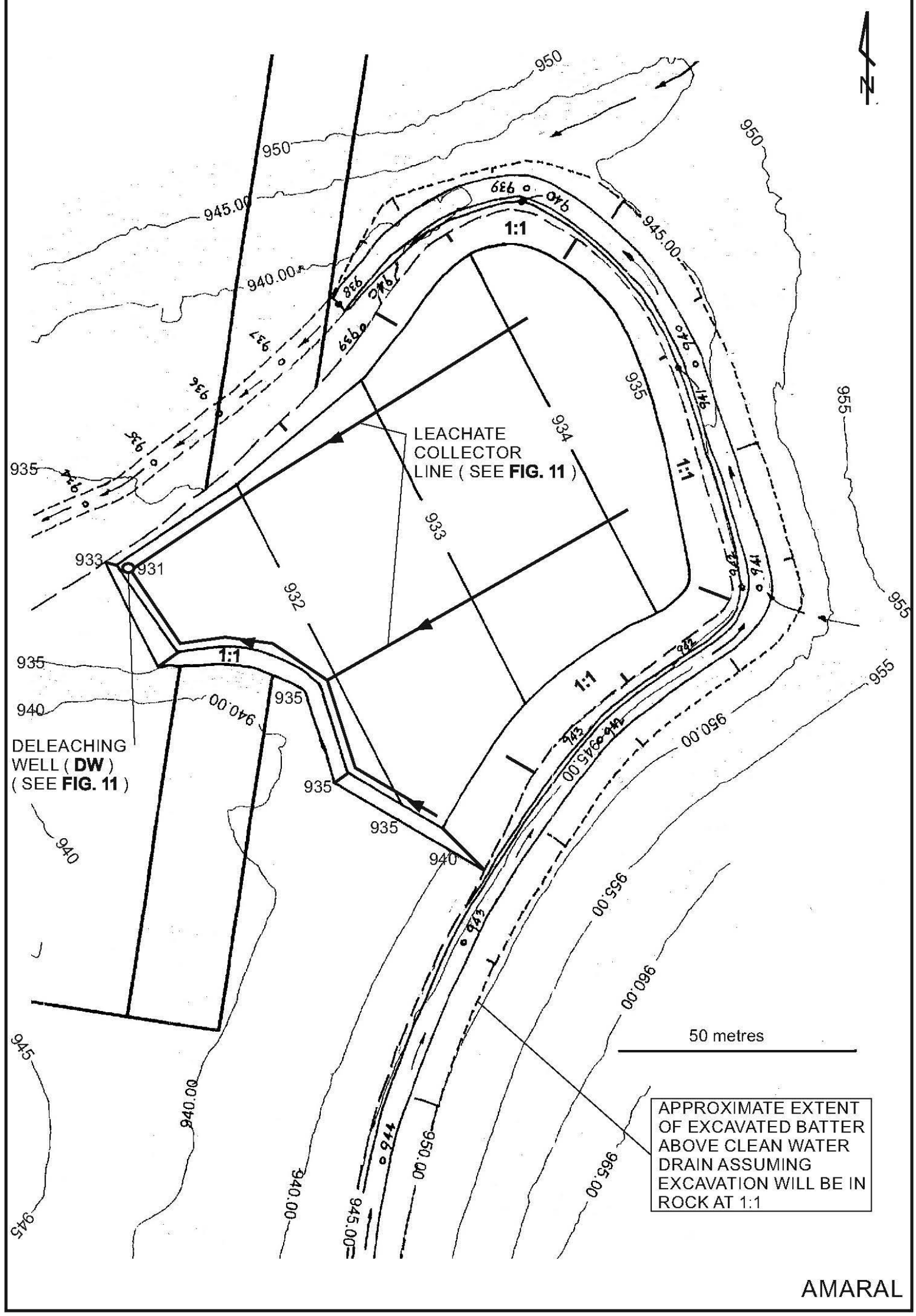
SECTION (WASTE PLACEMENT ABOVE CLEAN WATER DRAIN)

SCHEMATIC / NOT TO SCALE

AMARAL

EXCAVATION PLAN FOR "BORROW AREA "

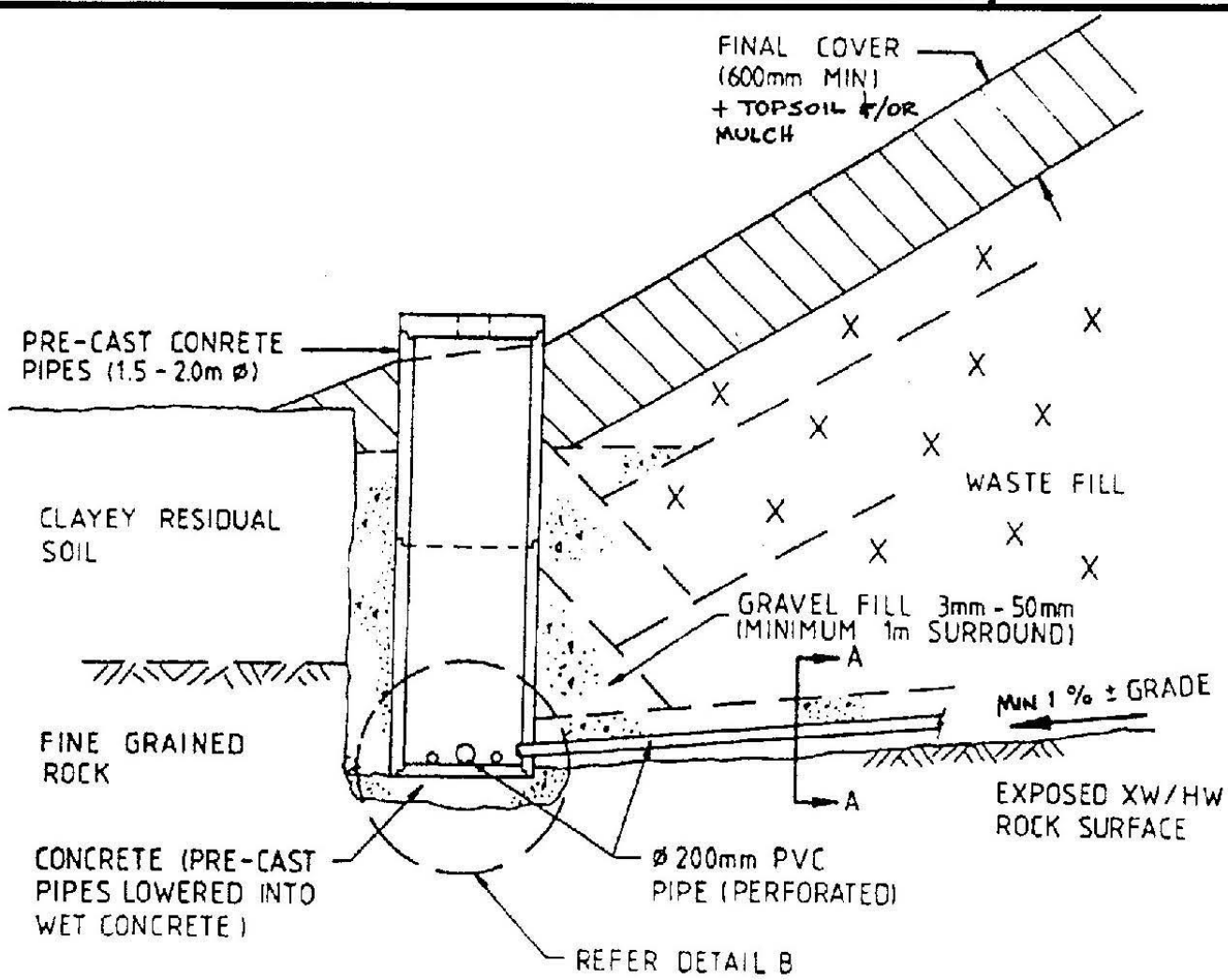
FIGURE 10

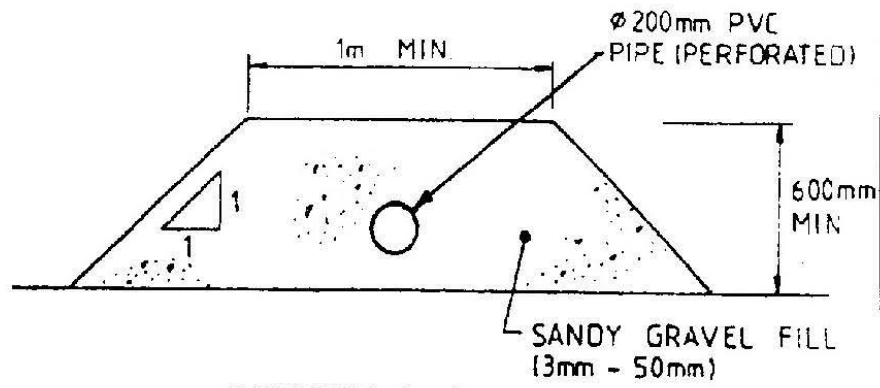


AMARAL

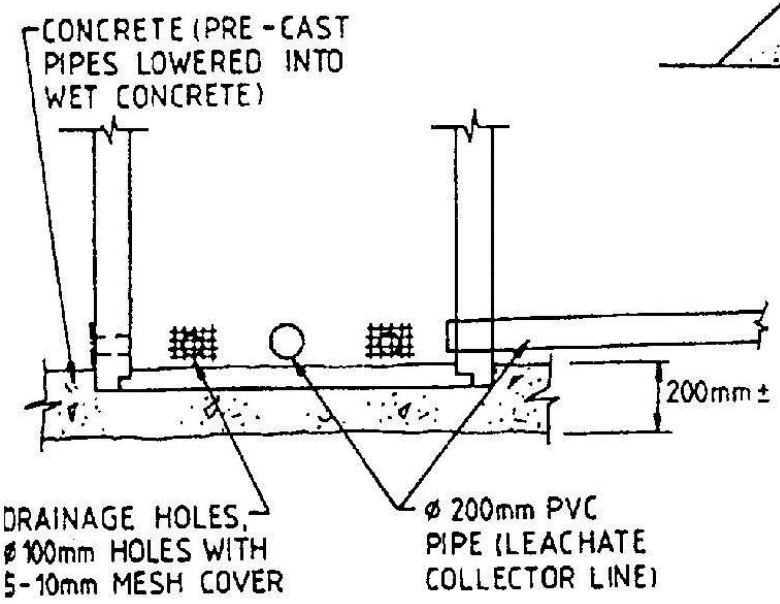
DELEACHING WELL DETAILS

FIGURE 11





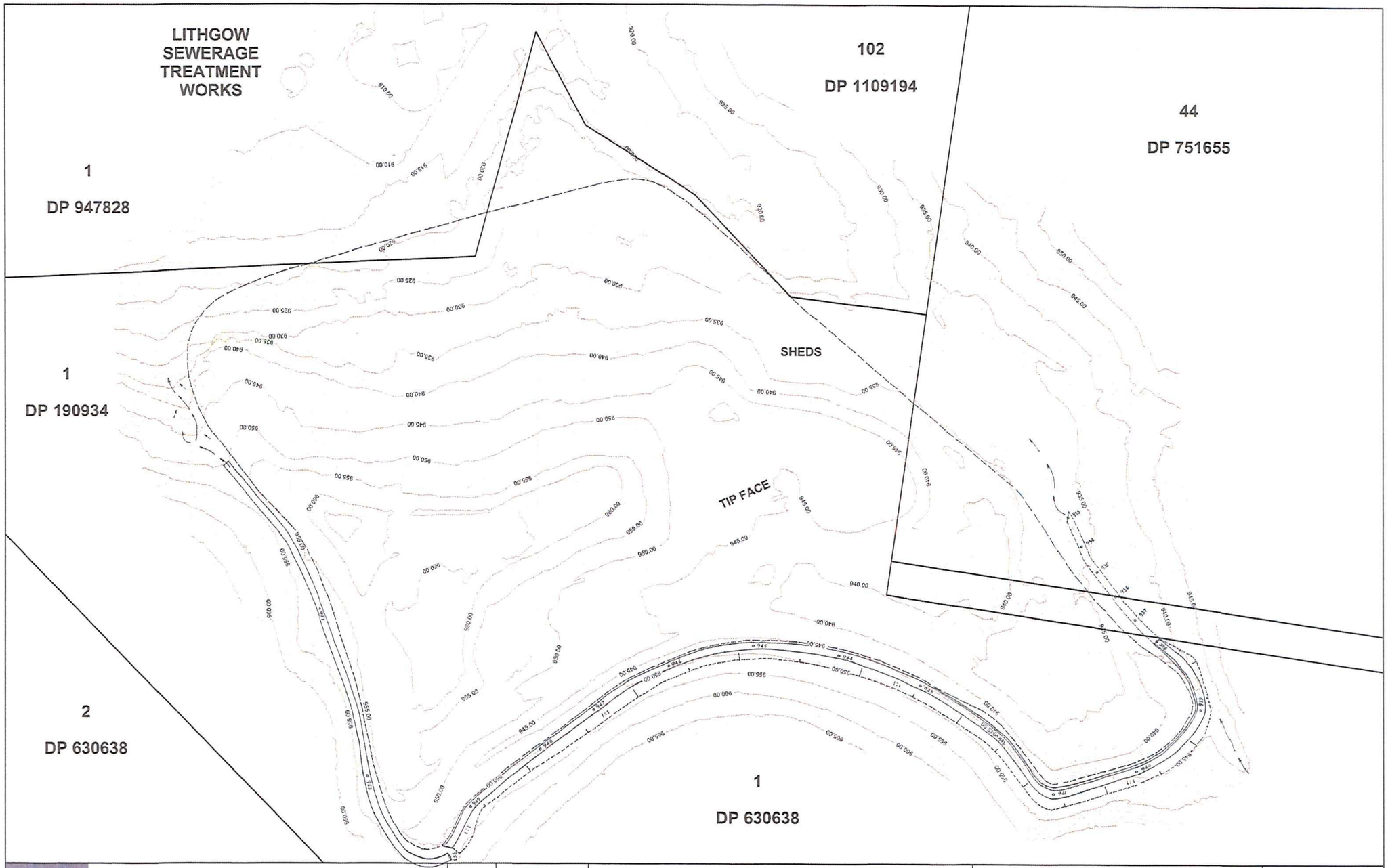
SECTION A-A



DETAIL B

SCHEMATIC / NOT TO SCALE

AMARAL



CEH SURVEY
CONSULTING LAND, ENGINEERING AND MINING SURVEYORS
Address: 1 Rutherford Lane, LITHGOW 2790
ABN: 46 000 544 667 Office: (02) 6351 2201
Email: surveyor@ceh.com.au Website: www.ceh.com.au

DATE	01-03-2016
AMENDED	
SURVEYOR	TH/BN
DRAWN	TH
CHECKED	

NOTES:

MGA COORDINATES AND AHD DATUM
BOUNDARIES HAVE NOT BEEN SURVEYED

MGA

CITY OF LITHGOW
LITHGOW WASTE DEPOT
SURVEY : 18th FEBRUARY 2016

SCALE - 1:1000

DRAWING No:
E668-16M

Border size = 508mm x 564mm on A1 paper

Appendix 4 - Surface Water Diversion Drain (Drawing E668-16M)