September 2014

WHYTES GULLY NEW LANDFILL CELL

Landfill Environmental Management Plan

Submitted to:
Wollongong City Council

REPORT

Report Number. 117625003_061_R_Rev2

Distribution:

Wollongong City Council
Department of Planning and Infrastructure
NSW EPA

Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Objectives

This Landfill Environmental Management Plan (LEMP) describes the operating and management procedures for waste disposal and general operation of the Whytes Gully Resource Recovery Park (RRP) (the site). The site is operated by Wollongong City Council (Council). The LEMP has been prepared to provide easily accessible procedures for environmentally sound and operationally efficient management of the site.

The LEMP will specifically serve as:

- A management tool for site operation;
- A means of identifying and concentrating on the key operational, environmental and rehabilitation issues;
- A guidance document for monitoring and reporting; and
- A guidance document for interaction with relevant Government authorities such as the NSW Environment Protection Authority (EPA) and NSW Department of Planning and Environment.

This plan follows the expected format of a Landfill Environmental Management Plan and the criteria established in the NSW Environmental Guidelines: Solid Waste Landfills (EPA, 1996).

This LEMP is considered a working document that will be updated by Council on a regular basis as management requirements change. The document will be reviewed on an annual basis to identify sections requiring revision.

A Landfill Extension Environmental Management Plan was prepared by Maunsell Pty Ltd in 1998 (Maunsell 1998). This LEMP supersedes the document prepared by Maunsell.

The WGRRP is subject to Environment Protection Licence (EPL) 5682 and the conditions of the Project Approval (project reference number 11_0094) issued by the Department of Planning and Environment in April 2013 (refer Appendix A). The conditions of Project Approval require a number of sub-plans to be presented in the LEMP, and specifically Schedule 5 Condition 3 which requires an update of the draft LEMP (prepared for the EA) to be provided to the satisfaction of the Director-General prior to commencement of operation.

1.2 Document Structure

The document has been structured to encourage its use on a day to day basis and to outline the procedures required to manage key environmental factors pertaining to operation of the WGRRP.

The document addresses the benchmark techniques outlined in the NSW Environmental Guidelines: Solid Waste Landfills (EPA, 1996) and follows a structure that encourages its use by operational staff. The document structure is summarised as follows:

Section 2 – Site Overview

This Section describes the natural setting (geological, hydrological, climate, etc.) of the site as well as its history.

Section 3 – Operations Overview

This section describes the current and proposed operations of the site. It elaborates on the landfill design and describes the proposed filling plan of the site and discusses how the landfill life is maximised by measures such as recycling and resource recovery.

Section 4 – Structure and Responsibilities

This section outlines the organisational and management structure of the facility and outlines responsibilities for key staff members.

Section 5 - Gatehouse Operations

This section outlines the procedures for operation of the gatehouse, in particular how the receipt of materials is managed, how customers are managed and how the quality of received waste is controlled. The section also describes the management of tyres and the cleaning of vehicles.

Section 6 - Filling Operations

This section describes the efficient management of tip face operations including waste filling, fillings plans, compaction of waste and covering of waste.

Section 7 - Water Quality Management

This section describes how surface water, groundwater and leachate are managed and how the offsite impact of water is minimised. Contingency measures for remediation of groundwater and surface water impacts are discussed. The section describes a detailed water monitoring program. This section also addresses the requirements of Schedule 4, Condition 18 of the Project Approval.

Section 8 - Air Quality Management

This section describes control measures to reduce air emissions, in particular landfill gas emissions, originating from the site operation and outlines a monitoring program as well as contingency measures for remediation of air pollution.

Section 9 - Hazards and Loss of Amenity

This section outlines management procedures to control the impact of the facility on the amenity of stakeholders and to reduce other hazards originating from the facility. The main impacts of the site on amenity of stakeholders are security, litter, dust, pests, vermin, noxious weeds, odour, noise, traffic impacts and fires.

Section 10 - Site Closure

This section outlines the proposed approach for site closure and rehabilitation.

Section 11 - Reporting

This section outlines the reporting requirements at the facility both internally and externally.

Section 12 - References and Bibliography:

This section summarises the relevant reference documents for this LEMP.

1.3 Consultation

This report was sent to and reviewed by the following authorities:

NSW Department of Primary Industries Office of Water – June 2014. Feedback received 28 July 2014

NSW Environmental Protection Authority – August 2014. Feedback received on 22 August 2014

NSW Department of Planning and Infrastructure – August 2014. Feedback received 2 September 2014

All comments and feedback has been incorporated into this document.

2.0 SITE OVERVIEW

2.1 Site Description

2.1.1 Regional Setting

The Wollongong Local Government Area (LGA) is located 80 kilometres south of Sydney and covers approximately 714 km^2. Wollongong LGA is bordered by the Royal National Park to the north, Lake Illawarra to the south, the Tasman Sea to the east and the Illawarra escarpment to the west.

WGRRP is located approximately 10 km to the south west of the Wollongong CBD and is approximately 65 ha in size. Figure 1 identifies the WGRRP regional context and local government area.

2.1.2 Site Location

The WGRRP is located on Reddalls Road, Kembla Grange NSW (refer Figure 2). The site is generally bounded by Reddalls Road to the south and west, rural residential lands to the north, north-east and north-west, and a water treatment plant to the south east. An industrial area lies to the south of Reddalls Road and Dapto Creek lies to the west.

The residential suburb of Farmborough Heights is located approximately 360 m to the north east over a ridgeline. Two individual residences are located within 120 m of the site boundary.

2.1.3 Site Ownership, Zoning and Tenure Details

The site is located approximately 10 kilometres to the south west of the Wollongong Central Business District, on Reddalls Road, Kembla Grange, and within the Wollongong City Council LGA.

The WGRRP is owned by Council and consists of:

- Part Lot 501, DP 1079122;
- Lot 502, DP 1079122;
- Lot 2, DP 240557;
- Lot 52, DP 1022266;
- Lot 53, DP 1022266; and
- Lot 51, DP 1022266.

This land is zoned as IN2 Light Industrial under the *Wollongong Local Environment Plan (West Dapto) 2010* (LEP).

2.1.4 Surrounding Land Uses

The surrounding area is identified as follows:

- To the north and north east is zoned E1 and E2 to predominantly to identify and protect the escarpment area.
- To the North West and west is zoned RU2 (Rural Landscape). Isolated residential properties are also scattered through this zoning.
- To the west is zoned E3 (Environmental Management) to protect potential watercourses.
- To the south is zoned IN3 (Heavy Industrial). Use is generally low intensity light industrial.

To the east is zoned IN2 (Light Industrial) land.

2.2 Site History and Development

All locations referred to in this section are shown in Figure 3 –Site Layout.

The Whytes Gully RRP was established in 1984 at a site known as Whyte's farm. As identified within "*Environmental Impact Statement – Proposed Waste Disposal Depot at Reddalls Road West Dapto"* prepared by Scott and Furphy in 1982 (Western Gully EIS), the site is defined by two gullies known as the western and eastern gullies separated by a central north-south trending ridgeline. Whyte's farm initially comprised an area of 35.6 ha of mostly cleared, improved grazing land owned by Mr Whyte for a period of approximately 40 years prior to the sites development as a landfill.

An area of land to the south of Whyte's farm adjacent to the Eastern Gully was also purchased by Wollongong City Council to accommodate the Whytes Gully RRP development as a landfill. A stockyard remains near the central western boundary of the site which is remnant from this prior use.

2.2.1 Western Gully

Development consent for landfilling in the Western Gully was granted in 1984, in accordance with the Western Gully EIS. Landfilling commenced in the Western Gully in 1984.

Site Preparation – It is understood that colluvium and residual soil were stripped from the natural slopes during preparation works prior to landfill being placed in the area. From discussions with Council staff involved in this stripping operation it appears that the natural slopes are likely to have been almost completely stripped to rock head, but that colluvium and residual soil were not removed to full depth at the base of the natural slopes.

Lining - The Western Gully Landfill is unlined.

Leachate Collection –Collection of leachate was originally through a central 100 mm diameter perforated pipe located at the base of the landfill. From discussions with Council staff we understand that this pipe did not have filter protection and became non-functional early on during the filling process. These discussions also indicate that an alternate leachate collection system was constructed where leachate collection horizons were established successively at approximate 5 m vertical intervals within the landfill mass comprising a network of finger drains. At the low point on each horizon, flows in the finger drains enter a shallow 300 mm concrete or HDPE pipe and are conveyed to the base of the landfill batter. At the toe of the landfill batter the shallow 300 mm pipe extends through the landfill bund wall to the current leachate collection pit near the current landfill access road, from where it is transferred to the leachate collection ponds.

Irrigation of leachate is also understood to have historically been undertaken on the Western Gully Landfill but has not been practiced in recent years.

Volume - The Western Gully Landfill received approximately 980,000 cubic meters (cu.m.) of waste during its 9.5 year life from 1984 to 1993 (Forbes Rigby, 2001).

Filling - Landfilling commenced following the construction of a large soil bund wall at the toe of the landfill with a height of 5 m and a crest elevation of RL 35 m . The bund wall extends from one side of the Western Gully to the other. After site preparation, waste was subsequently placed in the gully behind the bund wall. Once waste was placed to the height of the bund wall, a second, smaller, bund wall was placed to a height of approximately 37.5 m AHD. Waste was then placed to the crest level of the second bund wall. This filling technique of bund construction followed by waste filling was continued throughout the life of the landfill with each bund wall being approximately 2.5 m high. The maximum waste thickness is approximately 30 m.

Bund wall and cover material was won from site preparation works prior to filling of each lift. The external bund wall surfaces were subsequently vegetated following completion of each lift.

Capping – the Western Gully Landfill is covered with a varying depth of cover materials comprising generally low to medium plasticity sandy clay ranging in thickness from 0.3 m to 2.5 m (Golder 2012).

Profile - The profile of the landfill batter comprises an average surface slope of approximately 20% with indistinct benches at approximate 5 m to 10 m vertical intervals. The landfill surface above RL 80 m has gentler slopes, generally flatter than 10%.

Footprint – The approximate footprint of the Western Gully landfill is 10 ha.

2.2.2 Eastern Gully

Development consent for landfilling in the Eastern Gully was granted in 1993 in accordance with the "Whytes Gully Landfill Extension Environmental Impact Statement" undertaken by Maunsell in 1992 (Eastern Gully EIS).

Site Preparation - As with the Western Gully we understand that colluvium and residual soil were stripped from the natural slopes during preparation works prior to landfill being placed in the area. From discussions with Council Staff involved in this stripping operation it appears that the natural slopes are likely to have been almost completely stripped to rock head, but that colluvium and residual soil were not removed to full depth at the base of the natural slopes.

Leachate Barrier - The Eastern Gully Landfill was constructed as a lined landfill, with the barrier component of the lining system comprising a high density polyethylene (HDPE) geomembrane liner (2 mm thickness). The HDPE geomembrane liner has a textured surface in sloped areas to enhance landfill stability.

The HDPE geomembrane liner is underlain by a groundwater drainage layer comprising an approximate 500 mm thick fine gravel layer that is intended to collect any groundwater seepage from natural materials below the liner. This layer incorporates a 100 mm diameter collection pipe that drains by gravity to a surface water pond at the toe of the Eastern Gully Landfill. Sampling shows that water collected in the groundwater system may be impacted by leachate. We understand that when high water levels develop in the surface water pond, it is pumped to the leachate management system.

Leachate Collection - The HDPE geomembrane liner is overlain by a blanket leachate drainage layer comprising an approximate 300 mm thick clean sand layer. This layer incorporates two 300 mm diameter leachate collection pipes that drain by gravity to the toe of the landfill – one pipe drains Stage 1 and the other pipe drains Stage 2 (refer below for stage description). Collected leachate is transferred to leachate ponds.

Filling - has been undertaken in four stages. Stage 1 commenced in 1993 and was located in the upper portion of the Eastern Gully. Stage 2, located on the lower section of the Eastern Gully commenced in 2001. Stages 1 and 2 together received approximately 1,250,000 cu.m. of waste to the year 2004. Stage 3 is located over the Stage 1 and Stage 2 filling area and had an estimated 610,000 cu.m. capacity over a five year period (2004 to 2009). Stage 4, located in the upper portion of the gully over Stage 3 and Stage 1 is currently underway and has an estimated 750,000 cu.m. capacity over a four year period (2009 to 2013) with completion of filling expected in 2013 (Forbes Rigby, 2001 and WCC Drawing No. 1475, 2004, Survey Drawings KFW dated December 2000, December 2001, June 2004 and December 2009 drawing numbers 2982, 3156, 3705, 4600 respectively).

Capping - Capping materials encountered had a variable composition of materials throughout the existing cap. The thickness of the capping observed by Golder (2012a) ranged from 0.1 m (GAHA04) to 0.6 m (GAHA01) across the Eastern Gully Landfill.

Profile - The current landfill batter has an average slope of approximately 25% and is terraced with benches at 2 m to 3 m vertical intervals, bench widths at 3m to 5m, and slope inclinations of 2H:1V to 3H:1V between benches.

Refer to Appendix B for drawings of the Western Gully and Eastern Gully Landfill.

2.2.3 Site Access

Access to the Whytes Gully RRP has changed several times during its operation based on changes to the alignment of Reddalls Road and changes to the site access point. Prior to site development, Reddalls Road turned to the North West to the east side of Glengarry Cottage. A section of the road was realigned around

the time of commencement of landfilling such that the road continued wesTWArd to the south of Glengarry Cottage and then turning north between the current Materials Recycling Facility (MRF) location and Glengarry Cottage.

At the time of commencement of the Eastern Gully Landfill it was recognised that the location of Reddalls Road presented difficulties for the long term development of the landfill and for local residents who had to pass through the facility to access the local road network. To address these issues Reddalls Road was deviated to the south west in 2001 after preparation of the "Review of Environmental Factors for Proposed Deviation of Reddalls Road, Kembla Grange" (REF) in 2001. The REF states that the Wollongong City Council LEP (1990) would allow such works to proceed without development approval.

In 2007 the current entrance and weighbridge was approved and located to the west of the existing MRF and east of the Leachate Treatment Plant.

The currently disused weighbridge is located on the main site access road near the oil recycling area and the intersection with old Reddalls Road. This facility consists of the pitless weighbridge (approximately 16 m by 5 m), a concreted traffic island (approximately 50 m in length) and a weighbridge office. Reinforced concrete slabs associated with the discussed weighbridge are 100 mm thick (underneath the weighbridge) and 200 mm thick on either end of the weighbridge with footings up to 800 mm thick. Vehicles currently accessing the landfill and the materials drop off areas pass by the disused weighbridge. This weighbridge and foundations will be demolished during construction of the project.

The existing landfill access road is a two-lane, paved road extending approximately 1.7 km from the existing weighbridge at approximate elevation RL 20 m to the northern edge of the Eastern Gully Landfill at approximate elevation RL 75 m. The road traverses existing Western Gully waste for a distance of approximately 250 m at approximate elevation RL 65 m. Access tracks suitable for 4WD vehicles extend: (a) from the landfill toe up the central ridge to the landfill access road; and (b) up the eastern ridge.

2.3 Environmental Setting

2.3.1 Topography

The landfill is sited on a south facing slope, which is dominated by an east-west trending ridgeline to the north. The landfill is located in two historical gullies, the Western Gully and the eastern gully, which correspond to the two landfill developments at the site; the Eastern Gully Landfill and the Western Gully Landfill. The northwest and eastern extents of the landfill are bounded by ridgelines, with a small central north-south trending ridgeline separating the two historical gullies, the upslope portion of which is still visible today. The site rises from RL 15 m at the south west to RL 100 m to the north east. Figure 4 presents the existing site contours.

2.3.2 Soil and Geology

Based on the 1:100,000 geological map 'Wollongong-Port Hacking' (Department of Primary Industries, 1985) the WGRRP is on the boundary of two major geological formations. The southern part of the site is underlain by fluvial sands, silts and clays associated with Dapto Creek. Sandstone of the Budgong Sandstone formation underlies these alluvials. The Budgong Sandstone formation typically composes red, brown and grey lithic sandstone. The northern portion of the site is underlain by interbedded lithic sandstone, coal, carbonaceous claystone, siltstone and claystone of the Pheasants Nest Formation. It appears that the Pheasants Nest formation is mainly encountered on the ridgelines.

The Western Gully EIS (1982) indicates that prior to landfilling, volcanic sandstone covered most of the site with a transition to andesitic sandstone with coal seams, carbonaceous shale and mudrock in the higher section (above approximately RL 100 mAHD) and a zone of alluvium, gravels and sands in the lower sections (below approximately RL 30 mAHD). Bedrock is reported to appear at the surface in the upper sections of the site.

The geotechnical investigation carried out by Golder Associates (Golder 2012a) summarises the conditions encountered as outlined in the following paragraphs.

The report describes the site geological setting as four different geological areas. These areas are:

Geological Area 1 – Pheasants Nest Formation: This area is located on the upper slopes across the northern portion the site. The material encountered is generally weathered sandstone that grades into fresh sandstone at depths typically less than 10 m. The residual soil is generally less than 2 m thick. Siltstone was encountered in zones throughout the sandstone at depths greater than about 15 m (based on the Maunsell 1992 investigation). Siltstone was not encountered in the Golder 2012a investigation.

Geological Area 2 – Budgong Sandstone Formation: This area is located across the southern portion of the site. This sandstone generally has a weathering profile that extends to depths up to 15 m. Zones of weathered siltstone, up to approximately 3m thick, are located intermittently throughout this formation.

Geological Area 3 – Alluvial Soils: This geological area consists of colluvial / alluvial soil material (silty clay and silt with some sands and sub angular gravels and cobbles) and is located across the middle and south west portion of the site. The thickness of this material varies to a maximum of approximately 11m. This geological area is expected to be underlain by Budgong Sandstone.

Geological Area 4 – Capping Layer and Landfill: This geological area is located across the northern slope. The capping material consists of generally low to medium plasticity sandy clay and is typically less than 1.5m thick. Landfill waste is located beneath the capping layer and consists of general waste such as paper, plastic, wood, rubble and other materials. The depth to the base of the general waste fill is not well defined, however old topographical data suggests that the thickness of the fill could be up to 52 m within the Eastern Gully Landfill. This geological area is expected to be underlain by the Pheasants Nest Formation.

The geological areas are identified in Figure 5 and investigation locations are presented in Figure 15.

2.3.3 Climate

Climate data for the site has been collated from a number of Bureau of Meteorology's (BoM) weather stations as no nearby weather station has a continuous long term record of weather data and variability in rainfall patterns in particular is known in the area. The weather stations in closest proximity to the site are summarised in the Table 6.1.

Table 2.1: Weather Stations

Station	BoM Reference	Approximate Distance to Site (km)	Station Open	Data selected
Albion Park (Wollongong Airport)	068241	10	1999 to present	Temperature, solar exposure, wind speed, humidity
Dapto West (Stane Dykes)	068023	5	1898 to 1987	Rainfall
Berkeley (Northcliffe Drive)	068110	4	1963 to present	Rainfall
Sydney Airport	066037	67	1974 to present	Mean Daily Evaporation

Mean monthly rainfall, temperature, evaporation, wind speed and humidity are presented in Table 6.3.

Table 2.2: Monthly Climate Statistics (BOM, 2011)

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)[1]	100.6	133.2	140.1	112.9	85.7	106	54.5	66.2	58.2	93	96.5	76.8	1125.4
Mean Rainfall (mm)[2]	123.5	130.2	140.9	106.7	101.7	101.3	78.6	70.9	59.6	85.8	92.3	97.6	1192.4
Mean Rainfall (mm)[3]	116.1	157.5	183.7	92.9	89.0	140.3	62.6	87.7	55.0	108.0	94.3	90.4	1278.6
Mean max temperature (°C)[4]	26.8	26.3	25.2	23.1	20.3	18.2	17.5	18.9	21.4	22.7	23.7	25.5	22.5
Mean max temperature (°C)[3]	24.1	24.4	24.1	22.4	19.4	17.5	16.7	17.3	19.2	20.7	22.4	23.4	21.0
Mean min temperature (°C) [4]	16.7	17.2	15.3	11.9	8.6	6.9	6.2	6.4	8.4	10.7	13.3	15.0	11.4
Mean min temperature (°C)[3]	18.4	18.7	18.0	15.7	12.7	10.9	9.8	10.3	11.8	13.7	15.3	17.1	14.4
Mean daily evaporation (mm) [5]	7.2	6.4	5.4	4.2	2.9	2.5	2.7	3.7	4.9	5.8	6.5	7.4	5.0
Mean daily solar exposure (MJ/m^2) [4]	22.7	20.0	17.4	13.9	10.4	8.7	9.8	13.3	17.0	19.8	21.1	23.0	16.4
Mean 9am wind speed (km/hr) [4]	11.6	9.8	8.1	10.7	12.4	13.6	14.4	15.0	15.3	14.4	12.9	12.7	12.6
Mean 9am wind speed (km/hr) [3]	17.4	16.1	14.7	14.7	16.7	17.4	17.7	18.5	18.7	19.7	19.5	18.1	17.4
Mean 3pm wind speed (km/hr) [4]	21.6	20.0	18.9	17.7	17.1	17.6	18.1	21.8	22.6	20.9	20.9	21.5	19.9
Mean 3pm wind speed (km/hr) [3]	24.4	23.7	22.9	22.8	21.9	22.0	24.6	25.4	27.1	26.3	26.5	25.5	24.4
Mean 9am relative humidity (%)[4]	68	74	76	68	69	73	68	61	57	58	67	66	67
Mean 3pm humidity (%)[4]	63	67	64	61	58	57	54	49	53	58	63	61	59

[1] Mean data for Dapto West (Stane Dykes) weather station, (068023)

[2] Mean data for Berkeley (Northcliffe Drive) weather station, (068110)

[3] Mean data for Port Kembla (Signal Station) weather station, (068053), data from 1950 to 1976 and from 1957 to 1976 for wind speed

[4]Mean data for Albion Park (Wollongong Airport) weather station, (068241)

[5] Mean data for Sydney Airport weather station (066037), data from 1974 to 2010.

For the Dapto West (Stane Dykes) weather station, which is the station in operation for the longest period, the average annual rainfall is 1192.4 mm. The rainfall distribution throughout the year is higher for summer, with winter and spring months experiencing on average the driest weather.

Monthly wind roses for the Wollongong Airport weather station (BoM reference: 068241) are shown in Appendix C. As wind directions vary significantly depending on the site location, wind roses from the Port Kembla signal station (BoM reference: 068053, data available from 1957 to 1977) have also been included for comparative purposes.

Wind directions at the site are seasonal and are dominated by strong westerly winds during the winter months. North-easterly winds dominate during the remainder of the year.

A Davis Vantage Pro 2 has been installed adjacent to the site offices that will measure air temperature, wind direction, wind speed, rainfall and relative humidity. Data will be recorded and stored on site at the Glengary cottage offices.

2.3.4 Hydrology

The site lies at the foot of Mt Kembla and is located within the catchment of Dapto Creek which discharges to Lake Illawarra via the larger Mullet Creek. The site is approximately one kilometre upstream of Dapto Creek and five kilometres upstream of Lake Illawarra.

There is no major continuous watercourse flowing from the site. Both gullies feed into one minor ephemeral watercourse which discharges under Reddalls Road into Dapto Creek.

Dapto Creek discharges into the much larger Mullet Creek catchment which is approximately 74.5 km^2. Mullet Creek rises at the escarpment at an elevation of about 600m AHD, and flows a distance of about 22 Km before reaching the tidal Lake Illawarra. These steep catchment conditions provide for dynamic flooding and geomorphic conditions in the catchment.

The headwaters for the Mullet Creek catchment are mainly forested and much of its catchment is still used for rural activities. However Dapto, Horsley, Brownsville, Kembla Grange and Farmborough Heights represent significant urban use.

The general surface water drainage direction on the site is from the north east towards the south west. The catchment area of the site is approximately 50 ha and extends from a ridge to the north of the site to Reddalls Road to the south. Run-on to the site is minimal due to the site being bounded by ridgelines.

Surface water runoff from covered areas of the Western and Eastern Gully Landfills is captured by swales on the landfill surface. The swales divert the runoff towards drains around the perimeter of the landfills and to a central drain between the Eastern and Western Gully landfills. Runoff from the natural slope above the northern edge of the Eastern Gully Landfill (rainforest area) is also directed to the central drain.

Surface water runoff reports to the surface water ponds at the southwest corner of the site before discharge to Dapto Creek.

2.3.5 Hydrogeology

Regionally the site is located within the southern portion of the Sydney Basin, a geological basin stretching from the Illawarra Plateau in the south to the Lower Hunter Valley region in the north, and incorporating the topographically low Cumberland Basin in the centre. Generally, the dip of the geological formations within the Sydney Basin is from the topographically higher ground in the north and south towards the topographic low ground in the centre of the basin, although this varies locally based on structural features.

The regional hydrogeological setting of the site includes groundwater resources associated principally with the sandstone formations of the Hawkesbury Sandstone, Narrabeen Group, Illawarra Coal Measures and the Shoalhaven Group. Each of these geological groups generally comprise of varying proportions of sandstone, siltstone, claystone, shale and coal. Groundwater resources are generally described as occurring as stacked aquifer systems associated with the sandstone formations, separated by lower permeability strata acting as aquitards. Structural contours presented on the 1:100,000 geological map ‘Wollongong-Port Hacking’ (Department of Primary Industries, 1985) indicate a local geological dip direction approximately towards the north to northwest in the vicinity of the site, which would be expected to influence the regional groundwater flow direction.

On the site scale, groundwater occurrence is generally associated with two shallow systems: groundwater present in the upper weathered and fractured profile of the local bedrock geology, and groundwater present in the unconsolidated deposits that infill the two gullies at the site at the toe of the sloping topography. Water levels measured in wells installed within the shallow weathered bedrock in the sloping northern portion of the site generally range from 5 to 10 metres below ground level (mbgl), whereas water levels in wells installed in both the shallow bedrock and unconsolidated material in the flatter southern portion of the site are shallower, generally on the order of 1 to 3 mbgl. The water level associated with GABH03 is approximately 0.4 m above ground level, indicating local artesian conditions within the shallow bedrock at this location.

Shallow groundwater flow associated with the weathered bedrock horizon is inferred to be sympathetic to the sloping topography of the northern portion of the site, with a south to southwest flow direction. Anecdotal information indicates that a number of springs were present in the former gullies in which the existing landfill cells were developed. Groundwater within the unconsolidated deposits on the southern portion of the site also exhibits a south-southwest flow direction. Where nested wells were installed, an upward vertical hydraulic gradient was evident between the shallow weathered bedrock and the overlying unconsolidated deposits, which is likely attributable to the significant hydraulic gradient from the sloping terrain on the

northern portion of the site. On the basis of the lithological logs and water level observations, it is considered that the weathered bedrock groundwater system is semi-confined beneath the unconsolidated deposits, but there is likely to be a degree of hydraulic connectivity between the systems.

Hydraulic testing of wells completed within both the shallow weathered bedrock and in the unconsolidated deposits indicated hydraulic conductivity values on the order of 10^{-5} to 10^{-6} m/s, which is consistent with the range of published values for the lithologies encountered.

2.3.6 Flora and Fauna

A Flora and Fauna assessment was carried out by Biosis (Biosis 2012). The following sections summarise the flora and fauna generally occurring on site. Figures showing the location and extent of Flora and Fauna communities are shown in Biosis 2012 and Figure 6.

Flora

Five vegetation communities have been identified by Biosis at the site (Biosis 2012). These are:

- **Lowland Dry Subtropical Rainforest**, which occurs along a south facing slope within the northeast of the Study Area;
- **Moist Box Redgum Foothills Forest**, which occurs within the north east of the Study Area in a relatively narrow strip adjoining the Lowland Dry Subtropical Rainforest occurring downslope
- **Forest Red Gum Open Forest/Woodland**, which occurs in relatively small patches in the north of the Study Area and in a larger area in the east of the site
- **Acacia Scrub/Exotic vegetation community**, which occurs in disturbed areas that have been previously cleared, as well as revegetated areas around the edges of landfill; and
- **Closed Exotic Grassland**, which is the most common vegetation community, occurring throughout the Study Area in cleared areas as well as over the landfill.

In addition, a number of native trees have been planted along the road leading from the weighbridge towards the landfill area.

The flora survey found one threatened ecological community that occurs in a steep area to the north of the Eastern Gully Landfill (Figure 6):

- Lowland Dry Subtropical Rainforest corresponds with the TSC Act listed Illawarra Subtropical Rainforest (ISTR) EEC.

A total of 87 plant species were recorded from the Study Area during the current survey. The flora species inventory includes 64 locally occurring native species and 23 introduced species. Of the 23 introduced species, two are listed as noxious under Order 20 of the NSW *Noxious Weeds Act 1993* for the Wollongong LGA:

- Lantana - Class 4; and,
- African Lovegrass - Class 4

The legal requirement for a Class 4 noxious weed is that the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold or knowingly distributed.

Fauna

Biosis identified the following four major fauna habitats are present within the Study Area:

- **Aquatic Environments** – including the three surface water ponds located in the south-western section of the Study Area, ephemeral drainage lines, decommissioned ponds and various other water bodies (including the Primary and Secondary Leachate Ponds);
- **Open Forest/Woodland** – highly disturbed habitat encompassing the Forest Red Gum Open Forest/Woodland located in the south-eastern section of the Study Area;
- **Closed Forest** – encompassing the Moist Box Redgum Foothills Forest and Lowland Dry Subtropical Rainforest located in the north-eastern section of the Study Area; and,
- **Cleared and Disturbed** – including the operational areas of the Resource Recovery Park, easements, Cleared Exotic Grasslands and Acacia Scrub.

A total of 63 fauna species were recorded in the Study Area, which included 57 (90%) native species. A total of six introduced fauna species were recorded. Two threatened species, the Grey-headed Flying-fox *Pteropus poliocephalus* and Southern Myotis *Myotis macropus,* (probable detection) were recorded within the Study Area. The aquatic habitats provide potential habitat for the threatened Green and Golden Bell Frog *Litoria aurea.*

There is also a high likelihood of an additional five threatened fauna species occurring in the Study Area. These species include;

- Eastern Bentwing-bat *Minopterus schreibersii oceanensis*;
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*;
- Eastern Freetail Bat *Mormopterus norfolkensis*;
- Eastern False *Pipistrelle Falsistrellus tasmaniensis*; and,
- Greater Broad-nosed Bat *Scoteanax rueppellii*.

Four targeted surveys were undertaken for the Green and Golden Bell Frog and Australian Painted Snipe with no recordings.

2.4 Cultural Heritage

2.4.1 Aboriginal Heritage

Heritage assessments completed at the site to assess the potential impacts of the Project upon indigenous and non-indigenous heritage are reported in “Whytes Gully New Landfill Cell Aboriginal Cultural Heritage Assessment Report” Biosis Research (January 2012) and “Whytes Gully New Landfill Cell: Historical Heritage Assessment” Biosis Research (January 2012). These assessments identified three Aboriginal archaeological sites:

- Whytes Gully 1 – an isolated artefact
- Whytes Gully 2 – a low density artefact scatter; and,
- Whytes Gully 3 – shell material that has been imported into the Study Area as part of a fill deposit..

The location of these sites is presented on Figure 7.

2.4.2 European Heritage

The only identified European heritage item on site is Glengarry Cottage and the surrounding curtilage. (Biosis 2012). Glengarry Homestead is listed on the Historical Register for Regional significance as it is the last of the Veteran's Land Grants homes at Kembla Grange (Wollongong City Council webpage 2011). The cottage currently houses Council offices and will not be impacted by the landfill operations.

3.0 OPERATIONS OVERVIEW

3.1 Regulatory Background

3.1.1 Consents and Licences

The following Table summarises consents and licenses relevant to the site. Reference is made to Schedule 3 Condition 7 of the Project Approval which requires the surrender of development consents listed in table 1 of that condition (refer Appendix A).

Appendix A presents the current EPL and the trade waste agreement.

Table 3: Relevant Consents and Licences

Reference	Type	Description
EPL5862	NSW EPA Environment Protection Licence (EPL)	The site landfill licence
TWA 11205	Trade Waste Agreement	Trade Waste Agreement with Sydney Water for discharge of treated leachate to sewer
DA-1982/459	Development Consent Conditions	Lot 2 DP 240557 & PT Por 9 – Waste Disposal Site
DA-1984/228	Development Consent Conditions	Develop and Operation of a Waste Disposal Depot
DA-1992/662	Development Consent Conditions	Upgrading The Existing Western Gully Landfill & Extending The Land Filling Operation Into the Adjacent Eastern Gully
DA-1999/533	Development Consent Conditions	Reddalls Road Realignment
DA-2001/2240	Development Consent Conditions	Construction of new leachate and stormwater treatment ponds
DA-2003/532	Development Consent Conditions	Leachate Treatment Plant
DA-2005/1635	Development Consent Conditions	Extension of MRF
DA-2006/463	Development Consent Conditions	Weighbridge and new site entrance
DA-2008/1425	Development Application	Replacement of current scrap metal and Small Vehicles Recoverables Drop off centre compounds
DA-2010/1088	Development Consent Conditions	Small vehicle waste transfer station

3.1.2 Guidelines and Legislation

The NSW EPA (1996) *Environmental Guidelines: Solid Waste Landfills* (referred to as the Landfill Guidelines) presents a non-prescriptive, performance-based approach to managing putrescible and non-putrescible solid waste landfills across NSW. Although the environmental goals identified in the Landfill Guidelines are not laws, operation of solid waste landfills should meet these goals where appropriate. Appendix A of the Landfill Guidelines outlines possible benchmark techniques which may be adopted in Landfill Environmental Management Plans in order to achieve the environmental goals.

A number of NSW Acts and their associated regulations also apply to the management of the facility and are summarised below in Table 5. Those highlighted in **bold** are the most relevant to the site operations.

Table 4: NSW Legislation that relates to the operation of the facility.

Act	*Associated Regulations*	*General Intent*	*Relation to the Operation of the Facility*
Waste Avoidance and Resource Recovery Act 2001	-	To minimise the consumption of natural resources and the final disposal of waste and achieve integrated waste and resource management planning.	The operation of the facility must uphold principles of ecologically sustainable development and focus on waste minimisation and resource recovery over disposal.
Environmental Planning and Assessment Act 1979	Environmental Planning and Assessment Regulation 2000	To encourage the proper management, development and conservation of natural and artificial resources and protection of the environment.	Determines the development approval process.
Environmentally Hazardous Chemicals Act 1985	**Environmentally Hazardous Chemicals Regulation 2008**	To control activities related to chemical waste.	Affects permissible waste type.
Heritage Act 1977	Heritage Regulation 2005	To conserve heritage items.	Operations affected if heritage items are nearby.
Local Government Act 1993	Local Government (General) Regulation 2005	To provide the legal framework for an effective, efficient, environmentally responsible and open system of local government in NSW.	Gives Councils a role in managing and developing resources and encourages community consultation.
National Parks and Wildlife Act 1974	National Parks and Wildlife Regulation 2009	To conserve natural ecosystems, landforms and places of social significance.	Protection of places of sites of natural and Aboriginal significance must be considered.
Native Vegetation Act 2003	Native Vegetation Regulation 2005	To protect native vegetation and prevent broadscale clearing.	Re-vegetation at the facility should be encouraged.
Noxious Weeds Act 1993	Noxious Weeds Regulation 2008	To reduce the negative impact of weeds on the economy, community and environment.	A Weed Management Strategy is required.
Occupational Health and Safety Act 2000	**Occupational Health and Safety Regulation 2001**	To secure and promote the health, safety and welfare of people at work.	The facility must provide a safe work environment.
Ozone Protection Act 1989	-	To control atmospheric pollutants that contribute to the depletion of ozone in the stratospheric ozone layer.	The emission of atmospheric pollutants must be managed.

Act	*Associated Regulations*	*General Intent*	*Relation to the Operation of the Facility*
Protection of the Environment Operations Act 1997	Protection of the Environment Operations (Clean Air) Regulation 2002 Protection of the Environment Operations (General) Regulation 2009 Protection of the Environment Operations (Noise Control) Regulation 2008 **Protection of the Environment Operations (Waste) Regulation 2005**	To enhance the quality of the environment in NSW.	Outlines requirements for a range of activities related to waste facilities including licensing, monitoring, reporting.
Public Health Act 1991	-	To increase the standard of health in NSW.	Outlines requirements for safe drinking water.
Soil Conservation Act 1938	-	To conserve soil resources.	Land degradation, soil erosion must be managed.
Threatened Species Conservation Act 1995	Threatened Species Conservation Regulation 2002	To protect threatened species, populations, ecological communities and habitats.	The potential impact of the development on threatened species must be considered.
Water Management Act 2000	-	To protect, enhance and restore water sources, associated ecosystems and water quality.	Effect of facility on surface and groundwater must be managed.

In addition to the above NSW legislation and regulations, a number of environmental planning instruments (EPIs) also apply to the planning and management of waste facilities and have been listed below in Table 5.

Table 5: NSW EPIs that relate to the operation of the facility.

EPI	***General intent***	***Relation to the operation of the facility***
State environmental planning policy (SEPP) (infrastructure) 2007	To facilitate the effective delivery of infrastructure across NSW	Determines allowable locations of waste facilities
SEPP (major development) 2005	To determine the development assessment and approval process	Determines the approval process for waste facilities
SEPP no.55 – remediation of land 1998	To provide for a state-wide planning approach to the remediation of contaminated land	Identifies the process and consent required to remediate land should contamination occur
SEPP no.33 – hazardous and offensive development 1992	To determining whether a development is a hazardous or offensive industry and minimise the adverse impact of the development	Outlines the development consent required for a hazardous and offensive development

3.2 Key site features

A site layout plan presenting the existing site features is presents in Figure 3. The main site features are listed following.

- Eastern and Western Gully Landfills;
- Amenities building, chemical and fuel stores;
- Surface water ponds;
- Leachate ponds (primary pond and secondary pond);
- Leachate treatment plant;
- Weighbridge;
- Local heritage listed Glengarry Cottage, currently in use as Council offices;
- Green waste recycling facility for processing of green waste from customer drop-off, operated by contractor (kerbside green waste recycling facility relocated offsite in 2012);
- “Small Vehicles Recoverables Drop Off” resource recovery centre, operated by contractor ;
- Materials recycling facility (MRF), operated by contractor; and
- Small Vehicles Transfer Station (located within the former solid waste to energy recycling facility (SWERF) building).
- Tree and shrub plantings along the site boundary have been undertaken during the site development to provide a visual buffer from neighbouring properties.

Works as executed drawings for the main infrastructure at the site are presented in Appendix C.

3.2.1 Easements

A number of easements exist on site. These are summarised as follows and are presented on Figure 8:

- An easement for the 132 kV overhead power transmission line which runs east to west across the site, situated south of the Eastern Gully Landfill and north of Reddalls Road.
- Power lines as well as a Telstra line run along old Reddalls Road.
- Power supply easement for the LTP runs from old Reddalls Road near Glengarry Cottage along the northern edge of the MRF property.
- A private power line easement exists in the northern part of the site and crosses the Western Gully Landfill. It is understood this line is de energised and due for decommissioning.
- Municipal water supply is provided to amenities buildings via an underground water pipe running from Reddalls Road across the lot 53 DP 1022266 to Glengarry Cottage.
- A 70 mm high density polyethylene (HDPE) sewer connection runs between the leachate treatment plant and sewer along Reddalls Road.

3.2.2 Small Vehicles Transfer Station

A Small Vehicles Transfer Station is located in the former SWERF building at the toe of the Eastern Gully Landfill. Waste dropped off at the transfer station is inspected and then transported by Council to the tipping face where it is spread, placed and compacted. Recyclables or unacceptable waste is removed from the transfer station for appropriate management.

3.2.3 Leachate ponds

Leachate collected at the landfill is piped to the leachate ponds (primary and secondary leachate ponds) from where the leachate is pumped to the on-site leachate treatment plant.

3.2.4 Leachate treatment plant

The leachate treatment plant is a biological treatment process using sequencing batch reactor (SBR) technology. Treated leachate is discharged to sewer under a trade waste agreement with Sydney Water up to 250 kL per day.

3.2.5 Surface water ponds and drains

All surface water flows are directed via swale drains into the surface water treatment system, which comprises a series of surface water ponds approved in 2003. A figure showing existing (pre-project) catchment boundaries and surface water management features is provided in Appendix D. The system is located in the south west corner of the site and comprises two reed beds (reed beds 1 and 2) and an upper and lower surface water polishing pond. The total capacity of the surface water treatment system is 40,000 kL. The design of the ponds is detailed in design drawings prepared by Forbes Rigby within “Whytes Gully Waste Disposal Facility Leachate and Stormwater Ponds Civil Works, Reddalls Road, Kembla Grange for Wollongong City Council” (Forbes Rigby 2003) and provided in (Appendix E). Discharge from the ponds is to Dapto Creek.

3.2.6 Water use and site water balance

Water use at the site includes use of water from storm water ponds for dust suppression when required, and potable water use for staff amenities.

The construction of sealed operational roads at the site limits the demand for use of water in dust suppression on roads.

Treated stormwater discharges from the treatment ponds into Dapto Creek. A figure showing stormwater catchments and ponds is provided in Appendix D.

The site water balance used to determine the leachate pond and surface water pond size requirements is provided in the reports presented in Appendix E. A leachate water balance update used to assess the suitability of the existing infrastructure to manage the leachate waters for the Project is presented in the Detailed Design Report in Appendix I. The site water balance is summarised in the table below.

Water	Inflows	Storage	Outflows
Surface water	Rainfall (refer section 2.3.3 for rainfall data)	Surface water ponds (40 000 kL)	Periodic overflow at Reddalls Road, into tributary of Dapto Creek Minor onsite use for dust suppression, minor evaporation loss
Groundwater	Rainfall recharge	Strata	Potential discharge to surface waters down gradient of site
Leachate	Rainfall infiltration through waste mass Groundwater through waste mass at base of landfill (historical springs)	Waste mass, Leachate ponds (18 000 kL)	Discharge treated leachate to sewer up to 250 kL per day

3.2.7 Green waste processing

Green waste is dropped off separate from mixed general waste at the green waste processing area at the toe of the Western Gully Landfill. The green waste collected is shredded on a regular basis and subsequently exported from site for reuse.

3.2.8 Recoverables drop off and buy back (Revolve)

The recoverables drop off and buy back (Revolve) is located to the east of the weighbridge. Customers can drop off reusable items at the revolve centre, where they are sold back to the public.

3.2.9 Small vehicle recyclables drop off

Small vehicle recyclables drop off is located at the toe of the Western Gully Landfill and is shown on Figure 3.

Resource recovery at the WGRRP consists of the acceptance of the following recyclable materials:

- Comingled recyclables (glass bottles, paper and cardboard);
- Mobile phones;
- Car batteries;
- Scrap metal (including white goods, steel, brass, aluminium, copper);
- Gas bottles and fire extinguishers;
- Fluorescent lights and CFL's;
- Waste oil (motor oil, transmission oil, gear oil, kerosene and diesel, no cooking oil or petrol are accepted);
- Green waste;
- E waste; computers and televisions;
- Mattresses; and
- Tyres.

3.3 Future operations and key site features

The future landfill operation will comprise a number of new stages (stage 1, stage 2a, stage 2b, stage 3, stage 4), which will cover current and previous landfill areas in addition to previously unfilled areas. The staging sequence is shown on Figure 9 and staging plans are presented in the Landfill Master Plan (Appendix F). The following table outlines the construction staging and description of staging of the project.

Table 6: summary of construction staging (approximate)

Stage	Area (m^2)	Airspace including cap (cum)	Life of cell (years)	Operation period	Proposed capping construction period (*)	Proposed liner construction period (*)
1	82,000	912,000	4.4	2013 - 2018	2016 - 2019	2013 - 2016
2a	22,500	343,000	2.4	2018 - 2020	2020 - 2021	2017 – 2018
2b	81,200	2,134,000	15.2	2020 - 2035	2023 - 2036	2019 – 2031
3	67,200	1,589,000	11.3	2035 - 2046	2038 - 2047	2035 – 2041
4	69,000	1,007,000	7.2	2046 - 2054	2048 - 2055	2046 – 2050
Total	**321,900**	**5,985,000**	**40.5**			

* Not continuous during period

Figure 9 presents the staging sequence and Figure 10 presents the footprint of the future operations.

Stage 1 covers the Eastern Gully Landfill, a section of the Western Gully Landfill and a non-landfilled area at the foot of the Eastern Gully Landfill that is occupied by roads and stormwater infrastructure.

Stage 2 covers part of the Western Gully Landfill, a non-landfilled area at the toe of the Western Gully Landfill that is occupied by roads and stormwater infrastructure and a non-landfilled ridge line between the eastern and Western Gully Landfills.

Stage 3 covers part of the Western Gully Landfill and a non-landfilled area at the toe of the Western Gully that is occupied by roads, the green waste process area and stockpiling areas.

Stage 4 covers an area to the west of the Western Gully Landfill that has previously not been landfilled as well a non-landfilled area at the toe of the Western Gully Landfill that is currently occupied by roads and the primary and secondary leachate ponds.

In addition to landfilling:

- Green waste kerb-side collection processing activities were relocated offsite in 2012. Green waste processing remains onsite for customer drop-off.
- Leachate ponds will be relocated at the end of stage 3 prior to commencing stage 4 construction.
- Surface water pond will be down sized at the end of stage 3 prior to commencing stage 4 construction.
- Landfill gas extraction and flaring will be installed in the existing waste in 2012 to 2014.
- Landfill gas extraction and electricity generation will be installed progressively in the new waste from 2014.
- The MRF will be relocated and upgraded in 2014.

- Future approval for stage 4-2b will be required to be sought from department of planning (this stage is not included in the current approval).

3.4 Cell construction activities

Construction of the new landfill cells would comprise the following general steps:

- Site preparation
- Cell preparation
- Liner and leachate collection system construction
- Landfilling and cover
- Final capping and rehabilitation.

Three distinct types of ground conditions can be identified for proposed new landfill areas of the project:

1) Non-landfilled areas primarily occupied by infrastructure such as roads, soil fill placement, and ponds (south of existing landfill footprint) and would include cells 1 to 4.
2) Non-landfilled areas that have remained largely undisturbed (western ridge and central ridge) including cells 2a, 2b and 4a.
3) The Eastern Gully and Western Gully Landfill (existing waste) including piggy back 1, 2a, 2b, 3.

The future landfill operation involves a number of preparatory stages prior to placement of waste, which differ depending on the presence of ground condition types 1 through to 3 described above. The preparatory measures for each ground condition are described in the following sections.

1) Non-landfilled areas occupied by infrastructure such as roads, ponds, etc. (cells 1,2,3,4):

- Stripping of vegetation where present;
- Removal of road surfaces and subgrades, building demolition, service removal, and service trench backfilling;
- Removal of lining systems of ponds and removal of sludge from ponds;
- Smoothing of abrupt changes in grade by cutting and filling;
- Filling of ponds and areas as required to maintain an adequate groundwater separation distance;
- Compaction and proof rolling of subgrade including formation of cell bund walls and leachate sumps;
- Placement of lining system for new cell area including leachate collection system.

2) Non-landfilled areas that have remained largely undisturbed (cells 2a, 2b and 4a):

- Stripping of vegetation;
- Excavation and profiling of up to 5 m of soil and rock and stockpiling for re-use as cover material;
- Compaction and proof rolling of subgrade including formation of cell bund walls; and
- Placement of composite liner system for non-landfilled areas including leachate collection system.

3) Eastern Gully and Eastern Gully Landfill (piggy back 1, 2a, 2b, 3):

- Stripping of vegetation where present;

- Smoothing of abrupt changes in grade by minor cutting/filling of existing cover soils and removal of existing terrace bunds on the Eastern Gully landfill batter;
- Compaction and proof rolling of subgrade including formation of cell bund walls; and
- Placement of 'piggy-back' lining system including landfill gas under drainage layer, base layer and leachate collection layer

3.5 Landfilling activities

Landfilling of solid waste for the Project comprises:

- Dumping of waste in the active filling area and placement of waste in layers.
- Compaction of waste using a compactor and a loader used to assist spreading the waste.
- Placement of landfill lids and/or daily cover (150 mm) over exposed waste at the end of each working day.
- Removal of landfill lids prior to recommencement of filling in an area and/or removal or puncturing of daily cover prior to placement of waste.
- Placement of intermediate cover (300 mm) on finalised lifts and batters. Intermediate cover would be applied over landfilled surfaces in areas that are not going to be used for more than the next 90 days. Intermediate cover areas would be revegetated with grasses.
- Stripping of intermediate cover prior to placement of the subsequent layer of waste and reuse of the intermediate cover for future lifts.
- The intermediate cover over the final landfill lift would remain in place to form part of the landfill capping layer subgrade.

While one cell is being filled with waste, the liner for the succeeding cell would be constructed. In addition finalised cells would be capped and rehabilitated whilst waste is being landfilled in subsequently staged cells. Progressive staging plans are shown in the Landfill Master Plan (Appendix F).

3.6 Hours of operation

The hours of operation of the site are outlined in the following table.

Table 7: hours of operation

Activity	***Day***	***Time***
Operation	*Monday – Friday*	*7:30am to 4:30pm*
	Saturday, Sunday and public holidays	*8:00am to 4:00pm*

3.7 Nature and quality of waste received

According to the EPL 5862, the site is licensed to receive the following waste types:

- Tyres as defined in schedule 1 of the protection of the environment operations (POEO) Act (1997).
- General solid waste (non-putrescible) as defined in schedule 1 of the POEO Act (1997).
- General solid waste (putrescibles) as defined in schedule 1 of the POEO Act (1997)
- Asbestos waste as defined in schedule 1 of the POEO Act (1997), however, Council does not accept asbestos waste at the facility

- Any waste that is received below licensing thresholds in schedule 1 of the POEO Act (1997), as is in force from time to time.

Waste not accepted at the site is referred to as ‘excluded waste’.

3.8 Life of landfill and disposal rates

The landfill has an approximate life of 40 years. The Table 6 outlines the approximate timelines for each stage of the project. Timelines are based on placing 140,000 m^3 of waste per annum.

4.0 STRUCTURE AND RESPONSIBILITIES

4.1 Staffing and Responsibilities

Requirements

The Solid Waste Landfill Guidelines (EPA 1996) provide the following requirements in benchmark technique 39 'staffing and training requirements'.

'*The level and nature of staffing and training should be adequate for environmentally responsible and safe management of the landfill. Staffing requirements will vary as a function of size, type of wastes, diversity and complexity of site operations.*

Landfill occupiers are to provide adequate staff to ensure that during operating hours all continuous tasks (including waste reception and security, compaction and covering) are completed in compliance with an approved LEMP.

At a minimum, staff training is to ensure that:

- *All operators of compaction or earthworks equipment are skilled at undertaking all tasks required of them*
- *All those who operate gas testing, water sampling or water testing apparatus are familiar with required testing and sample retention protocols, to a standard approved by the EPA*
- *All those who are to inspect or direct the placement of incoming wastes are capable of accurate data recording, and skilled at identifying wastes that are unacceptable.*'

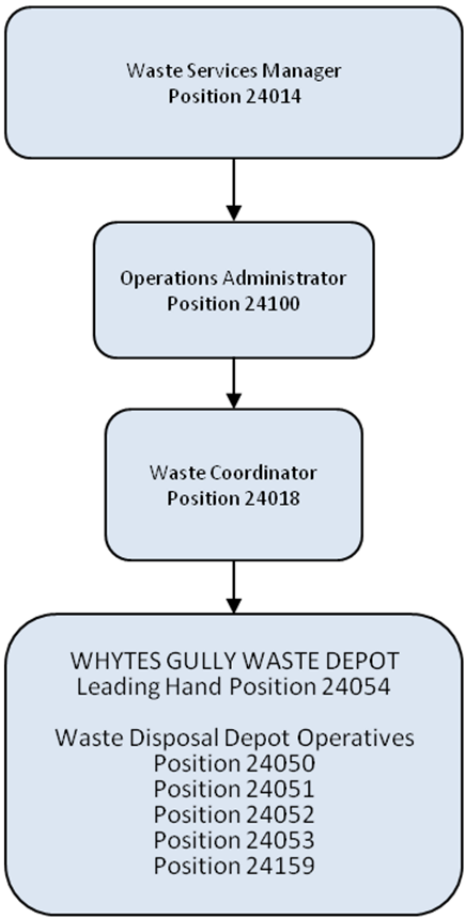
Objectives

Waste management facilities require adequate staffing levels to ensure that during operating hours all continuous tasks are completed in compliance with the LEMP. Clear definition of staff function, roles and responsibilities is necessary to ensure this.

Management Strategy

Chart 1 presents an organisational chart for the key staff involved in the management and operation of the WGRRP.

Chart 1: WGRRP Organisational Structure



The following sections comprise a summary of the roles and responsibilities of each staff member.

Waste Services Manager (WSM)

Overall responsibility for operational management of the facility.

Responsibilities include:

- Managing the Operations Administrator, waste coordinator, weighbridge operators, plant operators and contractors on site;
- Managing all onsite staff issues;
- Preparing reports, budgets and monitoring income generation;
- Ensuring staff training program are implemented;
- Managing construction activities on the site;
- Managing safety issues at the site;
- Ensuring outgoing product quality control.

Operations Administrator (OA)

Overall responsibility for the strategic planning and environmental management of the landfill facility. This responsibility includes:

- Ensuring that landfill operations are carried out in accordance with the LEMP and landfill licence and other environmental legislative requirements;
- Managing the preparation of Annual Reports;
- Managing site resource recovery and transfer station contractors and activities;
- Reporting to DECCW;
- Managing regular review of the LEMP and annual review;
- Managing environmental monitoring programs, groundwater assessment programs and remediation programs;
- Managing training and inductions;
- Managing design activities for the site; and
- Reviewing filling and compaction rates.

Waste Coordinator (WC)

- Supervising activities in accordance with the LEMP and landfill licence;
- Supervising weighbridge operators, plant operators, labourers and contractors on site;
- Induction of contractors and induction and training of weighbridge operator, plant operators and general labourers;
- Ensuring all activities and directions issued by the Operations Administrator and waste services manager are carried out;
- Directing safety issues within the landfill;
- Supervising the maintenance of road, fence, sedimentation and erosion traps, signs , leachate pumps, ponds and general infrastructure within the landfill;
- Rostering of staff at the landfill;
- Maintenance of vehicles and plant;
- Management of unacceptable waste loads;
- Managing disposal areas for “special waste types”;
- Recording and acting on complaints; and
- Managing the progress of filling and managing cover materials.

Leading Hand (LH)

- Manages tasks of the WC in the case the WC is not on site
- Supervising weighbridge operators, plant operators, labourers and contractors on site;
- Induction of contractors and induction and training of weighbridge operator, plant operators and general labourers;
- Confirms that operational staff is competent in their assigned tasks following inductions and training period;

- Directing safety issues within the landfill;
- Supervising the maintenance of road, fence, sedimentation and erosion traps, signs , leachate pumps, ponds and general infrastructure within the landfill;
- Rostering of staff at the landfill;
- Maintenance of vehicles and plant;
- Management of unacceptable waste loads;
- Managing disposal areas for “special waste types”; and
- Managing the progress of filling and managing cover materials.

Weighbridge Operator (WO)

- Operating weighbridge;
- Opening and closing gatehouse;
- Keeping gatehouse and surrounds in a clean and tidy manner;
- Screening of all waste to allow only permitted waste into the landfill according to the landfill licence and this LEMP; and
- Directing all vehicles to the appropriate tipping area.

Plant Operators (POs)

- Efficient operation of equipment;
- Processing waste in accordance with the LEMP and licence conditions including identifying unacceptable materials at the tip face;
- Relieving at the gatehouse when required;
- Maintain a safe tipping area;
- Covering the waste at the end of the day; and
- Maintain the plant in a good working condition.

Waste Disposal Depot Operatives

- Picking up litter around the landfill;
- Maintaining sedimentation and erosion controls within the landfill;
- Maintaining the landfill amenities;
- Maintaining all infrastructure within the landfill; and
- Relieving the gatehouse operator when required.

Small Vehicle Transfer Station Supervisor

- Supervising the small vehicle transfer facility area;
- Screening of waste delivered by small vehicle drop offs; and
- Ensuring that only approved waste is dropped off at the transfer station.

Small Vehicle Recyclables Drop Off Attendant

- Supervising the small vehicle recyclables drop off area;
- Screening of waste delivered;
- Ensuring that only approved waste is dropped off at the area; and
- Ensuring that waste is dropped off in the appropriate stockpile.

Recoverables Drop Off Centre Attendant

- Supervising the recoverables drop off centre;
- Screening of waste delivered;
- Ensuring that only approved items are dropped off at the recoverables drop off centre; and
- Communicate with customers purchasing items from the recoverables drop off centre.

4.2 Training

Staff training should be adequate for environmentally responsible and safe management of the facility, and to meet the conditions relating to staff competency outlined above. According to the Landfill Guidelines (benchmark technique number 39), at a minimum staff training should ensure that:

- All operators of compaction or earthworks equipment are skilled at undertaking all tasks required of them.
- All those who operate gas testing, water sampling or water testing apparatus are familiar with the required testing and sample retention protocols, to a standard approved by the EPA.
- All those who are to inspect or direct the placement of incoming waste are capable of accurate data recording, and skilled at identifying wastes that are unacceptable.

The management of training at the WGRRP incorporates four elements as summarised below:

- Position competency requirements;
- General induction training;
- Site specific induction training; and
- Ongoing training.

Position competency requirements

Table 8 presents qualifications/ competencies that are prerequisites for performing each of the landfill roles.

Table 8: competencies

Role	Prerequisite qualifications/competencies
Waste Services Manager (WSM)	■ Qualifications or equivalent experience in waste management desirable
Operations Administrator (OA)	■ Qualifications or equivalent experience in waste management desirable
Waste Coordinator (WC)	■ Qualifications and/or equivalent experience in managing solid waste landfills desirable ■ TAFE certificate or equivalent in civil engineering or waste

Role	Prerequisite qualifications/competencies
	management discipline ■ Class “c” driver’s license
Leading Hand (LH)	■ Competent in the identification of waste types ■ Competent in the use of computers and knowledge of MS word ■ Class “c” driver’s license
Weighbridge Operator (wo)	■ Competent in the use of computers and knowledge of MS word ■ Possess keyboard skills to certificate level ■ Experience in use of weighbridge ■ Possess good public relations and communication skills ■ Competent in the identification of waste types
Plant Operators (PO)	■ Class “c” driver’s license ■ WorkCover accreditation as front end loader operator ■ WorkCover certificate of competency as a “dogman” ■ Accredited traffic controller’s certificate

General Induction Training

All staff employed by Council undergo a formal induction program relating to their position. The training program comprises:

- Occupational health and safety (OH&S) training;
- Code of conduct training; and
- Risk assessment training.

First aid training if offered to all staff, but is an optional training element.

Site Specific Induction Training

Site induction and training of landfill staff (WO, POs) is undertaken by the Waste Coordinator. Training involves:

- Training in all applicable Standard Operating Procedures (SOPs), depending on the staff member:
  - Daily inspections;
  - OH&S record keeping;
  - End of day operations;
  - The general site management plan;
  - Cash handling;

- Armed hold ups;
- General weighbridge operation;
- Traffic control;
- Bin emptying using hook lift trucks;
- Visitors to waste depot;
- Receipt of waste;
- Water tank operation;
- Special waste handling;
- Leachate dosing;
- Landfill lid operation;
- 18 litre hand spray pump operation;
- Herbicides application;
- Fire management;
- Mower operation (John Deere and Victa);
- Plant maintenance procedures;
- Plant operator's end of day's procedures
- Loader tip face operations; and
- Compactor tip face operations.

- Breathing apparatus training;
- Site specific fire management procedure;.
- Gas testing, water testing and water sampling;
- Accurate data recording;
- Emergency response plan; and
- 'on-the-job' training for plant operators and weighbridge operators. The OA assesses staff competency for tasks assigned and confirms competency once achieved.

Contractors also undergo a site specific induction, conducted by the Waste Coordinator or Leading Hand.

Ongoing Training

Ongoing training requirements will be reviewed on an annual or as-needs basis depending on staffing at the site and triggers for ongoing training such as equipment upgrades, review of procedures or change in regulatory requirements.

Some staff may be required to obtain tickets or licenses to operate plant or conduct certain tasks. A register of tickets and licenses for each staff member is maintained by Council.

Actions for Compliance

- Training for correct identification of excluded waste should be included in the training program.

Performance Indicators

- The level of skill and performance of the work force.
- The outcome of performance reviews of the staff.
- The number of errors in data recording and reporting.
- Level of operational and administrative efficiency.

Responsible Persons

- Waste Services Manager.
- Operations Administrator.
- Waste Coordinator.
- Leading Hand.

Reporting

- Annual Report (refer Section 11.5).

Corrective Actions

- If annual reviews detect a failing, then measures will be put in place to increase the staffing levels and/or training requirements.

4.3 Complaints

Requirements

The EPL contains the following requirements for management of 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.

M5.1 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 Conditions M5.1 and M5.2 do not apply until 3 months after:

(a) the date of the issue of this licence or

(b) if this licence is a replacement licence within the meaning of the protection of the environment operations (savings and transitional) regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.'

Objectives

The purpose of maintaining a complaints register is to record and monitor the number of complaints received to improve site operations.

Management strategy, tasks and actions

A complaints register will be maintained to log public complaints regarding odours, vermin, litter, dust and noise received at the WGRRP. The date, time and nature of any complaint is recorded and the /subsequent actions taken to help minimise or eliminate the concerns will be logged. A complaints register form is presented in Appendix G. All Council communication including communication relating to complaints are maintained in Council's record keeping system trim.

All staff will be trained in the requirement to notify and record any public complaints.

Council's main customer service line is 4227 7111. This number is widely advertised and calls to this number are promptly allocated to the responsible officer.

The telephone number for the WGRRP is (02) 4227 7197 and is a public listing and is also displayed on the front gate.

Performance indicators

- Number of complaints recorded.

Responsible person

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- If complaints are not being recorded, staff may need further training in this area.

5.0 GATEHOUSE OPERATIONS

5.1 Introduction

The adoption of sound land management and conservation principles is one of the primary environmental goals of the LEMP. Two important aspects of this are the diversion of wastes that can be re-used or recycled to minimise the loss of landfill capacity, and managing the site to ensure that unsuitable wastes are not received and that the nature of wastes that are received is known.

The gatehouse represents an important control point for the WGRRP, and control of the following operations is essential in meeting the above goal:

- Waste screening;
- Waste measurement and recording;
- Recycling;
- Tyre management;
- Waste Transfer Station; and
- Cleaning of vehicles.

These aspects, including the specific guideline conditions applying to them, are discussed in the following sections.

5.2 Waste screening

Requirements

The following EPL licence conditions relate to waste screening at the WGRRP.

'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
T140	*Tyres*	*As defined in schedule 1 of the POEO Act, in force from time to Time.*	*Waste storage Waste disposal (application to land)*	*Na*
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)*	*Na*
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)*	*Na*

Code	Waste	Description	Activity	Other limits
T140	*Tyres*	*As defined in schedule 1 of the POEO Act, in force from time to Time.*	*Waste storage Waste disposal (application to land)*	*Na*
Na	*Asbestos waste*	*As defined in schedule 1 of the POEO Act, as in force from time to Time.*	*Waste disposal (application to land)*	*Na*
Na	*Waste*	*Any waste received on site that is Below licensing thresholds in Schedule 1 of the POEO Act, as in Force from time to time*	-	*Na*

O6.3 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.

M6.1 The licensee must maintain a record of all events involving the removal of any waste that was brought to the facility and which is not permitted to be disposed of at the facility.'

Council does not accept asbestos waste at the WGRRP.

Objectives

The purpose of screening the wastes received is to ensure that the site receives only those wastes that it is licensed to receive.

Management strategy

The following provisions are in place at the WGRRP to prevent the disposal of unacceptable wastes. Detailed procedures are presented in the SOP's in Appendix H.

- Signs are presented at the entrance to WGRRP which clearly indicate the types of wastes that are accepted and those that are not accepted.
- General information wastes accepted available on WCC's landfill website and brochures available at local libraries and WCC customer service.
- Training provided to operations staff on waste accepted.
- All incoming vehicles enter via the weighbridge/gatehouse, where the vehicle registration number is entered.
- Customer declares type and source of waste.
- If the weighbridge operator is suspicious about the waste load, the load is inspected.
- If waste is from an industrial source and application for disposal is to be submitted by customer and assessed.
- Screen and check incoming waste at the weighbridge where load is not covered. An overhead cctv is installed to enable visual inspection of loads by the weighbridge operator.
- Screen and check waste at Small Vehicles Transfer Station and tipping face. Refer Section 6.2.
- All information is entered on a computer where records are regularly backed up and archived. Records are kept for at least four years.
- When loads of excluded wastes are identified at the weighbridge, the weighbridge operator informs the customer that the waste is not acceptable and the customer is refused entry. The customer is informed of the correct waste disposal procedure or location.

- When loads or partial loads of excluded waste are identified at the waste Transfer Station, the customer is asked to remove the excluded waste from the site and is informed of the correct waste disposal procedure or location.
- When loads or partial loads of excluded waste are identified at the tipping face, the customer is asked to remove the excluded waste from the site and is informed of the correct waste disposal procedure or location. Where no customer can be identified, Council removes the excluded waste and the waste is transferred to an approved disposal or treatment location.
- Pesticides and chemical drums are not accepted for disposal nor are hazardous, restricted solid, liquid or special waste.

Refer to Appendix H for SOP's for screening waste, including forms and records and procedures for dealing with hazardous and unacceptable waste.

Actions for compliance

- Tip face waste screening to be undertaken by someone other than the compactor operator.

Performance indicators

- Quantity of unacceptable waste types rejected.
- Number of detection reports of any waste rejected.
- Number of incidents whereby unacceptable wastes are discovered at the tipping face.
- Monitoring data indicating consistent occurrences of unacceptable waste being detected.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Random vehicle audits	Daily	Random
Screening of waste	Continuous	Continuous
Screen when truck tipping at tip face or tipping at Transfer Station.	Continuous. Refer Section 6.2	Continuous. Refer Section 6.2

Responsible party

- Weighbridge Operator
- Waste Coordinator
- Leading Hand
- Plant Operator at tipping face

Reporting

- Receipt of significant amounts of unacceptable waste at the site constitutes an incident. Incident reporting (refer Section 11.2).
- Monthly waste contributions report (refer Section 11.4).
- Annual Report (refer Section 11.5)

  Maintain register of all events involving the removal of waste that was brought to the site and is not permitted to be accepted at the site.

Corrective actions

- If unacceptable waste is detected at the weighbridge, direct truck offsite. If it is a repeat offender, exclude from landfill.
- If unacceptable waste is detected at Small Vehicles Transfer Station or tipping face, collect waste and send to appropriate landfill.
- If the annual review process identifies waste screening procedures need to be augmented, the program could be modified. This modification would depend on the types unacceptable waste but will likely include:

  i) Training of staff;

  ii) Increased stringency in the screening procedure; and/or

  iii) Education of waste generators and haulers.

5.3 Waste measurement and recording

Requirements

The following licence conditions (EPL 5862) relate to the waste measurement recording at the WGRRP:

L3.2 The licensee must not dispose of any tyres on the premises which;

(a) have a diameter of less than 1.2 metres; and

(b) are delivered at the premises in a load containing more than 5 whole tyres; and

(c) became waste in the Sydney metropolitan area.

Note

This condition does not apply where:

(i) the tyres received comply with the EPA tyre disposal specifications; or

(ii) the premises have the capacity, at the time of unloading the tyres, to comply with the EPA tyre disposal specifications; or

(iii) the premises have the capacity, at the time of unloading the tyres, to recycle or reprocess the tyres into a saleable product, including retreading the tyres.

L3.3 Tyres stockpiled on the premises must:

(a) not exceed fifty (50) tonnes of tyres at any one time; and

(b) be located in a clearly defined area away from the tipping face; and

(c) be managed to control vermin; and

(d) be managed to prevent any tyres from catching fire.

M6.1 The licensee must maintain a record of all events involving the removal of any waste that was brought to the facility and which is not permitted to be disposed of at the facility.

O6.3 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.

Objectives

The objectives of recording the quantities, types and sources of waste received are to enable the effective monitoring of incoming waste and to aid in reporting requirements.

Management strategy

The weighbridge is a self-indicating Mettler Toledo 7560 with a maximum capacity of 60 tonnes and eight load cells mounted in pairs and are located near the site entry off Reddalls Road. The weighbridge consists of identical weighbridges for incoming and outgoing vehicles. The terminal for the weighbridge is an 'IND310drive' terminal. Associated with the weighbridge is the following infrastructure:

- Concrete ramps for vehicle access to the weighbridge;
- Roof to protect the weighbridge and customers from rain;
- Weighbridge office including amenities for staff; and
- Cctv cameras, which relay footage of vehicles at the weighbridge to the operator.

Gross weights are recorded as the vehicle enters and tare weights recorded before departure. The weighbridge is certified annually (certification number 6/10b/46c).

The weighbridge used will have a valid calibration certificate in accordance with the requirements of the national trade measurement regulations, 2009 at all times.

The amount, type and source classification of all waste received is recorded by the weighbridge operator on computer in accordance with the weighbridge operations manual. The waste codes used based on the nomenclature used for the national waste classification system.

A register of the amount, weight and type of tyres stored on site is to be maintained.

Formal volumetric surveys of the filling area are conducted on a six monthly basis for correlation with waste measurements made at the weighbridge.

Each month, Council provides data to EPA on the amount, type and source of waste in the monthly contributions report. Refer Section 11.4.

Performance indicators

- The number of occurrences the weighbridge is inoperative.
- Comparison between waste volumes recorded at the weighbridge and results of regular volumetric surveys.

Responsible party

- Weighbridge Operator.
- Waste Coordinator.
- Leading Hand.

Inspection, monitoring and maintenance schedule

Table 9: inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Measurement of waste	Continuous	Continuous
Site survey	Twice per year	June, December
Weighbridge certification	Once per year	December

Reporting

- Monthly report to EPA. Refer Section 11.4.

- Annual Report. Refer Section 11.5.
- If for any reason, the weighbridge is inoperative, Council will notify EPA, and all vehicles will be recorded and tonnages calculated from EPA truck factors. This procedure is provided in the SOPs Appendix H.

Corrective actions

- If the weighbridge at the site becomes inoperative or inaccurate, repair and/or calibration is required as soon as practicable.

5.4 Recycling

Requirements

There are no specific conditions relating to recycling in the licence. The Landfill Guidelines call for a plan to recover and recycle, re-use or reprocess wastes that can be viably recycled.

Objectives

The primary objective of resource recovery and recycling is to prolong the life of the site.

Management strategy

The WGRRP includes a Small Vehicles Transfer Station where recyclable materials are sorted from waste received as well as a small vehicles recyclables drop off area at the toe of the Western Gully Landfill.

Once inside the WGRRP, small vehicle customers dropping of recyclable materials are directed to the small vehicles recyclables drop off area at the toe of the Western Gully Landfill. Council accepts the following recyclable items at the WGRRP:

- Commingled/mixed recyclables;
- Glass bottles;
- Paper and cardboard;
- Mobile phones;
- Car batteries;
- Scrap metal (white goods, steel, brass, aluminium, copper);
- Gas bottles & fire extinguishers;
- Fluorescent lights and CFL's; and
- Waste oil (e.g. Sump oil, engine and lubricating oils. Fuel, petrol, diesel, heater oil, thinners or cooking oils are not accepted).

Recyclables dropped off at the waste transfer station in the former SWERF building at the toe of the Eastern Gully Landfill are separated by Council staff and transferred to the recyclables drop off area.

At the recyclables drop off area, separate storage is provided for reusable and recyclable material. Reusable material is removed for re-processing as required. Recyclables are sent offsite to various recycling contractors including the materials recovery facility (MRF) adjacent to the site.

Once inside the WGRRP, customers dropping of green waste are directed to the green waste drop off area in the western part of the site at the foot of the Western Gully Landfill. At the green waste drop off area, the green waste is stockpiled and mulched as required. The processed material is converted into mulch or sent off site for composting as required.

A 'Small Vehicles Recoverables Drop Off' centre is located to the north of the former SWERF building and accepts reusable items that have some resale value. All public traffic is directed past the Small Vehicles Recoverables Drop Off Centre first to assist Council in promoting resource recovery. Signage is posted at the entry to the Small Vehicles Recoverables Drop Off Centre advising customers of what types of materials should be directed to the Small Vehicles Recoverables Drop Off Centre. Second hand goods recovered from the facility are sold at the Small Vehicles Recoverables Drop Off Centre. Vehicle parking is provided for customers of the Small Vehicles Recoverables Drop Off Centre. In addition:

- Direction and advice is provided at the weighbridge by the weighbridge operator.
- Small Vehicles Recoverables Drop Off Centre attendant provides assistance and advice to customers to increase the opportunity for resource recovery.

To promote customer separation and patronage the Small Vehicles Recoverables Drop Off Centre should always be maintained in a clean, accessible and safe condition. Items should not obstruct access.

In the future, additional facilities for resource recovery and waste treatment may be implemented by Council, which would affect the resource recovery infrastructure on site. The Council waste management strategy (Wollongong City Council 2011) outlines short, medium and long term objectives to increase resource recovery, recycling and composting.

Performance indicators

- Quantity of material recovered

Responsible party

- Weighbridge Operator;
- Leading Hand;
- Recyclables Drop Off Area Attendant;
- Small Vehicles Recoverables Drop Off Centre Attendant;
- Transfer Station Attendant.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing	Responsible person
Recording quantities of recovered materials	Continuous	Continuous	Recyclables drop off area attendant; Small Vehicles Recoverables Drop Off Centre attendant
Assist customers with identifying opportunity for resource recovery	Continuous	Continuous	Recyclables drop off area attendant; Small Vehicles Recoverables Drop Off Centre attendant
Monitor the cleanliness of the recoverables and recyclables drop off centre	Continuous	Continuous	Recyclables drop off area attendant; Recoverables drop off centre attendant

Reporting

- Included in Section 5.3.

Corrective actions

- If the quantity of resources recovered falls over time, the recycling strategy and recovery practice will be reviewed.

5.5 Tyre management

Requirements

The following licence conditions (EPL 5862) relate to tyre management at the WGRRP:

L3.2 The licensee must not dispose of any tyres on the premises which;

(a) have a diameter of less than 1.2 metres; and

(b) are delivered at the premises in a load containing more than 5 whole tyres; and

(c) became waste in the Sydney Metropolitan Area.

Note

This condition does not apply where:

(i) the tyres received comply with the EPA tyre disposal specifications; or

(ii) the premises have the capacity, at the time of unloading the tyres, to comply with the EPA tyre disposal specifications; or

(iii) the premises have the capacity, at the time of unloading the tyres, to recycle or reprocess the tyres into a saleable product, including retreading the tyres.

L3.3 Tyres stockpiled on the premises must:

(a) not exceed fifty (50) tonnes of tyres at any one time; and

(b) be located in a clearly defined area away from the tipping face; and

(c) be managed to control vermin; and

(d) be managed to prevent any tyres from catching fire.

Objectives

The objectives of tyre management include minimising landfill space used and prevention of fires and vermin.

Management strategy

Customers with tyres in their loads are discouraged from disposing of them at the landfill. If tyres are received they are stockpiled at the small vehicles recyclables drop off and sent offsite for recycling. Tyres discovered at the tip face or the waste transfer station are separated and also stockpiled at the recyclables drop off area. Bulk loads of tyres are not accepted.

Tyres are transferred off site for recycling on a regular basis in order to not exceed the maximum allowable amount of tyres stored on site (50 tonnes) and to control vermin. Tyres are stockpile in a separate stockpile away from flammable goods.

Performance indicators

- The number of times tyres not conforming to the requirements of licence condition L3.2 are discovered at the landfill will indicate the effectiveness of tyre management at the WGRRP.
- Tyre fires and infestation of the tyre stockpile with vermin are indications that the tyres have not been managed in accordance with the requirements of licence condition L3.3.

Responsible party

- Weighbridge Operator.
- Plant Operators.
- Waste Coordinator.
- Leading Hand.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Waste screening at tip face and waste transfer station	Continuous	Continuous

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- If whole tyres are discovered on site they are separated and stockpiled at the recoverables drop off centre.
- Should whole tyres start being discovered on a regular or increasing frequency, waste screening procedures may need to be reviewed and modified.

5.6 Cleaning of vehicles

Requirements

The following licence conditions (EPL 5862) relate to the cleaning of vehicles at the WGRRP:

O6.5 Vehicles leaving the premises must not track materials to external surfaces.

The environmental guidelines: solid waste landfills (EPA 1996) specify that:

- *The landfill occupier should provide a wheel-washing or wheel-cleaning facility for use by customers. The occupier is responsible for deciding the appropriate cleaning method, taking into consideration site traffic and local road conditions. Hand-held pressure washing hoses, drive-through immersion bunds and vibration grids are all options which may suit different operations.*
- *The landfill occupier should display signs advising customers that it is the vehicle operator's responsibility to ensure that the remnants of their load or the material stuck to the underside of the vehicle or the wheels does not litter public roads.*

Objectives

The objectives of cleaning vehicles are to:

- Minimise the effects on local amenity; and
- Minimise the effects on quality of stormwater runoff.

Management strategy

- The tipping face access road is bitumen sealed to within 100 m of the tipping face. This limits the amount of mud and clay that can collect on the wheels and undercarriage of vehicles. The tipping area and access road are maintained free from debris.

- Access roads used by small vehicles are either sealed or covered with gravel.
- A water cart is permanently available at the WGRRP. This cart is used for dust suppression and also washing mud etc. From the sealed roads as required. A high pressure water cleaner is located on site and will be used for cleaning of vehicles if required.
- During wet weather, aggregate is placed on the tipping area to prevent vehicles coming in contact with excessive mud and provide a safe tipping environment.
- A wet weather tipping area covered with gravel and breckets only is used during times of inclement weather to limit the exposure of vehicles to mud.
- Signs 'cover your load' are installed at the site entry and exit.
- A wet weather tipping area is maintained by Council to reduce the dispersion of mud across the site. The wet weather tipping area utilises 'breckets', a gravelly slag product, as cover material to reduce generation of mud.

Actions for compliance

- Clear signage indicating location and availability of high pressure water cleaner should be installed.

Performance indicators

- Number of complaints from the community regarding mud and litter on trucks leaving site.
- Mud and litter found on roadways surrounding the site.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Visual check of the site access road	Daily	End of day
Random audit of trucks leaving site	Weekly	End of week

Responsible party

- Waste Coordinator.
- Leading Hand.

Reporting

- Annual Report. Refer Section 11.5
- A record of any complaints will be maintained. Refer Section 4.3.

Corrective actions

- Corrective action will be taken based on complaints or observations.
- Trucks found not to be using the wheel wash bay will be directed to use it.

6.0 FILLING OPERATIONS

6.1 Introduction

Operations at the tip face are important for the effective environmental management of the facility for the reasons listed below:

- Land management and conservation is affected through tipping supervision, waste compaction and the plan adopted for filling and final contouring of the site; and
- Water pollution, air pollution and hazards and loss of amenity are affected through covering of wastes.

Tip face operations, including the relevant benchmark techniques (EPA 1996), are discussed in the following Sections.

6.2 Tipping supervision

Requirements

There are no specific conditions in the licence relating to tipping supervision.

The Landfill Guidelines recommend supervision of tipping activity at the tip face when wastes are received at all landfills. It is noted that where facilities receive in excess of 500 tonnes per week (25,000 tonnes per annum) this supervision should be undertaken by someone other than the compactor driver.

Objectives

The objective of tipping supervision is to ensure the accountability of those depositing unacceptable wastes at the site. Supervision at the tipping site is an extension of waste screening at the weighbridge and hence also has the objective of ensuring that only those wastes that Council are licensed to receive are disposed of at the WGRRP.

Management strategy

- Full time supervision of tipping at the Small Vehicles Transfer Station by the Waste Transfer Station supervisor.
- SOPs outline tipping supervision requirements at the tip face (refer Appendix H).
- The tip face is inspected daily prior to tipping.
- The compactor driver undertakes screening at the tip face.

Actions for compliance

- Currently, the tipping is supervised by the compactor and loader operators. Council should provide a full time supervisor other than the compactor driver.
- An SOP should be developed for the Small Vehicles Transfer Station.

Performance indicators

- The number of incidents whereby unacceptable wastes are discovered at the Small Vehicles Transfer Station and tipping face.

Inspection monitoring and maintenance schedule

Action	Frequency	Timing
Screen when truck tipping at tip face or tipping at transfer station.	Continuous.	Continuous.

Responsible party

- Plant Operators.
- Waste Transfer Station Operator.

Reporting

- Receipt of significant amounts of unacceptable waste at the site constitutes an incident (refer Section 11.2).

Corrective actions

- If unacceptable waste is detected at the Small Vehicles Transfer Station or the tipping face, collect waste and send to appropriate landfill.
- If annual review process identifies waste screening procedures need to be augmented, the program could be modified. This modification would depend on the types unacceptable waste but will likely include:

  Training of staff; and/or

  a. Increased stringency in the screening procedure; and/or

  b. Education of waste generators and haulers.

6.3 Filling plan/ contours

Requirements

There are no specific conditions in the licence relating to a filling plan and the landfill contours.

The EPA (1996) Landfill Guidelines (benchmark technique 27) recommend that a filling plan be maintained that identifies areas to be used in the disposal of waste. The filling plan must be regularly updated.

Objectives

The objectives of producing filling plans/contours are to demonstrate that the site operations are being controlled in a planned manner and to estimate the volume of waste land filled.

Management strategy

Filling is directed in general accordance with the filling plan. The filling plan is saved in the compactor on board GPS system to guide the operator on the filling. Filling is controlled by the conduct of frequent informal surveys by means of on board survey data collected by the waste compactor as well as formal surveys on a six monthly basis. The survey results are reviewed continuously and changes to the filling activities are implemented as required.

The proposed final landform contours for the Whytes Gully New Landfill Cell are illustrated on Figure 11.

As discussed in Section 3.5, the future landfill operation will comprise a number of new stages (stage 1, stage 2a, stage 2b, stage 3, stage 4), which will cover current and previous landfill areas in addition to previously unfilled areas. Each stage is subdivided into a number of cells. The staging sequence is shown on Figure 9. Staging plans are presented in the Landfill Master Plan (Appendix F). An outline of staging timeframes is provided in Section 3.3.

Filling methodology should be undertaken in accordance with the principals of separation of waters as described in Section 7.0 and in particular surface water and sediment controls. Management of surface waters during filling should include diversion of clean surface waters away from filling areas and preventing runoff from waste areas entering surface waters through the use of temporary bunds up gradient and down gradient of the filling area as required by the filling area geometry. The area of waste exposed should be

minimised to the extent practicable to limit the potential for generation of leachate contaminated surface waters.

Large commercial vehicles are directed to the active tip face for dumping, while smaller commercial vehicles are directed to an alternative tip face that is compacted at the end of each day using the same filling and compaction methodology.

Filling batters for Stage 1 are to be at a maximum slope described in Section 2.2 of the Detailed Design Report on Stability of Interim Landfill Slopes (refer Appendix I).

Performance indicators

- The results of regular surveys are used to assess the progress in filling the site.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Final filling plans/contours completed six months after each completed cell.	As required	As required
Informal progress surveys	As required	As required
Six monthly survey	Six monthly	June, December

Responsible party

- Operations Administrator.
- Waste Coordinator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- The Waste Coordinator reviews the ongoing progress of the filling plan and determines the necessary modifications to the filling activities on a daily basis.

6.4 Compaction of waste

Requirements

There are no specific conditions in the licence relating to compaction of waste.

The EPA (1996) Landfill Guidelines (benchmark technique 24) recommends that maximum compaction must be achieved for the capacity of the machines used. For landfills receiving over 50,000 tonnes of waste per annum, the waste compaction goal is 0.85 tonnes per cubic metre, excluding cover material.

Objectives

The objective of waste compaction is to minimise the amount of landfill space and land used to dispose of waste. Compaction also improves the stability of landfills, and minimises voids that would encourage vermin, fires or excess generation of leachate. A well compacted landfill will also suffer less settlement problems.

Management strategy

The compactor and front end loader operate continuously at the tip face in accordance with the SOP's presented in Appendix H.

- Waste is placed in layers with a maximum thickness of 0.3 m and in 3 m high runs of waste. Each run has a width of between 15 m and 20 m, depending on the geometry of the filling area, but never more than 2½ times the width of the compactor.
- The front end loader operator acts to push the waste into the compaction area in even layers with a thickness of 300 mm. The front end loader used is a caterpillar 950h machine with an operating weight of 18.4 t.
- The compactor operator acts to spread and compact waste in layers of a maximum thickness of 500 mm. The compactor used is a caterpillar 836h with an operating weight of 55.6 t.
- The working face is at a grade of less than 1v:5h.
- Waste is compacted by a maximum of five passes of the compactor.
- The compactor operator uses an on board GPS system to assess the level of compaction achieved. The GPS system indicates settlement achieved following each pass by the compactor. Placement of further waste only occurs when the GPS system indicates that a sufficient level of compaction has been achieved.
- The filling plan is saved in the compactor GPS system to guide the operator on the filling.
- The progress of compaction is monitored frequently, as are the filling plan/ contours, using survey data collected from the compactor GPS survey system and recorded waste measurement data.
- The waste density achieved is calculated twice per year based on weighbridge and survey data.

Performance indicators

- The compaction aim for waste is 1 t/m³ as calculated from the waste mass measured at the weighbridge and the volumetric surveys.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Assess waste compaction with compactor survey system	Ongoing	Ongoing
Six monthly review of compaction data	Twice per year	June, December

Responsible party

- Plant Operators.
- Waste Coordinator.
- Leading Hand.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

If compaction data falls below performance indicator, operating procedures will be reviewed. This may require spreading and compacting thinner layers or specifying additional passes with the compactor.

6.5 Covering of waste

Requirements

The following licence conditions (EPL 5862) relate to covering of waste at the WGRRP:

O3 Waste management

O6.1 Cover material must be virgin excavated natural materials (VENM) or a steel framed and fabric covered moveable structure.

a) Daily cover

Cover material must be applied to a minimum depth of 150mm 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 to a minimum depth of 300mm over surfaces of the landfilled waste at the premises which are to be exposed for more than 90 days.

b) 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.

General requirements for covering of waste are further outlined in benchmark technique 33 of the solid waste Landfill Guidelines (EPA 1996) and comprise:

- Daily soil cover of at least 15 cm thickness.
- Intermediate cover of at least 30 cm thickness in areas which will be exposed for more than 90 days using an approach as decided by the design philosophy.
- Maintenance of a stockpile of two weeks of cover material where cover material cannot be won on site.

Lastly, the active tipping face area, waste relocation area, daily cover and 90 day cover are to be limited during landfill operations as defined by Table 10 and Figure 9 attached:

Table 10: Active tipping face area, waste relocation area, daily cover and 90 day cover

Stage	Active Tipping Face Area (m^2)	Waste Relocation Area (m^2)	Daily Cover Area (m^2)	90 Day Cover Area (m^2)
Stage 1	1,100	1,800	19,800	14,000
Stage 2	1,000	0	1,300	7,500
Stage 3	1,000	0	1,300	7,500
Stage 4	1,000	0	1,300	7,500

Objectives

The objectives of cover material are to:

- Limit run-on and reduce infiltration of water;
- Control and minimise the risk of fire;
- Minimise the emission of landfill gas;

- Suppress site odour;
- Reduce pest and vermin; and
- Decrease litter generation.

Management strategy

Cover material is classified as daily, intermediate or final:

- Landfill lids and/or daily cover to 150 mm soil – are used as daily cover on exposed areas of waste at the end of the day. Council currently own four landfill lids that cover an area of 70 square meters each.
- A stockpile of intermediate cover material suitable for two weeks is maintained next to the tipping face. This may be supplemented from time to time with cover material sourced on site or imported from off site. Imported cover material can comprise 'breckets', a slag product produced by BlueScope Steel, Port Kembla. 'breckets' are used as cover during wet weather filling or for access tracks.
- Intermediate cover - is placed over each completed 3 m high lift, or when there will be waste surfaces exposed for more than 90 days. It is applied to a minimum 0.3 m thickness. Any water runoff from the intermediate cover will be treated as clean water.
- Final cover - is placed on final surfaces of the landfill. The final capping is designed to reduce rain water infiltration into the landfill. Surface water runoff from the final cap will be treated as clean water. Design of the final capping is discussed in Section 10.2.

Performance indicators

- Quantity of daily, intermediate and final cover material used.
- Effective sealing of the waste from the environment. Daily cover controls windblown litter, pest species and landfill odours. For this reason, client, visitor or resident identification of windblown litter, vermin and landfill odours in the complaints register forms the performance indicators for adequacy of cover material.
- Surface gas emission monitoring will provide a performance indicator for areas covered with intermediate or final cover.
- Odour complaints.
- Surface water quality monitoring.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Visual inspection of daily cover and landfill lids	Daily	End of day
Inspection after completion of land filling in each cell	As required	As required
Surface gas emissions	Refer Section 8.3.2	Refer Section 8.3.2
Surface water quality monitoring	Refer Section 7.3.3	Refer Section 7.3.3

Responsible party

- Plant Operator.
- Waste Coordinator.
- Leading Hand.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- If there is evidence of litter or odour nuisance due to insufficient cover being placed on the daily working face, a thicker daily cover should be utilised. If the material being used as cover is assessed to be inappropriate for use as cover material, an alternative material will be located and used.
- Refer to Section 9.6 for Odour Control.
- Refer to Section 8.0 for Landfill Gas Management.

7.0 WATER QUALITY MANAGEMENT

This section addresses the requirements of schedule 4, condition 18 of the Project Approval, *soil, water and leachate management plan* (refer Appendix A).

7.1 Introduction

The environmental goals for water pollution management are:

- Preventing water pollution by leachate and sediments;
- Detecting water pollution; and
- Remediating water pollution.

7.2 Prevention of water pollution by leachate

The following management techniques used to prevent pollution of water by leachate are:

- Leachate barrier system;
- Leachate collection system;
- Surface water and sediment controls; and
- Leachate monitoring program.

7.2.1 Leachate barrier system

Requirements

The EPA (1996) Landfill Guidelines (benchmark technique 1) require that a suitable leachate barrier system be designed in order to contain leachate over the time that the waste poses a potential environmental risk thus reducing the potential for environmental impacts caused by the landfill.

Reference is also made to schedule 4 condition 17 of the Project Approval for requirements in relation to leachate management (refer Appendix A).

Objectives

The primary objective of the leachate barrier system is to provide a physical barrier to leachate migration during the time that it poses significant environmental risk so that neither groundwater nor surface water are affected.

Management strategy

Western gully landfill

The Western Gully Landfill does not have a liner system.

Eastern Gully Landfill

The Eastern Gully Landfill was constructed as a lined landfill, with the barrier component of the lining system comprising a high density polyethylene (HDPE) geomembrane liner (2 mm thickness). The HDPE geomembrane liner is underlain by a groundwater drainage layer comprising an approximate 500 mm thick fine gravel layer that is intended to collect any groundwater seepage from natural materials below the liner. This layer incorporates a 100 mm diameter collection pipe that drains by gravity to a pond at the toe of the landfill.

Future development

The design of the leachate barrier system is presented in the Preliminary Design Report and Detailed Design Report in Appendix I and summarised herein.

Cells 1, 2, 3 and 4 base elevation

The cell design includes a separation distance of 2 m between the ground water level and the base of the waste. This based on a groundwater level of 1 m below ground level. This groundwater level will be verified for detailed design of the cells from analysis of data currently being collected from data loggers installed in the proposed cell footprint area.

Perimeter bund and internal bunds

The cell design includes a perimeter bund. The perimeter bund provides a physical boundary for the limit of placement of waste within the cell and also provides a termination point for both the base liner system and the barrier layer in the capping system.

Internal bunds between sub-cells will be constructed to provide a physical barrier to waste and water movement during sequential excavation, lining, and filling.

Liner

Three distinct types of ground conditions can be identified for future landfilling areas:

4) Non-landfilled areas occupied by infrastructure such as roads, ponds, etc. (south of existing landfill footprint) i.e. cells 1 to 4

5) Non-landfilled areas that have remained largely undisturbed (western ridge and central ridge) i.e. cells 2a, 2b and 4a

6) The Eastern Gully and Western Gully Landfill (existing waste)

The type of liner varies depending on the ground conditions as follows:

New cell liner for cells 1 to 4

The leachate barrier system for the new cell floor comprises from bottom to top:

- 200 mm bearing layer (clay rich soil);
- Geosynthetic clay liner;
- 1.5 mm high density polyethylene (HDPE) geomembrane lining layer;
- Cushion geotextile; and
- 300 mm drainage aggregate and filter geotextile with periodic pipes.

New cell liner for cells 2a, 2b and 4a

The leachate barrier system for these cells comprises:

- 200 mm bearing layer (clay rich soil);
- GCL;
- 1.5 mm high density polyethylene (HDPE) geomembrane lining layer; and
- Leachate collection layer (geocomposite drainage net) with filter geotextile and periodic pipes; and
- 300 mm protection layer.

Piggy back liner for existing waste

The leachate barrier system for the piggyback cells comprises from bottom to top comprises:

- Gas drainage trenches with perforated gas collection pipes;
- Reinforcement layer consisting of 500 mm of base material and a geogrid;
- 200 mm bearing layer;
- GCL;
- 1.0 mm linear low density polyethylene (LLDPE) geomembrane capping layer with filter geotextile and periodic pipes;
- Leachate collection layer (geocomposite drainage net) with geotextile;
- Leachate collection layer (geonet); and
- 300 mm protection layer.

Performance indicators

- The leachate barrier system will be constructed in accordance with the indicative construction specifications refer Detailed Design Report (Appendix I).
- Results of the ongoing monitoring of groundwater, surface water, leachate and landfill gas.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Regular earthworks monitoring and testing during construction to ensure quality assurance	Refer Detailed Design Report Appendix I	Refer Detailed Design Report Appendix I
Groundwater and surface water and leachate monitoring	Refer Section 7.3	Refer Section 7.3
Landfill gas monitoring	Refer Section 8.3	Refer Section 8.3

Responsible person

- Waste Services Manager.
- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Section 7.5 identifies the actions to be undertaken if the monitoring results indicate that conditions have changed and leachate has a potential to cause environmental degradation of the groundwater or surface waters.

7.2.2 Leachate Collection System

Requirements

O7.3 The licensee must maintain a leachate management system to collect and direct all leachate to a point for treatment and disposal to sewer.

Objectives

The primary objective of the leachate collection system is to ensure that leachate in excess of field capacity of the waste is collected and managed in a responsible manner to prevent escape from the landfill into groundwater, surface water or subsoil.

Management strategy

Western Gully landfill

Collection of leachate was originally through a central 100 mm diameter perforated pipe located at the base of the landfill. From discussions with Council staff we understand that this pipe did not have filter protection and became non-functional early on during the filling process. These discussions also indicate that an alternate leachate collection system was constructed. Leachate collection horizons were established successively at approximate 5 m vertical intervals within the landfill mass comprising a network of finger drains. At the low point on each horizon, flows in the finger drains enter a shallow 300 mm concrete or HDPE pipe and are conveyed to the base of the landfill batter; a pipe pit was installed at each horizon. At the toe of the landfill batter the shallow 300 mm pipe extends through the landfill bund wall to the current leachate collection pit near the current landfill access road, from where it is transferred to the leachate collection ponds.

Eastern Gully Landfill

The HDPE geomembrane liner in the Eastern Gully is overlain by a blanket leachate drainage layer comprising an approximate 300 mm thick clean sand layer. This layer incorporates two 300 mm diameter leachate collection pipes that drain by gravity to the toe of the landfill – one pipe drains stage 1 and the other pipe drains stage 2. Collected leachate is transferred to leachate ponds.

Future cells

The leachate collection system in all new liner areas comprises a continuous blanket collection layer, either geocomposite drain or aggregate layer, with a network of leachate collection pipes. The collection pipes are positioned to provide an approximate 50 m (maximum) flow distance from point of entry into the blanket to the nearest pipe and to maintain positive drainage after long-term landfill settlement. The system is sized to provide for long-term clogging resistance and for pipe clean out access points.

The bases of cells 1 to 4 are graded to drain to the south, with a leachate collection sump positioned in a southern corner of each cell. Leachate will drain to the leachate collection sump via gravity. Leachate from the piggy back cells and cells 2a and 2b and 4a would also drain to one of these four sumps. The sumps are essentially depressions that are filled with drainage aggregate. Each sump drains via gravity to a leachate sump riser outside the perimeter bund. Each leachate sump riser is subsequently drained via gravity through a new leachate drainage pipe to a single external leachate pumping pit for pumping to the leachate ponds. For the first stages of the project, the existing leachate well near the leachate ponds will be the pumping location; while in subsequent stages a new pumping pit will be constructed near the south west corner of the landform. From this point leachate is pumped to the appropriate storage pond.

Performance indicators

- Results of the ongoing monitoring of groundwater, surface water and leachate.
- Construction of leachate collection system in accordance with indicative construction specification (refer Detailed Design Report Appendix I).

Inspection monitoring and maintenance schedule

Action item	Frequency	Timing
Regular monitoring during construction to ensure Quality Assurance.	**Refer Appendix I.**	**Refer Appendix I.**
Inspection of leachate pump and	Weekly and daily during	End of week

Action item	Frequency	Timing
Pond operation	rainfall	
Preventative maintenance of Leachate pumps	Bi-annual with full overhaul Every 3 years	End of week
Inspection of leachate ponds including liner integrity	Quarterly	March, June, September, December
Leachate disposal quantity (recorded from flowmeter)	Monthly	End of month
Inspection of irrigation area prior To irrigation	Daily	Work days
Groundwater and surface water Monitoring	Refer Section 7.3	Refer Section 7.3

Responsible person

- Waste Services Manager.
- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- If the leachate collection system is found to be not performing, it may need to be flushed or repaired.
- Section 7.5 identifies the actions to be undertaken if the monitoring results indicate that conditions have changed and leachate has a potential to cause environmental degradation of the groundwater or surface waters.

7.2.3 Surface water and sediment controls

Requirements

L1.2 There must be no discharge of contaminated stormwater to waters under dry weather conditions or storm event(s) of less than 1:10 year 24 hour recurrence interval, that is 297.4mm of rainfall within a 24 hour time period.

***"dry weather"** means less than ten millimetres of rain falling within a 24 hour period.*

Discharges of contaminated stormwater from the ponds following a 1:10 year 24 hour storm event (297.4mm of rainfall within a 24 hour time period) or greater do not constitute a breach of this licence.

L1.3 There must be no discharge of leachate to waters under dry weather conditions or storm event(s) of less than 1:25 year 24 hour recurrence interval, that is 371.5mm of rainfall within a 24 hour time period.

***"dry weather"** means less than ten millimetres of rain falling within a 24 hour period.*

Discharges of leachate from the leachate pond following a 1:25year 24 hour storm event (371.5mm of rainfall within a 24 hour time period) or greater do not constitute a breach of this licence.

O7.1 Drainage from areas not subject to waste disposal activities must be directed away from the existing leachate collection pond(s).

O7.2 Disturbed areas must be provided with separate water quality controls for the treatment of runoff containing suspended or turbid pollutants.

The DECC has outlined guidelines for surface water, erosion and sediment control at waste landfills in DECC (2008).

Objectives

The objectives of surface water controls are to:

- prevent unacceptable sediment loads in receiving waters;
- Prevent any surface water mixing with waste;
- Prevent erosion of cover material and/or waste; and
- Avoid generation of excessive leachate.

Management strategy

The following terminology is adopted for surface water categories;

- "clean" stormwater: runoff from areas of the site where soil and vegetation have not been disturbed or vegetation has been established is considered to be 'clean'.
- "dirty" stormwater: runoff from areas of the site where soils have been disturbed and are likely to generate sediment are considered to be "dirty", including areas of intermediate cover or areas of final capping that have not yet been vegetated; and
- "leachate": comprises runoff from areas of waste or daily cover material as well as leachate generated by the landfill.

Existing

Control and management of "clean" stormwater

Run-on into the site is minimal due to the site being bounded by ridgelines.

Runoff from the western ridge is diverted offsite via a culvert under Reddalls Road to Dapto Creek.

Runoff entering the Western Gully Landfill from the western ridge area combines with the "dirty" stormwater system.

Runoff from the woodland to east of the Eastern Gully Landfill area either combines with the "dirty" stormwater system or is diverted around the Eastern Gully Landfill in a diversion drain, which subsequently discharges into the "dirty" stormwater system.

Runoff from the vegetated ridge to the north of the Western Gully Landfill currently discharges through the depression between the eastern and the Western Gully Landfill and combines with the "dirty" stormwater flow.

Control and management of "dirty" stormwater

Surface water runoff from the Western Gully and Eastern Gully Landfills is captured by swale drains on the landfill surface. The swale drains divert the runoff towards drains around the perimeter of the landfills and a central drain located between the Eastern Gully and Western Gully Landfills. Runoff from the natural slope above the northern edge of the Eastern Gully Landfill is also directed to the central drain. Runoff from the western ridge is directed offsite and discharges to Dapto Creek via a culvert under Reddalls Road.

All surface water flows are directed into the surface water treatment system, which comprises a series of surface water ponds approved in 2003. The system is located in the south west corner of the site and comprises two reed beds (reed beds 1 and 2) and an upper and lower surface water polishing pond. The

total capacity of the surface water treatment system is 40,000 cu.m. The design of the ponds is provided in the Forbes Rigby (2003) design drawings and provided in Appendix B. Discharge from the ponds is to Dapto Creek.

Control and management of leachate water

Surface water which falls within an active cell, whether it is covered with daily cover or exposed waste, is considered leachate and is directed to the leachate management system from where it is diverted to the leachate treatment plant.

Leachate is collected from the Eastern Gully and Western Gully Landfills at collection points at each landfill toe. The collected leachate is piped to the leachate ponds (primary and secondary leachate pond). The leachate ponds are 18,000 cum capacity plus 300 mm freeboard. Leachate is pumped from the ponds to the onsite leachate treatment plant. The leachate treatment plant is a sequencing batch reactor technology.

The leachate ponds and leachate treatment plant are monitored daily. Discharge from the leachate treatment plant is monitored in general accordance with the trade waste agreement.

Future works

The surface water management controls would be progressively developed as the landfilling areas are developed. A drainage philosophy has been designed based on the construction staging of the landfill cells and offsite discharge constraints. As increasing areas of the landfill are covered and revegetated with time, clean runoff from the landfill surface as well as clean run-on will be separated from dirty stormwater and discharged off site without treatment directly to Dapto Creek. Dirty surface water will be directed to the surface water ponds. The existing surface water ponds (2 reed beds and polishing ponds) will be used up to the completion of stage 3 of the new landfill cell. Between stage 3 and 4 the volume of the existing surface water ponds can be reduced to the footprint of just the polishing pond due to the 60% catchment reduction and used as the new surface water pond. This will allow for the relocation of the leachate ponds to the footprint of the 2 existing reed beds. The leachate ponds will be relocated prior to construction of stage 4. The reduced surface water pond will remain in place for the stage 4 works. A plan outlining surface water management during the development of the site is shown in drawing D051 in the Preliminary Design Drawings (refer Appendix I). Detailed designs will be undertaken with consideration of chapter e14 of Wollongong DCP 2009 and latest version of the Blue Book volume 1 and volume 2b. The following summarises the staged approach.

Stage 1 and stage 2a:

The drainage philosophy up to the completion of stage 2a is to discharge the whole 50 ha catchment to the existing sediment pond. The “Whytes Gully landfill leachate management study” (Forbes Rigby, 2002) and the “Whytes Gully landfill surface water and leachate management plan 2008” (RIENCO consulting)” reports (refer Appendix E) indicate, and Golder have verified, that there is sufficient capacity in the existing surface water management system for the whole 50 ha catchment.

Detailed design of stage 1a drainage is presented in the Detailed Design Report in Appendix I.

A minor existing discharge offsite from the western ridge would be maintained.

Stage 2b:

After completion of stage 2b the Eastern Gully would become fully capped and therefore surface runoff would become ‘clean’ runoff. During stage 2b a new ‘clean’ drain can be constructed to bypass the sediment pond and discharge directly to the Dapto Creek outfall. This drain would be constructed between the existing leachate treatment plant and the surface water ponds. On completion of stage 2b, approximately 24 ha will discharge directly to Dapto Creek and 26 ha to the existing sediment pond.

Stage 3:

On completion of stage 3, approximately 30 ha will be discharged directly to Dapto Creek and 20 ha to the existing sediment pond. Due to the extent of the stage 4 works the existing leachate ponds will require

relocating towards the end of stage 3. At this stage it is proposed that the leachate pond is relocated to the footprint of the two reed bed ponds and downsize the existing surface water pond. The downsizing of the surface water pond at this stage is possible due to approximately 60 percent of the original 50 ha catchment now discharging directly to the Dapto Creek outfall.

Stage 4:

The downsized surface water pond is designed for a 20 ha catchment. The clean 30 ha catchment would discharge unrestricted to the Dapto Creek outfall. The surface water pond would be made up of sediment pond and onsite surface water detention pond. The outflow from the pond to the Dapto Creek outfall would be restricted to meet discharge constraints and the resultant attenuated runoff detained within the surface water pond.

Cap drainage and perimeter drain

Benching and drop structures would be implemented and constructed into the formation of the landfill cells to reduce the runoff velocities and prevent scouring and sediment migration on the landfill cap. The design of the landform will include positive grades in all areas, batters (4h:1v), cell top (5 percent), and bench (3 to 5 percent cross fall), to collect and convey runoff generated from rainfall on the cell.

The cell design includes a perimeter drainage swale, which serves to collect and convey runoff water from cap drainage.

Erosion control

Erosion control works are required for all works where the possibility for soil erosion exists and are used to control and minimise erosion and sedimentation. Erosion control measures employed at the site incorporate the following:

- Reducing the area of exposed soil including recently constructed sections of the landfill;
- Diverting clean run on away from disturbed areas;
- Reducing the length and steepness of slopes;
- Rehabilitating capped areas in the timely manner;
- Applying sediment control measures to intercept and retain sediment on site (e.g. drains around perimeter and sedimentation ponds);
- Applying sediment control measures to topsoil stockpiles to preserve topsoil for capping;
- An inspection maintenance and cleaning program for control structures to maintain capacity and integrity;
- Wheel wash facilities would be at site egress points, to prevent the tracking of mud or loose sediment off site; and
- Using designated access roads and paths where possible.

Where required, erosion and sediment control measures implemented will be consistent with the requirements of the latest version of the Blue Book volume 1 and volume 2b. Specific erosion and sediment control plans to manage construction works packages fall under the project's construction environmental management plan.

Actions for compliance

- Separate "clean" and "dirty" stormwater collection systems and discharge "clean" stormwater off site.
- Vegetate all drains

- Repair bare areas or areas showing surface erosion.

Performance indicators

- Quantity of sediment in sediment control structures;
- Level of maintenance to sediment control measures;
- Construction of surface water management features in accordance with indicative construction specification (refer Detailed Design Report Appendix I).
- Visual inspection of the control systems; and
- Results of the ongoing monitoring of surface water.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Inspection of surface water reed beds and surface water polishing ponds	Quarterly and after rainfall events	March, June, September, December
Inspection of storm water diversion drains	Quarterly and after rainfall events	March, June, September, December
Surface water monitoring	Refer Section 7.3	Refer Section 7.3

Responsible party

- Operations Administrator.
- Waste Coordinator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Maintain and repair sediment control structures when required (clean out sediment when surface water ponds reach capacity, clean out table drains etc. to maintain capacity).
- Repair of bare areas or areas showing surface erosion.

7.2.4 Control and management of leachate

Leachate is deemed to include all water that has come into contact with waste. A range of appropriate measures would be implemented to minimise, contain, collect and dispose of leachate generated during landfilling at the site. All practicable measures would be undertaken to minimise the volume of leachate generated at the site, including:

- Diverting upstream, clean stormwater runoff around the landfilling operation, where able;
- Staging the landfilling operation, to minimise the active footprint of the landfill;
- Minimising exposed areas at the active landfilling area by regular covering of the landfilled waste;
- Grading filled areas to direct surface water runoff away from the active waste landfilling area;
- Applying intermediate cover on all areas of the landfill that are left inactive for periods greater than 90 days; and

- Progressive capping and rehabilitation of landfilled areas.

Existing

Leachate is collected in leachate collection systems in the eastern and Western Gully Landfills. The leachate is piped to the leachate ponds the leachate treatment system at the site currently incorporates aeration and biological treatment with the primary and secondary leachate ponds and subsequent treatment in the leachate treatment plant using sequencing batch reactor technology. Leachate is discharged to sewer in accordance with the site trade waste agreement as described in Section 7.6. The leachate treatment plant as well as the leachate ponds are inspected and monitored on a daily basis.

Future

It is proposed to retain the existing leachate treatment system in place until the end of the first year of stage 1 (end of 2014) of the project.

During the first year of the Project it is proposed there would be significant works undertaken at the Whytes Gully RRP site including operational changes that are expected to significantly impact and reduce the leachate generation rates. These include capping and reprofiling the existing Eastern Gully Landfill batter (considered to be a significant source of infiltration and stormwater contribution to the leachate collected at the site) in addition to capping of the current landfilling area and commencement of the piggy back liner in stage 1.

Additionally, Sydney Water may in this time develop firm upgrade plans for the sewer along Reddalls Road and consider an increased discharge limit to sewer for the Project site.

Wollongong City Council would log and review the resultant leachate generation volumes and rainfall amounts during 2014 and reassess the water balance model assumptions for infiltration rates and continue to liaise with Sydney Water on timing for sewer capacity upgrade and quantify and assess the need to upgrade the leachate treatment plant.

The following contingency actions for leachate storage and/or treatment are considered feasible, and could be implemented in a short period of time at the Project site if necessary:

- Discharge to sewer directly from the leachate storage ponds during periods of low ammonia concentrations to increase leachate storage capacity (this approach is known to be acceptable to Sydney Water and has been implemented successfully in the past year).
- Leachate reinjection over short-term into new waste proposed for the new cell through surface application across the daily cover area (10 000 m^2);
- Trucking of leachate to sewage treatment plant for disposal;
- ‘package’ plants: proprietary package treatment plants are available that can be mobilised to the Whytes Gully RRP site should increased leachate treatment capabilities be temporarily required;
- Until the end of stage 1 store excess leachate in the former surface water pond at the toe of the western gully, or construct a new leachate overflow storage pond in the cell 2 or cell 3 area;
- Upgrade the existing leachate treatment plant to increase volume throughput and/or efficiency of treatment process/new technologies; and
- Construct a cover over the existing leachate ponds to reduce the effects of direct rainfall.

Actions for compliance

- Separate “clean” and “dirty” stormwater collection systems and discharge “clean” stormwater off site.
- separate “dirty” stormwater and leachate water flows.

Performance indicators

- Quantity of sediment in sediment control structures;
- Level of maintenance to sediment control measures;
- Visual inspection of the control systems; and
- Results of the ongoing monitoring of surface water.

Responsible party

- Operations Administrator.
- Waste Coordinator.

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Surface water monitoring	Refer Section 7.3	Refer Section 7.3
Inspection of integrity of leachate ponds	Quarterly	March, June, September, December
Groundwater monitoring around leachate ponds	Refer Section 7.3	Refer Section 7.3
Monitor leachate pond levels and LTP operation	Daily	Daily
Sampling discharge from LTP	Refer Section 7.6	Refer Section 7.6
Maintenance of leachate management system	Monthly	End of month

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Maintain and repair sediment control structures when required (clean out sediment when surface water ponds reach capacity, clean out table drains etc. to maintain capacity).
- Review leachate storage system capacity (leachate water balance) and surface water diversion measures within active cells.

7.3 Detecting water pollution

The following management techniques will be applied for early detection of surface water and groundwater pollution:

- Groundwater monitoring network.
- Groundwater monitoring program.Surface water monitoring program.
- Leachate monitoring program.
- Annual review of water monitoring.
- Groundwater assessment program.

7.3.1 Groundwater monitoring network

Requirements

The EPL specifies monitoring of surface water points 1, 33 and 34 and ground water monitoring points 2, 5 through 20, for the analytes and at the sampling frequencies outlined in Table 11.

Benchmark technique 4 for groundwater monitoring network in the EPA (1996) Landfill Guidelines provides technical guidance regarding the construction of groundwater monitoring wells. The groundwater monitoring network must allow for the collection of representative samples of groundwater. It is therefore important that wells comprising the monitoring network are:

- Strategically located to maximise the opportunity for intercepting any discharge from the landfill; and
- Constructed appropriately to ensure sample representativeness.

Objectives

A groundwater monitoring network is necessary to demonstrate that there is limited potential for migration of hazardous constituents from a solid waste landfill to the surrounding groundwater, during the active life of the landfill and the post-closure care period. The wells employed for a groundwater network should be strategically located, to maximise the opportunity for intercepting groundwater flow onto the site as well as any discharge from the landfill site.

Management strategy

Groundwater monitoring wells are being monitored on a quarterly frequency. Refer Figure 12 for groundwater monitoring locations.

Well installation locations were selected to provide long term monitoring locations that are unlikely to require relocation or decommissioning during construction of the new landfill cells (based on the current proposed development footprint). A summary of the wells is provided in Table 11 below.

Table 11: Well installation locations and rationale

Well id	Location	Unit screened	Rationale
GMW101	North of Western Gully Landfill	Shallow rock	Upgradient data coverage
GMW102	Northwest of Western Gully Landfill	Shallow rock	Upgradient data coverage
GMW103	Northeast of active cell (Eastern Gully Landfill)	Shallow rock	Upgradient coverage - boundary
GMW104	West of Western Gully Landfill	Shallow rock	Cross-gradient coverage - boundary
GMW105	East of active cell (Eastern Gully Landfill), eastern ridge	Shallow rock	Cross-gradient coverage
GMW106	Southeast of Eastern Gully Landfill	Shallow rock	Cross/downgradient coverage
GMW108s	South of future cells (east of weigh station)	Alluvials	Downgradient coverage
GMW108d	South of future cells (east of weigh station)	Shallow rock	Downgradient coverage
GMW109s	Southwest corner of property	Alluvials	Downgradient coverage - boundary
GMW109d	Southwest corner of property	Shallow rock	Downgradient coverage - boundary
GMW110	West of proposed leachate pond	Shallow rock	Downgradient coverage - boundary
GMW111	West of proposed new cells	Shallow rock	Downgradient coverage - boundary
GABH01	Within proposed cell footprint	Shallow rock	New cell footprint coverage
GABH02	Within proposed cell footprint	Shallow rock	New cell footprint coverage

Well id	Location	Unit screened	Rationale
GABH03	Within proposed cell footprint	Shallow rock	New cell footprint coverage
GABH06s	Within proposed cell footprint	Alluvials	New cell footprint coverage
GABH06d	Within proposed cell footprint	Shallow rock	New cell footprint coverage

At each location, one well was installed into shallow weathered rock to provide site-wide coverage of this shallow groundwater system. In addition, three locations (GMW108, GMW109 and GABH06) were completed as paired wells with an additional shallow well completed in the alluvial/ colluvial soil profile overlying the shallow rock.

Based on initial rounds of monitoring completed in 2011, a groundwater contour map for the site has been created and is shown in Figure 16.

Borelogs and monitoring well construction logs are presented in Appendix J.

Actions for compliance

- Install monitoring locations in accordance with objectives to set out in benchmark technique 4.

Performance indicators

- The groundwater monitoring network will be constructed in accordance with the well locations and rationale.
- Groundwater monitoring results provide information to meet the objectives for network coverage.

Inspection, monitoring and maintenance schedule

- Review suitability of monitoring network to meet objectives annually during annual review of water monitoring (refer Section 7.3.5).

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Install modifications required as identified in the annual review of water monitoring (refer Section 7.3.5).

7.3.2 Groundwater Monitoring Program

Requirements

Benchmark technique 5 for groundwater monitoring program in the EPA (1996) Landfill Guidelines provide recommended groundwater indicator parameters and respective detection limits. Sampling on a quarterly basis is recommended and detailed sampling and quality assurance/ quality control methodologies are also provided in the Landfill Guidelines.

Condition 18 (e) of the Project Approval requires a combined surface on groundwater monitoring program to gain an understanding of surface and groundwater interaction and potential for any impacts of the Project and the downstream environment including GDEs and Dapto Creek.

Objectives

The objective of the groundwater monitoring program is to effectively monitor and report groundwater character, and ensure early detection and reporting of possible pollution of groundwater.

Management strategy

The following monitoring program is being undertaken in order to provide a robust baseline dataset of groundwater quality. This monitoring program should be reviewed following completion of the first two rounds and again after the completion of an annual quarterly monitoring cycle to optimise the program based on the observations from the baseline data set (i.e. reduce the frequency and analytical suite to focus on groundwater quality indicators identified as being of relevance to the site).

The following suites of analytes are considered for the proposed monitoring regime:

- General water quality parameters:
  - Field water quality suite (temperature, pH, EC, ORP and DO);
  - Cations and anions (calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, speciated alkalinity);
- Leachate indicator suite:
  - Nitrate, nitrite, ammonia, total kjeldahl nitrogen (TKN);
  - Biochemical oxygen demand (BOD);
  - Total organic carbon (TOC);
- Metals and metalloids (aluminium, arsenic, cadmium, chromium, copper, iron, manganese, mercury, nickel, lead and zinc);
- Organic suite - limited (for quarterly monitoring):
  - TPH;
  - Benzene, toluene, ethylbenzene and xylenes (BTEX) + naphthalene;
- Organic suite - extended (for annual monitoring):
  - TPH;
  - VOCs (includes BTEX); and
  - SVOCs (includes PAHs, pesticides, speciated phenols and PCBs).

A proposed monitoring frequency is provided in Table 12. Observations to date indicate that some of the organic analytical suites are unlikely to be relevant for ongoing monitoring once the baseline dataset has been established, and would be culled with regard to future monitoring. Appendix K provides the baseline data assessment report (June 2013) submitted for the 2013 EPL review.

In addition, the nominated wells may be modified if new wells are installed, or if a revision to the number of monitoring locations can be rationalised following review of the monitoring results.

Table 12: Groundwater monitoring program for baseline water quality assessment

Well no.	EPA id no.	General water quality suite	Leachate indicator suite	Metals and metalloids	Organic suite - limited	Organic suite - extended	Rationale for location
GMW101		Quarterly	Quarterly	Annually	Quarterly	Annually	Upgradient data coverage
GMW102	9	Quarterly	Quarterly	Annually	Quarterly	Annually	Upgradient data coverage

Well no.	EPA id no.	General water quality suite	Leachate indicator suite	Metals and metalloids	Organic suite - limited	Organic suite - extended	Rationale for location
GMW103	10	Quarterly	Quarterly	Annually	Quarterly	Annually	Upgradient coverage - boundary
GMW104	11	Quarterly	Quarterly	Annually	Quarterly	Annually	Cross-gradient coverage - boundary
GMW105	12	Quarterly	Quarterly	Annually	Quarterly	Annually	Cross-gradient coverage
GMW106	13	Quarterly	Quarterly	Annually	Quarterly	Annually	Cross/downgradient coverage
GMW108s	14	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage
GMW108d	15	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage
GMW109s	16	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage - boundary
GMW109d	19	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage - boundary
GMW110	17	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage - boundary
GMW111	18	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage - boundary
GABH01	2	Quarterly	Quarterly	Annually	Quarterly	Annually	New cell footprint coverage
GABH02	5	Quarterly	Quarterly	Annually	Quarterly	Annually	New cell footprint coverage
GABH03	6	Quarterly	Quarterly	Annually	Quarterly	Annually	New cell footprint coverage
GABH06s	8	Quarterly	Quarterly	Annually	Quarterly	Annually	New cell footprint coverage
GABH06d	7	Quarterly	Quarterly	Annually	Quarterly	Annually	New cell footprint coverage
Bh6^	20	Quarterly	Quarterly	Annually	Quarterly	Annually	Downgradient coverage - boundary

Note: ^the 2009/10 annual monitoring report describes BH6 as being installed by WCC. BH6 lithology is assumed to be that of BH3 “new entry gate” WCC reference w9872, installed by WCC in March 2009. The location and measured depth of BH6 (from 2009/10 annual monitoring report, GHD 2010) are consistent with the bore report and location for BH3.

Actions for compliance

- Undertake groundwater monitoring as scheduled in management strategy.

Performance indicators

- Quarterly and annual data obtained from groundwater monitoring network.

Inspection, monitoring and maintenance schedule

- Review suitability of monitoring program to meet objectives annually during annual review of water monitoring (refer Section 7.3.5).

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Implement modifications required as identified in the annual review of water monitoring (refer Section 7.3.5).

7.3.3 Surface Water Monitoring Program

Requirements

The EPL specifies monitoring of surface water monitoring points 1, 33 and 34 annually and during overflow.

Benchmark technique 7 for surface water monitoring program in the EPA (1996) Landfill Guidelines require establishment of surveyed monitoring points, to be sampled on a quarterly basis for the recommended groundwater indicator parameters.

Condition 18 (e) of the Project Approval requires a combined surface on groundwater monitoring program to gain an understanding of surface and groundwater interaction and potential for any impacts of the Project and the downstream environment including GDEs and Dapto Creek.

Objectives

The objective of the surface water monitoring program is to effectively monitor and report surface water character, and ensure early detection and reporting of possible pollution of surface water.

Management strategy

Six surface water monitoring locations are currently being monitored quarterly to provide a baseline data set for the site for the analytes outlined below. Refer Figure 13 for monitoring locations. As with the groundwater monitoring program these locations and analytes may be rationalised after completion of 1 annual cycle of monitoring (refer also Appendix K).

- Field suite (temperature, pH, electrical conductivity, dissolved oxygen, oxidation reduction potential);
- General water quality (TDS, TSS);
- Cations and anions (calcium, magnesium, sodium, potassium, chloride, sulphate, fluoride, alkalinity);
- Total metals and metalloids (aluminium, arsenic, cadmium, chromium, copper, iron, manganese, mercury, nickel, lead and zinc) (unfiltered samples);
- Nitrate, ammonia, total kjeldahl nitrogen (TKN);
- Total petroleum hydrocarbons (TPH);
- Volatile organic compounds (VOCs);
- Polycyclic aromatic hydrocarbons (PAHs);
- Total phenolics;
- Biochemical oxygen demand (BOD); and
- Total organic carbon (TOC).

Actions for compliance

- Undertake surface water monitoring as scheduled in management strategy.

Performance indicators

- Quarterly data obtained from surface water monitoring network.

Inspection, monitoring and maintenance schedule

- Review suitability of monitoring program to meet objectives annually during annual review of water monitoring (refer Section 7.3.5).

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Implement modifications required as identified in the annual review of water monitoring (refer Section 7.3.5).

7.3.4 Leachate Monitoring Program

Requirements

Condition m6.2 of the EPL specifies that *'the licensee must make available to the EPA the results of monthly trade waste monitoring of leachate and include these results in the annual report.'*

Benchmark technique 8 for leachate monitoring program in the EPA (1996) Landfill Guidelines require initial characterisation testing of leachate with additional quarterly or batch testing of a representative samples.

Objectives

The objective of the leachate monitoring program is to chemically characterise the leachate to allow assessment of the potential environmental harm and impacts.

Management strategy

The leachate monitoring currently comprises monitoring of flow volume and regular chemical analysis for leachate treatment plant operation and analysis of treated leachate in accordance with the site trade waste agreement as outlined in Section 7.6.

One leachate monitoring location was monitored quarterly to provide information for the baseline data set for the site for the analytes outlined in Section 7.3.2. Refer Figure 4 for monitoring location. As with the groundwater monitoring program, these locations and analytes were rationalised following completion of 1 annual cycle of monitoring, as discussed in the baseline data assessment report in Appendix K.

Actions for compliance

- Undertake leachate monitoring as scheduled in management strategy.

Performance indicators

- Data collected in accordance with management strategy.

Inspection, monitoring and maintenance schedule

- Review suitability of monitoring program to meet objectives annually during annual review of water monitoring (refer Section 7.3.5).

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).
- Trade waste reporting (refer Section 7.6).

Corrective actions

- Implement modifications required as identified in the annual review of water monitoring (refer Section 7.3.5).

7.3.5 Annual Review of Water Monitoring

Requirements

Schedule 4, condition 18 of the Project Approval requires a combined surface and groundwater monitoring program to gain an understanding of surface and groundwater interaction and potential for any impacts of the Project and the downstream environment including GDEs (Lake Illawarra) and Dapto Creek. Condition 18 (e) specifically requires reporting of results of water monitoring to NOW and other relevant government agencies every 12 months.

Objectives

The program for monitoring of waters is suitable for monitoring groundwater flows onto the site and detection of offsite impacts to groundwater or surface water.

Management strategy

A review of water monitoring results will be undertaken annually in order to assess potential impacts on downstream environments. The review will include assessment of monitoring results under leachate, ground water and surface water monitoring programs. The review will be undertaken to assess results against relevant ANZECC guidelines, baseline data and upgradient water quality. The outcome of a review may include the requirement to prepare a groundwater assessment program to further assess specific issues identified (refer Section 7.4).

The monitoring programs will also be reviewed on an annual basis as required to ensure they appropriately reflect site conditions and activities.

Actions for compliance

- Undertake annual review of water monitoring.

Performance indicators

- Review documented in Annual Report.

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Modify groundwater monitoring network
- Modify groundwater monitoring program
- Modify surface water monitoring program
- Modify leachate monitoring program

- Undertake a groundwater assessment program (refer Section 7.4)

7.4 Groundwater Assessment Program

Requirements

The Landfill Guidelines benchmark technique number 6 requires a groundwater assessment program if groundwater monitoring detects a possible failure of the leachate containment system.

Objectives

The objective of the groundwater assessment program is to set procedures in place if the groundwater monitoring program detects a possible failure of the leachate containment system and potential adverse effect on downstream sensitive receptors.

Management strategy, tasks and actions

Groundwater will be monitored and background concentrations will be established for all analytes. If a significant change in concentration for any of the indicator parameters is detected over two consecutive monitoring periods, then the affected groundwater monitoring bores will be resampled as soon as possible. Statistical comparisons of key indicator parameters may be required to identify statistically significant evidence of contamination between key indicator parameters.

A risk based perspective will be taken in evaluating monitoring results potential impact on sensitive receptors.

If the anomaly is verified by resampling, the EPA will be notified by telephone and in writing within 14 days of verification of the increase in the groundwater indicator contaminants (refer Section11.2).

Within 28 days of the notification, Council will prepare a groundwater assessment plan for submission to EPA. A copy of the groundwater assessment plan will also be provided to NSW office of water (now).

The groundwater assessment plan will include:

- Identification of the specific contaminants and extent of the pollution to the groundwater;
- An assessment of whether further monitoring or investigation is required;
- A list of proposed analytes (including justification); and
- A monitoring program for sampling the wells and/ or installing further wells.

Any information obtained during this assessment will be used to prepare the water contamination remediation plan (refer Section 5.3).

Performance indicators

- Groundwater, surface water and leachate monitoring analytical results.
- ANZECC water quality guidelines 2000 values for protection of 95% of species in a marine/ freshwater environment and background water quality.

Inspection monitoring and maintenance schedule

Action	Frequency	Timing
Groundwater assessment program	When significant increases in indicator concentrations in groundwater occur	As required
Surface water monitoring	Annually and during overflow	March, June, September, December

Groundwater monitoring	Quarterly	March, June, September, December
Leachate monitoring	Monthly and during overflow	March, June, September, December

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Development of a water contamination remediation plan (refer Section 7.5).

7.5 Water Contamination Remediation Plan

Requirements

There are no specific conditions relating to the water contamination remediation plan in the licence.

The Landfill Guidelines benchmark technique 9 calls for development and implementation of a groundwater contamination remediation plan if contamination to groundwater is confirmed by the groundwater assessment program.

Schedule 4, condition 18 of the Project Approval requires a mitigation plan to address potential impacts of the Project on the downstream environment. The mitigation plan is referred to as the water contamination remediation plan for the purposes of this LEMP.

Objectives

The objective of the water contamination remediation plan is to describe the process to protect the water from further contamination and nominate a means to return the water to the original quality down hydraulic gradient of the landfill.

Management strategy

Water contamination remediation plans are developed on an individual basis dependent on the nature and degree of contamination detected. Rather than include a plan for any groundwater or surface water contingency, it is more important to define the concept and highlight responsibilities and likely actions. The specific plan can then be developed to suit the event.

Groundwater contingency plans

The need to develop a groundwater contingency plan will flow from the groundwater assessment program (Section 7.3.5). The assessment program will define the nature and general extent of contamination.

A remediation plan will utilise the information obtained in the assessment program. There will need to be a formal determination if sufficient information was obtained in that assessment. Should a groundwater specialist determine that there are data gaps, it will be necessary to fill these before developing the plan.

Data gaps for groundwater contamination may include insufficient mapping of the extent of contamination. In order to improve this situation it may be necessary to drill a larger number of monitoring locations in the zone that contamination was discovered.

There are three general options for controlling groundwater contamination in an aquifer. These options include:

- Installation of groundwater extraction wells;
- Installation of interception trenches; and
- Use of bentonite slurry to encapsulate and contain the contaminants.

Groundwater extraction wells and interception trenches would be the primary means for controlling the movement of contaminants in most plausible incidents at the site.

The contaminants would need to be treated at the surface following extraction prior to discharge. The treatment system would be dependent on the nature of contamination and allowable discharge limits. It may be necessary for Council to engage specialist engineers to design and test a treatment plant to control the contamination.

Surface water contingency plan

Surface water monitoring or visual observations may indicate the need to control surface water discharges to the environment. If monitoring results indicate that the limit concentrations have been breached, it will be necessary to establish the cause for that violation.

Determining the source will require the development of a plan. This plan may require sampling and testing from the point of the violation and moving upstream until a source can be located. Once the source has been identified, Council will be able to isolate the source and develop plans to control the discharge. The discharge may be contained by mechanical means or by restricting the flow off-site.

Once the action has been taken to contain the pollution, Council will prepare a report for EPA detailing the nature and source of contamination and the actions put in place to prevent recurrence.

Performance indicators

Performance indicators for contingency plans would be the amount of time following determination that successful control actions are established. The time will be a function of the severity of the incident and the nature of the controls. Successful control can be assessed from the results of ongoing monitoring.

Responsible party

- Operations Administrator

Reporting

Specific contingency plans and reporting activities are not required until uncontrolled release of pollutants have been identified. Reporting will be necessary to demonstrate to EPA that the situation is under control. Contingency plans would also be provided to now.

7.6 Trade Waste Agreement

Requirements

The Trade Waste Agreement (TWA) number 11205 specifies substances and daily masses as well as maximum daily volumes that Council is allowed to discharge to sewer, in particular discharges from the leachate treatment plant at the WGRRP. The TWA also specifies sampling and reporting requirements.

Objectives

The objective of the TWA is to ensure that Council discharges leachate from the WGRRP within the daily masses and volumes allowed by Sydney Water.

Management strategy, tasks and actions

The main management tasks and actions comprise sampling and reporting in accordance with the TWA. For detailed requirements, the current TWA should be referred to. The requirements of Sydney Water's published analytical methods shall be followed for all sampling and analysis. Some of the key management

tasks and action items relating to the TWA are summarised in the sections below. Refer Appendix A for TWA.

Performance indicators

- Number of events where a sample has not been collected;
- Number of events where the specified concentrations or load limits have been exceeded;
- Number of events where the reporting requirements of the TWA were not complied with; and
- The charges for trade wastewater discharge paid by Council to Sydney Water.

Responsible party

- Waste Services Manager;
- Operations Administrator.

Inspection, monitoring and maintenance schedule

- Sampling will occur at a point specified by Sydney Water;
- Sampling will occur over a full production day by combining equal volumes taken at 30 minute intervals;
- Sampling will occur on 7 May 2010 and every eight days thereafter;
- Discrete samples will be collected at the start and finish of each sample day and shall be analysed for pH;
- Composite samples will be analysed for:
  - Ammonia as n;
  - Biochemical oxygen demand;
  - Suspended solids;
  - Total dissolved solids;
- The flow meter shall be accessible to Sydney Water for inspection.

Reporting

- Results of analytical testing must be submitted to Sydney Water within 21 days of sampling;
- The results of the trade waste sampling shall be summarised in the Annual Report;
- Sydney Water must be notified in writing within seven days of:
  - Any failure to obtain samples;
  - Any loss of analytical data; and
  - Any failure in the discharge flow meter.

Corrective actions

- If sampling and reporting requirements are not met on a regular basis, reasons for this failure will be investigated and a more revised sampling procedure will be implemented; and

- If concentrations and load limits are not achieved on a regular basis, the performance of the leachate treatment plant will be investigated.

8.0 AIR QUALITY MANAGEMENT

For the purposes of addressing the requirements of Condition 29 Air Quality Management Plan of the Project Approval, Air Quality is addressed in this LEMP under sections 8.0 for Landfill Gas, and 9.6 for Odour.

8.1 Introduction

The environmental goals for air quality management are:

- Preventing landfill gas emissions;
- Detecting landfill gas emissions; and
- Remediating landfill gas emissions.

8.2 Preventing Air Pollution

The management techniques used to control landfill gas emissions are:

- Landfill gas containment system;
- Extraction and disposal of landfill gas;
- Fire prevention;
- Controlled burning of waste; and
- Site closure.

8.2.1 Landfill Gas Containment System

Requirements

There are no specific conditions relating to landfill gas containment in the licence. The Landfill Guidelines recommend that landfill gas should be contained by a combination of the leachate barrier system, site capping and revegetation and covering of waste.

Objectives

The objective of the landfill gas containment system is to minimise emissions of landfill gas through the surface of the landfill in order to minimise greenhouse gas emissions, odours and emissions of airborne impurities, pathogens and toxins that may pose a health risk to the community.

Management strategy

The site adopts a strategy for day to day management of landfill gas emissions via a combination of the leachate barrier system and covering of wastes, discussed in sections 7.2.1 and 6.5 respectively. In the long term, landfill gas containment is achieved by site capping and revegetation. Site capping and revegetation is discussed in Section 10.2.

Performance indicators

- Results of landfill gas monitoring (refer Section 8.3)
- Identification of odours.

Inspection monitoring and maintenance schedule

Action item	Frequency	Timing
Odour observations	**Continuous**	**Continuous**
Landfill gas monitoring	Refer Section 8.3	Refer Section 8.3

Responsible person

- Waste Services Manager

Reporting

- Complaint reporting (Section 4.3)

Corrective actions

- Section 8.4 identifies the actions to be undertaken if the monitoring results indicate the presence of landfill gas.

8.2.2 Landfill Gas Extraction/ Disposal

Requirements

There are no specific conditions relating to landfill gas extraction/ disposal in the licence. The Landfill Guidelines recommend installation of an appropriate landfill gas extraction and disposal system should perimeter wells or on-site structures show methane at concentrations above 1.25 percent (v/v) (25% of the LEL) (benchmark technique number 11).

Objectives

The objectives of extraction and disposal of landfill gas are to:

- Reduce the risk of explosion and fire;
- Reduce the contribution to greenhouse gases; and
- Lower the level of toxic organic compounds emitted from the landfill.

Management strategy

Current

There is currently no landfill gas extraction at the site. Although historically landfill gas extraction was adopted at the site in both the western and eastern gullies, this was decommissioned in 2004.

Future

Modelling of landfill gas (LFG) emissions undertaken in accordance with the *national greenhouse and energy reporting system measurement - technical guidelines for the estimation of greenhouse gas emissions from facilities in Australia*, department of climate change and energy efficiency, July 2011, predicts a significant volume of LFG generation from within both the existing landfill and the proposed new landfill cell as a result of the project. Modelling methodology and results are presented in chapter 11 and Appendix E of the EA based on 50 percent capture flaring and LFG combustion, which are considered feasible at the Whytes Gully RRP site.

The existing landfill is estimated to run out of air space during 2014 and as such the construction of the Project is required to commence in 2013. Therefore, the management of LFG within the existing landfill waste is required prior to the construction of proposed new landfill cells in late 2013. Wollongong City Council plan to implement landfill gas extraction at the site according to the following phased approach:

- Phase 1: revitalise existing LFG collection system on western gully, install additional vertical gas wells and commission a flare.
- Phase 2: install vertical gas wells within the Eastern Gully and prepare for construction of piggyback liner.

- Phase 3: collection of LFG from new landfill cells including the installation of sacrificial horizontal gas wells (initially) followed by vertical gas wells.

In addition to active gas extraction, gas collection layers are incorporated into the piggy back liner and the cap (refer Section 7.2.1 and Section 10.2).

The design of the piggyback lining system will accommodate the continuing operation of vertical gas wells in the existing waste that will be installed in phase 1 and phase 2, with potential design features described in the Preliminary Design Report (Appendix I). It is noted, however, that the need to continue extraction from these wells would depend on the quantum of future gas generation expected at the time of piggy back lining construction, and there would be less need to preserve phase 1 (western gully) wells due to the advanced age of the existing waste at the time of piggy back lining. The design of the piggyback lining system will also include gas collection vents beneath the lining to reduce the risk of increased lateral gas migration developing after lining construction.

Performance indicators

- Results of landfill gas monitoring (refer Section 8.3)

Inspection monitoring and maintenance schedule

- Landfill gas monitoring (refer Section 8.3)

Responsible person

- Waste Services Manager.

Reporting

- Complaint reporting (refer Section 4.3)

Corrective actions

- Section 8.4 identifies the actions to be undertaken if the monitoring results indicate the presence of landfill gas.

8.2.3 Fire Prevention

Requirements

The EPL outlines the following requirements for prevention and recording of fires.

O4 emergency response

O4.1 the licensee must extinguish fires at the premises as soon as possible.

R4 other reporting conditions

R4.1 The licensee must maintain a daily log and record the following data of fires at the site:

(a) time and date when the fire was deliberately started or reported.

(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 ceased and whether it burnt out or was extinguished.

(d) the location of fire (eg. Clean timber stockpile, putrescible garbage cell, etc.).

(e) prevailing weather conditions.

(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.

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

L3.3 Tyres stockpiled on the premises must:

(d) be managed to prevent any tyres from catching fire.

Objectives

The objectives of fire prevention are to minimise emissions to the atmosphere and to increase the level of safety on site.

Management strategy, tasks and actions

Landfill and vehicle fires

The following control measures will be addressed to prevent fires, as a minimum:

- Burning is not permitted on site.
- Good compaction procedures are undertaken to reduce void spaces that would encourage fires
- Signs will be on display to the public advising that hazardous or liquid wastes are not permitted on the site. This will be reinforced by advice to customers at the gatehouse and inspection of loads at the tip face.
- Stockpiles of approved amounts of combustibles for recycling and composting (such as tyres, wood or vegetation) will be divided into small piles or windrows so that any burning material can be kept away from or readily separated from additional fuel. The amount of tyres stored on site at any time will be limited to less than 50 tonnes.
- Cell construction, compaction and use of cover material will be undertaken in a manner conducive to the prevention of a landfill fire.
- All sealed or contaminated drums will be banned from landfill unless they are delivered as a special waste whose contents are clearly identified and suitable for acceptance.
- All fuels or flammable solvents for operational use will be stored in an appropriately ventilated and secure store. Waste oil will be stored within a bund of 110% capacity of the volume of those flammable liquids so that any release of raw or burning fuel will not cause a fire in the filled waste, or impact on stormwater.
- Stockpiles of combustibles, fuels and flammable solvents stored will be inspected once per quarter for fire risk.
- Any fire occurring on site will be investigated and the causes, damage and impact will be fully documented.
- Fighting of fires will be undertaken in accordance with the firefighting procedure (Appendix H)

Bushfires

The following control measures will be addressed for bushfire protection:

Asset protection zone

i) An asset protection zone (APZ) of 10 m should be maintained around existing site buildings.

Firebreak

i) A perimeter firebreak cleared of all vegetation is to be established around the entire site (roads and access tracks may be utilised to form the fire break). Reddalls Road may be considered to serve this purpose provided access to the site is maintained. Where a road is utilised it must be constructed to comply with AS 2890.2 – 2002. (The remnant lowland dry subtropical rainforest and moist box redgum foothills forest vegetation associations are to be protected).

ii) The firebreak is to be 5 m wide and is to be constructed by an approved method or combination of methods (ploughing, cultivating, scarifying, raking, burning, chemical spraying) so as to remove flammable matter within that 5 metre wide firebreak to a height of 5 metres.

iii) The firebreak is to be inspected monthly and maintained clear by physical or herbicide removal of weeds and plant material including litter.

iv) A firebreak 5 m wide is to be maintained around temporary site buildings during construction of the new cells or site infrastructure.

Access

i) Roads (or fire trails) must be maintained to provide safe access and egress and defendable space for emergency services.

ii) A secondary site access and egress should be maintained such as the site road adjacent to Glengarry Cottage.

iii) Fire hydrant outlets at the site are to be maintained clear of vegetation so as to facilitate unrestricted access.

Fuel reduction

i) Planted trees that are retained on the site are to have the lower branches trimmed (cut off) to a height of **2 m** above the ground. (The remnant lowland dry subtropical rainforest and moist box redgum foothills forest vegetation associations are to be protected and are not subject to this requirement). The tree trimming works may be staged with priority given to the protection of assets and fuel load reduction adjacent to roads.

ii) The canopy of any tree retained at the site is to be not less than **10 m** from any building, where this separation distance cannot be achieved by trimming branches consideration is to be given to the removal of the tree. Advice may be sought on a case by case basis taking into consideration the building construction, location and purpose.

iii) A vegetation management plan

iv) (including weed management) should ensure that grass cover on landfill cells is kept mowed or slashed so as not to exceed a fuel load of 2 t/ha. It is preferable that slashed or mown material is removed (this can be mulched on site). Weeds are to be managed at the site by a control program to ensure that they do not constitute a fire hazard. Lantana (and any Weeds of National Significance (WONS)) is to be removed.

v) Wind-blown litter is to be controlled as outlined in Section 9.3.

vi) Roadside vegetation adjacent to internal site access roads is to be slashed or mown for at least a distance of 1 m up slope and 4 m down slope and maintained cleared during the declared bushfire season.

Landscaping

i) The site vegetation (landscaping) should not exceed a fuel load of 2 t/ha.

ii) Tree planting within 20 m of buildings should be minimal and vegetation screening should be avoided.

iii) Trees planted within 20 m of a building should be spaced so as to ensure that crowns are no closer than 10 m apart.

iv) Trees planted must be more than 10 m away from a building at their closest point when mature i.e. crown no closer than 10 m when mature.

v) Tall shrubs are not to be planted in clumps within close proximity of a building.

vi) Landscaping plants used close to a building (within 20 m) should be low in profile.

vii) Coarse or inorganic mulch should be utilised and moisture should be retained by irrigation.

viii) The overall canopy cover within 20 m of a building should be no more than 15%.

Controlled burning

There will be no controlled burning at the site.

Performance indicators

- Results of landfill gas monitoring (refer Section 8.3).
- Identification of odours.
- The number of fires occurring on site.

Inspection monitoring and maintenance schedule

Action item	Frequency	Timing
Odour observations	Continuous	Continuous
Landfill gas monitoring	Refer Section 8.3	Refer Section 8.3
Stockpiles of combustibles, fuels and flammable solvents stored inspected for fire risk	Quarterly	March, June, Sept, Dec
Bushfire maintenance inspection	Annually and during bushfire season	Prior to bushfire season.

Responsible party

- Waste Coordinator.
- Leading Hand.

Reporting

- Annual Report (refer Section 11.5).
- The occurrence of fires constitutes an incident. Incident reporting (refer Section 11.2).

Corrective actions

- The cause of any fire will be determined and appropriate work practices will be put in place to reduce the occurrence.
- An investigation into volumes and appropriate disposal methods of landfill gas may be necessary if gas monitoring indicates a build-up of gas/gas migration.
- Section 8.4 identifies the actions to be undertaken if the monitoring results indicate the presence of landfill gas.

8.3 Detecting Air Pollution

The following management techniques will be applied for detecting air pollution:

- Subsurface gas monitoring wells;
- Subsurface gas monitoring program;
- Surface gas emission monitoring; and
- Gas accumulation monitoring.

8.3.1 Subsurface Gas Monitoring

Requirements

The following licence conditions relate to subsurface gas monitoring at the WGRRP:

"M2.2 Air Monitoring Requirements

POINT 21,22,23,24,25,26,27,28,29,30,31,32

Pollutant	***Units of measure***	***Frequency***	***Sampling Method***
Methane	*Percent by volume*	*Special Frequency 2*	*Special Method 3*

Note: Special Frequency 2 means monthly if an initial survey indicates significant gas.

Note: Special Method 3 means in accordance with subsurface gas monitoring procedures described in Benchmark 16 of the Environmental Guidelines: Solid Waste Landfills."

The EPA NSW (EPA NSW 1996) Landfill Guidelines benchmark technique number 15 provides technical guidance regarding the construction of subsurface gas monitoring devices and monitoring of subsurface landfill gas concentrations.

Current best practice guidance for design of landfill gas monitoring bore systems is provided in the Victorian Landfill Guidelines (EPA Vic 2010) (BPEM). The guidelines provide guidance on the location of monitoring bores. The guidelines give further guidance for monitoring bore depth, bore construction design and bore construction CQA.

Objectives

The objective of subsurface gas monitoring wells is to be capable of detecting migration of landfill gas offsite.

Management strategy, tasks and actions

The nearest developments to the landfill are the homestead to the north west of the site (distance of approximately 50 m from the edge of the landfill) and the homestead to the north east of the site (distance of approximately 170 from the edge of the landfill.

The geology of the site has been classified as sandstone in most areas (Golder 2011a) and while not many large fractures were observed, staining on some fractures indicates that gas flow may be fissure or fracture flow-dominated. An area to the south of the landfill between GABH03 and GMW107 is dominated by a uniform low-permeability stratum (clay).

The subsurface landfill gas monitoring system proposed for the site is shown in Figure 14 and comprises 37 monitoring bores (LFGMW01 through to LFGMW37). The spacing of the wells has been determined with consideration of the BPEM guideline. If considered suitable, some groundwater monitoring wells which are located near proposed gas monitoring wells, may be used as dual purpose water monitoring and gas monitoring wells.

The installation of the landfill gas monitoring bores would be staged, with the first stage of development concentrating on areas where landfilling of waste currently occurs and where the largest risk to residents may exist.

Wells to be installed initially are located along the eastern boundary of the landfill LFGMW01 through to LFGMW12). The monitoring system would be expanded as the active tipping face moves towards the west. However, installation along the north western boundary of the site will be a priority as this is the area closest to the nearest residence (LFGMW20 through to LFGMW31).

All monitoring bores will be installed to the top of groundwater levels as required by the NSW EPA Landfill Guidelines (NSW EPA 1996) and will be constructed in accordance with the requirements of the Victorian EPA guidelines (Vic EPA 2010), which are outlined in the following table.

Table 13: Typical construction details for landfill gas bore construction

Component	Value
Drilled bore diameter (mm)	100 – 150
Pipework casing diameter outer diameter (mm)	50
Pipework casing size of perforations (mm)	3-5
Depth of top bentonite seal (m)	1
Length of solid casing below ground level (m)*	1
Perforated casing pipe work (% open space)	10-0
Size range of gravel backfill (mm)	5-0
Gravel type	Gravel to be rounded to sub rounded, and noncalcareous (< 5%)

The EPA (1996) Landfill Guidelines benchmark technique 16 recommends monitoring of landfill gas on a quarterly frequency.

Monitoring of landfill gas will be carried out in accordance with the requirements of the Victorian EPA guidelines for monitoring of fugitive landfill gas emissions (Vic EPA 2011). Sampling of each monitoring well will be taken using a calibrated and appropriately maintained landfill gas monitor and the compounds tested will include methane (% v/v), carbon dioxide (% v/v), oxygen (% v/v), hydrogen sulphide (ppm) and carbon monoxide (ppm).

Actions for compliance

- Staged installation of gas monitoring wells.
- Conduct monitoring at a frequency in accordance with Benchmark 16 and Condition M2.2 of the EPL.

Performance indicators

- Data collected and reviewed in accordance with management strategy.
- Perimeter wells are not to have gas concentrations exceeding 1.25% methane (v/v) (EPA, 1996).

Inspection monitoring and maintenance schedule

Review suitability of monitoring program to meet objectives annually during annual review of landfill gas monitoring (refer Section 8.3.4).

Action item	Frequency	Timing
Subsurface gas monitoring	Quarterly	March, June, Sept, Dec

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section11.5).
- The detection of methane concentrations above 1.25% v/v during the subsurface monitoring constitutes an incident. Refer incident reporting (refer Section 11.2). If the concentration of methane is detected at greater than 1.25% (v/v), EPA will be notified within 24 hours. A written assessment of the emissions and management controls implemented, or proposed to be implemented to prevent further emissions, will be provided to EPA within 14 days of the incident.

Corrective actions

- Remediation of uncontrolled landfill gas emissions (refer Section 8.4) is required if methane at concentrations greater than 1.25% (v/v) is detected in monitoring wells.
- If the methane concentration exceeds 1.25% (v/v) within monitoring wells, an increase in testing frequency to monthly, weekly or daily will be required depending on the outcome of a risk assessment. The risk assessment will be carried out in accordance with Ciria C665 (Ciria 2007) and will comprise measurement of flow in monitoring wells.

8.3.2 Surface Gas Monitoring

Requirements

The following licence conditions relate to surface gas emission monitoring at the WGRRP:

M2.2 Air monitoring requirements

EPA ID no.	*Parameter*	*Description of location*	*Frequency*	*Method*
3	*Methane % v/v*	*Areas where intermediate or final cover has been placed*	*Special Frequency 2*	*Special Method 1*

Note: Special Frequency 2 means monthly if an initial survey indicates significant gas.

Note: Special Method 1 means in accordance with surface gas monitoring procedures described in Benchmark 17 of the Environmental Guidelines: Solid Waste Landfills."

R2.3 The licensee must notify the EPA within 24 hours in accordance with condition R2.1 if surface monitoring detects methane above 1.25% (v/v), and increase the frequency of monitoring to daily, until the EPA determines otherwise.

The EPA (1996) Landfill Guidelines benchmark technique number 17 provides technical guidance regarding the methodology for monitoring surface gas.

Objectives

The objective of surface gas emission monitoring is to demonstrate that the landfill cover material, capping and/or the gas extraction system are effective in controlling the emission of landfill gas. Monitoring the surface of the landfill should locate any point sources or fissures that may be emitting landfill gas.

Management strategy, tasks and actions

- Surface gas monitoring is conducted in accordance with the licence conditions listed above.
- Surface gas monitoring is undertaken on a quarterly basis. Monitoring on the surface is undertaken in a series of transverses over the landfilled areas spaced at 25 m intervals.

- Surface gas monitoring is undertaken in accordance with industry standard environmental monitoring procedures.

Actions for compliance

- If the concentration exceeds 500 ppm (v/v) of methane at any point on the landfill surface, corrective action is necessary. This action will include, but may not be limited to:
  - Repairing or replacing cover material; and
  - Adjusting or installing gas venting/extraction equipment.

Performance indicators

- Data collected and reviewed in accordance with management strategy.
- Threshold concentration for potential action for surface gas monitoring is 500 ppm methane (v/v) or 1% LEL. Threshold concentration for incident reporting is 1.25%v/v.

Inspection monitoring and maintenance schedule

Review suitability of monitoring program to meet objectives annually during annual review of landfill gas monitoring (refer Section 8.3.4).

Action item	Frequency	Timing
Surface gas monitoring	Quarterly	March, June, Sept, Dec

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section11.5).
- The detection of methane concentrations above 1.25% v/v during the surface monitoring constitutes an incident. Refer incident reporting (refer Section 11.2). If the concentration of methane is detected at greater than 1.25% (v/v), EPA will be notified within 24 hours. A written assessment of the emissions and management controls implemented, or proposed to be implemented to prevent further emissions, will be provided to EPA within 14 days of the incident.

Corrective actions

- If the concentration exceeds 500 ppm (v/v) of methane at any point on the landfill surface, corrective action is necessary. This action will include, but may not be limited to:
  - Repairing or replacing cover material; and
  - Adjusting or installing gas venting/extraction equipment.

8.3.3 Gas Accumulation Monitoring Program

Requirements

M2.2 Air monitoring requirements

EPA ID no.	*Parameter*	*Description of location*	*Frequency*	*Method*
4	*Methane*	*Inside all buildings within 250m of deposited waste*	*Special Frequency 2*	*Special Method 2*

EPA ID no.	Parameter	Description of location	Frequency	Method
	% v/v			

Note: Special Frequency 2 means monthly if an initial survey indicates significant gas.

Note: Special Method 2 means in accordance with gas accumulation monitoring procedures described in Benchmark 18 of the Environmental Guidelines: Solid Waste Landfills.

Objectives

The objective of gas accumulation monitoring is to monitor gas build up which may have the potential for explosion. In addition monitoring for methane in buildings is intended to protect human health. Methane is both an asphyxiant and explosive and can accumulate in buildings, particularly if they were constructed over landfilled materials.

Management strategy, tasks and actions

- Gas accumulation monitoring is conducted in accordance with the licence conditions.
- Gas accumulation monitoring is undertaken on a quarterly frequency. Monitoring for methane is conducted in all site buildings within 250 m of waste filled areas (refer Figure 14).
- Council currently undertake gas accumulation monitoring in all buildings within 250 m of waste filled areas. This radius encompasses non Council owned buildings.
- Gas accumulation monitoring is undertaken in accordance with the industry standard environmental monitoring procedures.
- If any surface structures or buildings are planned to be built within 250 m of deposited waste, they will be designed so as not to accumulate methane gas.

Performance indicators

- Data collected and reviewed in accordance with management strategy.
- Buildings are not to have gas concentrations exceeding 1.25% methane (v/v) (EPA, 1996).

Responsible party

- Waste Coordinator

Inspection, monitoring and maintenance schedule

Review suitability of monitoring program to meet objectives annually during annual review of landfill gas monitoring (refer Section 8.3.4).

Action item	Frequency	Timing
Building gas accumulation monitoring	Quarterly	March, June, Sept, Dec

Reporting

- Annual Report (refer Section11.5).
- The detection of methane concentrations above 1.25% v/v during the subsurface, surface or building accumulation monitoring constitutes an incident. Refer incident reporting (refer Section 11.2). If the

concentration of methane is detected at greater than 1.25% (v/v), EPA will be notified within 24 hours. A written assessment of the emissions and management controls implemented, or proposed to be implemented to prevent further emissions, will be provided to EPA within 14 days of the incident.

Corrective actions

- Remediation of uncontrolled landfill gas emissions (refer Section 8.4) is required if methane at concentrations greater than 1.25% (v/v) is detected in on-site structures.
- If the methane concentration exceeds 1.25% (v/v) within buildings, daily testing will be undertaken until ventilation or other measures control the methane build up.

8.3.4 Annual Review of Landfill Gas Monitoring

Requirements

Condition 29 Schedule 4 of the Project Approval requires that an Air Quality Management Plan includes an air quality monitoring program that evaluates and reports on the effectiveness of the air quality management system.

Objectives

The program for monitoring of landfill gas is suitable for monitoring landfill gas emissions to the environment.

Management strategy

A review of water monitoring results will be undertaken annually in order to assess potential impacts on safety or the environment. The review will include assessment of monitoring results under subsurface, surface and building accumulation monitoring programs. The review will be undertaken to assess results against relevant EPA guidelines. The outcome of a review may include the requirement to prepare a remediation action plan to further assess or action specific issues identified (refer Section 8.4).

The monitoring programs will also be reviewed on an annual basis as required to ensure they appropriately reflect site conditions and activities.

Actions for compliance

- Undertake annual review of landfill gas monitoring.

Performance indicators

- Review documented in Annual Report.

Responsible party

- Operations Administrator.

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Modify subsurface landfill gas monitoring network
- Modify surface landfill gas monitoring program
- Modify building accumulation monitoring program
- Undertake a remediation of uncontrolled landfill gas emissions (refer Section 8.4).

8.4 Remediation of Uncontrolled Landfill Gas Emissions

Requirements

There are no specific conditions relating to the remediation of uncontrolled landfill gas emissions in the licence. EPA has established monitoring thresholds that, if exceeded, require remedial actions. EPA thresholds are (benchmark technique number 17 and benchmark technique number 19):

1) Methane at concentrations greater than 1.25% (v/v) in sub-surface wells or in on-site structures, and greater than 0.05% (v/v) on the surface;

2) A one hour oxidised nitrogen (NO_x) average level above 320 µg/m^3 from electricity generating equipment; and

3) Non methane organic compounds (NMOC) destruction efficiency in the gas combustion equipment lower than 98%.

For the site only the first of these thresholds is currently relevant.

Objectives

The purpose of remediating uncontrolled landfill gas emissions is to prevent further emissions from occurring.

Management strategy

EPA must be notified within 24 hours of any landfill gas detection above the 1.25% (v/v).

A written assessment of the emissions and management controls implemented or proposed to prevent further emissions will be provided to EPA within 14 days of the incident.

Management controls to remediate uncontrolled landfill gas emissions are developed on an individual basis dependent on the nature and degree of emissions detected. Rather than include a plan for any landfill gas contingency, it is more important to define the concept and highlight responsibilities and likely actions. The specific plan can then be developed to suit the event, if required.

Surface gas emissions

Corrective actions in the event of excessive landfill gas emissions from the landfill surface may include:

- A review of waste screening procedures to ensure unacceptable waste is not being accepted at the site;
- Providing a thicker cover or changing the material used as cover, such as use of materials with greater cohesive properties; and/or
- Installation of passive or gas extraction wells within the waste mass; and/or
- Installation of perimeter gas collection trenches.

If these measures are not successful in controlling gaseous emissions, an assessment will be made as to the need to adopt engineering solutions.

Subsurface landfill gas

Should the monitoring program demonstrate lateral migration of landfill gas through soil or rock, the extent of the lateral migration will be established by increased monitoring and installation of additional monitoring wells, if required. Contingency measures will be developed on a risk basis using Ciria C665 (Ciria 2007) and may include:

- Increased monitoring;
- Extraction bores;

- Subsurface extraction drains; or
- Subsurface cutoff walls.

Building accumulation

Should the monitoring program demonstrate that corrective actions are necessary these may take the form of improving the ventilation within the buildings, continuous methane measurements or, in the short term, evacuation.

Performance indicators

- The results of monitoring are the key indicators for determining the effectiveness of the remediation.

Responsible party

- Waste Coordinator

Reporting

- Specific contingency plans and reporting activities are not necessary until uncontrolled release of pollutants have been identified. Review and reporting will be necessary to demonstrate that the situation is under control.

8.5 Greenhouse Gas Management Plan

Requirements

Condition 30, schedule 4 of the Project Approval requires:

"The proponent must develop and implement a greenhouse gas management plan prior to the commencement of operation of the new landfill cells. This plan must include, as a minimum:

(a) Final details of the landfill gas management system including flaring and/or combustion to reduce potential greenhouse gas emissions from the landfill;
(b) Energy saving measures to be implemented; and
(c) Include a program to monitor the effectiveness of these measures, and a protocol to periodically review the plan.

This plan must be documented in the landfill EMP.

Objectives

The objectives of greenhouse gas management at the site is to reduce emissions to a level which is as low as is practicable to ensure potential GHG emissions from the Project are adequately addressed in the site operation stage.

Management strategy

Greenhouse gas reduction measures:

- Ensure the design of landfill facilitates methane capture and conversion facilities (refer Section 8.2).
- Capture and flaring of landfill gas (refer Section 8.2.2).
- Encapsulation of waste and use of cover materials to reduce uncontrolled emissions to atmosphere (refer Section 8.2.1).
- Completion of a site-wide inventory of methane emissions and maintain records of landfill methane emissions reductions.

- Identify and document methods for calculating or determining greenhouse gas emissions from site operations and establish complementary or appropriate monitoring regimes (includes measures under Section 8.3).
- Regular maintenance of vehicles/equipment.
- Ongoing community education program in recycling and diversion of waste from landfill (refer Appendix P).

Energy savings measures:

- Assess the site's energy profile and usage patterns and use this as the basis for identifying opportunities for reducing energy consumption and costs.

Performance indicators

- Greenhouse gas emissions reduced or avoided.
- Energy savings from opportunities identified.

Responsible party

- Waste Coordinator

Reporting

- Prepare an annual action plan and progress report, focusing on ways of reducing both emissions and operating costs. Refer Section 11.5.

9.0 Hazards and Loss of Amenity

9.1 Introduction

The environmental goals of avoidance of hazards and loss of amenity are:

- Preventing unauthorised entry;
- Preventing degradation of local amenity;
- Preventing noise pollution;
- Firefighting capacity; and
- Staffing and training.

Also included in this Section is the flood emergency and evacuation plan to meet the requirements of schedule 4 condition 16 of the Project Approval (refer Appendix A).

9.2 Security of site

Requirements

The following licence conditions (EPL 5862) relate to the security of the site:

O5 Processes and management

O5.1 The licensee must take all practicable steps to control entry to the premises.

O5.2 The licensee must ensure that all gates are locked whenever the landfill is unattended.

Objectives

The objective of the security at the site is to prevent unauthorised entry at the facility. Unauthorised entry to landfills can lead to waste dumping, fires and vandalism of pollution control devices, as well as loss of amenity.

Management strategy

- The landfill site is bounded by a security fence along the perimeter of the site. In the north east of the site, the fence is partially located on a neighbouring property due to topographical constraints on the site.
- The main access gate is locked outside of business hours, whilst other gates on the boundary are permanently locked and opened only when access is required by authorised vehicles.
- The main access gate and the weighbridge building are alarmed outside business hours.

End of day closure and security procedures are outlined in Appendix H.

Performance indicators

- Number of intruders found.
- Any waste illegally disposed.
- Number of complaints with regard to access to the depot.
- Number of reports detailing damage or vandalism.
- Weekly inspections of the perimeter fence conditions.

Responsible party

- Waste Coordinator
- Leading Hand

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Perimeter inspection of fence condition	Weekly	End of week

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Repairs which are necessary will be undertaken promptly to ensure security.
- Segregation of dumped waste from approved waste.
- Notification to EPA that illegal dumping has breached site security (refer Section11.2).
- Evaluate the nature of the problem, determine its source and implement actions to prevent recurrence.

9.3 Litter Control

Requirements

There are no specific conditions relating to the litter control in the licence. The EPA (1996) Landfill Guidelines (benchmark technique 31) state that local amenity should not be degraded by litter. The specific requirements of benchmark technique 31 comprise:

- *The occupier should introduce procedures that prevent the unnecessary proliferation of litter. Such procedures might include continuous compaction and use of litter fences, and the occupier is responsible for ensuring that all wind-blown litter that leaves the site is retrieved.*
- *All litter fences, perimeter fences and gates should be inspected daily and cleared of litter on a daily basis or as required.*
- *Entry and exit signs need to advise transport operators that they can be fined for any litter on public roads resulting from their improper transportation of waste.*
- *All litter that leaves the site should be retrieved on a daily basis.*

Objectives

The objective of litter control at the site is to prevent degradation of local amenity by litter. Windblown litter is a nuisance to the community in the vicinity of landfill sites.

Management strategy

Generation of litter is primarily through wind movement of litter which has not yet been covered. To minimise this:

- The active land filling operation will have a combination of daily cover and landfill lids applied to the surface at the end of each working day and intermediate cover applied to the surface of each finalised lift.

- A litter fence is located at the perimeter of the landfill around the northern, eastern and western side of the active filling area.
- Local litter fences are used immediately around the tip face.
- Load covering signs are located along the site access road.
- Personnel are employed specifically to collect litter at the perimeter
- Inspection and clearing of the litter fence, perimeter fence and surrounding areas.
- The litter fences are repaired or replaced as required.
- Tip face orientation in high winds particularly during the windy months.

Actions for compliance

- Litter fences are currently inspected and cleared from litter on a weekly basis. The Landfill Guidelines require inspection and clearing daily.

Performance indicators

- Number of complaints received regarding litter escape.
- Quantity of litter and refuse found in nearby land and waterways.

Responsible party

- Waste Coordinator
- Leading Hand

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Litter fence, perimeter fence and surrounding roadsides inspection/ litter retrieval	Daily or as required depending on the extent of litter produced	Afternoon

Reporting

- Annual (refer Section 11.5).

Corrective actions

The corrective actions that may be employed if litter is observed or reported to be a nuisance include:

- Collection and removal of the litter; and
- Review litter control measures including open loads should be covered, compact and cover the waste more frequently during the day, confine dumping to a reduced surface area.

9.4 Dust Control

Requirements

The following licence conditions (EPL 5862) relate to dust control at the WGRRP:

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.

The following requirements of schedule 4 of the Project Approval relate to dust:

Dust criteria

24. The proponent shall ensure that dust generated by the project does not exceed the criteria listed in tables 2 to 4 at any private residential receiver, or on more than 25 percent of any privately owned land surrounding the site.

Table 2: long term criteria for particulate matter

Pollutant	Averaging	[D]criterion
Total suspended particulate (TSP) matter	Annual	[A]90 µg/m^3
Particulate matter < 10 µm (PM10)	Annual	[A]30 µg/m^3

Table 3: short term criterion for particulate matter

Pollutant	Averaging	[D]criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[A]50 µg/m^3

Table 4: long term criteria for deposited dust

Pollutant	Averaging	Maximum increase in deposited dust level	Maximum total[1] deposited dust level
[C]Deposited dust	Annual	[B]2 g/m^2/month	[A]4 g/m^2/month

Notes for tables 2 -4:

- *[A] total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources);*
- *[B] incremental impact (i.e. incremental increase in concentrations due to the development on its own);*
- *[C] deposited dust is to be assessed as insoluble solids as defined by standards Australia, AS/NZS 3580.10.1:2003: methods for sampling and analysis of ambient air - determination of particulate matter - deposited matter - gravimetric method; and*
- *[D] excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agree to by the Director-General in consultation with the EPA.*

Objectives

The objectives of dust controls are to:

- Minimise pollutants leaving the site as airborne dust;
- Reduce stormwater sediment load; and
- Protect local amenity.

Management strategy

Emissions causing a reduction in air quality can originate from the land filling operations, including cell construction, liner preparation, dumping and compaction, capping, vehicle traffic and machinery used in land filling.

Dust emissions are more likely to occur in the warmer months, especially during windy days. The magnitude of the impact will depend upon the type and size of the land filling operation, prevailing wind speed and direction, adjacent land use and the occurrence of natural and/or constructed wind breaks, wind abatement measures or buffers.

The management strategy for dust control at the WGRRP comprises:

- Unsealed trafficable areas and stockpiles are watered on a regular basis.
- Internal roads are sealed to within approximately 100 m of the tip face. The access road to the tip face is covered with breckets (a gravelly slag product).
- Plant operating at the tip face is not entering other areas of the landfill to prevent access roads from becoming impacted by dirt.
- Site roads are frequently cleaned with a water cart if found to be impacted by dirt.
- Revegetate capped areas as soon as possible after forming.
- Revegetate stockpiles that will not be used for some time.
- Reduce vehicular speeds on site to reduce dust.
- Mechanical plant and equipment are properly serviced and maintained in an efficient operating condition.
- Restricting the size of disturbed areas as much as practicable.
- Prevention of truck over-loading and covering dusty loads.
- Washing down trucks before they leave the site.
- Temporarily suspending operations under extreme wind speed conditions.
- Plant and equipment are fitted with appropriate pollution control devices.

Dust is to be monitored visually to ensure immediate response with mitigation.

Performance indicators

- The number of complaints by affected clients, visitors and nearby residents regarding dust.
- The dust deposition rate of 4g/m^2 per month (as an annual mean for total solids) will not be exceeded outside the site boundary (EPA, 1996).

Responsible party

- Waste Coordinator
- Operations Administrator

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Visual dust observations	Daily	Continuous
Particulate matter monitoring (PM_{10} and TSP)	Monthly	End of month
Deposited dust monitoring	Monthly	End of month

Reporting

- Annual Report (refer Section 11.5).
- Dust complaints reporting is undertaken in accordance with Section 4.3.

Corrective actions

- If dust is observed or reported control measures will be undertaken to reduce/mitigate dust generation (see tasks and actions) such as increase the frequency of water spray applied at the site.
- Increased revegetation of covered areas can also be considered to prevent dust generation.

9.5 Pest, Vermin and Noxious Weed Control

Requirements

The following licence conditions (EPL 5862) relate to control of pests and vermin at the WGRRP:

L3.3 Tyres stockpiled on the premises must:

(c) be managed to control vermin;

The EPA (1996) Landfill Guidelines (benchmark technique 35) state that pests, vermin and noxious weeds should not be present at the site in sufficient numbers to pose an environmental hazard or loss of amenity in the areas neighbouring the site.

The specific requirements of benchmark technique 35 comprise:

- *Waste should be compacted and covered, keeping the amount of exposed waste to a minimum. Additional effort may be required for loads containing large amounts of highly biodegradable wastes.*
- *The landfill occupier should take steps to ensure that surfaces are adequately drained to prevent ponds of water forming on the site.*
- *If alternative cover materials or systems (see 33. Covering of waste) are used, occupiers should specify the method by which they will quantitatively monitor changes in vermin population as a result of the new cover.*
- *A plan to manage pests, vermin and declared noxious weeds should be developed and detailed in the LEMP*.

Objectives

The objective of pest controls is to minimise the impact of vermin and noxious weeds on the surrounding environment.

Management strategy

- Rodenticide bait stations at various locations will be continued to control the black rat.
- Deer culling occurs on the site on a regular basis.
- Fox baiting occurs on site occasionally as part of a regional fox baiting program.
- Insecticides and pesticides will be used when necessary.
- Ensure the area of tipping face is minimised and covered regularly to limit food sources and breeding areas.

- Surfaces will be free draining to prevent ponded water.
- Weeds will be managed at the site by a control program to ensure that they do not constitute a fire hazard in accordance with the bushfire mitigation measures. Lantana (and any WONS) is to be removed.

Actions for compliance

- A weed management strategy shall be developed.

Performance indicators

- Number of complaints about pests/vermin/noxious weeds on site and from local nearby residents about pests/vermin moving off site.
- Number of pests/vermin found by pest control contractor.
- Amount of infestation of noxious weeds.

Responsible party

- Waste Coordinator
- Operations Administrator

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Visual observation for when pest/ vermin/ weed species Seem to be increasing	Daily	Continuous
Bait stations for vermin	Monthly	End of month
Noxious weed survey by site staff	Quarterly	March, June, Sept, Dec
Trapping programs	As required	As required

Reporting

- Annual Report (refer Section 11.5).

Corrective actions

- Increase number of bait stations and trapping if vermin numbers rise.
- Increase frequency of weed eradication if monitoring indicates spread of weeds.
- Deterrence programs for seagulls, ibis, pelicans and other birds have been carried out unsuccessfully by the NSW Parks and Wildlife Services. Birds continue to be a nuisance at the site.

9.6 Odour Control

Requirements

The following licence conditions (EPL 5862) relate to odour control at the WGRRP:

> ***L4 Potentially offensive odour***
>
> *L4.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.*

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

The EPA (1996) Landfill Guidelines (benchmark technique 36) state that landfills should have no odour impact and that a buffer zone to residents should be considered to minimise the odour impact.

Condition 23 of the Project Approval relates to odour:

> *23. The Proponent shall ensure the project does not cause or permit the emission of any offensive odour (as defined by the POEO Act).*

The POEO Act defines 'offensive odour' as:

an odour:

> *(a) that, by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstances:*
>
> > *(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*
> >
> > *(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*
>
> *(b) that is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations.*

Objectives

The objective of odour control at the site is to prevent degradation of local amenity by odour.

Management strategy

- Good covering procedures to keep the amount of exposed waste to a minimum (refer Section 6.5).
- Fast identification and attention to odorous waste loads
- Identification and management of odorous loads
- Avoid a queue of the incoming or outgoing trucks for extended periods of time
- Spill management procedures to include immediate clean-up of any spill/leakage from the incoming and outgoing trucks
- Maintaining a complaint logbook and in the event of a complaint immediately investigate any unusual odour sources (including spill or leakage in the traffic areas) within the site boundary and take appropriate action to eliminate these (refer Section 11.2); and
- Consider using a thicker cover, of up to 300 mm during stages of landfilling closer to residences.
- Odour management during construction activities is detailed in the project CEMP.

Performance indicators

- Number of complaints by affected clients, visitors and nearby residents regarding odour

Responsible party

- Waste Coordinator

- Leading Hand

Reporting

- Odour complaint reporting is undertaken in accordance with Section 4.3. These will be correlated with prevailing weather conditions and waste reception circumstances.

Corrective actions

- The first step following receipt of an odour complaint is to correlate this with weather conditions and deliveries of particularly odorous wastes. If these are identified as the cause, remedial actions which could be undertaken include increasing the thickness of the cover.
- If weather conditions and specific waste loads are not the indicated source of the odour complaints, a site walkover will be held to identify any potential areas that have experienced changed conditions that could cause the excessive odour.
- In addition to the site walkover, odour monitoring will be conducted on adjacent properties.
- If the source of the odour complaint is identified as poor control of landfill gas, corrective actions detailed in Section 8.4 will be considered.

9.7 Noise control

Requirements

The licence conditions (EPL 5862) do not provide noise limits.

The EPA (1996) Landfill Guidelines (benchmark technique 37) outline requirements for management of noise.

Schedule 4 condition 34 of the Project Approval requires a noise management plan to be prepared and implemented prior to commencement of construction and to be documented in the LEMP and CEMP.

The plan was submitted to and approved by the Director-General prior to commencement of construction. The plan is provided in Appendix M along with the letter from the Director-General approving the plan.

Objectives

As outlined in the EPA (1996) Landfill Guidelines (benchmark technique 37), noise generation during the operation of the facility should be managed to meet the following objectives:

- Noise from any single source does not intrude generally above the prevailing background noise level; and
- The background noise level does not exceed the level appropriate for the particular locality and land use.

Management strategy

- Mechanical plant and equipment will be maintained regularly.
- All contractors onsite shall make a commitment to minimise the levels of noise from their activities.
- The operating hours of the landfill are limited in accordance with approved times.

Actions for compliance

- Noise attenuation devices should be installed on all equipment on site.

Performance indicators

- Number of complaints by affected clients, visitors and nearby residents regarding noise.
- Noise criteria as outlined in the environmental assessment (Golder, 2012).

Responsible party

- Waste Coordinator
- Leading Hand

Reporting

- Noise complaint reporting is undertaken in accordance with Section 4.3. This will be correlated with noise related activities on the site.

Corrective actions

- A comprehensive review of operations and practices will be performed if excessive numbers of complaints about noise occur, or noise levels are in excess of performance indicator. Solutions aimed at attenuating any noise nuisance may include measures such as the use of residential grade exhaust silencers and acoustic engine enclosures.

9.8 Traffic control

Requirements

There are no specific requirements relating to traffic control in the licence or the Landfill Guidelines.

Objectives

The objective of traffic control at the site is to ensure the safety of clients, visitors and staff at the WGRRP.

Management strategy

- Signposting of slow speed limits.
- Allocation of separate areas for truck usage versus cars/ trailers/ Ute where possible.
- Signposting of colour coded access routes to disposal areas for dump trucks, commercial users, small vehicle customers and recyclable drop off customers.

Performance indicators

- Number of accidents or incidents involving vehicular traffic.

Responsible party

- Waste Coordinator
- Leading Hand

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Traffic flow	Continuous	Continuous

Corrective actions

- If traffic incidents commonly occur at the site, the traffic management should be reviewed. This may include construction of speed humps or stricter enforcement and signposting of speed limits if speeding is a significant problem.

9.9 Firefighting capacity

Requirements

The following licence conditions (EPL 5862) relate to fire control at the WGRRP:

O4 Emergency response

O4.1 The licensee must extinguish fires at the premises as soon as possible.

R4 other reporting conditions

R4.1 The licensee must maintain a daily log and record the following data of fires at the site:

(a) time and date when the fire was deliberately started or reported.

(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 ceased and whether it burnt out or was extinguished.

(d) the location of fire (eg. Clean timber stockpile, putrescible garbage cell, etc.).

(e) prevailing weather conditions.

(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.

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

L3.3 Tyres stockpiled on the premises must:

(d) be managed to prevent any tyres from catching fire.

The EPA (1996) Landfill Guidelines (benchmark technique 38) recommend that landfill operators have the ability to adequately fight fires at any part of the landfill site.

Objectives

The primary environmental objective for this aspect is to ensure that the site occupiers have the ability to adequately manage the fighting of fires at any part of the landfill site.

Management strategy

- All plant, including contract plant on site, must have an appropriate classification fire extinguisher in their cabin.
- Fire extinguishers of appropriate classification are to be located in a prominent position in the gatehouse.
- All extinguishers are to be current and checked monthly by site personnel and annually by external subcontractor.
- All staff are to be familiar with the operations of fire extinguishers.

- Select landfill staff are trained in firefighting techniques and a site specific fire management plan/procedure has been devised (refer firefighting procedure in Appendix H).
- In the event of fire, the Waste Coordinator and employees will ensure the safety of personnel and visitors on site.
- In the event of fire, the entry gate will be closed immediately and the public will be asked to vacate the WGRRP.
- The Waste Coordinator will immediately take all action possible to prevent the fire from spreading to the waste and sources of fuel.
- In the case that the Waste Coordinator is not on site, the Leading Hand will take immediate action and will contact the Waste Coordinator and the fire brigade immediately.
- The Waste Coordinator will immediately contact the emergency services and local fire brigade (**through 000**) and advise them of the fire.
- The Waste Coordinator will arrange for the water tankers and mobile firefighting unit to help extinguish the fire.

Internal roads act as suitable fire breaks and provide protection/access if any fire outbreak occurs in stockpiles, buildings or filled areas.

Actions for compliance

- Mitigation measures outlined in Section 8.2.3 for bushfire protection should be implemented.

Performance indicators

- The occurrence of fires.
- Number of fire fighting vehicles and appliances available.
- The length of time required to extinguish a fire.

Responsible party

- Waste Coordinator
- Leading Hand

Inspection, monitoring and maintenance schedule

Action	Frequency	Timing
Inspection of fire extinguishers (by contractor)	Annually	December
Inspection of fire extinguishers (by Waste Coordinator or Leading Hand)	Monthly	End of month
All firefighting equipment and facilities shall be checked for damage/condition	Weekly basis	End of week
All firefighting equipment and facilities shall be test operated	Three monthly basis	May, June, sept, Dec
Check fire equipment signposting to Australian standards and accessibility	Three monthly basis.	May, June, sept, Dec
Review capacity of fire fighting	Every 12 months.	December

Reporting

- A fire at the site constitutes an incident (refer Section 11.2).
- Annual Reporting (refer Section 11.5).

Corrective actions

- If the performance indicators detect a failing, then measures will be put in place to increase the firefighting capacity.
- If it is identified that the firefighting procedures need to be augmented to improve performance, the procedures should be modified. This modification may include additional training of staff.

9.10 Flood Emergency and Evacuation

Schedule 4 condition 16 of the Project Approval requires a flood emergency and evacuation plan to be prepared prior to the commencement of construction and to be documented in the LEMP.

The objectives of the plan a stated in schedule 4 condition 16 of the Project Approval as follows:

The plan must:

- Ensure the Project is designed in accordance with chapter e13 of *Wollongong DCP 2009*, Council's *Mullet and Brooks Creeks Floodplain Risk Management Study and Plan* and the *NSW Floodplain Development Manual*, taking into account Council's conduit blockage criteria;
- Identify contingency actions to be implemented in the event that the site is inundated during a major flood event to protect:
  - The integrity of stormwater/leachate ponds and prevent release of stormwater/leachate into the local environment including water quality control measures; and
  - Human safety.
- Identify emergency evacuation routes, flood warning alarms, and evacuation procedures.

The plan was submitted to and approved by the Director-General prior to commencement of construction. The plan is provided in Appendix N along with the letter from the Director-General approving the plan.

9.11 Vegetation and Biodiversity Management

Schedule 4 condition 49 of the Project Approval requires a vegetation management plan to be prepared prior to the commencement of construction and to be documented in the LEMP and CEMP.

The vegetation management plan was submitted to and approved by the Director-General prior to commencement of construction. The plan is provided in Appendix O along with the letter from the Director-General approving the plan.

10.0 Site closure

10.1 Introduction

The management techniques used for remediating the landfill after closure are:

- Site capping and revegetation; and
- Landfill closure and post closure monitoring and maintenance.

10.2 Site capping and revegetation

The following licence conditions (EPL 5862) relate to a closure plan for the WGRRP:

O6 *Waste management*

O6.10 *The licensee must ensure that landfill cells are capped progressively during operations and specifically at times when the level of waste reaches final heights.*

O6.11 *The last licensee must prepare and submit to the EPA within six months prior to the last load of waste being landfilled, a closure plan in accordance with section 76 of the Protection of the Environment Operations Act 1997.*

Condition 51, schedule 4 of the Project Approval requires a rehabilitation management plan to be prepared and implemented. The plan must:

- *Be undertaken in a manner which is complimentary with the rehabilitation is consistent with the proposed final landform depicted in the figures in appendices 4 and 7;*
- *Specify a time period for the rehabilitation to works to commence and be finalised following cessation of landfilling activities.*

Objectives

The objectives of site capping and revegetation are to ensure that the final surface provides a barrier to the migration of water into the waste, controls emissions to the atmosphere and reduce the risk of hazards.

Management strategy, tasks and actions

The final site capping and revegetation will be carried out as described in the landscape strategy (Appendix I). The site rehabilitation is summarised in the following sections.

Landform

The final landform is presented on Figure 11.

The final landform footprint is proposed to be roughly rectangular and measure approximately 850 m (e-w) by 550 m (n-s), extending between the crests of the natural eastern and western ridge lines at the Whytes Gully RRP site. The footprint includes pulling back from the current extent of waste by up to 35 m in the area of the proposed eastern waste cutback. The total landform footprint area is approximately 35 ha.

The peak of the landform is at elevation is proposed to have an RL of 111 m. From the high point, slopes extend to the north to meet the natural ground surface at RL 75m to RL 95m. The lowest point of the landform is at RL 19 m along the southern edge, with a 500 m length of the southern edge at RL 25m or less.

The principal landform batter is south and southwest-facing with a maximum height of greater than 80 m and a 4.5h:1v average inclination. North and east-facing batters would have a steeper average inclination of 4h:1v and but a maximum height of less than 30 m.

The batters of the final landform are proposed to be at a slope of 4h:1v towards the landform toe and would be intersected by 5 m wide grassed benches every ten vertical metres. This would result in an average slope of approximately 4.5h:1v. The benches would have a fall of 2 percent towards the surface water drop

structures and perimeter drains along the eastern and western toe of the proposed final landform. The purpose of the slope benches is to reduce runoff velocity and erosion potential for the final capping system to increase overall landform slope stability, and to provide access on the slope for capping system and gas extraction system inspection and maintenance.

A small area near the peak of the landform has relatively flat design grades of approximately 5 percent.

The Project landform design allows for access around the entire site perimeter and to the landform summit for groundwater monitoring, site inspection and maintenance, and bushfire protection. The design also includes surface water drains along the entire perimeter, with combined drains and access tracks in some areas. In addition, the design setback distance of 20 m along the western ridge property boundary also provides space for a nature strip and screening planting.

The proposed distance from the design limit of landfill waste placement to the closest adjacent residence buildings is approximately 70 m to the residence near the western ridge and 160 m for the residence to the north of the Eastern Gully Landfill area. It is noted the design limit of landfill waste placement is approximately 10 m inside the edge of the landform footprint.

Refer to the Preliminary Design Report (Appendix I) for further detail of final landform.

Capping system

The capping system will be constructed progressively as the landfill is being filled and is designed to minimise infiltration into the landfill waste and therefore reducing the amount of leachate generated and the potential for contamination of groundwater. Impact on air quality and odour emissions are controlled by reducing landfill gas emissions, which are controlled by installation of a landfill gas collection system as part of the cap design. The cap is designed to provide after users with an accessible and visually attractive vegetated surface.

The capping system is shown in the design report and will comprise (from top to bottom):

- 500 mm to 1 m revegetation layer, specifically designed to encourage growth of the selected plant species.
- Geocomposite drainage system with geotextile covers to prevent clogging of the system from sediment migration. The geocomposite layer conveys water infiltrating through the vegetation layer into collection pipes which will discharge into the grassed benches and drop structures. This system is designed to reduce the surface water head on the LLDPE liner, reduce infiltration through the cap and increase surficial slope stability.
- Linear low density polyethylene (LLDPE) geomembrane liner as the key layer to prevent infiltration of water into the landfilled waste. The LLDPE geomembrane is flexible to prevent damage to the capping system as a result of the expected landfill settlement.
- 200 mm clay rich bearing layer to form a low permeability and smooth base for geomembrane liner placement. The layer is designed to reduce infiltration through the capping system and to reduce the likelihood of damage to the LLDPE geomembrane.
- 500 mm intermediate cover remaining from the landfill operation.
- Landfill gas collection trenches underneath the cap, consisting of gravel aggregate and perforated collection pipes connected to an active landfill gas collection system.

The capping system will be constructed progressively as landfilled areas have achieved their final level. The progressive capping will reduce the amount of leachate generated.

Revegetation

The revegetation of the landfill is summarised below and is outlined in more detail in the landscape strategy (Appendix I).

The landscape strategy incorporates the following key components:

- Staging of the revegetation will aim to ensure the area of un-vegetated landfill slope is minimised by progressively establishing a vegetation cover on each section of slope as it is completed;
- Existing vegetation on the portions of site not required for landfill, particularly mature remnant trees, will be retained wherever possible to provide visual screening and contribute to the landscape character of the site;
- Vegetation to be established on the landfill slopes will include a mix of shrubs and small trees with areas of grass that will create a landscape character similar to adjoining rural areas;
- The top of the new landform will be visually modified to ensure it is visually compatible with the surrounding topography;
- Views to the coast will be maintained from the potential lookout area on the landfill ridgeline and from properties upslope of the site;
- Screen planting with dense tall tree planting on natural ground will be used to block views to the site, particularly from adjoining residences;
- Biodiversity and habitat values will be maintained and increased where possible by planting a range of indigenous species;
- The potential will be created for future public open space facilities such as a lookout and passive recreation areas with access provided by upgrading the maintenance track to the top of landfill landform;
- The visibility of drainage channels on the slopes will be minimised by design options that could include the use of dark coloured stone and native grasses;
- Provision of a maintenance program that includes regular removal of identified weed species; and
- Coordination of vegetation planting with bushfire management requirements that include access tracks and fuel management zones.

The proposed landscape strategy is presented in Appendix I. A full list of species selected for the revegetation of the site is provided in the landscape strategy (Appendix I). The proposed plant species and planting structure will establish vegetation that forms a sustainable ecosystem similar to the adjoining areas of remnant vegetation providing wildlife habitat and contributing to the ecological values of the region.

Surface water management

Capped areas of the landfill will be vegetated as soon as feasible. Until vegetation has been fully established, the capped areas as well as the run off from these areas will be treated in accordance with Managing Urban Stormwater volume 2b (DECC 2008). This will include intensive management of revegetated surfaces for the first few months after sowing. Management will include use of silt fences, establishment of sedimentation basins and full reestablishment and vegetation of capped areas where erosion has occurred. Existing sedimentation basins will be maintained until vegetation has been fully established or at least for two years following vegetation of the landfill cap.

Surface water management following closure of the site will comprise diversion of surface water run-on around the landfill in grassed diversion drains constructed during the operating life of the landfill. This surface water can be discharged directly into surrounding water bodies.

Leachate management

The landfill will continue to generate leachate into the foreseeable future. The leachate will continue to be collected in the leachate collection system piped to the leachate dams and the leachate treatment plant and

treated. The treated leachate will continue to be discharged to sewer under the trade waste agreement (TWA).

Landfill gas

The landfill will continue to generate landfill gas into the foreseeable future. The leachate will continue to be collected and extracted by the landfill gas collection and extraction system.

Final land use

The proposed final land use of the Whytes Gully RRP landfill cell will be passive open space. Given the long timeframe until completion of the landfill, a more detailed plan of the final land use of the site may be prepared in the future.

10.2.1 Implementation

The final site capping and revegetation will be carried out as described in the Preliminary Design Report (Appendix I). Site capping will occur progressively when final waste heights are reached.

10.3 Landfill closure and post-closure monitoring and maintenance

Requirements

The following licence conditions (EPL 5862) relate to preparation of a closure plan and post closure monitoring and maintenance for the WGRRP:

O6.11 *The last licensee must prepare and submit to the EPA within six months prior to the last load of waste being landfilled, a closure plan in accordance with section 76 of the Protection of the Environment Operations Act 1997.*

Objectives

The objective of the landfill closure and post-closure monitoring and maintenance is to ensure that the landfill continues to be non-polluting and does not cause environmental harm after site closure.

Management strategy, tasks and actions

A site closure plan will be submitted to the EPA within three months of the completion of the landfill's waste receipt operations. The closure plan will include putting into place a post-closure monitoring and maintenance program which ensures the long-term integrity of the landfill.

It is expected that the environmental monitoring of surface water, groundwater, leachate and landfill gas will continue in the same manner as during operation in order to detect deficiencies or damages to the containment system. Post closure monitoring will also involve site walkovers to detect areas of cap degradation, excessive settlement, erosion and slumping.

Sections 7.5 and 8.4 also outline contingency and remediation measures should environmental monitoring indicate that the landfill is impacting the air, surface water, groundwater or amenity of residents.

The following section describes the proposed components of the closure plan:

Leachate, gas and stormwater monitoring

All leachate collection, gas collection and stormwater sediment controls, monitoring and reporting practices shall be described including the continued operation of the leachate treatment plant, until leachate volume and concentrations have reduced to an acceptable level.

Groundwater monitoring

Groundwater monitoring will be described and will map the movement of any leachate plume in the groundwater over time. Monitoring will continue until the quality of groundwater reaches environmentally acceptable levels.

Maintenance

A description of how the following items shall be maintained, at a standard equivalent to that during the operational life of the landfill, for the period until the landfill does not pose a threat the environment:

- Sediment retention basins;
- Vegetation;
- Rehabilitated land; and
- Vermin and pest control.

Complaints

A description of how residents near the landfill are to be advised of contact persons to discuss any problems. Records of complaints shall be kept in the same manner as during operation of the landfill.

Waste receipt

Description of the means to ensure waste materials will not be received for disposal by the facility after landfill operations cease. Waste materials that are intended for use in the rehabilitation and remediation shall be documented and reported in the same way as for an operating facility.

10.4 Statement of completion

When sufficient evidence can be provided that the landfill is stable and non-polluting, Council may seek to complete all obligations and settle any financial assurance by submitting a certified statement of completion which states that the site remediation work has been completed and further environmental management of the site is not required. The statement shall be expected to show that:

- Gas concentration levels in all perimeter gas wells have fallen to less than 1% methane (v/v) and less than 1.5% carbon dioxide for a period of 24 months;
- Waste stabilisation has been completed. This would be documented by the composition of the leachate changing to a low level of contamination, and posing no hazard to the environment;
- Groundwater monitoring has indicated no failure of the landfill liner that would pose a threat to groundwater quality;
- The landfill capping has been assessed over some years and found to be stable with acceptable surface water drainage;
- Documentation that all functions in the closure planning and the written confirmation that closure planning has been completed.

Once EPA has approved the certified statement of completion, Council can cease the maintenance and monitoring of the site and any of the financial assurance requirements will lapse.

11.0 Reporting

Reporting is required to produce systematic, comprehensive and informative reports on the environmental monitoring and operational activities of the landfill. Performance assessments are based on the reports and provide the basis of information to the EPA for review of the LEMP. All pollution monitoring data collected in accordance with the EPL will be published as per section 66(6) of the POEO Act. The reports required are described in the following sections.

11.1 General

The following licence conditions (EPL 5862) relate to general reporting conditions for the WGRRP:

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 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R1.9 The annual return must be accompanied by/or include an annual report which must contain an assessment of environmental performance relevant to licence conditions including:

a) tabulated results of all monitoring data required to be collected by this licence;

b) 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;

c) an analysis and interpretation of all monitoring data;

d) an analysis of and response to any complaints received;

e) identification of any deficiencies in environmental performance identified by the monitoring data, trends or incidents and of remedial action taken or proposed to be taken to address these deficiencies; and

f) recommendations on improving the environmental performance of the facility.

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 the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of part 5.7 of the

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.

R2.3 The licensee must notify the EPA within 24 hours in accordance with condition r2.1 if surface monitoring detects methane above 1.25% (v/v), and increase the frequency of monitoring to daily, until the EPA determines otherwise.

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 maintain a daily log and record the following data of fires at the site:

(a) time and date when the fire was deliberately started or reported.

(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 ceased and whether it burnt out or was extinguished.

(d) the location of fire (eg. Clean timber stockpile, putrescible garbage cell, etc.).

(e) prevailing weather conditions.

(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.

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

11.2 Incident reporting

Requirements

In addition to the general reporting conditions outlined above, the following licence conditions (EPL 5862) relate to incident reporting at the WGRRP:

M6 Other monitoring and recording conditions

M6.1 the licensee must maintain a record of all events involving the removal of any waste that was brought to the facility and which is not permitted to be disposed of at the facility.

11.2.1 Incident definition

EPA will be notified of any incident that represents a threat to the environment and which may lead to a breach of licence conditions. Such incidents include (as outlined in the Landfill Guidelines):

- Identifying non-domestic quantities (more than 200 mL/tonne or 200 g/tonne) of hazardous substances among the waste.

- Fires at the landfill, either surface or subsurface.
- Mixing of leachate and stormwater, or waste and stormwater.
- Identification of any failure of an environmental protection system.
- Identification of significant difference in groundwater indicator parameters.
- Detection of landfill gas in surface or building monitoring at concentrations greater than 1.25% methane (v/v).
- Any other incident or observation that could potentially pose an immediate environmental hazard outside normal operating conditions.
- Any proposed change in the landfill's ownership or occupier. (EPA approval required before the ownership or occupier may change, i.e. transfer of licence).

A Pollution Incident Response Management Plan (PIRMP) has been included in Appendix N.

11.2.2 Telephone reporting

Initial contact can be made via the EPA's 24 hour pollution line within three hours of the incident first being identified. The pollution line can be reached on 131 555, or 02 9995 5555, if calling from outside NSW.

11.2.3 Written reporting

A written notice of any incidents as defined above should be made to the NSW EPA within seven days of the incident occurring.

11.2.4 Responsible party

- Waste Coordinator.
- Operations Administrator.

11.3 Trade waste agreement

A trade waste agreement (TWA) for the leachate treatment plant of the site has been issued by Sydney Water on 15 November 2011. The TWA (consent no.11205) specifies load limits and concentrations for ammonia, biochemical oxygen demand (bod), suspended solids (SS) and total dissolved solids (TDS) for the discharge of treated leachate as well as sampling and reporting requirements.

Council's reporting requirements under the TWA are as follows:

- Results of analytical testing must be submitted to Sydney Water within 21 days of sampling;
- The results of the trade waste sampling shall be summarised in the Annual Report;
- Sydney Water must be notified in writing within seven days of:
  - Any failure to obtain samples;
  - Any loss of analytical data; and
  - Any failure in the discharge flow meter.

In addition, Council will make the results of the trade waste monitoring available to the EPA in the Annual Report.

11.4 Monthly reporting (EPA)

The Landfill Guidelines (EPA 1996) require the landfill operator to submit to the EPA a report on the total tonnage of waste received and tonnages of specific source-separated wastes. This report is due by the 14th day of the following month in a format specified by the EPA in the Landfill Guidelines.

11.5 Annual Reporting and Annual Returns

Requirements

In addition to the general reporting conditions outlined in Section 11.1, the following licence conditions (EPL 5862) relate to annual reporting and annual returns at the WGRRP:

'M6.2 the licensee must make available to the EPA the results of monthly trade waste monitoring of leachate and include these results in the annual report.

Schedule 4, condition 18 requires the results of water monitoring to be provided to now on an annual basis.

Management strategy, task and actions

The annual return comprises a form provided by EPA, which should be filled in by Council and returned to EPA. This will be provided each year in support of the annual licence renewal application (with all information up to date to within 60 days of the licence renewal date). The annual return will be accompanied by an Annual Report, which will include the following sections:

- *Summary report* - this will include the total non-hazardous waste received during the previous 12 months (including cover material), its composition and its eventual fate (including recycling markets).
- *Landfill volume report* - this will include a report from Council's surveyor of the volume of landfill space consumed in the period for which the report is prepared and the estimate of compaction that this volume represents. An estimation of remaining landfill capacity and life based on current and projected waste acceptance rates will be made.
- *Hydrogeological report* - this will assess the changes detected in the groundwater monitoring results over the period of operation, updated for the last 12 months. Any changes in hydraulic gradient or statistically significant variations in contaminant concentrations should be highlighted and explained.
- *Leachate collection report* - this will identify the quantity and composition of any leachate generated over the past 12 months. Any trends should be highlighted and explained in terms of the biological activity within the landfill. The trends should generally be related to monthly rainfall and quarterly sampling results.
- *Surface water report* - this will summarise the surface water monitoring results over the period of operation for the past 12 months. Any changes in water levels and statistically significant variations in contaminants should be highlighted and explained.
- *Landfill gas emissions report* - this will summarise the gas monitoring results over the period of operation for the past 12 months. Any trends should be highlighted and explained. Annual review of monitoring program should be documented.
- *Dust report* - this will summarise all dust monitoring results gathered over the past 12 months, with statistically significant variations explained.
- *Incident report* - this will summarise any incident reported for the 12 month period.
- *Complaints report* - this will record odour, litter, noise or other complaints received by the facility in the past 12 months, including comments on their correlation with prevailing weather conditions or waste reception circumstances.
- *Rehabilitation report* - describing rehabilitation works carried out over the past twelve months.

- *Greenhouse Gas Action Plan* - Annual Report focusing on ways of reducing both emissions and operating costs.
- *Proposed site operations for the following year* – describing the landfilling operations, environment protection, construction works and rehabilitation planned for the following year.

To meet condition 18 (e) of the Project Approval , a copy of the surface water report, leachate collection report and the hydrogeological report will be provided to the NSW Office of Water annually. This may also be addressed by submitting the annual review of water monitoring report.

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Report Signature Page

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Jacinta McMahon
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KAD,DD/JLM/kad

A.B.N. 64 006 107 857

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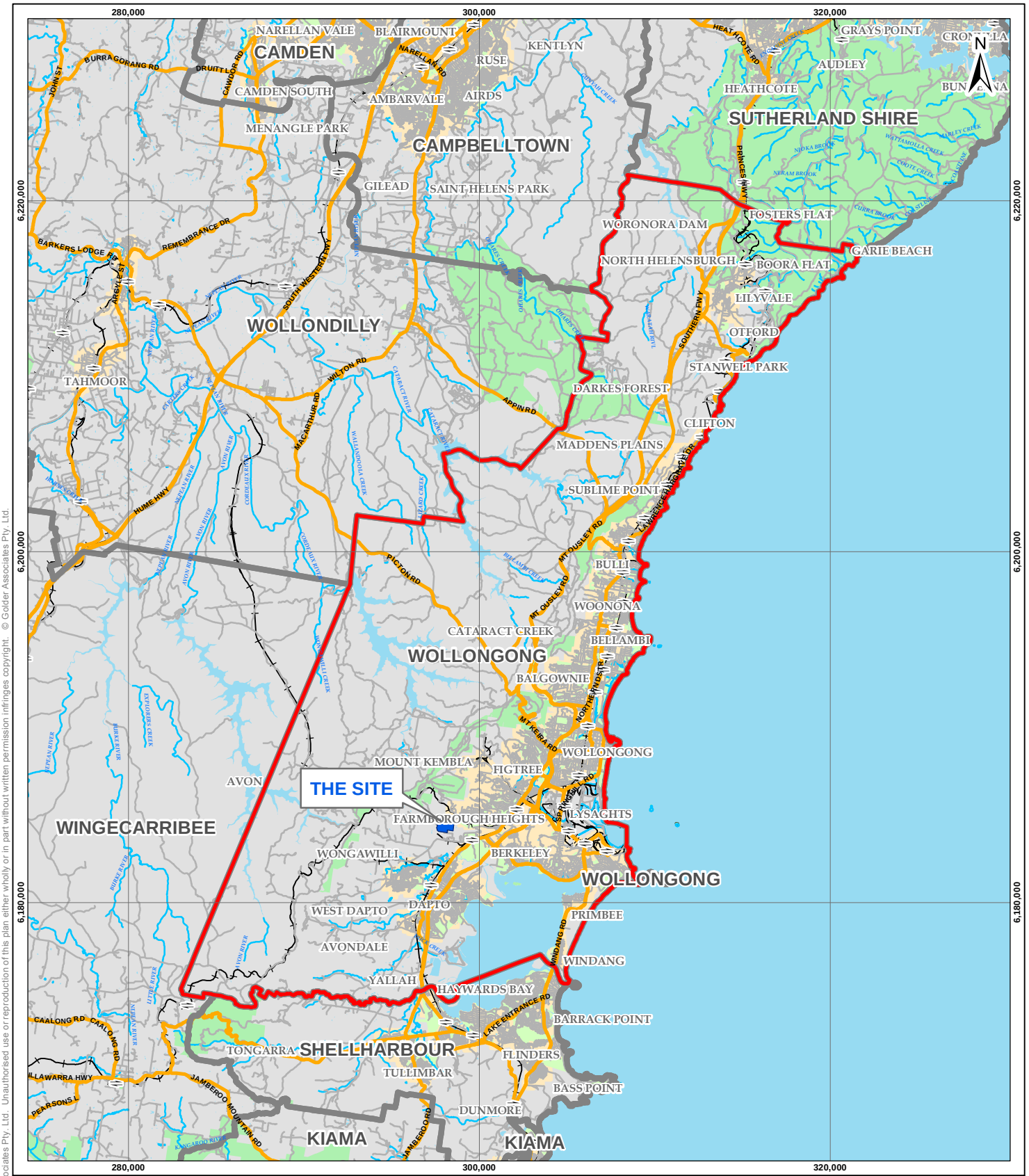


LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

Wollongong City Council

REGIONAL AREA

LEGEND

- Site Location
- Wollongong Local Government Area Boundary
- Local Government Areas

0 1.25 2.5 5 7.5 10 Kilometres

SCALE (at A4) 1:300,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 22/02/2012
DRAWN: AJW/FA
CHECKED: JMc

FIGURE 1

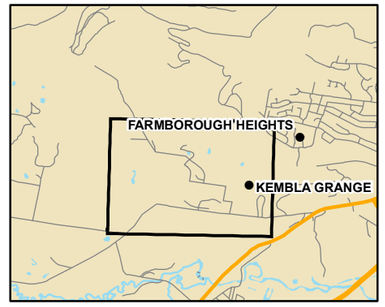
Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_XYZ_R_F0001_RegionalLocation.mxd

WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

SITE LOCATION PLAN, LOCAL



LEGEND

- Site Boundary
- Approximate Extent Of Waste
- Extent of Landfill Works

NOTES

Imagery copyright Microsoft Corporation

Extent of waste based on site observations and information provided by Council.

Extent of landfill works as per Golder Design Report.

0 50 100 200 300 metres

SCALE (at A3) **1:7,000**

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: **117625003**
DATE: **6/03/2012**
DRAWN: **FA`**
CHECKED: **JMc**

FIGURE 2

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_061_R_F0002_SiteLocations_Rev0.mxd

298,000

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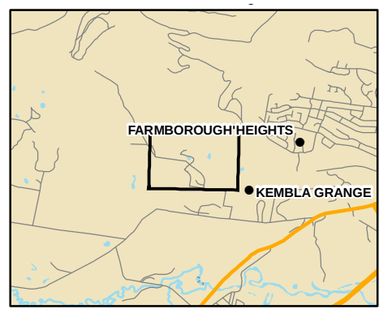
File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_114_R_F0002_General_Site_Details_Rev3.mxd

WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

EXISTING SITE LAYOUT



LEGEND

- Site Boundary
- Extent of Waste
- Extent of Landfill Works

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extend of landfill works as per Golder Design Report.

0 15 30 60 90 120 150 metres

SCALE (at A3) 1:3,800

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 22/02/2012
DRAWN: FA
CHECKED: JMc

FIGURE 3

Golder Associates

298,000

6,184,000

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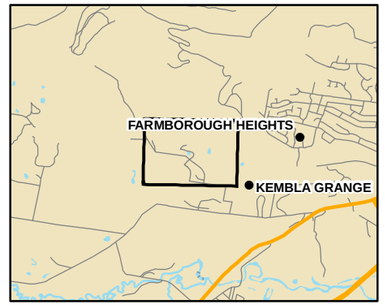
WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

EXISTING SITE CONTOURS AND CURRENT MONITORING LOCATIONS



LEGEND

- Existing Monitoring Location
- Site Contours
- Site Boundary
- Approximate Extent Of Waste
- Extent of Landfill Works

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

Site contours based on survey by KFW Williams, dated 20/07/2011

0 12.5 25 50 75 100 125 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT:	117625003
DATE:	12/03/2012
DRAWN:	FA
CHECKED:	JMc

FIGURE 4

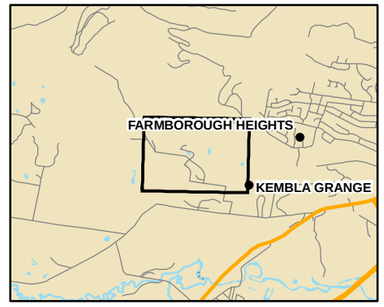
Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_114_R_F0003_Existing_Site_Contours_Rev2.mxd

WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

GEOLOGICAL AREAS



LEGEND

- Site Boundary
- Approximate Extent Of Existing Landfill Boundary

Geological Area

- Area 1 - Pheasants Nest Formation
- Area 2 - Budgong Sandstone Formation
- Area 3 - Alluvial Soils
- Area 4 - Capping Layer and Landfill

NOTES

Geological Areas as per the Wollongong - Port Hacking (DPI,1985) Geological Map (1:100,000)

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

0 15 30 60 90 120 150 metres

SCALE (at A3) 1:4,500

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 12/03/2012
DRAWN: FA
CHECKED: BJF

FIGURE 5

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_114_R_F0004_Rev0_GeologicalAreas.mxd

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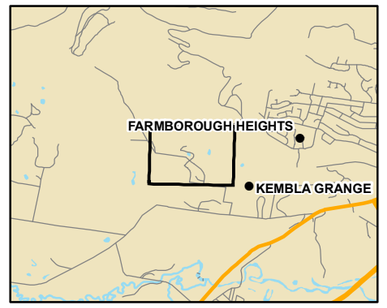
WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

FLORA AND FAUNA



LEGEND

- White-flowered Wax Plant
- Site Boundary
- Extent of Landfill Works

Habitat

- High
- Moderate

Endangered Ecological Communities

- Coastal Grassy Red Gum Forest
- Lowland Dry-Subtropical Rainforest
- Lowland Woollybutt-Melaleuca Forest

Biosis Vegetation

- Acacia Scrub/Exotic
- Closed Exotic Grasslad
- Forest-Redgum Open Forest/Woodland
- Lowland Dry Subtropical Rainforest
- Moist-Box Redgum Foothills Forest
- Planted

NOTES

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder design report.

Ecological data as provided by Biosis Pty Ltd on 20 December 2011.

0 25 50 100 150 metres

SCALE (at A3) 1:3,600

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 6/03/2012
DRAWN: FA
CHECKED: BJF

FIGURE 6

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_061_R_F0006_LEMP_Rev0.mxd

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PAH
7/12/2011

PAH
8/09/2011

Open Site
52-2-3867

ASF
8/09/2011

40

90

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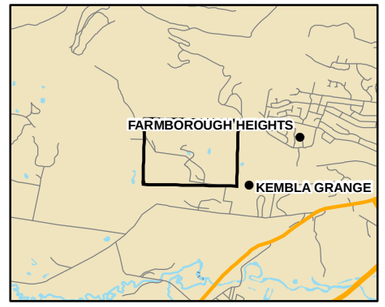
WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

HERITAGE AND ARCHAEOLOGICAL ITEMS



LEGEND

- AHIMS Results in Study Area
- Heritage Area (Glengarry Cottage)
- Aboriginal Archaeological Sites
- Site Boundary
- Extent of Landfill Works
- Cadastre

NOTES

Glengarry cottage heritage area provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

Aboriginal heritage areas as identified by Biosis (2011).

0 12.5 25 50 75 100 125 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: **117625003**
DATE: **5/03/2012**
DRAWN: **FA**
CHECKED: **JMc**

FIGURE 7

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_124_R_F0001_Heritage_Rev0.mxd

298,000

PAH
7/12/2011

PAH
8/09/2011

Open Site
52-2-3867

ASF
8/09/2011

90

90

N

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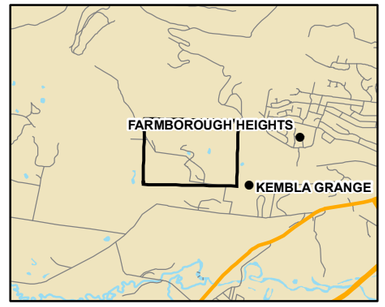
WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

DEVELOPMENT CONSTRAINTS



LEGEND

- Site Boundary
- Cadastre
- Easement
- Flood Planning Area (West Dapto LEP)
- Interpreted Flood Planning Area (50 cm Freeboard)
- Heritage
- Aboriginal Archaeological Sites (12/01/2012)
- AHIMS Results in Study Area (12/01/2012)
- Extent of Landfill Works

NOTES

Historic locations digitised by Golder from reports supplied by Wollongong City Council

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Site contours based on survey by KFW Williams, dated 20/07/2011

0 12.5 25 50 75 100 125 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 26/03/2012
DRAWN: FA
CHECKED: JMc

FIGURE 8

Golder Associates

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APPENDIX 3
REVISED STAGING PLAN

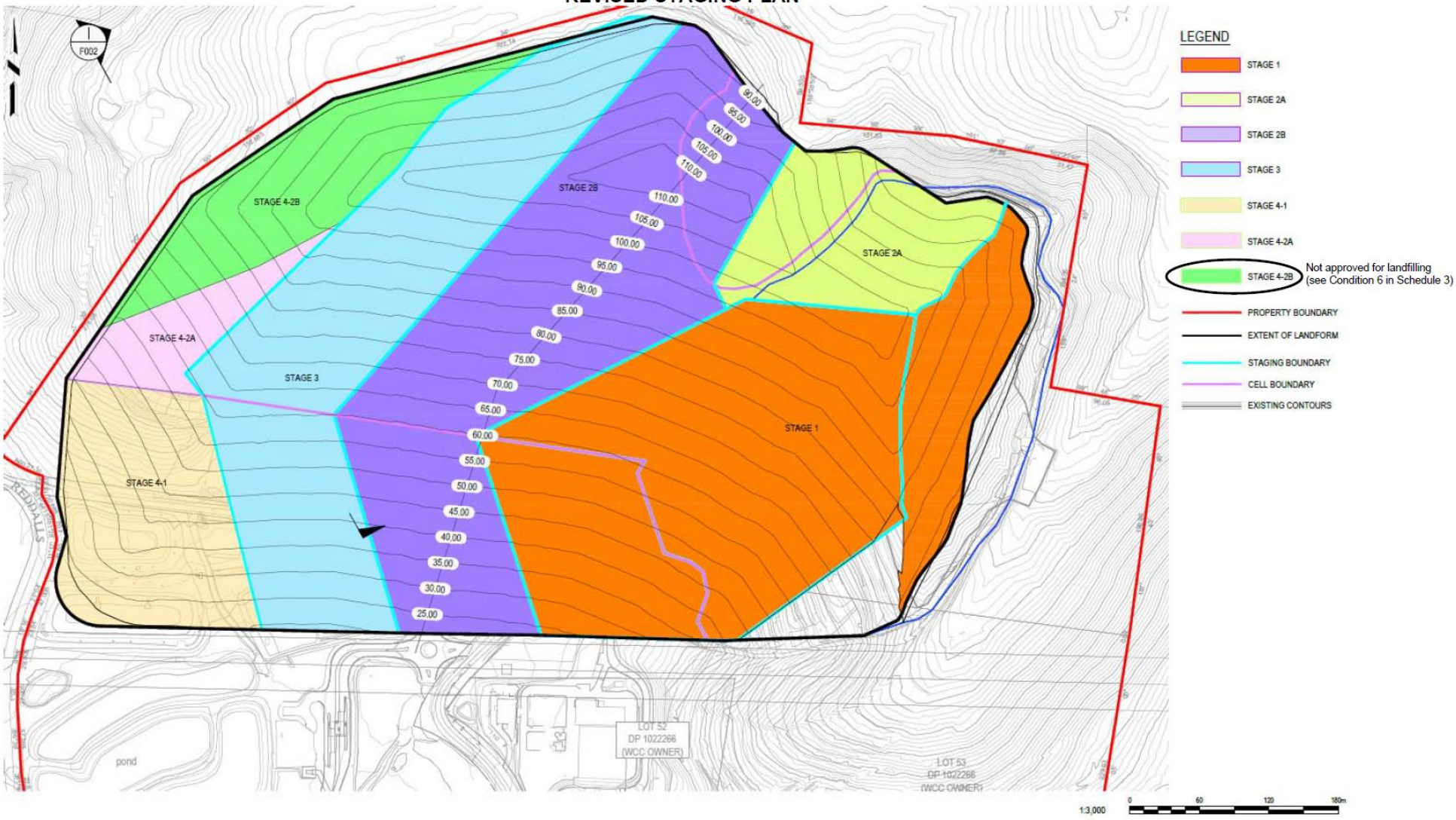

FIGURE 9

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Western Gully Landfill

Eastern Gully Landfill

85 95 100 105 110 90 85 75 75 70 65 90 80 60 55 50 45 40 35 30 25 20 20 20 20

Indicative New Leachate Pond Footprint

LTP

Indicative New Surface Water Pond Footprint

REDDALL'S ROAD

6,184,000

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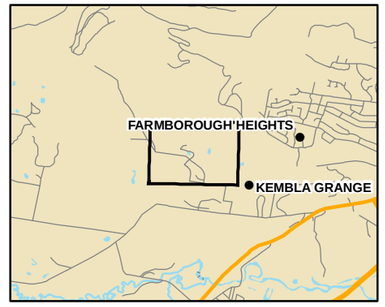
WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

PROJECT FOOTPRINT



LEGEND

- Contours of Final Landform (5 m interval)
- Site Boundary
- Approximate Extent of Waste
- Extent of Landfill Works
- Indicative New Leachate Pond Footprint
  New Leachate Pond to be established prior to commencement of Stage 4 construction
- Indicative New Surface Water Pond Footprint
  Surface Water Pond to be reduced in size prior to commencement of Stage 4 construction
- Indicative, augmented LTP footprint.
  LTP footprint will be assessed at the end of 2014.
- Existing Leachate Treatment Plant (LTP) Footprint

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

0 25 50 100 150 metres

SCALE (at A3) 1:3,800

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 22/02/2012
DRAWN: FA
CHECKED: JMc

FIGURE 10

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_116_R_F0002_ProjectFootprint_Rev1.mxd

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6,184,000

298,000

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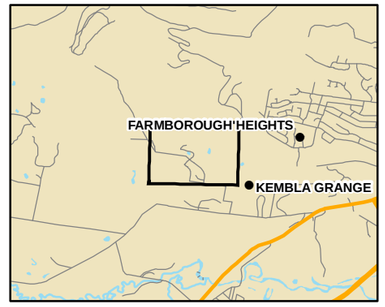
WHYTES GULLY NEW LANDFILL CELL
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN
WOLLONGONG CITY COUNCIL

FINAL LANDFORM



LEGEND

- Contours of Final Landform (5 m interval)
- Site Boundary
- Extent of Landfill Works

NOTES

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works and final contours as per Golder Design Report.

0 25 50 100 150 metres

SCALE (at A3) 1:3,800

Coordinate System: GDA 1994 MGA Zone 56

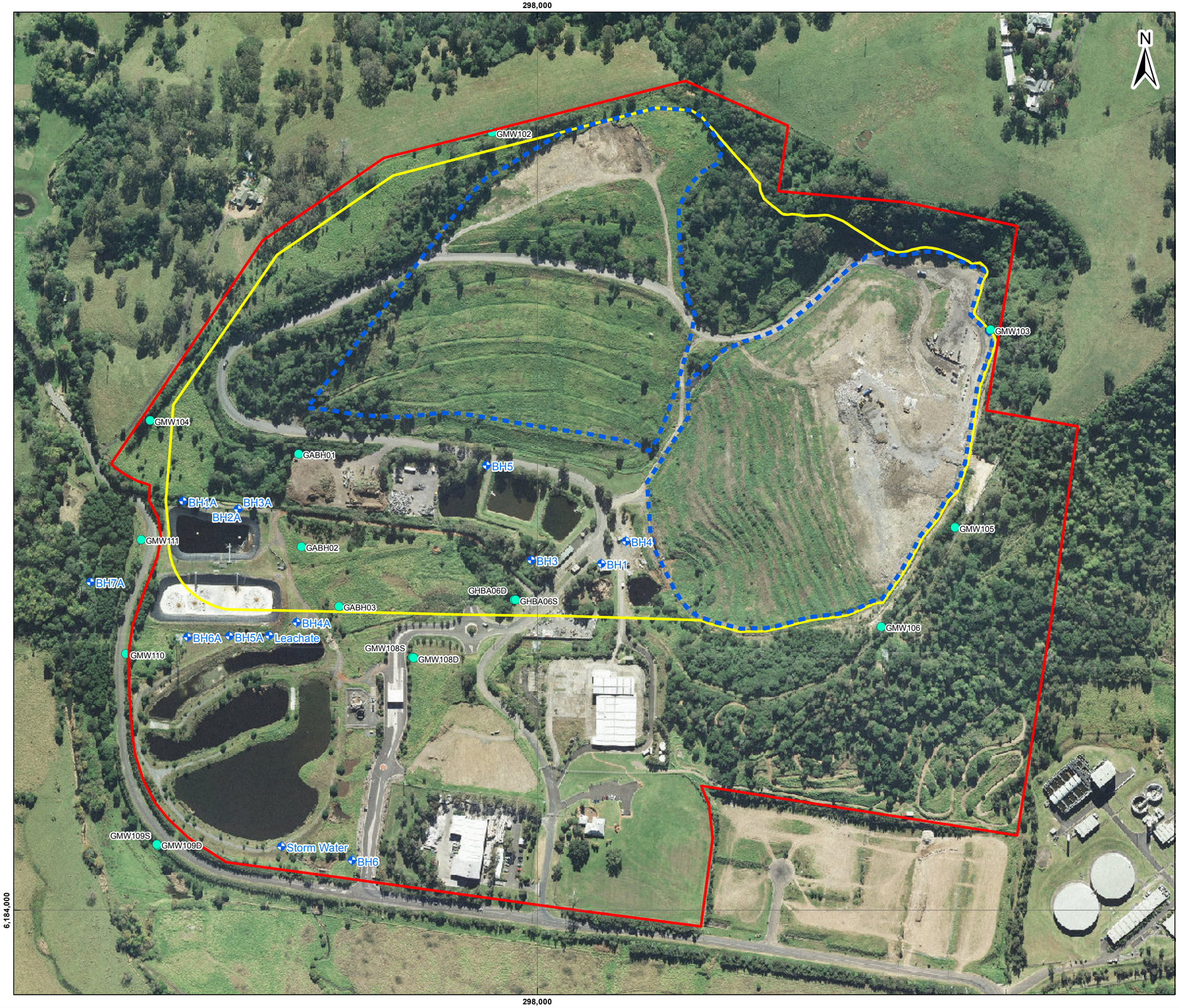
PROJECT: 117625003
DATE: 5/03/2012
DRAWN: FA
CHECKED: JMc

FIGURE 11

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_128_R_F0001_Landform_Rev0.mxd

298,000



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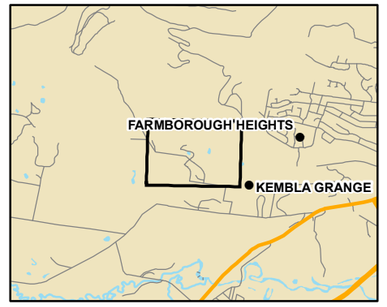
File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_120_R_F0004_ProposedWaterMonitoringLocations_Rev3.mxd

WHYTES GULLY NEW LANDFILL CELL
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN
WOLLONGONG CITY COUNCIL

PROPOSED WATER MONITORING LOCATIONS



LEGEND

- Proposed Ground Water Monitoring Locations
- Existing Monitoring Location
- Approximate Extent Of Waste
- Extent of Landfill Works
- Site Boundary

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

Investigation locations surveyed by KFW Williams.

0 25 50 100 150 metres

SCALE (at A3) **1:4,000**

Coordinate System: GDA 1994 MGA Zone 56

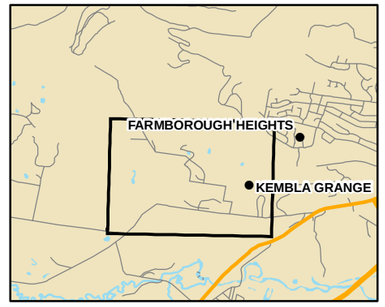
PROJECT: **117625003**
DATE: **26/03/2012**
DRAWN: **FA`**
CHECKED: **JMc**

FIGURE 12

Golder Associates

WHYTES GULLY NEW LANDFILL CELL
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN
WOLLONGONG CITY COUNCIL

PROPOSED SURFACE WATER MONITORING LOCATIONS



LEGEND

- Existing Monitoring Well Location
- Surface Water Monitoring Locations
- Site Boundary
- Approximate Extent Of Waste
- Extent of Landfill Works

NOTES

Aerial Photography Copyright NearMap Pty Ltd.
Image dated 2011.11.27.
Sourced with permission from Nearmap on 2011.11.16.
Image Georeferenced by Golder and intended for indicative purposes only.
More information can be found here:
http://www.nearmap.com/

Extent of waste based on site observations and information provided by Council.

Extent of landfill works as per Golder Design Report.

0 50 100 200 300 metres

SCALE (at A3) 1:7,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 26/03/2012
DRAWN: FA
CHECKED: JMc

FIGURE 13

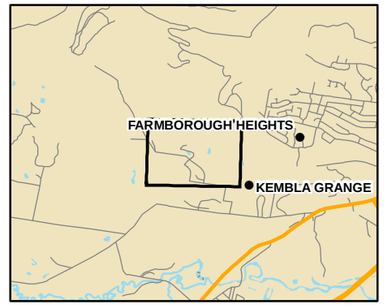
Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_120_R_F0005_ProposedSurfaceWaterMonitoringLocations_Rev2.mxd

WHYTES GULLY NEW LANDFILL CELL LANDFILL ENVIRONMENTAL MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL

PROPOSED LANDFILL GAS MONITORING LOCATIONS



LEGEND

- Proposed Landfill Gas Monitoring Wells (Stage 1)
- Proposed Landfill Gas Monitoring Wells (Future Stages)
- Site Boundary
- Approximate Extent Of Waste
- Extent of Landfill Works

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

Rationale for landfill gas monitoring locations is outlined in LEMP and EA chapter 12. Monitoring wells to be installed in stages during development of landfill.

0 25 50 100 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

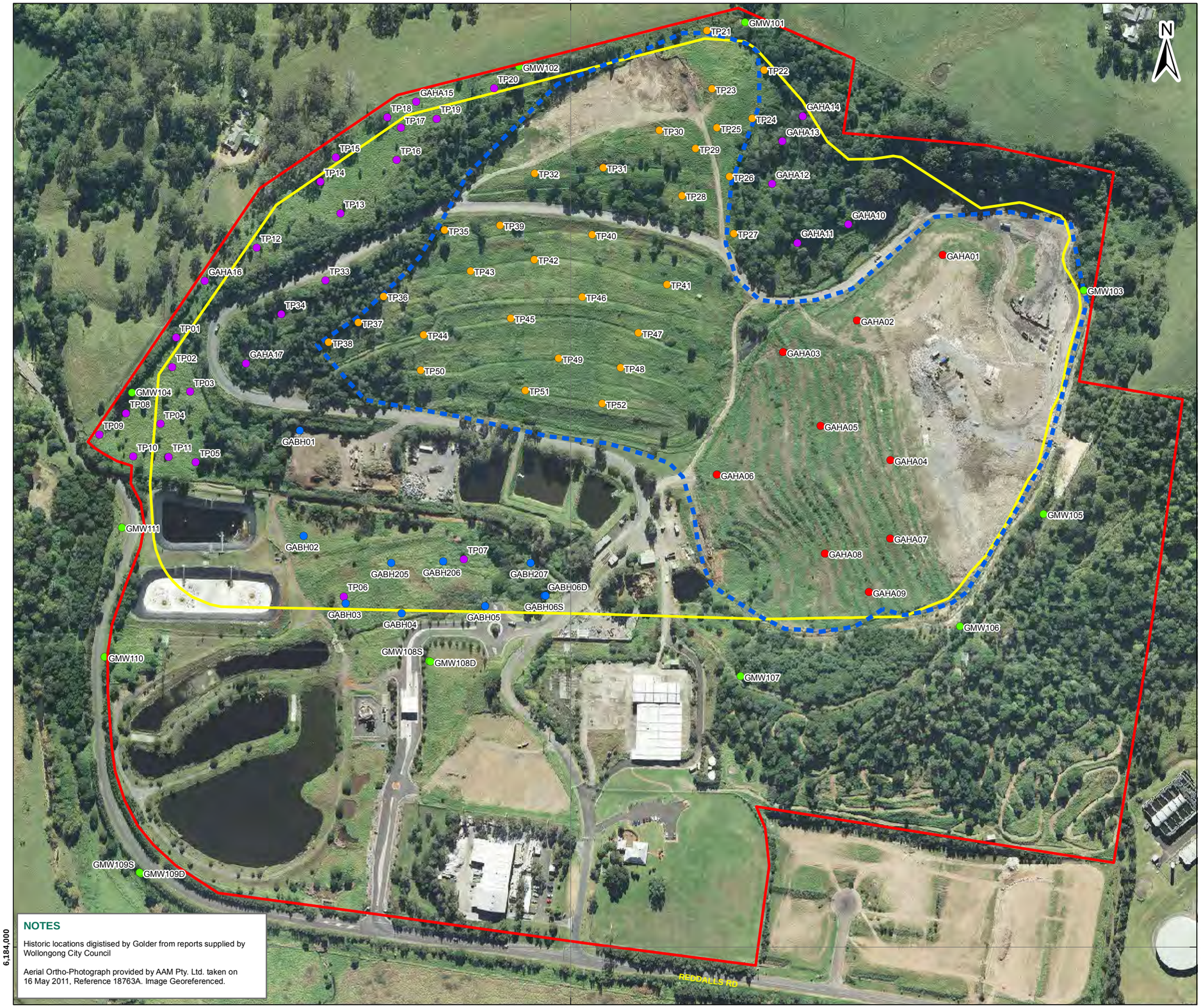
PROJECT: 117625003
DATE: 6/03/2012
DRAWN: FA`
CHECKED: JMc

FIGURE 14

Golder Associates

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_061_R_F0014_Proposed_LFG_MonitoringLocations_Rev0.mxd

298,000



NOTES

Historic locations digitised by Golder from reports supplied by Wollongong City Council

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

6,184,000

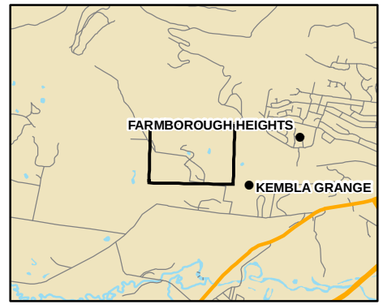
298,000

6,184,000

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_077_R_F0004_CurrentSiteInvestigationLocations_Rev03.mxd

WHYTES GULLY NEW LANDFILL CELL
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN
WOLLONGONG CITY COUNCIL

CURRENT SITE INVESTIGATION LOCATIONS



LEGEND

- New Cell Floor Investigation Location and Monitoring Well
- Ground Water Monitoring Well
- Exisiting Capping Hand Auger Location
- Exisiting Capping Test Pit Location
- Borrow Pit Test Pit Hand Auger Investigation Location
- Site Boundary
- Final Landfill Footprint
- Approximate Extent Of Waste

0 12.5 25 50 75 100 125 metres

SCALE (at A3) 1:3,600

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 6/03/2012
DRAWN: FA
CHECKED: BJF

FIGURE 15

Golder Associates

298,000

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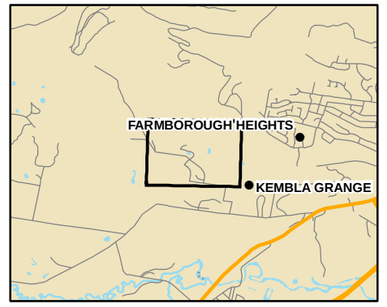
298,000

File Location: J:\GIS\Jobs\117625003_Wollongong Council_New Landfill Cell_Whytes Gully\Workspaces\117625003_120_R_F0002_GW Contours_Rev1.mxd

WHYTES GULLY NEW LANDFILL CELL
LANDFILL ENVIRONMENTAL MANAGEMENT PLAN
WOLLONGONG CITY COUNCIL

GROUNDWATER CONTOURS



LEGEND

- Groundwater Level (mAHD) - August 2011
- Groundwater Contours
- Site Boundary
- Approximate Extent Of Waste
- Extent of Landfill Works

Note: groundwater elevation contours have been estimated by linear interpolation between well locations, with minor adjustments based on professional judgement. Actual groundwater elevations in areas of limited data coverage (e.g. within the existing cells) may differ to an unknown extent from the estimated contour locations presented.

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

0 25 50 100 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 22/02/2012
DRAWN: RB/FA
CHECKED: LBJ

FIGURE 16

Golder Associates

APPENDIX A

Project Approval, Development Consent Conditions, Environment Protection Licence and Trade Waste Agreement

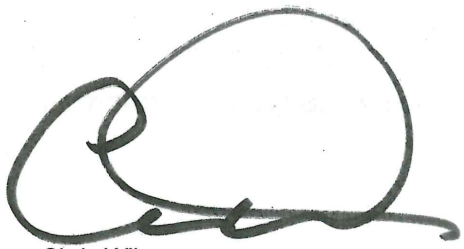
Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

Under the Minister for Planning and Infrastructure's delegation dated 27 February 2013, I approve the application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the Project.



Chris Wilson
Executive Director
Development Assessment Systems & Approvals

Sydney 3 APRIL 2013

SCHEDULE 1

Application No:	11_0094	
Proponent:	Wollongong City Council	
Approval Authority:	Minister for Planning and Infrastructure	
Land:	Reddall's Road:	Part Lot 501 DP 1079122; Lot 502 DP 1079122; Lot 2 DP 240557; Lot 51 DP 1022266; Lot 52 DP 1022266; and Lot 53 DP 1022266.
Project:	Whytes Gully Landfill Extension Project	

TABLE OF CONTENTS

SCHEDULE 2
DEFINITIONS

BCA	Building Code of Australia
Construction	The demolition of buildings or works, carrying out of works, including bulk earthworks and erection of buildings and other infrastructure covered by this approval
Council	Wollongong City Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
DCP	Development Control Plan
DA	Development Application
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department (or his nominee)
EA	Environmental Assessment titled *'Whytes Gully New Landfill Cell'*, dated June 2012 and prepared by Golder Associates Pty Ltd
ENM	Excavated Natural Material
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Regulation	*Environmental Planning & Assessment Regulation 2000*
EPL	Environment Protection Licence
Evening	The period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build
GDEs	Groundwater dependent ecosystems
General Solid Waste (Putrescible)	As defined in the *Waste Classification Guidelines* (DECCW)
General Solid Waste (Non-Putrescible)	As defined in the *Waste Classification Guidelines* (DECCW)
Incident	An incident causing or threatening material harm to the environment, and/or an exceedance of the limits or performance criteria in this approval
Land	In general, the definition of land is consistent with the definition in the EP&A Act.
Landfill	Whytes Gully Landfill
LEMP	Landfill Environmental Management Plan
LGA	Local government area
M	Metres
Material harm to the environment	Harm to the environment is material if it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial
Minister	Minister for Planning and Infrastructure
Mitigation	Activities associated with reducing the impacts of the Project
MRF	Whytes Gully Materials Recycling Facility
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
NOW	Department of Primary Industries – NSW Office of Water
OEH	Office of Environment and Heritage
Operation/s	Operation/s are triggered by the receipt of waste at the new landfill cells covered by this approval
POEO Act	*Protection of the Environment Operations Act 1997*
Preferred Project Report	Preferred Project Report prepared titled *'Whytes Gully New Landfill Cell Response to Submissions/Preferred Project Report'*, dated 20 December 2012 and prepared by Golder Associates Pty Ltd
Privately-owned land	Land not owned by the Proponent or where a private agreement does not exist between the Proponent and the land owner
Project	The development described in the EA
Proponent	Wollongong City Council, or its successor
Reasonable	Reasonable relates to the application of judgment in arriving at a decision, taking into account: mitigation benefits, costs of mitigation versus benefits provided, community views, and the nature and extent of potential improvements
Rehabilitation	The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment
RMS	Roads and Maritime Services
Site	The Whytes Gully RRP as described in the EA
Special Waste	As defined in the EPA's *Waste Classification Guidelines*
Statement of Commitments	The Proponent's Statement of Commitments in Appendix 1
SWERF	Solid Waste to Energy Recycling Facility
Tpa	Tonnes per annum
UV	Ultraviolet
VENM	Virgin Excavated Natural Material
WCC	Wollongong City Council
Whytes Gully RRP	Whytes Gully Resource Recovery Park

SCHEDULE 3
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or decommissioning of the Project.

TERMS OF APPROVAL

2. The Proponent shall carry out the project generally in accordance with the:
   (a) EA;
   (b) PPR;
   (c) Statement of Commitments (see Appendix 1);
   (d) site layout plans and drawings in the EA (see Appendix 2); and
   (e) conditions of this approval.

3. If there is any inconsistency between the above, the conditions of this approval shall prevail to the extent of any inconsistency.

4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   (a) any reports, plans, strategies, programs or correspondence that are submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained in these reports, plans, strategies, programs or correspondence.

LIMITS OF APPROVAL

5. The Proponent shall ensure that no more than 180,000 tpa of waste is accepted at the landfill in any calendar year.

6. This approval does not authorise any landfilling activities or new landfill cell to be constructed or operated within the area marked Stage 4-2B in the PPR and shown in the staging plan in Appendix 3 of this approval.

SURRENDER OF EXISTING DEVELOPMENT CONSENTS

7. Within 12 months from the date of this approval, or as otherwise agreed by the Director-General, the Proponent shall surrender the development consents identified in Table 1 in accordance with Sections 75YA and 104A of the EP&A Act.

Table 1: Existing development consents to be surrendered

DA No.	Site Description	DA Description
DA-1982/459	Western Gully (Landfill)	Waste disposal site
DA-1984/228	Western Gully (Landfill)	Construction and operation of a waste disposal depot
DA-1992/662	Eastern Gully (Landfill)	Upgrade of existing Western Gully Landfill and extension into the adjacent Eastern Gully
DA-1996/8256 DA-1996/6256	SWERF	Construction and operation of a SWERF
DA-1996/256	Landfill Gas and infrastructure	Landfill gas infrastructure
DA-1999/533	Site access and road realignment	Deviation of Reddalls Road, Kembla Grange
DA-2002/2240	Leachate and surface water ponds	Construction of new leachate and stormwater treatment ponds
DA-2003/532	Leachate treatment plant (LTP)	Construction and operation of a LTP
DA-2006/463	Weighbridge and new site entrance	Weighbridge and new site entrance
DA-2010/1088	Small vehicle transfer station	Small vehicle waste transfer station

Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&A Act. Surrender of a consent or approval should not be understood as implying that works legally constructed under a valid consent or approval can no longer be legally maintained or used.

8. To the extent of any inconsistency between the consents identified in Table 1 and this approval, this approval shall prevail.

TRANSITIONAL ARRANGEMENTS

9. All existing environmental management plans that apply to the site under those DAs listed in Table 1 of this Schedule shall continue to be fully applied until replaced under this approval.

STRUCTURAL ADEQUACY

10. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures are constructed in accordance with the relevant requirements of the BCA.

Notes:

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the Project.*

Retaining Walls

11. The Proponent shall ensure that:
    (a) all retaining walls are designed by a suitably qualified civil or structural engineer and are detailed on engineering plans which meet the requirements of WCC; and
    (b) following the completion of construction of any retaining wall, a certificate from a suitably qualified civil or structural engineer is obtained to verify the structural adequacy of the retaining wall.

DEMOLITION

12. The Proponent shall ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601:2001: The Demolition of Structures*, or its latest version.

OPERATION OF PLANT AND EQUIPMENT

13. The Proponent shall ensure that all plant and equipment used for the project is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

PROTECTION OF PUBLIC INFRASTRUCTURE

14. The Proponent shall:
    (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and
    (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

STAGED SUBMISSION OF PLANS OR PROGRAMS

15. With the approval of the Director-General, the Proponent may submit any plan or program required by this approval on a progressive basis.

SCHEDULE 4
SPECIFIC ENVIRONMENTAL CONDITIONS

WASTE

Restrictions on Receipt, Classification and Disposal

1. The Proponent shall only receive waste on site that is authorised for receipt by an EPL.

2. The Proponent shall ensure that any waste generated on the site during construction is classified in accordance with the EPA's *Waste Classification Guidelines* and disposed of to a facility that may lawfully accept the waste.

Resource Recovery

3. The Proponent shall implement all reasonable and feasible measures to recover resources from the waste stream to the satisfaction of the Director-General.

Screening and Acceptance

4. The Proponent must:
   (a) implement auditable procedures to:
      - ensure that the site does not accept wastes that are prohibited; and
      - screen incoming waste loads; and
   (b) ensure that:
      - all waste that are controlled under a tracking system have the appropriate documentation prior to acceptance at the site; and
      - staff receive adequate training in order to be able to recognise and handle any hazardous or other prohibited waste.

Monitoring

5. The Proponent shall prepare and implement a Waste and Resource Recovery Monitoring Program for the site to the satisfaction of the Director-General. This program must:
   (a) be prepared in consultation with the EPA;
   (b) be approved by the Director-General prior to the commencement of operation;
   (c) detail the screening and acceptance procedures required by Condition 4 above;
   (d) monitor:
      - the quantity, type and source of waste received on site; and
      - the effectiveness of the resource recovery measures (see Condition 3 above).

   This program must be documented in the Landfill EMP (see Condition 3 in Schedule 5).

Trade Waste Agreement

6. From the date of this approval, the Proponent shall ensure that a Trade Waste Agreement is in place with Sydney Water for as long as leachate is discharged to sewer.

Landfill Operations

7. Unless the Director-General agrees otherwise, the Proponent shall:
   (a) minimise the exposed or cleared areas at the landfill;
   (b) progressively revegetate all completed areas of the landfill and stabilise any exposed areas with intermediate cover of at least 0.3 m that are not required for operational purposes for a period greater than 90 days;
   (c) ensure intermediate cover areas are revegetated with grasses;
   (d) limit the size of the active tipping face area, waste relocation area, daily cover and 90 day cover areas to minimise dust and odour (see Table 5 of this approval);
   (e) minimise the tracking of mud and waste from the site on public roads;
   (f) fill the landfill cells in a systematic manner;
   (g) maximise landfill compaction rates;
   (h) cover the active landfill area with at least 0.15 m of soil (or a suitable alternative material) at the end of daily waste disposal and compaction activities;
   (i) progressively cap the landfill cells with the approved capping layer, which shall comprise the following (from top to bottom), or an EPA approved alternative:
      - 0.5 m to 1 m revegetation layer;
      - geocomposite drainage system with geotextile covers to prevent clogging of the system from sediment migration;
      - linear Low Density Polyethylene (LLDPE) geomembrane liner to prevent infiltration of water into the landfilled waste;

- 0.2 m clay rich bearing layer to form a low permeability and smooth base for geomembrane liner placement;
- 0.3 m intermediate cover remaining from the landfill operation;
- landfill gas collection trenches underneath the cap, consisting of gravel aggregate and perforated collection pipes connected to an active landfill gas collection system; and

(j) revegetate the covered landfill cells following the capping of each cell and once they reach their final design height.

Cover Material

8. The Proponent shall ensure that all daily waste cover material used on site is ENM, VENM and/or alternative daily cover, as approved in writing by the EPA.

Litter Control

9. The Proponent shall:
   (a) implement suitable measures to prevent the unnecessary proliferation of litter both on and off-site, including the installation and maintenance of a mesh fence of not less than 1.8 metres high around the site; and
   (b) inspect daily and clear the site (and if necessary, surrounding area) of litter on at least a weekly basis.

Lining System

10. Prior to the commencement of any landfilling over existing landfilled waste, the Proponent must construct a Piggyback Liner System over these surfaces to the satisfaction of the EPA. The Liner System shall include the following (from bottom to top), or an EPA approved alternative:
    (a) pipework and gravel trenching to collect and vent landfill gas from the underlying waste to minimise the risk of uncontrolled lateral migration of gas and uplift pressure on the liner;
    (b) a foundation or bridging layer at least 500mm thick comprised of clean, well-graded, coarse engineered fill, with geogrid reinforcement at mid-layer, to protect the liner from deformations due to settlement of the underlying waste;
    (c) a bearing layer at least 200mm thick comprised of compacted clay to provide a smooth surface for installation of the geosynthetic liner materials;
    (d) a composite liner comprised of a reinforced geosynthetic clay liner (GCL) with hydraulic conductivity less than 5×10^{-11} m/s under a 1.5mm thick textured linear low density polyethylene (LLDPE) geomembrane liner;
    (e) a geocomposite leachate collection layer, incorporating a tri-planar geonet drainage core between two protection geotextiles, linked to a pipe network graded at a minimum of 2% to convey collected leachate to a sump at the low point in each cell. The geonet must have equivalent hydraulic transmissivity to a gravel collection layer with a saturated hydraulic conductivity of 1×10^{-3} m/s^2, taking into account field conditions likely to impair the geonet's ability to convey flow; and
    (f) a protection layer comprised of at least 300mm of sand or similar material to protect the geonet and liner from damage (physical and UV).

11. The detailed design of the Piggyback Liner System referred to in Condition 10 of this Schedule (above) must include a settlement analysis addressing predicted settlement and lateral deformations of the underlying waste, and demonstrating, to the satisfaction of the EPA, that:
    (a) the stresses and strains induced in the geosynthetic liner materials by the predicted settlements will be lower than allowable values, as expressed in contemporary best practice guidelines for design with these types of materials;
    (b) there will be no grade reversal of drainage elements which could interfere with collection and conveyance of leachate; and
    (c) where these performance requirements cannot be met when modelling the liner system configuration specified in Condition 10 of this Schedule, that augmentations to the thickness and strength of the liner elements in Condition 10 can be made to provide for long term liner integrity under the predicted maximum settlements.

12. Prior to the commencement of any landfilling over natural surfaces, the Proponent must construct a Conventional Liner System over the base of the cell to the satisfaction of the EPA. The Liner System shall include the following (from bottom to top), or an EPA approved alternative:
    (a) a bearing layer at least 200mm thick of compacted clay to provide a smooth surface for installation of the geosynthetic liner materials;
    (b) a composite liner comprised of a reinforced geosynthetic clay liner (GCL) with hydraulic conductivity less than 5×10^{-11} m/s under a 2mm textured high density polyethylene (HDPE) geomembrane liner. A cushion geotextile must be installed above the geomembrane to protect it from construction and waste-related load damage, including excessive strains introduced by indentation from the overlying gravel drainage aggregate;
    (c) for leachate collection in areas other than over natural ridge areas, a gravel leachate collection layer at least 300mm thick containing a pipe network graded at a minimum of 2% to convey collected leachate to a sump at the low point in each cell. The gravel must be 20mm nominal size gravel with a

saturated hydraulic conductivity of greater than 1 x 10^{-3} m/s^2. The particle size distribution must be uniform, with maximum particle size 26.5mm, not more than 20% passing the 19mm standard sieve aperture, not more than 10% passing the 13.2mm standard sieve aperture, and not more than 3% smaller than 0.075mm. A filter protection geotextile must be placed above the gravel; and

(d) for leachate collection over natural ridge areas, a geocomposite leachate collection layer and a protection layer, as per the requirements for these elements specified for the Piggyback Liner System in Condition 10 of this Schedule.

13. The Proponent shall prepare and implement a Construction Quality Assurance Plan for the project. The plan must:
    (a) be prepared in consultation with EPA by a suitably qualified and experienced expert whose appointment has been endorsed by the Director-General;
    (b) be approved by the Director-General prior the commencement of construction, or at a time otherwise approved by the Director-General;
    (c) outline the construction activities and staging;
    (d) outline the measures taken (e.g. by independent testing, certification, monitoring and inspection) to ensure that the construction and installation of the final leachate-barrier management and collection system would be successful and quality assured;
    (e) specify the final leachate-barrier material selection and construction techniques;
    (f) specify/validate of the final thickness and permeability of leachate barrier/s; and
    (g) include an environmental-awareness site-induction program for construction personnel.

    This plan must be documented in the CEMP (see Condition 2 in Schedule 5).

SOIL & WATER

Surface Water Discharge Limits

14. The Proponent shall ensure that all licensed surface water discharges from the site comply with the discharge limits (volume and quality) set for the project in any EPL or relevant provisions of the POEO Act.

Stormwater Management

15. The Proponent shall:
    (a) design and install the stormwater management and collection system (including new stormwater pond and drainage) generally in accordance Chapter E14 of the *Wollongong DCP 2009*;
    (b) ensure that the system capacity has been designed in accordance with the Blue Book Volumes 1 and 2B and Chapter E14 of *Wollongong DCP 2009*;
    (c) ensure peak stormwater discharge rates from the site at each stage of the project do not exceed pre-development values;
    (d) divert existing clean surface water around operational areas of the site;
    (e) direct all sediment laden water in overland flow away from the leachate management system; and
    (f) prevent cross-contamination of clean and sediment or leachate laden water,

    to the satisfaction of the Director-General.

Flooding Management

16. The Proponent must prepare and implement a Flood Emergency and Evacuation Plan to the satisfaction of the Director-General. The Plan must:
    (a) be prepared by a suitably qualified and experienced expert in consultation with Council;
    (b) be approved by the Director-General prior to the commencement of construction;
    (c) ensure the project is designed in accordance with Chapter E13 of *Wollongong DCP 2009*, Council's Mullet *and Brooks Creeks Floodplain Risk Management Study and Plan* and the *NSW Floodplain Development Manual*, taking into account Council's conduit blockage criteria;
    (d) identify contingency actions to be implemented in the event that the site is inundated during a major flood event to protect:
        - the integrity of stormwater/leachate ponds and prevent release of stormwater/leachate into the local environment including water quality control measures; and
        - human safety.
    (e) identify emergency evacuation routes, flood warning alarms, and evacuation procedures.

    This plan must be documented in the Landfill EMP (see Condition 3 in Schedule 5).

Leachate Management

17. The Proponent shall:
    (a) design and install the leachate management and collection system (including new leachate pond) generally in accordance with the conceptual design in the EA/PPR, applicable Australian Standards and industry standard best practice guidelines, or otherwise approved by the EPA;

(b) ensure that leachate generated by the project is minimised and appropriately contained, collected and disposed of;
(c) collect and store all leachate generated by the project until it is transferred for treatment/processing;
(d) install a leachate barrier to be used for the direct impoundment of leachate (see Conditions 10 to 13 of this Schedule);
(e) design and operate the leachate management system to prevent leachate from escaping to surface water, groundwater or the surrounding subsoils;
(f) ensure that the leachate management and collection system does not include leachate discharge or disposal by way of leachate re-injection into any active or capped landfill cell, unless otherwise approved by the EPA;
(g) direct all surface water from areas not subject to waste disposal or leachate disposal away from the leachate management system; and
(h) treat all water that has entered areas filled with waste, or been contaminated by leachate, as leachate,

to the satisfaction of the Director-General.

Soil, Water and Leachate Management Plan

18. The Proponent shall prepare and implement a Soil, Water and Leachate Management Plan for the project in consultation with Council, NOW and the EPA and to the satisfaction of the Director-General. This plan must be prepared and implemented by a suitably qualified and experienced person and be approved by the Director-General prior to the commencement of operation. The plan must include:
(a) a site water balance that:
- identifies the source of all water collected or stored on site, including rainfall, stormwater and groundwater;
- includes details of all water use on site and any discharges; and
- describes the measures that will be implemented to minimise water use on site.

(b) an erosion and sediment control plan that:
- is consistent with the requirements in the latest version of the Blue Book Volume 1 and Volume 2B;
- identifies the activities on site that could cause soil erosion and generate sediment; and
- describes the measures that will be implemented to:
  - minimise soil erosion and the transport of sediment to downstream waters, including the location, function and capacity of any erosion and sediment control structures and maintain these structures over time;
  - ensure that any topsoil stockpiles on site are suitably managed to ensure that the topsoil in these stockpiles can be beneficially used in the proposed revegetation and rehabilitation of the site.

(c) a leachate management plan that:
- includes final detailed design specifications of the leachate management and collection system on site;
- demonstrates how the requirements of Condition 17 of this Schedule have been addressed; and
- includes a remedial action plan should leachate escape the leachate containment system.

(d) a stormwater management plan that:
- is consistent with the guidance in the latest version of the Blue Book Volume 1 and Volume 2B and Chapter E14 of *Wollongong DCP 2009*;
- includes final detailed design specifications for the stormwater management and collection system; and
- demonstrates how the requirements of Condition 15 of this Schedule has been addressed;

(e) an on-going surface water, groundwater and leachate monitoring program that includes (but is not limited to):
- baseline data;
- a combined surface and groundwater monitoring program to gain an understanding of surface and groundwater interaction and the potential for any impacts of the project on the downstream environment including GDEs and Dapto Creek;
- surface and groundwater impact assessment criteria including trigger levels for investigating adverse impacts;
- a Mitigation Plan detailing the remedial actions to be implemented address potential impacts on the downstream environment from surface or groundwater contamination associated with the project and/or in the event of exceedances of the surface and/or groundwater impact assessment criteria; and
- a commitment to provide the results of monitoring to NOW and other relevant government agencies every 12 months.

This plan must be documented in the Landfill EMP (see Condition 3 in Schedule 5).

Contamination Management Plan

19. The Proponent shall prepare and implement a Contamination Management Plan for the project to the satisfaction of the Director-General. This Plan must:
    (a) be prepared by a suitably qualified and experienced expert;
    (b) be submitted to the Director-General prior to the commencement of construction;
    (c) detail the protocols to be put in place and followed in the event that contaminated soil (including Acid Sulfate Soils) or water is encountered during construction;
    (d) be prepared in accordance with the relevant best practice industry guidelines such as the *NSW State Government's Acid Sulfate Soils Manual* (ASSMAC 1998);
    (e) detail how excavated soil will be tested, handled and stockpiled;
    (f) detail the measures that will be employed to prevent erosion and sedimentation of contaminated soil; and
    (g) outline how contaminated soil and water will be disposed of off-site (e.g. at a licensed facility).

    This plan must be documented in the CEMP (see Condition 2 in Schedule 5).

Bunding

20. The Proponent shall store all chemicals, fuels and oils used on-site in appropriately bunded areas in accordance with the requirements of all relevant Australian Standards, and/or EPA's *Storing and Handling Liquids: Environmental Protection – Participants Handbook*.

Erosion and Sediment Control

21. During the construction of the project, the Proponent shall implement suitable erosion and sediment control measures on site, in accordance with the relevant requirements in the latest version of the *Managing Urban Stormwater: Soils and Construction* guideline.

Soil

22. The Proponent shall:
    (a) minimise any soil loss through erosion on site;
    (b) set aside any topsoil won on site for the proposed revegetation and rehabilitation of the site; and
    (c) ensure that any topsoil stockpiles on site are suitably managed to ensure that the topsoil in these stockpiles can be beneficially used in the proposed revegetation and rehabilitation of the site.

AIR QUALITY

Odour

23. The Proponent shall ensure the project does not cause or permit the emission of any offensive odour (as defined by the POEO Act).

Dust Criteria

24. The Proponent shall ensure that dust generated by the project does not exceed the criteria listed in Tables 2 to 4 at any private residential receiver, or on more than 25 percent of any privately owned land surrounding the site.

Table 2: Long term criteria for particulate matter

Pollutant	Averaging period	[d]Criterion
Total suspended particulate (TSP) matter	Annual	[a]90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a]30 µg/m^3

Table 3: Short term criterion for particulate matter

Pollutant	Averaging period	[d] Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	[a] 50 µg/m^3

Table 4: Long term criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total[1] deposited dust level

[c]Deposited dust	Annual	[b]2 g/m^2/month	[a]4 g/m^2/month

Notes for Tables 2 -4:

- *[a]Total impact (i.e. incremental increase in concentrations due to the Development plus background concentrations due to other sources);*
- *[b] Incremental impact (i.e. incremental increase in concentrations due to the Development on its own);*
- *[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and*
- *[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agree to by the Director-General in consultation with the EPA.*

Dust Minimisation

25. During construction, the Proponent shall ensure that:
    (a) all vehicles on site do not exceed a speed limit of 25 kilometres per hour;
    (b) all loaded vehicles entering or leaving the site have their loads covered; and
    (c) all loaded vehicles leaving the site are cleaned of dirt, sand and other materials before they leave the site, to avoid tracking these materials on public roads.

Operating Conditions

26. The Proponent shall:
    (a) implement best management practice, including all reasonable and feasible dust and odour mitigation measures to prevent and minimise dust and odour emissions from operation;
    (b) prevent and minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events;
    (c) regularly assess air quality monitoring data and relocate, modify, and/or stop operation to ensure compliance with the relevant conditions of this consent; and
    (d) minimise surface disturbance of the site, other than as permitted under this consent.

Project Areas

27. For each stage of the project identified in Table 5 (below), the Proponent shall comply with the maximum area specified for active tipping face, waste relocation, daily cover and 90 day cover in the corresponding row and columns (from left to right), unless otherwise approved by the Director-General in consultation with the EPA.

Table 5: Active tipping face area, waste relocation area, daily cover and 90 day cover

Stage	Active tipping face Area (m^2)	Waste relocation Area (m^2)	Daily Cover Area (m^2)	90 Day Cover Area (m^2)
Stage 1	1,100	1,800	19,800	14,000
Stage 2	1,000	0	1,300	7,500
Stage 3	1,000	0	1,300	7,500
Stage 4	1,000	0	1,300	7,500

Note: This condition has been included in the approval to help control/minimise odour and dust emissions.

Monitoring

28. The Proponent shall install and operate a meteorological weather monitoring station on the site for the life of the project that complies with the requirements in the latest version of the EPA's *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline. The meteorological station must be maintained so as to be capable of continuously monitoring the following parameters: air temperature, wind direction, wind speed, rainfall and relative humidity.

Air Quality Management Plan

29. The Proponent shall prepare and implement an Air Quality Management Plan for landfilling operations in consultation with the EPA. The plan must:
    (a) be prepared and implemented by a suitably qualified and experienced expert;
    (b) be approved by the Director-General prior to the commencement of operation;
    (c) describe the measures that will be implemented to ensure:
        - best management practice is employed;
        - the air quality impacts (including odour) from landfilling are minimised during adverse meteorological conditions and extraordinary events; and
        - compliance with the relevant conditions of this approval.

(d) describes the air quality management system; and
(e) includes an air quality monitoring program that:
- is capable of evaluating the performance of the landfill;
- includes a protocol for determining any exceedances of the relevant conditions of approval and responding to complaints;
- adequately supports the air quality management system; and
- evaluates and reports on the effectiveness of the air quality management system.

This plan must be documented in the Landfill EMP (see Condition 3 in Schedule 5).

Greenhouse Gas Management Plan

30. The Proponent must develop and implement a Greenhouse Gas Management Plan prior to the commencement of operation of the new landfill cells. This plan must include, as a minimum:
(a) final details of the landfill gas management system including flaring and/or combustion to reduce potential greenhouse gas emissions from the landfill;
(b) energy saving measures to be implemented; and
(c) include a program to monitor the effectiveness of these measures, and a protocol to periodically review the plan.

This plan must be documented in the Landfill EMP (see Condition 3 in Schedule 5).

NOISE

Noise Limits

31. The Proponent shall ensure that the noise generated by the operations on site does not exceed the criteria in Table 6 at any private residential receiver.

Table 6: Noise impact assessment criteria dB(A)

Residential Receiver Location	Day
	$L_{Aeq\ (day)}$
N1	47
N2	45
N3	38
N4	35
N5	35

- *To identify a residential receiver location, refer to Appendix 6 of this approval and Appendix D of the EA.*
- *Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Operating Conditions

32. The Proponent shall:
(a) implement best management practice, including all reasonable and feasible noise management and mitigation measures to prevent and minimise operational, low frequency and traffic noise generated by the project;
(b) minimise the noise impacts of the project during adverse meteorological conditions when noise criteria do not apply;
(c) maintain the effectiveness of any noise suppression equipment on plant at all times and ensure defective plant is not used operationally until fully repaired; and
(d) regularly assess noise monitoring data and relocate, modify and/or stop operations to ensure compliance with the relevant conditions of this approval.

Operating Hours

33. The Proponent shall comply with the construction and operating hours detailed in Table 7 for the site, unless otherwise agreed in writing by the Director-General.

Table 7: Construction and Operating Hours

Activity	Day	Time
Construction	Monday - Friday	7.30am – 4.30pm
	Saturday	8.00am – 4.00pm
	Sunday and Public Holidays	Nil
Operation	Monday to Friday	7.30am – 4.30pm
	Saturdays, Sundays and Public Holidays	8.00am – 4.00pm

Noise Management Plan

34. The Proponent shall prepare and implement a Noise Management Plan for the project in consultation with the EPA and to the satisfaction of the Director-General. The plan must:
    (a) be prepared and implemented by a suitably qualified and experienced person whose appointment has been approved by the Director-General;
    (b) be approved by the Director-General prior to the commencement of construction;
    (c) describe the measures that will be implemented to minimise noise from the construction and operation of the project and ensure:
        - best management practice is employed on site;
        - implementation of traffic noise management measures;
        - the noise impacts of the project are minimised during adverse meteorological conditions; and
        - compliance with the relevant conditions (including noise limits) of this approval.
    (d) describe the noise management system;
    (e) includes a noise monitoring program that:
        - is capable of evaluating the performance of the project;
        - includes a protocol for determining exceedances of the noise limits in this approval and responding to complaints;
        - adequately supports the noise management system; and
        - evaluates and reports on the effectiveness of the noise management system.
    (f) include a description of the remedial actions that may be implemented in the event of a non-compliance with the noise limits in this approval.

    This plan must be documented in the CEMP and Landfill EMP (see Conditions 2 and 3 in Schedule 5).

TRANSPORT

Traffic Monitoring

35. The Proponent shall:
    (a) keep accurate records of the volume of waste transported to the site;
    (b) nominate a haulage route to be used by heavy vehicles accessing the landfill consistent with the traffic assessment in the EA; and
    (c) make these records available in its Annual Report.

Operating Conditions

36. The Proponent shall ensure that:
    (a) internal roads, driveways and parking (including grades, turn paths, sight distance requirements, aisle widths, aisle lengths and parking bay dimensions) associated with the project are constructed and maintained in accordance with the latest versions of AS 2890.1 and AS 2890.2;
    (b) the swept path of the longest vehicle entering and exiting the subject site, as well as manoeuvrability through the site, is in accordance with AUSTROADS;
    (c) the project does not result in any vehicles queuing on the public road network;
    (d) heavy vehicles and bins associated with the project do not park or stand on local roads or footpaths in the vicinity of the site;
    (e) all vehicles are wholly contained on site before being required to stop;
    (f) all loading and unloading of materials is carried out on site; and
    (g) the proposed turning areas in the car park are kept clear of any obstacles, including parked cars, at all times.

Intersection Upgrade

37. Prior to the receipt of more than 180,000 tpa of waste at the Whytes Gully RRP in any calendar year, or as otherwise directed by RMS, the Proponent must upgrade the intersection of West Dapto Road and the Princes Highway to traffic signals in accordance with WCC's Works Authorisation Deed with RMS, to the satisfaction of RMS.

Construction Traffic Management

38. The Proponent shall prepare and implement a Construction Traffic Management Plan for the project, to the satisfaction of the Director-General. The Plan shall:
    (a) be prepared in consultation with Council and RMS by a suitably qualified and experienced expert;
    (b) be approved by the Director-General prior to the commencement of construction;
    (c) include a detailed analysis of the impact of the project on the road network during construction;
    (d) detail the measures that would be implemented to manage internal and external road safety and network efficiency including measures to control traffic movements during construction;
    (e) detail the access and parking arrangements for the site during construction;
    (f) detail the measures to ensure that the local road network is not utilised by vehicles associated with the project during construction; and
    (g) if necessary, detail procedures for notifying residents of any potential disruptions to routes and access.

    This plan must be documented in the CEMP (see Condition 2 in Schedule 5).

VISUAL AMENITY

Lighting

39. The Proponent shall ensure that the lighting associated with the project:
    (a) complies with the latest version of *AS 4282(INT) - Control of Obtrusive Effects of Outdoor Lighting*; and
    (b) is mounted, screened and directed in such a manner that it does not create a nuisance to surrounding properties or the public road network.

Landscaping

40. The Proponent shall progressively implement the Landscape Plan (Appendix 7) following the completion of ground disturbing works across the site, to the satisfaction of the Director-General.

Signage

41. The Proponent shall not install any advertising signs on site without the written approval of the Director-General.

HAZARDS

Pre-construction

42. The Proponent shall prepare the studies set out under subsections 42(a) to 42(b) (the pre-construction studies). Construction, other than of preliminary works that are outside the scope of the hazard studies, shall not commence until study recommendations have been considered and, where appropriate, acted upon.

    (a) Bushfire Risk Management Strategy
    A Fire Management Strategy for the Project. This strategy shall cover all proposed recommendations and safeguards set out in the Bushfire Report at Appendix M of the EA.

    (b) Hazard and Operability Study
    A Hazard and Operability Study (or equivalent) for the proposed landfill gas handling equipment, chaired by an independent qualified person. The study shall be consistent with the Department of Planning's *Hazardous Industry Planning Advisory Paper No. 8, 'HAZOP* Guidelines'.

Pre-commissioning

Safety Management System

43. Prior to commissioning, the Proponent shall develop and implement a comprehensive Safety Management System (SMS), covering all on-site operations. The Safety Management System shall be consistent with the Department of Planning's *Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'*. The SMS shall include procedures for ensuring the ongoing implementation and integrity of the safeguards identified in the Preliminary Hazard Analysis (PHA) at Appendix L of the EA and in the Bushfire Risk Management Strategy at Appendix M of the EA.

Pre-startup

Pre-startup Compliance Report

44. The Proponent shall submit to the Department a report detailing compliance with Conditions 42 and 43 one month prior to the commencement of operation.

Pest, Vermin & Noxious Weed Management

45. The Proponent shall:
    (a) implement suitable measures to manage pests, vermin and declared noxious weeds on site; and
    (b) inspect the site on a regular basis to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard, or cause the loss of amenity in surrounding area.

    Note: For the purposes of this condition, noxious weeds are those species subject to an order declared under the Noxious Weed Act 1993.

Fire Management

46. The Proponent shall:
    (a) implement suitable measures to minimise the risk of fire on site, including in the landfill area;
    (b) extinguish any fires on site promptly; and
    (c) maintain adequate fire-fighting capacity on site.

CONSERVATION

Heritage

47. During the life of the Project, the Proponent shall protect the identified heritage and archaeological sites outside of the Project footprint, in consultation with the Local Aboriginal Land Council, and to the satisfaction of the Director-General.

    Note: The location of heritage and archaeological sites on the site are illustrated in Appendix 8 of this approval.

Heritage Management

48. The Proponent must prepare:
    (a) heritage training and induction processes for construction personnel (including procedures for keeping records of inductions) including site identification, protection and conservation of Aboriginal and historic heritage; and
    (b) procedures for dealing with heritage items including human remains, including cessation of works in the vicinity and notification of the Department, NSW Police Force (in the case of human remains), OEH and registered Aboriginal stakeholders and not recommencing any works in the area unless authorised by the NSW Police Force and/ or the Department.

    These procedures must be documented in the CEMP (see Condition 2 in Schedule 5).

Vegetation and Biodiversity Management

49. The Proponent shall prepare and implement a Vegetation Management Plan for the project to the satisfaction of the Director-General. This plan must:
    (a) be prepared by a suitably qualified and experienced expert;
    (b) be approved by the Director-General prior to the commencement of construction;
    (c) include a vegetation clearing protocol (see Condition 50 of this Schedule);
    (d) must specifically include a Biodiversity Offset Strategy that:
        - is assessed against the OEH's '*Principles for the Use of Biodiversity Offsets in NSW*' and the '*Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, SSD and SSI Projects'*;
        - details the proposed offset measures to be implemented and secured for removing 0.49 hectares of native vegetation (including 0.01 hectares of Illawarra Subtropical Rainforest);
        - identify conservation mechanisms to be used to ensure the long term protection and management of the offset sites;
        - references best practice management guidelines for restoring and managing the vegetation communities proposed for protection;
        - details how the proposed offset measures will be protected, managed, funded and monitored over the life of the project;
    (e) ensure the project maintains suitable buffer distances to nearby waterways in accordance with *Wollongong DCP 2009* to protect riparian land; and
    (f) details the site-wide ecological management and monitoring program/s to be implemented for the life of the project.

    This plan must be documented in the Landfill EMP and CEMP (see Conditions 2 and 3 in Schedule 5).

50. The Vegetation Clearing Protocol must:
    (a) clearly identify the location and type of vegetation to be retained and to be removed from the site;

(b) detail measures that would be implemented for vegetation clearing;
(c) ensure vegetation, including trees would not be pushed or felled into any retained bushland areas during the vegetation removal process;
(d) detail procedures to manage impacts on fauna including translocation of fauna by a suitably qualified ecologist/wildlife rescuer (if appropriate); and
(e) detail the staging of construction to avoid breeding times for key species on site.

LANDFILL CLOSURE AND REHABILITATION

51. The Proponent shall prepare and implement a Rehabilitation Management Plan for the landfill to the satisfaction of the Director-General. This plan must:
(a) be prepared in consultation with the OEH by a suitably qualified and experienced expert;
(b) be submitted to the Director-General for approval within six (6) months of the date of this approval;
(c) be undertaken in a manner which is complementary with the rehabilitation is consistent with the proposed final landform depicted in the figures in Appendices 4 and 7;
(d) specify a time period for the rehabilitation to works to commence and be finalised following cessation of landfill activities; and
(e) be documented in the Landfill EMP (see Condition 3 in Schedule 5).

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING & AUDITING

COMMUNITY EDUCATION PROGRAM

1. The Proponent shall prepare and implement a Community Education Program for the project to the satisfaction of the Director-General. This program must be submitted to the Director-General for approval prior to the commencement of operation, and shall at a minimum focus on promoting resource recovery activities provided at the site.

ENVIRONMENTAL MANAGEMENT

Construction Environmental Management Plan

2. The Proponent shall prepare and implement a Construction Environmental Management Plan for the project to the satisfaction of the Director-General. The Plan must:
   (a) be approved by the Director-General prior to the commencement of construction;
   (b) identify the statutory consents and approvals that apply to the project;
   (c) include a copy of all relevant management plans and monitoring programs required under this approval;
   (d) outline all environmental management practices and procedures to be followed during construction and demolition works associated with the project;
   (e) describe all activities to be undertaken on the site during construction of the project, including a clear indication of construction stages;
   (f) detail how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;
   (g) describe of the roles and responsibilities for all relevant employees involved in construction and demolition works associated with the project;
   (h) include arrangements for community consultation and complaints handling procedures during construction and demolition; and
   (i) be placed on Council's website within 2 weeks of its approval.

   Note: Construction of the project shall not commence until written approval of this plan has been received from the Director-General.

Landfill Environmental Management Plan

3. Prior to the commencement of operation, the Proponent shall update the draft Landfill Environmental Management Plan in the EA for the site to the satisfaction of the Director-General. This plan must:
   (a) be prepared by suitably qualified and experienced experts whose appointment has been endorsed by the Director-General;
   (b) be prepared in consultation with the EPA and other relevant government agencies;
   (c) be approved by the Director-General prior to the commencement of operation;
   (d) describe in detail the management measures that would be implemented to address:
      - the relevant matters referred to in the *Environmental Guidelines for Solid Waste Landfills*;
      - the conditions of this approval; and
      - requirements of the EPL;
   (e) include a copy of:
      - the relevant plans and programs required under this approval;
      - a quality assurance plan for the design and installation of the leachate management system and any capping of the landfill cells that covers the relevant issues outlined in sections 1 – 2 of Appendix A of the *Environmental Guidelines for Solid Waste Landfills*;
   (f) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the Project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the Project; and
      - respond to emergencies;
   (g) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the Project; and
   (h) be placed on Council's website within 2 weeks of its approval.

Management Plan Requirements

4. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:
   (a) detailed baseline data;
   (b) a description of:
      - the relevant statutory requirements (including any relevant approval, licence or lease conditions);

- any relevant limits or performance measures/criteria; and
- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;

(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
(d) a program to monitor and report on the:
(e) impacts and environmental performance of the Project;
(f) effectiveness of any management measures (see c above);
(g) a contingency plan to manage any unpredicted impacts and their consequences;
(h) a program to investigate and implement ways to improve the environmental performance of the project over time;
(i) a protocol for managing and reporting any:
(j) incidents;

- complaints;
- non-compliances with statutory requirements; and
- exceedances of the relevant limits and/or performance measures / criteria; and

(k) a protocol for periodic review of the plan.

Annual Review

5. One year after the commencement of operation, and annually thereafter, the Proponent shall review the environmental performance of the Project to the satisfaction of the Director-General. This review must:
   (a) describe the operations that were carried out in the past calendar year;
   (b) analyse the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the
   - relevant statutory requirements, limits or performance measures/criteria;
   - monitoring results of previous years; and
   - relevant predictions in the EA;

   (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
   (d) identify any trends in the monitoring data over the life of the Project;
   (e) describe what actions will be implemented over the next year to improve the environmental performance of the project (including a timeline for the completion of each action); and
   (f) be placed on Council's website within 2 weeks of its completion.

Revision of Plans & Programs

6. Within 3 months of the submission of an:
   (a) audit under Condition 9 of Schedule 5;
   (b) incident report under Condition 7 of Schedule 5; and
   (c) annual review under Condition 5 of Schedule 5,

   the Proponent shall review, and if necessary revise the plans and programs required under this approval to the satisfaction of the Director-General.

   Note: This is to ensure the plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the Project.

REPORTING

Incident

7. The Proponent shall notify the Director-General and any other relevant agencies of any incident or potential incident with actual or potential significant off-site impacts on people or the biophysical environment associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of this incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident.

Regular

8. The Proponent shall provide regular reporting on the environmental performance of the Project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Director-General.

INDEPENDENT ENVIRONMENTAL AUDIT

9. Within a year of the commencement of operation of the project, and every 5 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the Project. This audit must:
   (a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
   (b) include consultation with the relevant agencies;

(c) assess the environmental performance of the project and assess whether it is complying with the relevant requirements in this approval and any relevant EPL (including any plan or program required under these approvals);
(d) review the adequacy of any plans or programs required under these approvals; and, if appropriate; a
(e) recommend measures or actions to improve the environmental performance of the Project, and/or any plan or program required under these approvals; and
(f) be placed on Council's website within 2 weeks of its completion.

Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Director-General.

10. Within 6 weeks of the completing of this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

11. From the commencement of construction of the project, the Proponent shall make the following information publicly available on its (Council's) website as it is progressively required by the approval:
(a) a copy of all current statutory approvals;
(b) a copy of the current plans and programs required under this approval;
(c) a summary of the monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval;
(d) a complaints register, which is to be updated on a monthly basis;
(e) a copy of the Annual Reviews (over the last 5 years);
(f) a copy of any Independent Environmental Audit, and the Proponent's response to the recommendations in any audit; and
(g) any other matter required by the Director-General.

APPENDIX 1
PROPONENT'S STATEMENT OF COMMITMENTS

Issue	Commitments
General	• Wollongong City Council would implement the Project in accordance with the EA and conditions of approval as provided by the determining authority. • Wollongong City Council commit to considering the Concept Site Masterplan for future planning of resource recovery activities on the Whytes Gully RRP site. This includes consideration of an appropriate footprint for future resource recovery activities and access requirements. • By 2014 Wollongong City Council's Waste Strategy commits Wollongong City Council to reviewing available alternative waste technologies as identified in Wollongong City Council's Waste Strategy. • If the Project is approved, it is proposed that Wollongong City Council would surrender existing development consents of relevance to the Project site. This does not include the existing development consent for the MRF, which is not affected by the Project.
Waste Management Strategy	• Wollongong City Council would implement the Project in accordance with the "Wollongong City Council Waste and Resource Recovery Strategy 2012 to 2022" as provided in Appendix B and future updates of this document as relevant to the Project. • Detailed design of the Project would consider and address constraints and opportunities identified within the EA.
Environmental Management Plans	• A Construction Environmental Management Plan would be prepared and implemented to guide environmental management and monitoring activities during construction. The CEMP would include specific environmental issue sub-plans to reduce potential impacts and in accordance with relevant commitments identified within the EA and within this table. A monitoring program shall be conducted throughout the construction period to monitor compliance with the CEMP. • The Landfill Environmental Management Plan (LEMP) would be implemented to be consistent with the draft LEMP provided in Appendix P. This includes implementation measures to guide environmental management and monitoring activities during operation as identified within the EA in addition to further specific issues identified within this Table.
Noise	Wollongong City Council commit to the following with regard to noise: • All mobile equipment would be selected to minimise noise emissions. Equipment would be fitted with silencers and be in good working order. • Broadband reversing alarms would be used for all site equipment. • Construction activities would be limited to the recommended construction hours where feasible and reasonable. • Consultation with residents who are identified as potentially affected by cumulative and operational noise exceedances and communication of details of the construction and operational program on a regular basis. • In accordance with Chapter 8 of the EPA "NSW Industrial Noise Policy" (2000), negotiated agreements would be commenced prior to construction of the appropriate stage of the Project with the affected community (i.e. Receiver N1 – Stage 3, Receiver N2 – Stage 2). • Provide a community liaison phone number and permanent site contact so that noise complaints would be received and addressed in a timely manner. • ~~Submission of a noise impact assessment and associated mitigation measures for Stage 4 2b for approval prior to commencement of construction of Stage 4 2b.~~
Greenhouse Gas	Wollongong City Council commit to the following:

Issue	Commitments
	• An active landfill gas management system would be installed including flaring and/or combustion to reduce potential greenhouse gas emissions from the landfill. • Potential energy efficiency measures would be considered in the detailed design phase of the Project and be implemented and monitored through an Energy Savings Action Plan in accordance with the "Guidelines for Energy Savings Action Plans (DEUS 2005).
Erosion and Sediment Control	• An Erosion and Sedimentation Control Plan would be developed as part of the CEMP in general accordance with the following erosion and sedimentation control principles including: o Construction of earth bunds and diversion drains upslope and around the perimeter of construction areas where surface disturbance occurs, to prevent clean surface water entering these areas. o Erection of silt fences or straw bales at strategic locations (i.e. around stockpiles) to manage the migration of fines. o Construction of temporary sediment retention ponds. o Dust suppression as needed. o Reducing the surface area disturbed by construction activities at any one time. o Regular inspection and maintenance of sediment and erosion control structures. o Protecting and retaining vegetation and surface cover where possible. o Placement of an erosion protection barrier (e.g. grassing) at the completion of works. o Using designated access roads and paths where possible. o Removing soil adhering to the wheels and undercarriage of trucks (e.g. by wheel wash) prior to departure from the Project site. o Limit both the size of any stockpile footprints and the time between excavation and removal off-site of materials. o Do not place stockpiles within 30 m of any watercourse. o Stabilise all disturbed areas as soon as practicable. Temporary vegetative destabilisation techniques must be applied to any disturbed soil to prevent areas remaining bare for more than 28 days. o Stabilise all temporary and permanent drainage immediately. o Maintain all sediments and erosion control measures in effective condition until the works are completed and the site is stabilised. o Release "Dirty" Stormwater, captured and stored by sediment and erosion control measures or site works, after treatment and testing to confirm compliance with relevant criteria. o A monitoring program shall be conducted by throughout the construction period to monitor compliance with the CEMP. • Proposed erosion and sediment control measures that would be applied during operation of the Project are outlined in the draft LEMP (Appendix P).
Acid Sulfate Soils	In the event of discovery of Acid Sulfate Soils, procedures would be implemented/adopted to mitigate potential impacts on the environment in accordance with appropriate guidance and legislation and as identified in Chapter 12 of the EA.
Contamination	In the event of discovery of previously unidentified area(s) of potentially contaminated material, procedures would be implemented/adopted to mitigate potential impacts on the environment, employees and the public in accordance with appropriate guidance and legislation and as identified in Chapter 12 of the EA.
Surface Water	• A Surface Water Management Plan would be developed as part of the CEMP in general accordance with the following control principles: o Bund fuels, oils, paints, and other chemicals onsite to comply with the requirements of relevant legislation. o Bunds must be fitted with an impervious floor and must not be fitted with a drain valve. o Remove accidental spills of soil or other materials.

Issue	Commitments
	• Wollongong City Council would commit to the following key principles in developing the surface water management controls for operation of the Project. o Diversion of clean drainage directly into Dapto Creek. Runoff from areas that are unaffected by the development would be allowed to discharge directly from the site to Dapto Creek. o Runoff from areas that are likely to generate sediment such as the new cell construction areas and stockpile areas would be directed into the Surface Water Ponds. o Reduce the volume of runoff to Surface Water Ponds by reducing the contributing catchment area at any particular time. o Keep sources of different water quality types separate from each other. o Construction of a perimeter bund around the entire active landfill area to prevent surface water from entering the landfill area. o Construction of a diversion drain around the entire landfill area to collect all runoff from disturbed areas (but outside exposed/uncapped active waste cell area(s)) which would drain to the sedimentation basin o The existing surface water ponds would be used for Stage 1 to 3 of the development. o The Surface Water ponds would be downsized for Stage 4 onwards, as Stage 1 to 3 would be rehabilitated and runoff would be directed offsite to Dapto Creek. o Re-use 'dirty' water for dust suppression.
Groundwater	• A Construction Quality Assurance (CQA) system would be implemented for cell construction. Detailed CQA requirements are embedded in the Technical Specification of the Design Report (Appendix 0). • During the operational phase of the Project a number of engineering measures and management strategies would be used to mitigate impacts to groundwater. Further documented within the EA these include: o Leachate Barrier System and Leachate Collection System o Leachate Pond o Leachate Treatment Plant o Groundwater separation o Monitoring - A network of groundwater bores would be used to monitoring groundwater quality and trends at the Project Site. This would include a regular programme of groundwater sampling and assessment as detailed in the LEMP. - The leachate management system would be monitored in accordance with measures described in the LEMP including direct monitoring for the purposes of system integrity, leachate quantity and quality. - Groundwater Assessment Program to monitor background concentrations. If a significant change in concentration for any of the indicator parameters is detected over two consecutive monitoring periods, then the affected groundwater monitoring bores would be resampled and assessed and OEH notified (if required). Following this a groundwater remediation plan may be developed in accordance with the LEMP. - Combined surface water and groundwater monitoring program to gain an understanding of surface water and groundwater interaction and to assess potential impacts on the downstream environment including Dapto Creek and GDEs
Leachate Management	Wollongong City Council commit to the following with respect to leachate management: • Segregation of leachate from surface water and groundwater; • Maintain pond levels with adequate freeboard to minimise the potential for

Issue	Commitments
	overflow; • Continue to monitor leachate discharge to sewer in accordance with Trade Waste Agreement.
Flora and Fauna	Wollongong City Council commit to the following to ensure the Project maintains or improves the biodiversity values of the region. • Clearing for the purposes of bushfire protection would be restricted to non-native vegetation communities (Acacia Scrub/Exotic, Closed Exotic Grassland, Planted). In accordance with the Bushfire Assessment, clearing or trimming of the Illawarra Subtropical Rainforest on the site is proposed to be avoided. • Removal of native vegetation communities and fauna habitats during construction and operation of the Project be avoided and minimised where possible. • Undertaking two additional targeted surveys for the Green and Golden Bell Frog in the peak breeding season to confirm results of targeted surveys undertaken in November/December 2011 and early January 2012. • Waterbody removal and associated vegetation removal being undertaken over the spring or summer months when fauna species are most active. • Undertaking protection of all retained trees. Tree protection measures such as temporary fencing will be implemented for any trees potentially indirectly impacted by the Project. • Installation of protective fencing around all retained native vegetation. This is particularly important for areas of ISTR EEC where there is a risk of indirect impact. • Installation of sediment and erosion controls as required including for potential indirect impacts to the ISTR EEC. • Ensure machinery parking, equipment or materials storage compounds, temporary stockpiling of excavated material and work areas are outside sensitive natural features including retained native vegetation, wetlands and drainage lines. • Logs removed with any vegetation removal would be relocated into areas of retained vegetation, for the purpose of providing fauna habitat. • A weed control program would be undertaken in accordance with the LEMP. • Undertake revegetation of cleared and disturbed areas using a range of native species of local provenance for the purpose of managing weeds, controlling soil erosion, and maintaining fauna habitat in accordance with the Landscape Strategy (Appendix N). • Maintain suitable buffer distances from nearby waterways. These buffer distances are recommended based on the stream orders of waterways and the subsequent categories identified within the "Wollongong City Council Development Control Plan 2009". • Following the disturbance of existing surface water ponds, landscaping would be undertaken to enhance existing riparian zone vegetation associated at the ponds to be in accordance with appropriate riparian buffer widths. The vegetation buffer is proposed to be constructed to an average width of 5 metres where possible to improve the existing aquatic habitats. • Extend the current water quality monitoring program to include one monitoring location on Dapto Creek, upstream of the discharge point and two locations downstream. • Biodiversity and habitat values would be maintained and increased where possible by planting a range of indigenous species. • Offsetting measures, and measures to monitor the success of these offsets, would be outlined in a Vegetation Management Plan.

Issue	Commitments
Air Quality	Wollongong City Council commits to the following with regard to air quality: • Watering of unsealed haul roads and disturbed surfaces (including construction areas). • Restricting the size of disturbed areas as much as practicable. • Disturbed areas would be rehabilitation progressively in accordance with the Landscape Strategy. • Prevention of truck over-loading and covering dusty loads. • Washing down trucks before they leave the site. • Maintaining equipment and plant appropriately to ensure efficient operation. • The active landfill area would be covered following the completion of waste placement at the end of each day with landfill lids or approximately 150 mm of daily cover material or other cover system. • Adhering to appropriate hours of construction and operation. • Temporarily suspending operations under extreme wind speed conditions. • Giving consideration to reducing the footprint of the active cell area and daily cover and increasing the thickness of daily cover to control odour as required, particularly during the operation of Stage 1 during waste relocation works and Stage 4. • An air quality (including dust and odour) management strategy would be incorporated into the CEMP. • Monitoring in accordance with the EPL and ongoing assessment.
Traffic and Transport	Wollongong City Council commit to: • Appropriate management and maintenance of road pavement of Reddalls Road intersection to Whytes Gully RRP and site access. • The CEMP for the Project would include a traffic management plan identifying truck movements to and from the site, internal access, interactions with general public, parking and access requirements for construction personnel and safety signage and training of personnel in traffic management in accordance with relevant requirements and guidelines of the RTA in terms of road safety and network efficiency. • Where possible, trucks to the site would be scheduled to avoid peak hour and within standard hours of operation, except in emergencies.
Heritage	Wollongong City Council commit to the following with regard to heritage (indigenous and non-indigenous): • Registered Aboriginal parties identified within the EA would be informed about the management of Aboriginal cultural heritage sites within Whytes Gully RRP where they may be impacted upon by the Project. • Identified potential archaeological deposits within the Whytes Gully RRP site would be left in their identified location and not salvaged unless the Project cannot avoid impacting upon these sites. If salvage is required Wollongong City Council would consult with the relevant statutory bodies and provide an opportunity for collection of the cultural material from the site. • Monitoring of construction would be completed for the Project where in proximity to listed heritage items (i.e. Glengarry Cottage) to ensure there is no disturbance to heritage significance. • A heritage induction including indigenous and non-indigenous heritage is proposed to be incorporated within the general induction during construction of the Project. • Should indigenous or non-indigenous cultural material be identified during any

Issue	Commitments
	works, construction and/or operation will cease in the vicinity of the find and the appropriate representative at OEH will be contacted.
Visual	Wollongong City Council commit to: • Staging and planning of landfill activities to reduce the extent to which they would be visible during the construction and operation of the Project. • Implementation of the Landscape Strategy (Appendix N of the EA) to reduce and manage potential long term visual impacts. • Reducing the area of un-vegetated landfill slope, both permanent and temporary, by staging the operations and progressively establishing a vegetation cover on each section of slope as they are completed. • Revegetating the proposed landfill slopes with mix of shrubs and small trees and grass to create a landscape character similar to adjoining rural areas. • Adopting design options (when suitable) to be in keeping with the surroundings of the site including native grasses and dark toned colours for existing and proposed structures to reduce their visual contrast with their landscape setting. • Consulting with residents (as identified within the relevant chapter of the EA) to discuss the potential for planting to be carried out close to their houses to screen views of the landfill operations. • Subject to bushfire protection requirements (such as trimming of mature trees), existing native vegetation would be retained where possible to provide visual screening and contribute to the landscape character of Whytes Gully RRP. • Screen planting with dense tall tree planting on natural ground would be used to block views to the site, particularly from adjoining residences.
Socio-economic	Wollongong City Council commit to ensuring: • A Stakeholder Strategy would be implemented throughout the delivery of the Project. Provided within environmental management documentation (LEMP) the Stakeholder Strategy would provide procedures for communication with stakeholders, procedures for the dissemination of information to the community, identification of the communication channels available for the community and stakeholders to provide feedback on the Project, a protocol for the Project to respond to any enquires or feedback and for managing site visits and property inspections. • Implementation of measures to reduce the potential for construction and operation impacts upon amenity as identified within the relevant chapters of the EA and the draft Statement of Commitments.
Hazards and Risks	Wollongong City Council commit to ensuring: • No smoking around plant equipment and within designated areas only. • Any dangerous goods would be stored in accordance with normal dangerous goods storage procedures. • Spill containment to be managed in accordance with relevant Australian Standards. • Safety hazards would be managed through occupational health and safety procedures. • Environmental hazards would be managed through the CEMP and LEMP. • Fire protection (including fire extinguishers, separation distances) would be provided in accordance with relevant Australian Standards and as identified within the EA. • Fire suppression and protection systems serviced and inspected periodically. • Water carts would continue to be made available at the site.

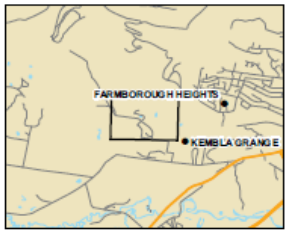
Issue	Commitments
	• Site emergency response plan including emergency contact numbers provided within management system for the site. • The site landscaping would not exceed a fuel load of 2 t/ha. • Planted trees that are retained on the site would have the lower branches trimmed (cut off) to a height of 2 m above the ground. The tree trimming works may be staged with priority given to the protection of assets and fuel load reduction adjacent to roads. • An asset protection zone (APZ) of 10 m would be maintained around existing site buildings. • A perimeter firebreak of 5 metres be established around the entire Whytes Gully RRP site and around buildings (roads and access tracks including offsite roads and tracks, may be utilised to form the fire break). • Wind-blown litter would be managed as outlined in the LEMP. • Coordination of vegetation planting and removal with bushfire management requirements that include access tracks and fuel management zones. • Flammable materials would be removed from site fencing as outlined in the LEMP. • The LEMP would be implemented to ensure reduction of hazards and risk associated with delivery and/or processing of waste. • A Vegetation Management Strategy (including Weed management) would be developed within the LEMP to ensure that vegetation is managed to not exceed recommended fuel loads in relevant guidelines. • The general public would not be allowed direct access to the landfill. • Security of the site would be maintained during construction and operation including security fencing, which is locked after hours of operation. • Waste entry and flows would be monitored and controlled in accordance with the LEMP.
Rehabilitation and Final landform	Wollongong City Council commit to: • Development of a final landform that integrates with the surrounding landscape and environment. • Implementing of the Design Report to ensure that appropriate capping of the landfill is completed progressively throughout the Project. • Implementing the LEMP to ensure appropriate post closure monitoring and maintenance. This includes contingency and remediation measures should environmental monitoring indicate that the closed landfill is impacting upon air, surface water, groundwater or amenity of nearby receptors. This also includes procedures for maintaining the landfill surface post closure and repairing damage to the capping system.
Stakeholder Engagement	Wollongong City Council commit to ongoing regular consultation with the community on the Project through: • Community Consultative Committee for the Whytes Gully RRP. • Phone line to communicate issues to Whytes Gully RRP management. • Complaints management process (as provided in the draft LEMP). • Clear signage at construction sites during construction. • Stakeholder satisfaction surveys and feedback forms (as part of wider Wollongong City Council activity). • Ongoing use of interactive web-based activities including updates of the Project website.

APPENDIX 2
GENERAL LAYOUT OF THE PROJECT SITE

WHYTES GULLY NEW LANDFILL CELL
ENVIRONMENTAL ASSESSMENT

WOLLONGONG CITY COUNCIL

PROJECT FOOTPRINT



LEGEND

- Contours of Final Landform (5 m interval)
- Site Boundary
- Approximate Extent of Waste
- Extent of Landfill Works
- Indicative New Leachate Pond Footprint
  New Leachate Pond to be established prior to commencement of Stage 4 construction
- Indicative New Surface Water Pond Footprint
  Surface Water Pond to be reduced in size prior to commencement of Stage 4 construction
- Indicative LTP infrastructure will be assessed at the end of 2014.
- Existing Leachate Treatment Plant (LTP) Footprint

NOTES

Extent of waste based on site observations and information provided by Council.

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18783A. Image Georeferenced.

Extent of landfill works as per Golder Design Report.

0 25 50 100 150 metres

SCALE (at A3) 1:3,800

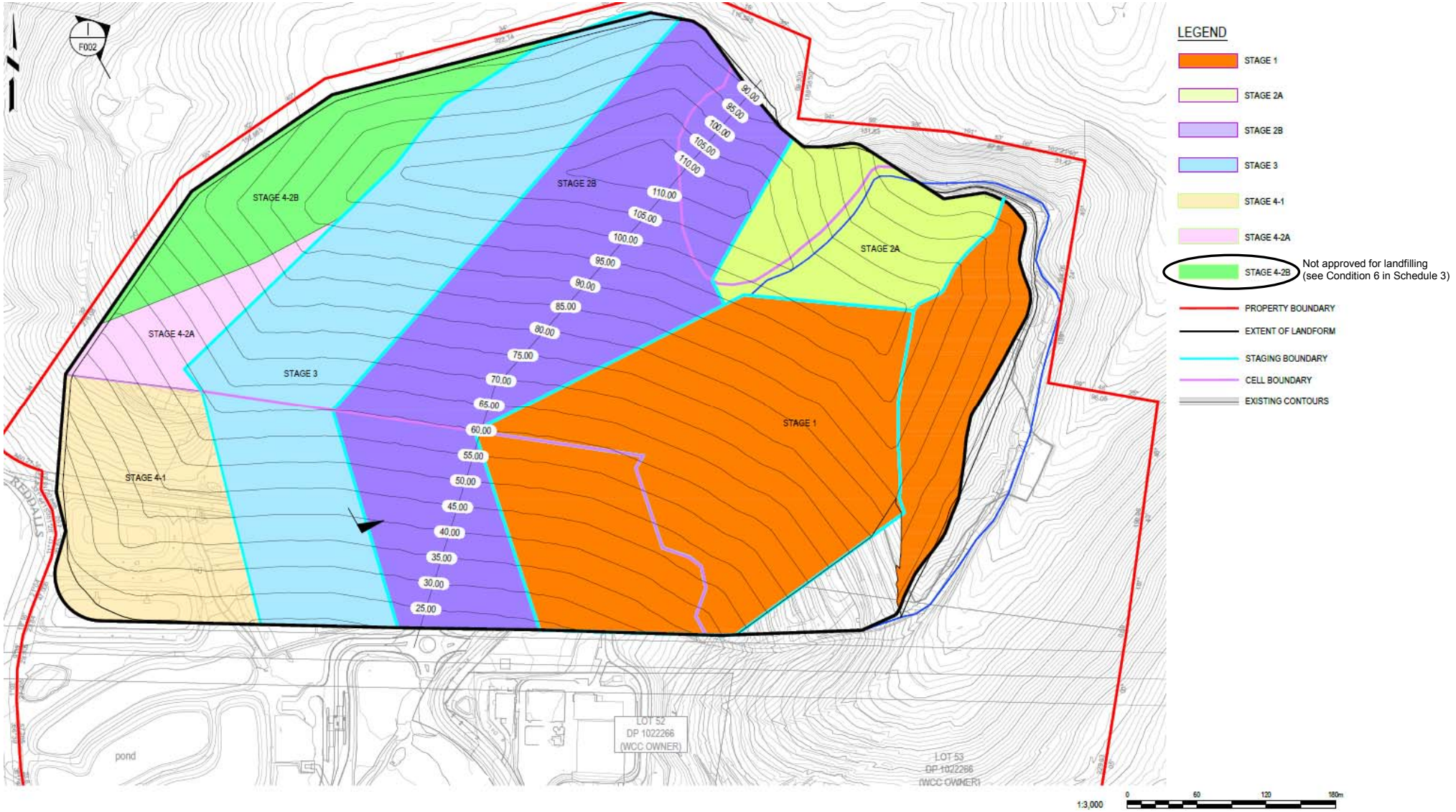
Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 22/02/2012
DRAWN: FA
CHECKED: JMc

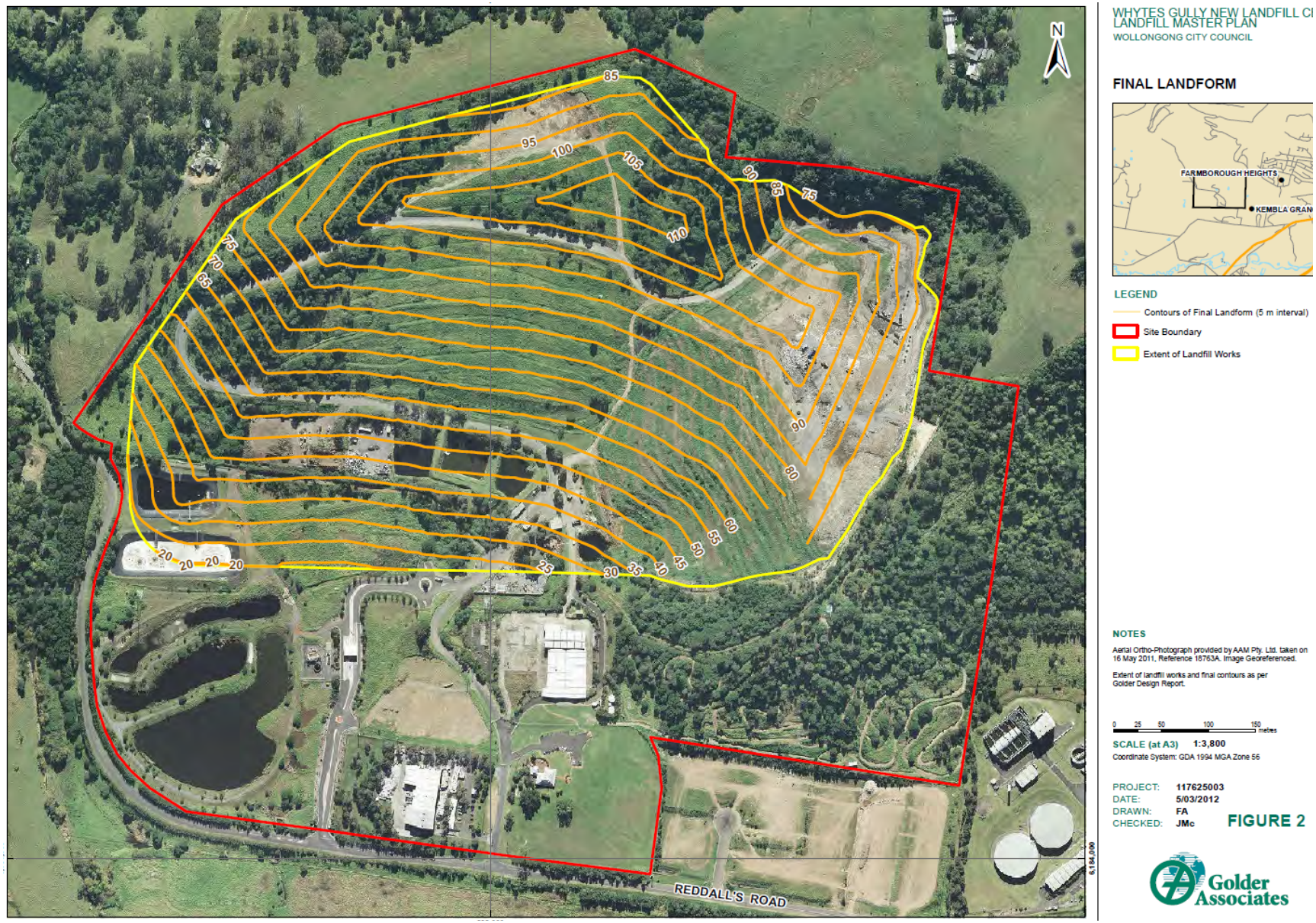
FIGURE 5.1

Golder Associates

APPENDIX 3
REVISED STAGING PLAN



APPENDIX 4
INDICATIVE FINAL LANDFORM



WHYTES GULLY NEW LANDFILL CI
LANDFILL MASTER PLAN
WOLLONGONG CITY COUNCIL

FINAL LANDFORM

LEGEND

- Contours of Final Landform (5 m interval)
- Site Boundary
- Extent of Landfill Works

NOTES

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Extent of landfill works and final contours as per Golder Design Report.

0 25 50 100 150 metres

SCALE (at A3) 1:3,800

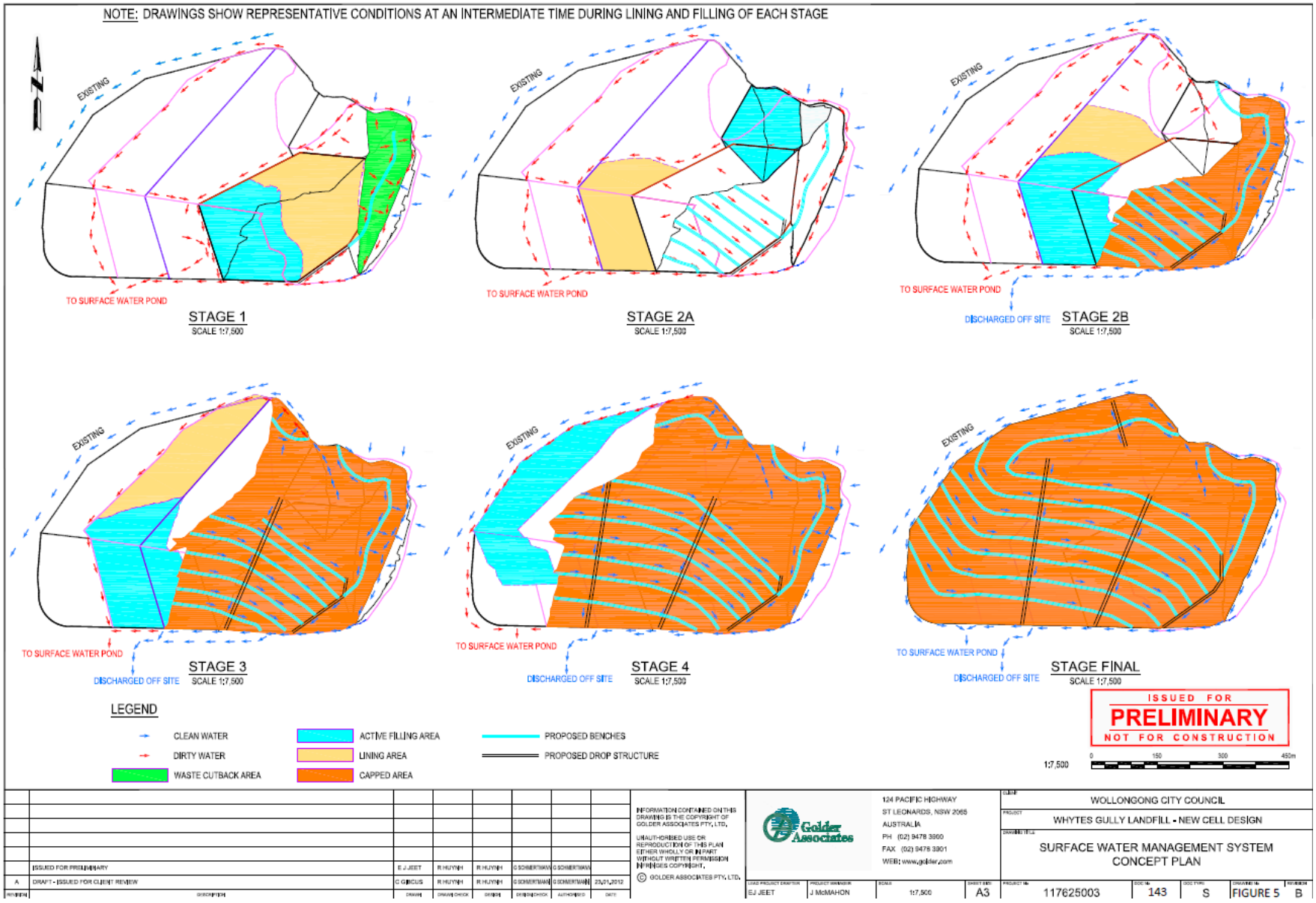
Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 5/03/2012
DRAWN: FA
CHECKED: JMc

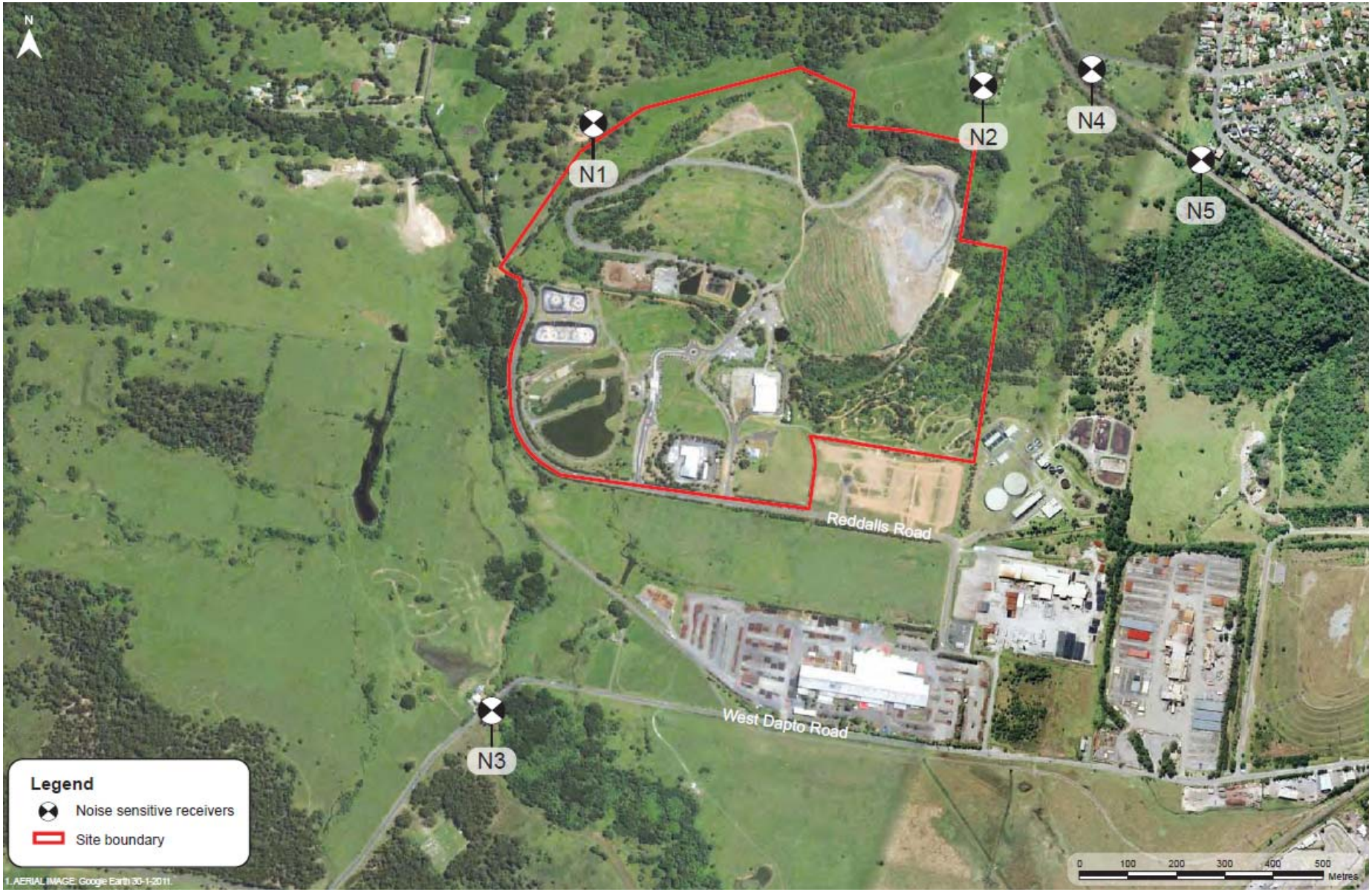
FIGURE 2

Golder Associates

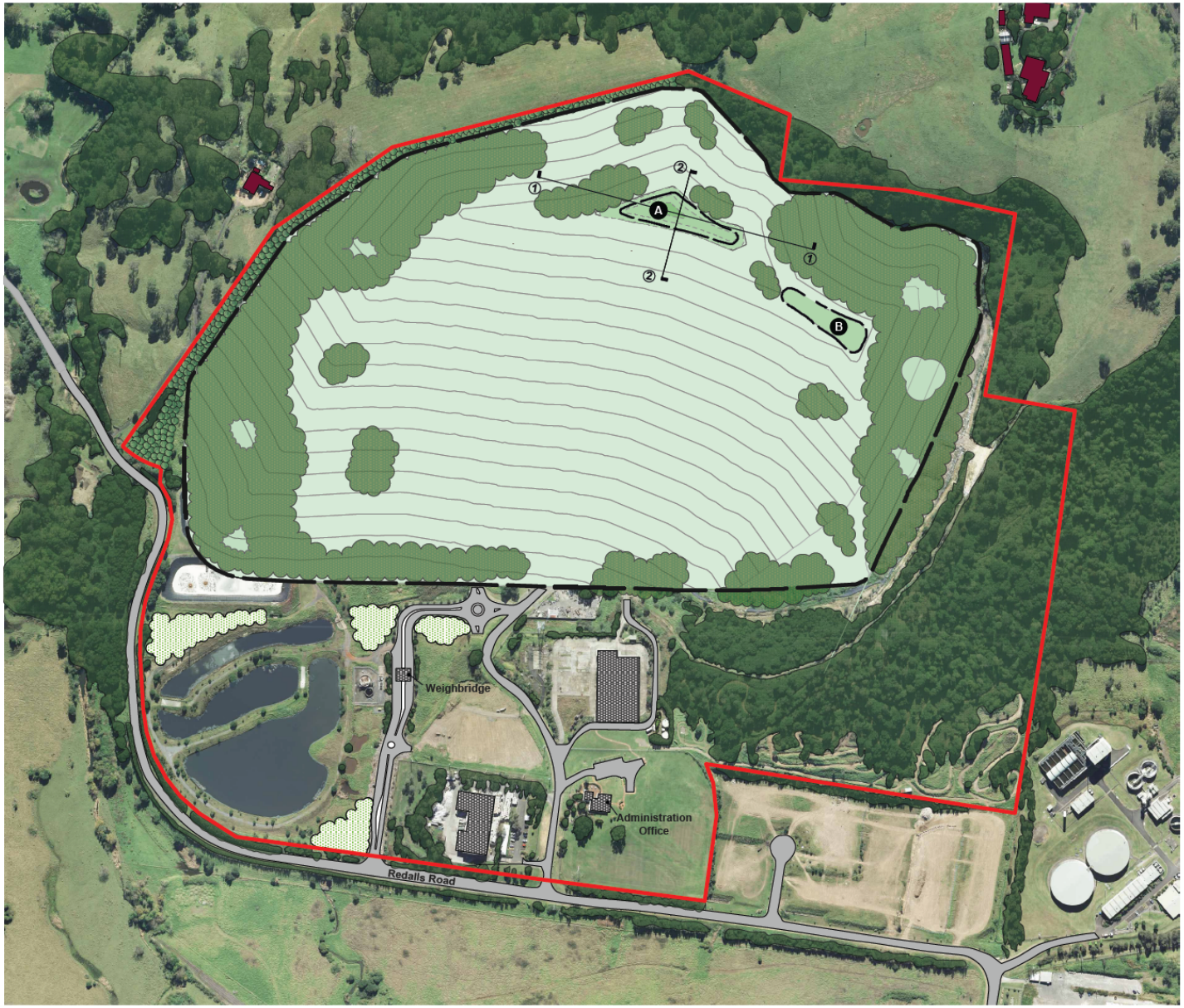
APPENDIX 5
INDICATIVE SURFACE WATER MANAGEMENT SYSTEM CONCEPT PLAN



APPENDIX 6
NOISE RECEIVER LOCATIONS



APPENDIX 7
INDICATIVE LANDSCAPING PLAN



WHYTES GULLY NEW LANDFILL CELL
ENVIRONMENTAL ASSESSMENT
WOLLONGONG CITY COUNCIL

LANDSCAPING PLAN

LEGEND

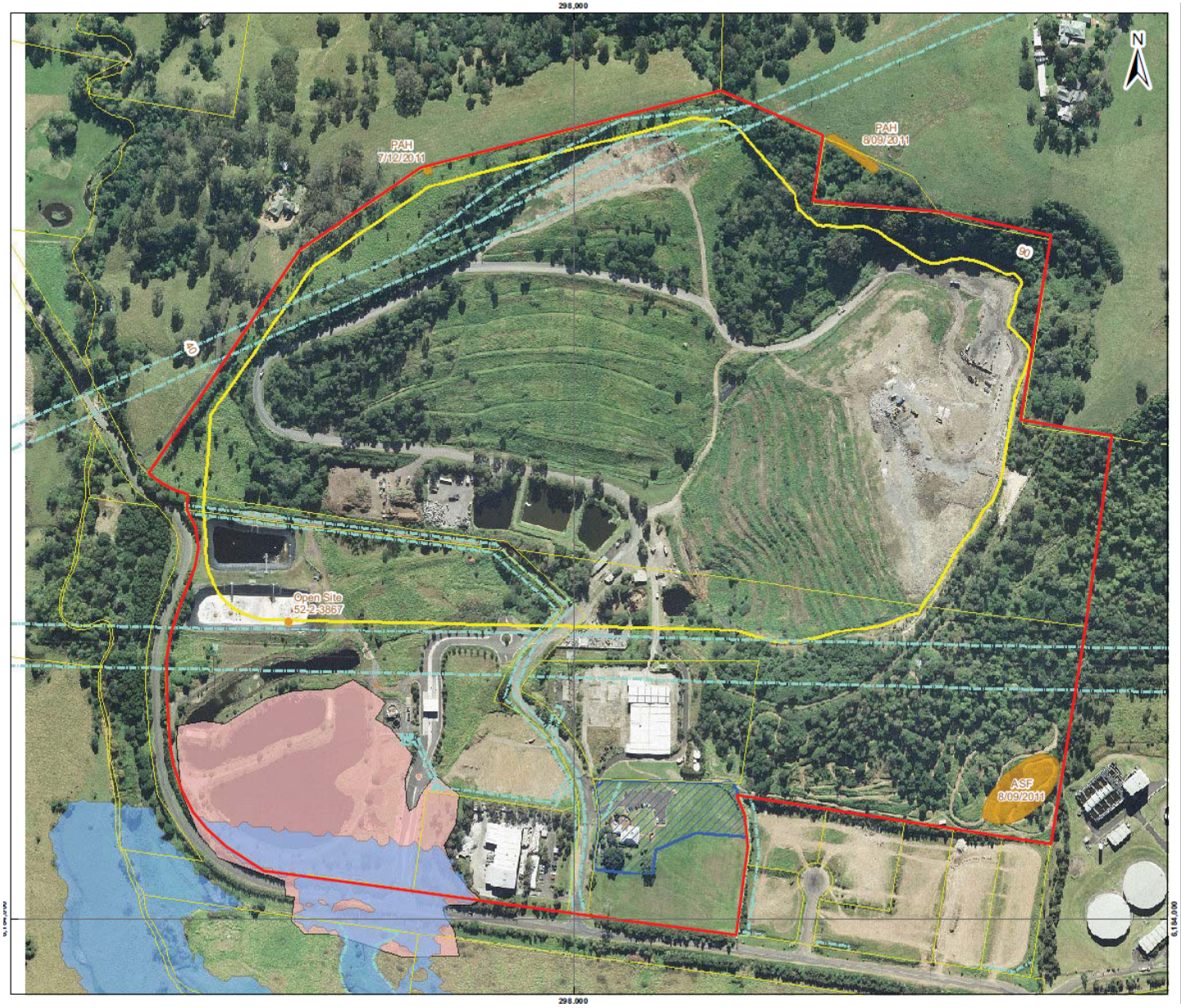
- Site boundary
- New landfill boundary
- Proposed contours (5m intervals)
- Existing trees to be retained
- Proposed screen planting along boundary
- Proposed small tree & shrub planting on landfill
- Proposed tree planting on natural ground
- Proposed grass on landfill slopes
- Existing ponds retained
- A Potential lookout area
- B Potential passive open space recreation area
- Existing industrial buildings on site
- Existing residential buildings adjoining site

Golder Associates

FIGURE 20.3

Figure provided by
Landscape Architect
Corkery Consulting
Landscape Architecture
Urban Design

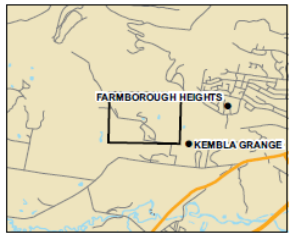
APPENDIX 8
DEVELOPMENT CONTRAINTS



WHYTES GULLY NEW LANDFILL CELL
ENVIRONMENTAL ASSESSMENT

WOLLONGONG CITY COUNCIL

DEVELOPMENT CONSTRAINTS



LEGEND

- Site Boundary
- Cadastre
- Easement
- Flood Planning Area (West Dapto LEP)
- Interpreted Flood Planning Area (50 cm Freeboard)
- Heritage
- Aboriginal Archaeological Sites (12/01/2012)
- AHIMS Results in Study Area (12/01/2012)
- Extent of Landfill Works

NOTES

Historic locations digitised by Golder from reports supplied by Wollongong City Council

Aerial Ortho-Photograph provided by AAM Pty. Ltd. taken on 16 May 2011, Reference 18763A. Image Georeferenced.

Site contours based on survey by KFW Williams, dated 20/07/2011

0 12.5 25 50 75 100 125 150 metres

SCALE (at A3) 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117625003
DATE: 26/03/2012
DRAWN: FA
CHECKED: JMc

FIGURE 7.2

Golder Associates

Environment Protection Licence

Licence - 5862

Licence Details	
Number:	5862
Anniversary Date:	29-May

Licensee

WOLLONGONG CITY COUNCIL

LOCKED BAG 8821

WOLLONGONG NSW 2500

Premises

WHYTES GULLY WASTE DISPOSAL FACILITY

REDDALLS ROAD

KEMBLA GRANGE NSW 2526

Scheduled Activity

Waste Disposal (application to land)

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

Region

Waste & Resources - Waste Management

59-61 Goulburn Street
SYDNEY NSW 2000

Phone: (02) 9995 5000

Fax: (02) 9995 5999

PO Box A290 SYDNEY SOUTH

NSW 1232

Environment Protection Licence

Licence - 5862

Environment Protection Licence

Licence - 5862

Environment Protection Licence

Licence - 5862

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

Licence - 5862

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:

WOLLONGONG CITY COUNCIL
LOCKED BAG 8821
WOLLONGONG NSW 2500

subject to the conditions which follow.

Environment Protection Licence

Licence - 5862

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
WHYTES GULLY WASTE DISPOSAL FACILITY
REDDALLS ROAD
KEMBLA GRANGE
NSW 2526
LOT 2 DP 240557, PART LOT 52 DP 1022266, PART LOT 53 DP 1022266, PART LOT 501 DP 1079122, PART LOT 502 DP 1079122
THE PREMISES BOUNDARY IS DEPICTED BY THE AREA BOUNDED IN GREEN ON THE DRAWING LABELLED "WHYTES GULLY WASTE DISPOSAL FACILITY SITE BOUNDARY PLAN - 2 JULY 2014" (EPA REF DOC14/116147)

A3 Information supplied to the EPA

A3.1 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.

A3.2 The Whytes Gully Landfill Environmental Management Plan (LEMP), dated March 2012 is not to be taken as part of the documentation in A3.1, other than those parts specifically referenced in this licence.

Environment Protection Licence

Licence - 5862

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
3	Surface gas monitoring		Areas where intermediate or final cover has been placed.
4	Gas accumulation monitoring		Inside all buildings within 250 metres of deposited waste.
21	Subsurface gas monitoring		Monitoring point labelled LFG MW1 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298084 N6184278
22	Subsurface gas monitoring		Monitoring point labelled LFG MW2 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298202 N6184228
23	Subsurface gas monitoring		Monitoring point labelled LFG MW3 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298297 N6184244
24	Subsurface gas monitoring		Monitoring point labelled LFG MW4 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298376 N6184303
25	Subsurface gas monitoring		Monitoring point labelled LFG MW5 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298438 N6184381
26	Subsurface gas monitoring		Monitoring point labelled LFG MW6 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298376 N6184303
27	Subsurface gas monitoring		Monitoring point labelled LFG MW7 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298470 N6184553
28	Subsurface gas monitoring		Monitoring point labelled LFG MW8 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298376 N6184303

29	Subsurface gas monitoring	Monitoring point labelled LFG MW9 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298465 N6184645
30	Subsurface gas monitoring	Monitoring point labelled LFG MW10 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298448 N6184684
31	Subsurface gas monitoring	Monitoring point labelled LFG MW11 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298400 N6184695
32	Subsurface gas monitoring	Monitoring point labelled LFG MW12 on Figure 14 titled "Proposed Landfill Gas Monitoring Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298351 N6184701

P1.2 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.

P1.3 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.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Stormwater monitoring and discharge point	Stormwater monitoring and discharge point	Outlet at Reddalls Road - Monitoring point labelled 1 on Figure 13 titled "Proposed Surface Water Monitoring Locations" dated 26 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297777 N6183972
2	Groundwater quality monitoring		Monitoring point labelled GABH01 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297751.8 N6184474
5	Groundwater quality monitoring		Monitoring point labelled GABH02 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297754.9 N6184377

Environment Protection Licence

Licence - 5862

6	Groundwater quality monitoring	Monitoring point labelled GABH03 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297793.8 N6184315
7	Groundwater quality monitoring	Monitoring point labelled GABH06D on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297975.6 N6184322
8	Groundwater quality monitoring	Monitoring point labelled GABH06S on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297977 N6184322
9	Groundwater quality monitoring	Monitoring point labelled GMW102 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297952.6 N6184807
10	Groundwater quality monitoring	Monitoring point labelled GMW103 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298470.2 N6184603
11	Groundwater quality monitoring	Monitoring point labelled GMW104 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297597.9 N6184508
12	Groundwater quality monitoring	Monitoring point labelled GMW105 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298433.3 N6184397
13	Groundwater quality monitoring	Monitoring point labelled GMW106 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E298356.8 N6184294
14	Groundwater quality monitoring	Monitoring point labelled GMW108S on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297870.2 N6184262

Environment Protection Licence

Licence - 5862

15	Groundwater quality monitoring	Monitoring point labelled GMW108D on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297871.4 N6184262
16	Groundwater quality monitoring	Monitoring point labelled GMW109S on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297605.7 N6184068
17	Groundwater quality monitoring	Monitoring point labelled GMW110 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297572.6 N6184266
18	Groundwater quality monitoring	Monitoring point labelled GMW111 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297588.6 N6184385
19	Groundwater quality monitoring	Monitoring point labelled GMW109D on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297604.9 N6184068
20	Groundwater quality monitoring	Monitoring point labelled BH6 on Figure 15 titled "Current Site Investigation Locations" dated 6 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297807.4 N6184052
33	Stormwater monitoring point	Downstream monitoring point labelled 4 on Figure 13 titled "Proposed Surface Water Monitoring Locations" dated 26 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297767 N6183396
34	Stormwater monitoring point	Upstream monitoring point labelled 6 on Figure 13 titled "Proposed Surface Water Monitoring Locations" dated 26 March 2012 (Whytes Gully New Landfill Cell EA - Volume IV). E297495 N6184504

3 Limit Conditions

Environment Protection Licence

Licence - 5862

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.

L1.2 There must be no discharge of contaminated stormwater to waters under dry weather conditions or storm event(s) of less than 1:10 year 24 hour recurrence interval, that is 297.4mm of rainfall within a 24 hour time period.

"dry weather" means less than ten millimetres of rain falling within a 24 hour period.

Discharges of contaminated stormwater from the ponds following a 1:10 year 24 hour storm event (297.4mm of rainfall within a 24 hour time period) or greater do not constitute a breach of this licence.

L1.3 There must be no discharge of leachate to waters under dry weather conditions or storm event(s) of less than 1:25 year 24 hour recurrence interval, that is 371.5mm of rainfall within a 24 hour time period.

"dry weather" means less than ten millimetres of rain falling within a 24 hour period.

Discharges of leachate from the leachate pond following a 1:25 year 24 hour storm event (371.5mm of rainfall within a 24 hour time period) or greater do not constitute a breach of this 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 1

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
TSS	milligrams per litre				50

Environment Protection Licence

Licence - 5862

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
T140	Tyres	As defined in Schedule 1 of the POEO Act, in force from time to time	Waste storage Waste disposal (application to land)	NA
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)	NA
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)	NA
NA	Asbestos waste	As defined in Schedule 1 of the POEO Act, as in force from time to time	Waste disposal (application to land)	NA
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA

L3.2 The licensee must not dispose of any tyres on the premises which;
a) have a diameter of less than 1.2 metres; and
b) are delivered at the premises in a load containing more than 5 whole tyres; and
c) became waste in the Sydney Metropolitan Area.

Note:

This condition does not apply where:
i) The tyres received comply with the EPA Tyre Disposal Specifications; or
ii) The premises have the capacity, at the time of unloading the tyres, to comply with the EPA Tyre Disposal Specifications; or
iii) The premises have the capacity, at the time of unloading the tyres, to recycle or reprocess the tyres into a saleable product, including retreading the tyres.

L3.3 Tyres stockpiled on the premises must:
a) not exceed fifty (50) tonnes of tyres at any one time; and

b) be located in a clearly defined area away from the tipping face; and
c) be managed to control vermin; and
d) be managed to prevent any tyres from catching fire.

L4 Potentially offensive odour

L4.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

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.

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.

O4 Emergency response

O4.1 The licensee must extinguish fires at the premises as soon as possible.

Environment Protection Licence

Licence - 5862

O5 Processes and management

O5.1 The licensee must take all practicable steps to control entry to the premises.

O5.2 The licensee must ensure that all gates are locked whenever the landfill is unattended.

O6 Waste management

O6.1 Cover material must be Virgin Excavated Natural Material (VENM) or a steel framed and fabric covered moveable structure.
a) Daily cover
Cover material must be applied to a minimum depth of 150mm 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 to a minimum depth of 300mm 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.

O6.2 The surface of filled areas must have a minimum slope of one per cent with suitable design to prevent ponding of water. Any surface depressions that develop must be restored, graded and compacted to prevent further ponding of water.

O6.3 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.

O6.4 The licensee must not exhume any landfilled waste unless approved in writing by the EPA.

O6.5 Vehicles leaving the premises must not track materials to external surfaces.

O6.6 The licensee must provide a report to the EPA which details the design, construction, operation and rehabilitation of any new landfill cell. This report must be submitted to the EPA at least six months before the licensee intends to construct the cell, and it must include details on a QA/QC program which can demonstrate that the cell was constructed to meet its design specifications.

O6.7 The licensee must obtain approval from the EPA prior to constructing any landfill cells at the premises.

O6.8 The licensee is approved to construct Part 1A and Part 1B of the "Whytes Gully New Landfill Cell" in accordance with the following documents, drawings, and requirements:
(a) "Whytes Gully Resource Recovery Park - Detailed Design Report - Tender Packages 1, 2 and 3" dated 29 June 2013 and prepared by Golder Associates
(b) Design Drawings for Package 1A and 1B contained within Attachment A of "Whytes Gully Resource Recovery Park - Detailed Design Report - Tender Packages 1, 2 and 3" dated 29 June 2013 and prepared by Golder Associates
(b) The Cushion Geotextile (Unit 12) to be used in the liner system in Part 1A and Part 1B must have:
- Thickness > 4mm

- Mass per unit area > 700g/m2
- Trapezoidal tear strength, both MD and XMD > 1450 N
- CBR puncture strength > 9800 N

O6.9 Prior to disposing of any waste in Cells 1A and 1B, the licensee must submit to the EPA, a report prepared in accordance with the QA/QC program, showing the cell construction details, including as-constructed diagrams.

O6.10 The licensee must ensure that landfill cells are capped progressively during operations and specifically at times when the level of waste reaches final heights.

O6.11 The last licensee must prepare and submit to the EPA within six months prior to the last load of waste being landfilled, a closure plan in accordance with section 76 of the Protection of the Environment Operations Act 1997.

O7 Other operating conditions

O7.1 Drainage from areas not subject to waste disposal activities must be directed away from the existing leachate collection pond(s).

O7.2 Disturbed areas must be provided with separate water quality controls for the treatment of runoff containing suspended or turbid pollutants.

O7.3 The licensee must maintain a leachate management system to collect and direct all leachate to a point for treatment and disposal to sewer.

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.

Environment Protection Licence

Licence - 5862

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 3

Pollutant	Units of measure	Frequency	Sampling Method
Methane	percent by volume	Special Frequency 2	Special Method 1

POINT 4

Pollutant	Units of measure	Frequency	Sampling Method
Methane	percent by volume	Special Frequency 2	Special Method 2

POINT 21,22,23,24,25,26,27,28,29,30,31,32

Pollutant	Units of measure	Frequency	Sampling Method
Methane	percent by volume	Special Frequency 2	Special Method 3

M2.3 Water and/ or Land Monitoring Requirements

POINT 1,33,34

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
Conductivity	microsiemens per centimetre	Special Frequency 1	Grab sample
Dissolved Oxygen	milligrams per litre	Special Frequency 1	Grab sample
Filterable iron	milligrams per litre	Special Frequency 1	Grab sample
Fluoride	milligrams per litre	Special Frequency 1	Grab sample
Magnesium	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

Environment Protection Licence

Licence - 5862

Sodium	milligrams per litre	Special Frequency 1	Grab sample
Sulfate	milligrams per litre	Special Frequency 1	Grab sample
Temperature	degrees Celsius	Special Frequency 1	In situ
Total organic carbon	milligrams per litre	Special Frequency 1	Grab sample
Total Phenolics	milligrams per litre	Special Frequency 1	Grab sample
Total suspended solids	milligrams per litre	Special Frequency 1	Grab sample

POINT 2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Quarterly	Grab sample
Aluminium	milligrams per litre	Yearly	Grab sample
Arsenic	milligrams per litre	Yearly	Grab sample
Barium	milligrams per litre	Yearly	Grab sample
Benzene	milligrams per litre	Yearly	Grab sample
Cadmium	milligrams per litre	Yearly	Grab sample
Calcium	milligrams per litre	Quarterly	Grab sample
Chloride	milligrams per litre	Quarterly	Grab sample
Chromium (hexavalent)	milligrams per litre	Yearly	Grab sample
Chromium (total)	milligrams per litre	Yearly	Grab sample
Cobalt	milligrams per litre	Yearly	Grab sample
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Copper	milligrams per litre	Yearly	Grab sample
Ethyl benzene	micrograms per litre	Yearly	Grab sample
Fluoride	milligrams per litre	Yearly	Grab sample
Lead	milligrams per litre	Yearly	Grab sample
Magnesium	milligrams per litre	Quarterly	Grab sample
Manganese	micrograms per litre	Yearly	Grab sample
Mercury	milligrams per litre	Yearly	Grab sample
Nitrate	milligrams per litre	Yearly	Grab sample
Nitrite	milligrams per litre	Yearly	Grab sample
Nitrogen (ammonia)	milligrams per litre	Quarterly	Grab sample
Organochlorine pesticides	milligrams per litre	Yearly	Grab sample
Organophosphate pesticides	milligrams per litre	Yearly	Grab sample
pH	pH	Quarterly	Probe
Polycyclic aromatic hydrocarbons	milligrams per litre	Yearly	Grab sample
Potassium	milligrams per litre	Quarterly	Grab sample
Sodium	milligrams per litre	Quarterly	Grab sample
Standing Water Level	metres	Quarterly	In situ
Sulfate	milligrams per litre	Quarterly	Grab sample

Environment Protection Licence

Licence - 5862

Toluene	milligrams per litre	Yearly	Grab sample
Total dissolved solids	milligrams per litre	Quarterly	Grab sample
Total organic carbon	milligrams per litre	Quarterly	Grab sample
Total petroleum hydrocarbons	milligrams per litre	Yearly	Grab sample
Total Phenolics	milligrams per litre	Yearly	Grab sample
Xylene	milligrams per litre	Yearly	Grab sample
Zinc	milligrams per kilogram	Yearly	Grab sample

Note: Special Frequency 1 means annually and whenever overflows occur.

Note: Special frequency 2 means monthly if an initial survey indicates significant gas.

Note: Special method 1 means in accordance with surface gas emission monitoring procedures described in Benchmark technique 17 of the Environmental Guidlines: Solid Waste Landfills.

Note: Special method 2 means in accordance with gas accumulation monitoring procedures described in Benchmark 18 of the Environmental Guidelines: Solid Waste Landfills.

Note: Special method 3 means in accordance with subsurface gas monitoring procedures described in Benchmark 16 of the Environmental Guidelines: Solid Waste Landfills.

M3 Testing methods - concentration limits

M3.1 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.

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 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.

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:
a) the date of the issue of this licence or
b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Other monitoring and recording conditions

M6.1 The licensee must maintain a record of all events involving the removal of any waste that was brought to the facility and which is not permitted to be disposed of at the facility.

M6.2 The licensee must make available to the EPA the results of monthly Trade Waste monitoring of leachate and include these results in the Annual Report.

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 The Annual Return must be accompanied by/or include an Annual Report which must contain an assessment of environmental performance relevant to licence conditions including:
a) tabulated results of all monitoring data required to be collected by this licence;
b) 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;
c) an analysis and interpretation of all monitoring data;
d) an analysis of and response to any complaints received;
e) identification of any deficiencies in environmental performance identified by the monitoring data, trends or incidents and of remedial action taken or proposed to be taken to address these deficiencies; and
f) recommendations on improving the environmental performance of the facility.

Environment Protection Licence

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.

R2.3 The licensee must notify the EPA within 24 hours in accordance with condition R2.1 if surface monitoring detects methane above 1.25% (v/v), and increase the frequency of monitoring to daily, until the EPA determines otherwise.

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 maintain a daily log and record the following data of fires at the site:
a) Time and date when the fire was deliberately started or reported.
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 ceased and whether it burnt out or was extinguished.
d) The location of fire (eg. clean timber stockpile, putrescible garbage cell, etc).
e) Prevailing weather conditions.
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.

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

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.

Environment Protection Licence

Licence - 5862

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 - 5862

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 - 5862

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 Bernie Weir

Environment Protection Authority

(By Delegation)

Date of this edition: 06-December-2000

Environment Protection Licence

Licence - 5862

End Notes

1	Licence varied by notice 1004923, issued on 28-Mar-2001, which came into effect on 19-Apr-2001.
2	Licence varied by notice 1006649, issued on 15-Jun-2001, which came into effect on 10-Jul-2001.
3	Licence varied by notice 1010783, issued on 22-Oct-2001, which came into effect on 16-Nov-2001.
4	Licence varied by notice 1013124, issued on 19-Mar-2002, which came into effect on 13-Apr-2002.
5	Licence varied by notice 1018823, issued on 11-Jul-2002, which came into effect on 05-Aug-2002.
6	Licence fee period changed by notice 1027159 on 07-May-2003.
7	Licence varied by notice 1040733, issued on 15-Mar-2005, which came into effect on 21-Mar-2005.
8	Licence varied by notice 1046062, issued on 11-Oct-2005, which came into effect on 05-Nov-2005.
9	Licence varied by change to DEC Region allocation, issued on 17-Mar-2006, which came into effect on 17-Mar-2006.
10	Licence varied by change to EPA Region, issued on 07-Aug-2006, which came into effect on 07-Aug-2006.
11	Licence varied by notice 1080328, issued on 20-Nov-2007, which came into effect on 20-Nov-2007.
12	Licence varied by notice 1092800, issued on 17-Oct-2008, which came into effect on 17-Oct-2008.
13	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
14	Licence varied by notice 1095240, issued on 28-Nov-2008, which came into effect on 28-Nov-2008.
15	Licence varied by Correction to EPA Region data record., issued on 28-Jun-2010, which came into effect on 28-Jun-2010.
16	Licence varied by notice 1502805 issued on 16-Apr-2012
17	Licence varied by notice 1506302 issued on 23-Aug-2013
18	Licence varied by notice 1522234 issued on 08-Jul-2014

APPENDIX B

As built drawings

BULK EARTHWORKS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthophoto maps.

Note: 3. See drawings 14892-004 and 14892-005 for cross sections.

Note: 4. Site clearing is limited to all areas within liner access road.

Note: 5. The following base preparation works are to be undertaken.

- Stripping of organic matter and soft topsoil, silt and peaty materials.
- Proof rolling of the base using an 10 tonne minimum vibratory roller to identify soft spots.
- Replacement of soft alluvium with non reactive backfill, and recompaction of the base using the above roller.
- Where extensive and deep cohesive alluvial deposits are encountered, heavy compaction may not be possible. In these instances a compacted granular bridging layer, typically 0.5 metres thick should be placed over the alluvium to provide a firm base for compaction equipment.

Note: 6. Compaction tolerances as detailed in Liner Specification

Note: 7. The following cut batters are to be used in all constructions:
Alluvial Creek Deposits 1V in 2H for periods less than 3 months
1V in 2.5H long term
Residual Soils & Highly Weathered Material 1V in 1H 1V in 1.5H for periods less than 3 months
1V in 1.75H 1V in 2H long term

Note: 8. Stripped topsoil is to be stockpiled and stabilised with hydromulch or reused to cap western gully.

Note: 9. The bulk earthworks should be carried out in stages as dictated by the liner contract. The infrastructure at the base of the gully will not be affected until the final stage of the eastern gully landfill.

Note: 10. Fenceline to be removed as required by Staging.

POINT	EAST	NORTH	R.L.
1	1924	5368	65
2	1965	5349	68
3	2024	5358	73
4	2041	5347	73
5	2041	5294	76
6	2060	5267	76
7	2038	5148	88
8	2003	5079	83
9	1875	4978	59
10	1702	4978	30
11	1654	5027	24
12	1698	5154	33
13	1754	5242	55
14	1880	5320	62

SITE BOUNDARY
EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992
EXISTING FENCELINE
RAINFOREST
LINER BOUNDARY & ACCESS ROAD
RESIDENTIAL ACCESS
BH No 2
BH No 3
BH No 1
STORMWATER TREATMENT PONDS
LEACHATE POND
STORMWATER TREATMENT PONDS
PLANT COMPOUND
RECYCLING AREA
DAM
DAM
REED BEDS
DRAIN
STORM WATER
DAM
CENTRE TRANSECT
132kV TRANSMISSION LINES
REDDALLS ROAD
GATEHOUSE & WEIGHBRIDGE
FOR CROSS SECTIONS CH 575.0 - CH 575.0 SEE 14892-005 SHT 5 OF 8
FOR CROSS SECTIONS CH 750 - CH 300.0 SEE 14892-004 - SHT4 OF 8

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV.	DATE	DESCRIPTION	DWR No.	P.O.
01	3.11.92	GENERAL REVISION		

SCALE 20 0 20 40 60

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	P.FOY		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT

1249 SHT 2 P33

PROJECT TITLE
DRAWING TITLE
WHYTES GULLY LANDFILL
WOLLONGONG
BULK EARTHWORKS CONTOURS 2 of 8

DATE OF ISSUE
SIZE A0
CAD REFERENCE PLAN02.DWG
DATE PLOTTED 23.10.92
ORG. No. 14892-002
REV. 01
ORG. STATUS FINAL

S402-1

STORMWATER

Note: 1 These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully topping face and of base of the eastern gully. The surrounding contours have extrapolated using orthophoto maps.

Note: 3. See drawing 14892-006 for details of stormwater drains.

Note: 4. Drains are to be graded to suit natural topography with maximum slope as shown.

D1, G, 4%

Drain Type — Maximum Slope

Lining

Note: 5. Lining will be either be "G" - grass, "R" - Rip Rap or "J" - Jute

Note: 6. For soil conservation structures of temporary works refer drawing 14892-006.

Note 7. For drainage from interim cover see Operational details 14892-007

Note 8. Drainage from base of the eastern gully landfill during Stages 1 & 2 will be via natural streambeds.

Note 9. During closure of the western gully site all stormwater from the tipping face will be drained to the lined eastern landfill.

Note 10. Drainage via existing pipe system will be collected in open channels.

Note 11. Catchdrain at the base of the western gully is to be constructed after this area has been capped and Council is convinced no leachate is collecting in this area

Note 12. During liner construction while tipping is still taking place on western gully all clean stormwater is to be diverted across the front face of western gully. After western gully has been capped and reached final landform. All clean stormwater from top of catchment will be diverted along the western gully access road.

CULVERT SCHEDULE

CULVERT No	CULVERT	Q m /s	HW m	TW m	SLOPE %	VELOCITY m /s	REMARKS
1	5 x 750Ø RCP	5.0	1.141	0.6	2.0	4.109	SCOUR PROTECTION AT OUTLET
2	6 x 750Ø RCP	6.0	1.141	0.5	2.0	4.109	SCOUR PROTECTION AT OUTLET
3 & 6	3 x 750Ø RCP	3.0	1.141	0.5	2.0	4.109	SCOUR PROTECTION AT OUTLET
4 & 5	2 x 600Ø RCP	1.5	1.268	0.5	2.0	3.997	SCOUR PROTECTION AT OUTLET

SITE BOUNDARY

EXISTING CATCH DRAIN

EXISTING CATCH DRAIN

EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992

ACCESS ROAD TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY

D1,G,4% TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)

CATCH DRAIN TO DIVERT INTO ROAD DRAIN AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)

DIVERSION TO TAKE PLACE AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY (SEE NOTE 12)

D1,G,4%

EXISTING FENCELINE

RAINFOREST

CULVERT (3)

CULVERT (5)

D4,G,2%

EXISTING 750Ø PIPE D1,R,20%

D1,G,8% (TEMPORARY) SEE NOTE 12

D1,G,10%

D1,G,4%

D2,G,2% (SEE NOTE 11)

FOR ACCESS ROAD CROSS SECTION SEE 14892-006

RESIDENTIAL ACCESS

NEW CULVERTS (1)

DURING STAGE 1 ALL STORMWATER IN THIS AREA TO BE TREATED AS LEACHATE

AFTER THE STAGE 1 ACCESS ROAD IS CONSTRUCTED. STORMWATER WILL BE DIVERTED ALONG THE ACCESS ROAD

LINER BOUNDARY AND ACCESS ROAD

D1,J,4%

LEACHATE POND

LEACHATE POND

EXISTING STORMWATER PONDS TO BE UPGRADED TO LEACHATE PONDS. STORMWATER TO BE DIVERTED.

NEW CULVERT (2)

D1,R,4%

5x1050Ø CULVERT EXISTING

D1,R,2%

REVISION AREA

BH No

2x900Ø CULVERT EXISTING

D1,G,20% (TO BE CONSTRUCTED IN STAGE 2)

CULVERTS (6) (TO BE CONSTRUCTED AFTER STAGE 1)

375 Ø RCP

132kV TRANSMISSION LINES

D1,R,20%

DAM 1

DAM 2

EXISTING NATURAL STREAM BED

REDDALLS ROAD

GATEHOUSE & WEIGHBRIDGE

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV.	DATE	DESCRIPTION	SVR No.	P.D.
01	3.11.92	GENERAL REVISION		

SCALE 20 0 20 40 60

	NAME	SIGNATURE	DATE
QUALITY RECORD			
DRAFTEN CHECK	P.POY		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MALLEUD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED

A.C.N 004 846 824

CLIENT

1249 SHT 3 P331

PROJECT TITLE: WHYTES GULLY LANDFILL WOLLONGONG

DRAWING TITLE: DRAINAGE

DATE OF ISSUE

SIZE: A0

CAD REFERENCE: PLAN03.DWG

DATE PLOTTED: 23.10.92

DRG No. 14892-003

REV. 01

DRG STATUS: FOR APPROVAL

3 OF 8

SV034

EXISTING CONDITIONS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthophoto maps.

Note: 3. Drainage and stormwater details from WCC Drawing P331/17 S OF 29 and 9 of 29

Note: 4. Rainforest marked in from aerial photograph

SITE BOUNDARY

CATCH DRAIN

EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992

LEACHATE DRAIN AT BASE OF LANDFILL

750mm Ø PCPC

2 x 750mm Ø RCP

RESIDENTIAL ACCESS

VOLUME= 4200m³ STORMWATER TREATMENT PONDS TWL=4.7

LEACHATE POND TWL=25.6 VOLUME=8000m³

LEACHATE RECIRCULATION PUMP

STORMWATER TREATMENT PONDS TWL=24.0 VOLUME= 3000m³

PLANT COMPOUND

GRADED OPEN CHANNEL @ 1%

SPILLWAY

RECEIVING AREA

BH No 1

100mm Ø RCP

2 x 900 Ø RCP

DAM

REED BEDS

6 x 1050 Ø RCP

375 Ø RCP

132kV TRANSMISSION LINES

REDDALLS ROAD

GATEHOUSE & WEIGHBRIDGE

4WD TRACK

EXISTING FENCELINE

SPRAY IRRIGATION OF LEACHATE (TO BE ABANDONED)

RAINFOREST

MIXED WOODLAND

DAM

STORM

5600N 5500N 5400N 5300N 5200N 5100N 5000N 4900N

1900E 2000E 2100E 2200E 1300E 1400E 1500E 1600E 1700E 1800E 1900E 2000E 2100E 2200E

1320 P331 SV01

REV.	DATE	DESCRIPTION	DWR No.	P.O.
02	10.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

SCALE 25 0 10 20 30 METRES

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	P.POY		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED

A.C.N 004 846 824

CLIENT

THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL

DRAWING TITLE: SITE PLAN : EXISTING FACILITIES

DATE OF ISSUE: 10.2.93 SIZE: A0

CAD REFERENCE: PLAN01.DWG DATE PLOTTED: 10.2.93

DRG No. 14892-001 REV. ~~02~~ 1

ORG. STATUS: PRELIMINARY

1 OF 9

STORMWATER NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION.
2. THE CONTOUR DATA HAS BEEN PREPARED FROM COUNCIL STADIA SURVEY OF WESTERN GULLY TIPPING FACE AND BASE OF THE EASTERN GULLY. THE SURROUNDING CONTOURS HAVE BEEN EXTRAPOLATED USING 1:4000 ORTHOPHOTO MAPS.
3. SEE DRAWING 14892/006 FOR DETAILS OF STORMWATER DRAIN CROSS SECTIONS.
4. DRAINS ARE TO BE GRADED TO SUIT NORMAL TOPOGRAPHY WITH MAXIMUM SLOPE AS SHOWN

D1, G, 4%
DRAIN TYPE — LINING — MAXIMUM SLOPE

5. LINING WILL EITHER BE "G" - GRASS, "R" - RIP RAP OR "J" - JUTE.
6. FOR SOIL CONSERVATION STRUCTURES OF TEMPORARY WORKS REFER TO DRAWING 14892/005
7. FOR DRAINAGE FROM INTERIM COVER SEE OPERATIONAL DETAILS ON DRAWING 14892/006
8. DRAINAGE FROM BASE OF THE EASTERN GULLY LANDFILL DURING STAGES 1 & 2 WILL BE VIA NATURAL STREAM BEDS.
9. DURING CLOSURE OF THE WESTERN GULLY SITE ALL STORMWATER FROM THE TIPPING FACE WILL BE DRAINED TO THE LINED EASTERN LANDFILL.
10. DRAINAGE VIA EXISTING PIPE SYSTEM WILL REMAIN UNALTERED.
11. THE DAM LOCATION SHOWN ON THIS PLAN IS PRELIMINARY ONLY. DETAILED LOCATION WILL BE VERIFIED IN THE FIELD WITH A MORE DETAILED SURVEY.
12. DURING LINER CONSTRUCTION WHILE TIPPING IS ACTUL TAKING PLACE ON THE WESTERN GULLY ALL CLEAN STORMWATER IS TO BE DIVERTED ACROSS THE FRONT FACE OF WESTERN GULLY. AFTER WESTERN GULLY HAS BEEN CAPPED AND REACHED FINAL LANDFORM. ALL CLEAN STORMWATER FROM TOP OF CATCHMENT WILL BE DIVERTED ALONG THE WESTERN GULLY ACCESS ROAD.
13. THE CONSTRUCTION OF STAGE 1 OF THE LANDFILL WILL BE THE SUBJECTED DETAIL DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR IN CONSULTATION WITH COUNCIL.

CULVERT SCHEDULE

CULVERT No	CULVERT	Q m^3/s	HW m	TW m	SLOPE %	VELOCITY m/s	REMARKS
3	3 x 750Ø RCP	3.0	1.141	0.5	2.0	4.109	SCOUR PROTECTION AT OUTLET/INLET
4 & 5	2 x 600Ø RCP	1.5	1.268	0.5	2.0	3.997	SCOUR PROTECTION AT OUTLET/INLET
6	3 x 900Ø RCP	3.8	1.103	0.5	2.0	4.312	SCOUR PROTECTION AT OUTLET
7	2 x 900Ø RCP	6.0 *	1.295	0.5	2.0	4.599	SCOUR PROTECTION AT OUTLET
8	1 x 450Ø RCP	0.3	0.742	0.5	2.0	3.137	SCOUR PROTECTION AT OUTLET
9	2 x 1050Ø RCP	9.6 *	1.018	0.5	2.0	1.785	SCOUR PROTECTION AT OUTLET

* COMBINED WITH EXISTING CULVERT

LEGEND

- STORMWATER CHANNEL
- SCOUR PROTECTION
- CULVERT & HEADWALL/ INLET STRUCTURE

SITE BOUNDARY
EXISTING CATCH DRAIN
EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992
ACCESS ROAD TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY
TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)
DIVERSION TO TAKE PLACE AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY (SEE NOTE 12)
EXISTING FENCELINE
RAINFOREST
CULVERT (3)
CULVERT (4)
CULVERT (5)
CATCH DRAIN TO DIVERT INTO ROAD DRAIN AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)
EXISTING 750Ø PIPE D1,R,20%
FOR ACCESS ROAD CROSS SECTION SEE 14892-006
RESIDENTIAL ACCESS
EXISTING CULVERTS (1) 2x750mmØ PIPES
STORMWATER POND
500mm HIGH EARTH MOUNT
LEACHATE POND 500mm DEPRESS SPILLWAY
LEACHATE POND
2:1 BATTER (FILL)
DURING STAGE 1 ALL STORMWATER IN THIS AREA TO BE TREATED AS LEACHATE
300mm HIGH EARTH MOUNT
LINER BOUNDARY AND ACCESS ROAD
CULVERT No (8)
CULVERT No (7)
CULVERT No (9)
BH No 1
RECYCLING AREA
SPILLWAY
SPILLWAY DAM
2x900Ø CULVERT EXISTING
5x1050Ø CULVERT EXISTING
CULVERTS (6) (TO BE CONSTRUCTED AFTER STAGE 1)
375 Ø RCP
132kV TRANSMISSION LINES
AFTER THE STAGE 1 ACCESS ROAD IS CONSTRUCTED, STORMWATER WILL BE DIVERTED ALONG THE ACCESS ROAD
D1,G,20% (TO BE CONSTRUCTED IN STAGE 2)
DAM 1
EXISTING NATURAL STREAM BED
REDDALLS ROAD
GATEHOUSE AND WEIGHBRIDGE
OUTLET FOR GROUNDWATER (SEE 14892/008 FOR LOCATION AND 14892/007 FOR DETAILS)

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV.	DATE	DESCRIPTION	DWR No.	P.D.
02	24.3.93	GENERAL REVISION		
01	8.11.92	GENERAL REVISION		

SCALE 20 0 20 40 60 METRES

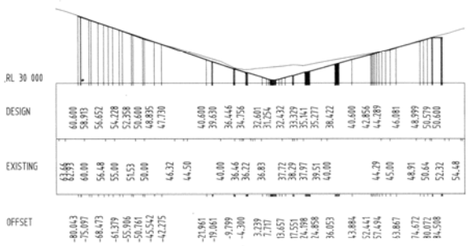
QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	A.MILFORD		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MALLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: DRAINAGE PLAN ULTIMATE LANDFORM
DATE OF ISSUE: 26.3.93
SIZE: A0
CAD REFERENCE: PLAN03.DWG
DATE PLOTTED: 26.3.93
DRG No.: 14892-003
REV.: 02
DRG STATUS: DESIGN COMPLETE
SHEET: 1320 P331 6403
3 OF 9



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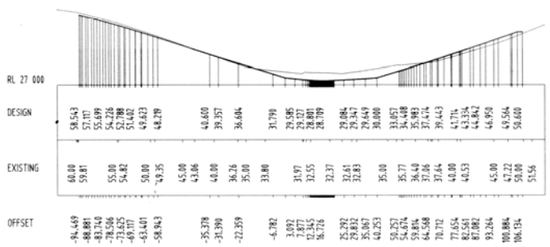

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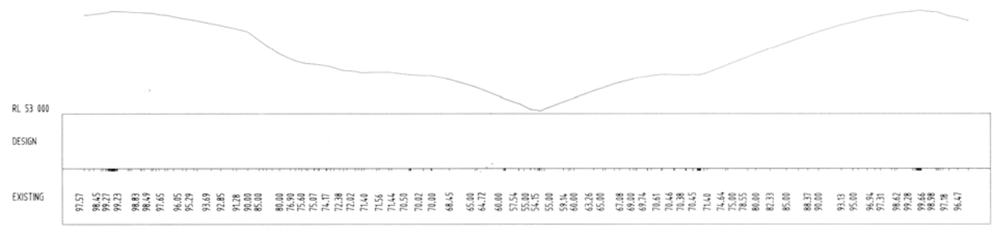

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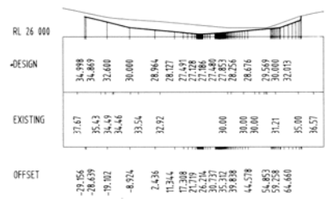

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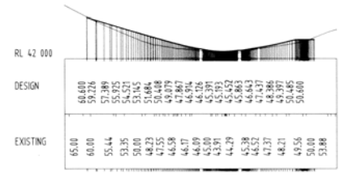

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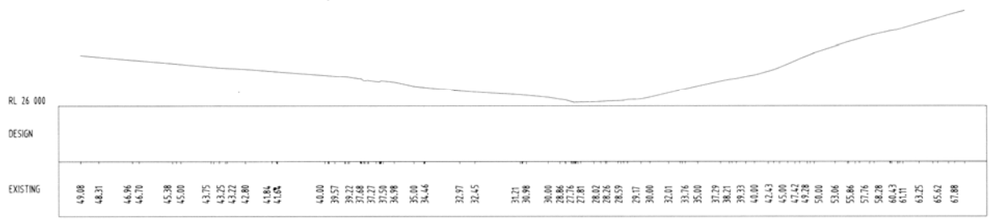

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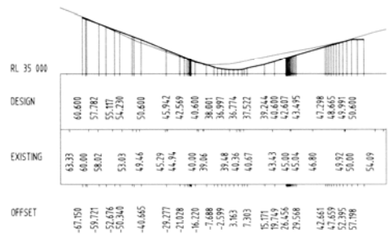


425

1320 P331

REV.	DATE	DESCRIPTION	DVR No.	P.D.
01	16.3.93	GENERAL REVISION		

SCALE	1:1000		
QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	A.MILFORD		17.2.93
DESIGNER CHECK	E.MADEW		17.2.93
PROJECT DIRECTOR APPROVAL	D.MACLEOD		17.2.93

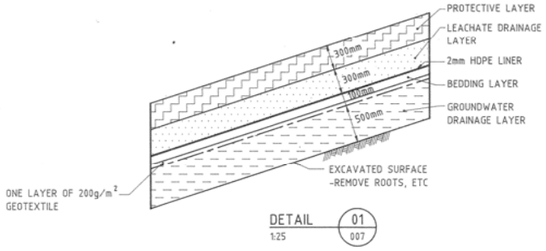
COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WELLINGTON

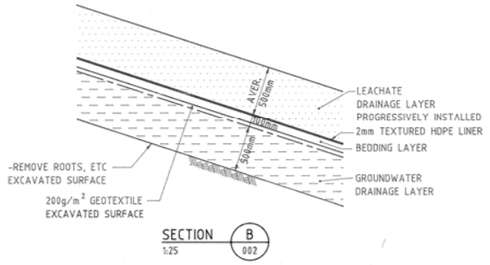
PROJECT TITLE	WHYTES GULLY LANDFILL
DRAWING TITLE	CROSS SECTIONS CH.225 - CH.525
DATE OF ISSUE	17.3.93
SIZE	A0
CAD REFERENCE	PLAN04.DWG
DATE PLOTTED	16.3.93
DRG No.	14892/004
REV.	01
DRG. STATUS	DESIGN COMPLETE

SHEET 4 OF 9



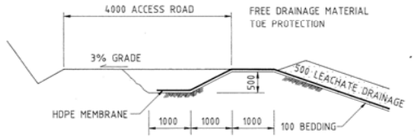
DETAIL 01 / 007 — 1:25

LINER SYSTEM DETAILS - FLAT SLOPES
IE: ≯ 1 IN 4



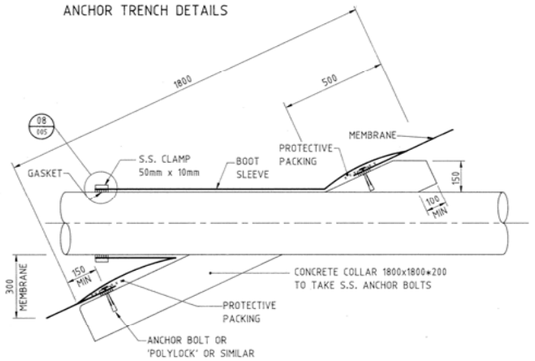
SECTION B / 002 — 1:25

LINER SYSTEM DETAILS - STEEP SLOPES
IE: 1 IN 4 OR STEEPER



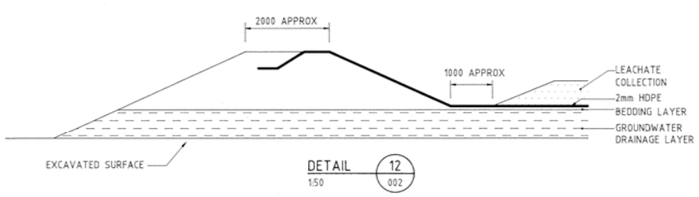
DETAIL 03 / 002 — 1:50

ANCHOR TRENCH DETAILS



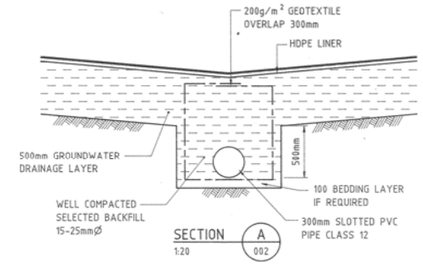
DETAIL 04 / 002 — 1:10

MEMBRANE/PIPE PENETRATION DETAIL



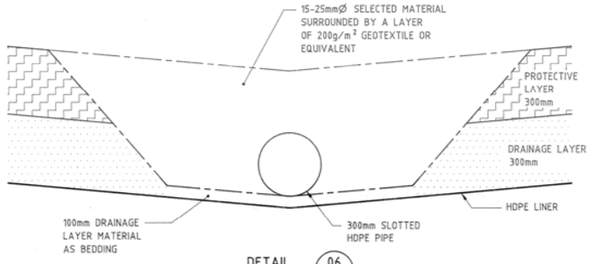
DETAIL 12 / 002 — 1:50

EDGE OF LINER DETAIL



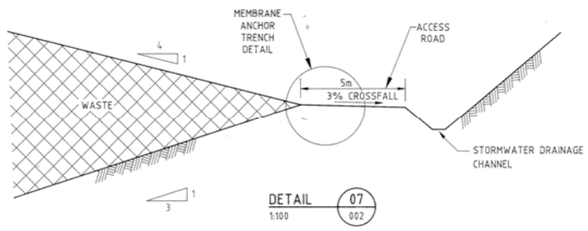
SECTION A / 002 — 1:20

GROUNDWATER DRAIN



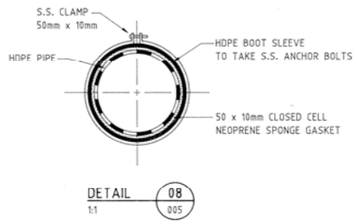
DETAIL 06 / 007 — 1:10

LEACHATE DRAIN DETAIL



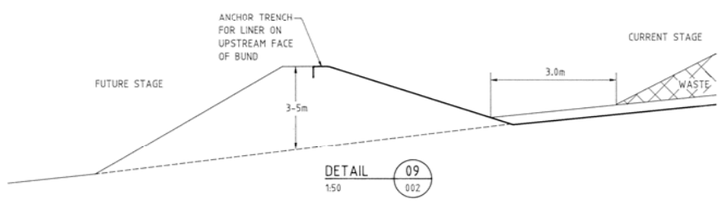
DETAIL 07 / 002 — 1:100

PERIMETER ACCESS ROAD



DETAIL 08 / 005 — 1:1

CLAMP DETAIL



DETAIL 09 / 002 — 1:50

TEMPORARY BUND DETAIL

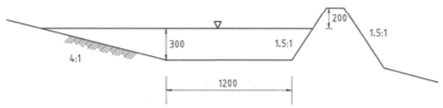
LEGEND

MATERIAL TYPES

- GROUNDWATER DRAINAGE
- BEDDING
- FREE DRAINING MATERIAL
- LEACHATE DRAINAGE
- PROTECTIVE LAYER
- VEGETATIVE LAYER
- CLAY LAYER

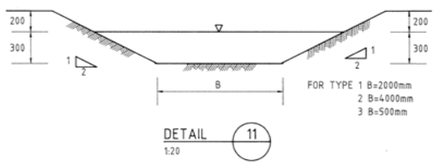
LINE TYPES

- TEXTURED 2mm HDPE LINE
- GEOTEXTILE
- LEACHATE PIPELINE
- GROUNDWATER PIPELINE



DETAIL 10 / 1:20

CONTOUR DRAIN DETAIL - TYPE 4



DETAIL 11 / 1:20

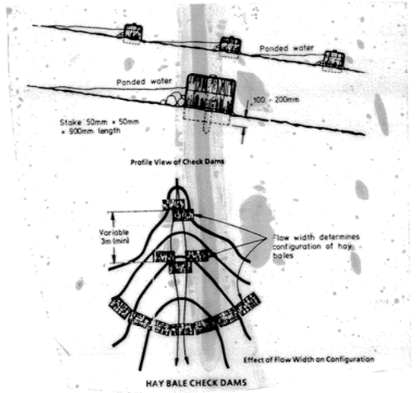
STORMWATER DRAIN DETAIL - TYPE 1,2 & 3

NOTE:
THESE LININGS FOR STORMWATER DRAINS
- RIP RAP
- GRASS
- JUTE

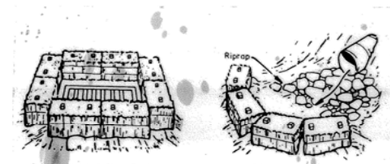
STORMWATER DRAIN DETAILS

CONSTRUCTION DETAIL NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION.
2. LINER CONSTRUCTION DETAILS ARE PRELIMINARY TO GIVE INDICATION OF SCHEME OF WORKS AND TYPE OF DRAINAGE LAYERS REQUIRED.
3. FOR SPECIFICATION OF DRAINAGE LAYER SEE THE LANDFILL MANAGEMENT PLAN OR CONSULTANTS SPECIFICATION
4. THE NEED FOR DAM 2 SHOULD BE EVALUATED AFTER DAM 1 HAS BEEN CONSTRUCTED.
5. THE VELOCITY ON THE SPILLWAY OF DAMS IS TO BE LIMITED TO 2m ³/s



HAY BALE CHECK DAMS



TEMPORARY HAY BALE SEDIMENT TRAPS AT CULVERT INLETS AND OUTLETS

TEMPORARY SOIL CONSERVATION WORKS FOR EASTERN GULLY

LINER & LEACHATE COLLECTION CONSTRUCTION DETAILS

1320 P331

REV.	DATE	DESCRIPTION	DWG No.	P.D.
02	16.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

SCALE: AS SHOWN

	NAME	SIGNATURE	DATE
QUALITY RECORD			
DRAFTER CHECK	A.MILFORD		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.McLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WOLLONGONG

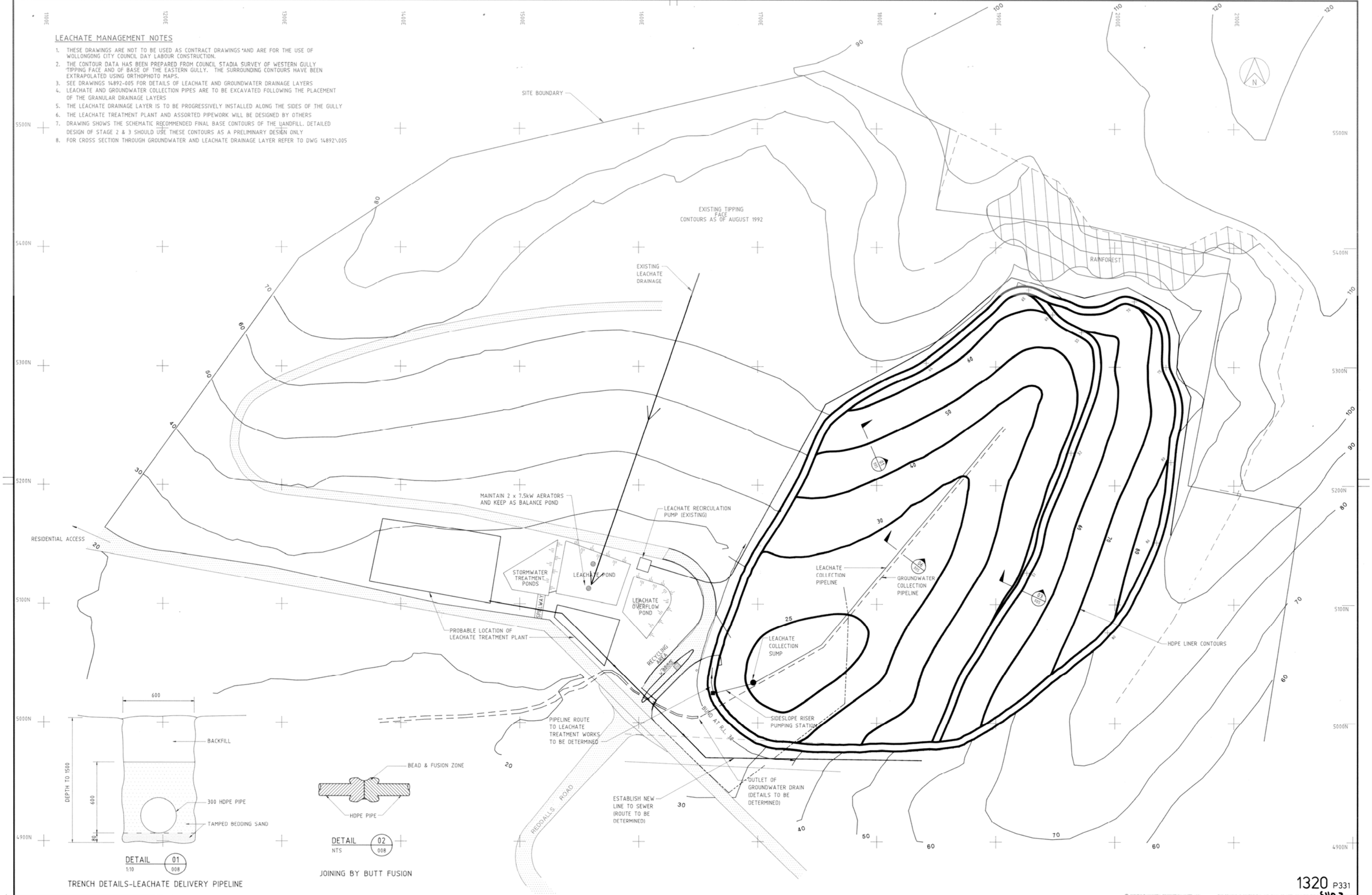
PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: CONSTRUCTION DETAILS
DATE OF ISSUE: 16.2.93
SIZE: A0
CAD REFERENCE: PLAN05.DWG
DATE PLOTTED: 16.2.93
DRG No.: 14892-005
REV.: 02
DRG STATUS: DESIGN COMPLETE

5 OF 9

1320 SWDS P331

LEACHATE MANAGEMENT NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION.
2. THE CONTOUR DATA HAS BEEN PREPARED FROM COUNCIL STADIA SURVEY OF WESTERN GULLY TIPPING FACE AND OF BASE OF THE EASTERN GULLY. THE SURROUNDING CONTOURS HAVE BEEN EXTRAPOLATED USING ORTHOPHOTO MAPS.
3. SEE DRAWINGS 14892-005 FOR DETAILS OF LEACHATE AND GROUNDWATER DRAINAGE LAYERS
4. LEACHATE AND GROUNDWATER COLLECTION PIPES ARE TO BE EXCAVATED FOLLOWING THE PLACEMENT OF THE GRANULAR DRAINAGE LAYERS
5. THE LEACHATE DRAINAGE LAYER IS TO BE PROGRESSIVELY INSTALLED ALONG THE SIDES OF THE GULLY
6. THE LEACHATE TREATMENT PLANT AND ASSORTED PIPEWORK WILL BE DESIGNED BY OTHERS
7. DRAWING SHOWS THE SCHEMATIC RECOMMENDED FINAL BASE CONTOURS OF THE LANDFILL. DETAILED DESIGN OF STAGE 2 & 3 SHOULD USE THESE CONTOURS AS A PRELIMINARY DESIGN ONLY
8. FOR CROSS SECTION THROUGH GROUNDWATER AND LEACHATE DRAINAGE LAYER REFER TO DWG 14892\005



DETAIL 01 (008) 1:10

TRENCH DETAILS-LEACHATE DELIVERY PIPELINE

DETAIL 02 (008) NTS

JOINING BY BUTT FUSION

1320 P331

REV.	DATE	DESCRIPTION	DWR No.	P.D.
03	23.2.93	GENERAL REVISION		
02	16.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

SCALE 20 0 20 40 60 METRES

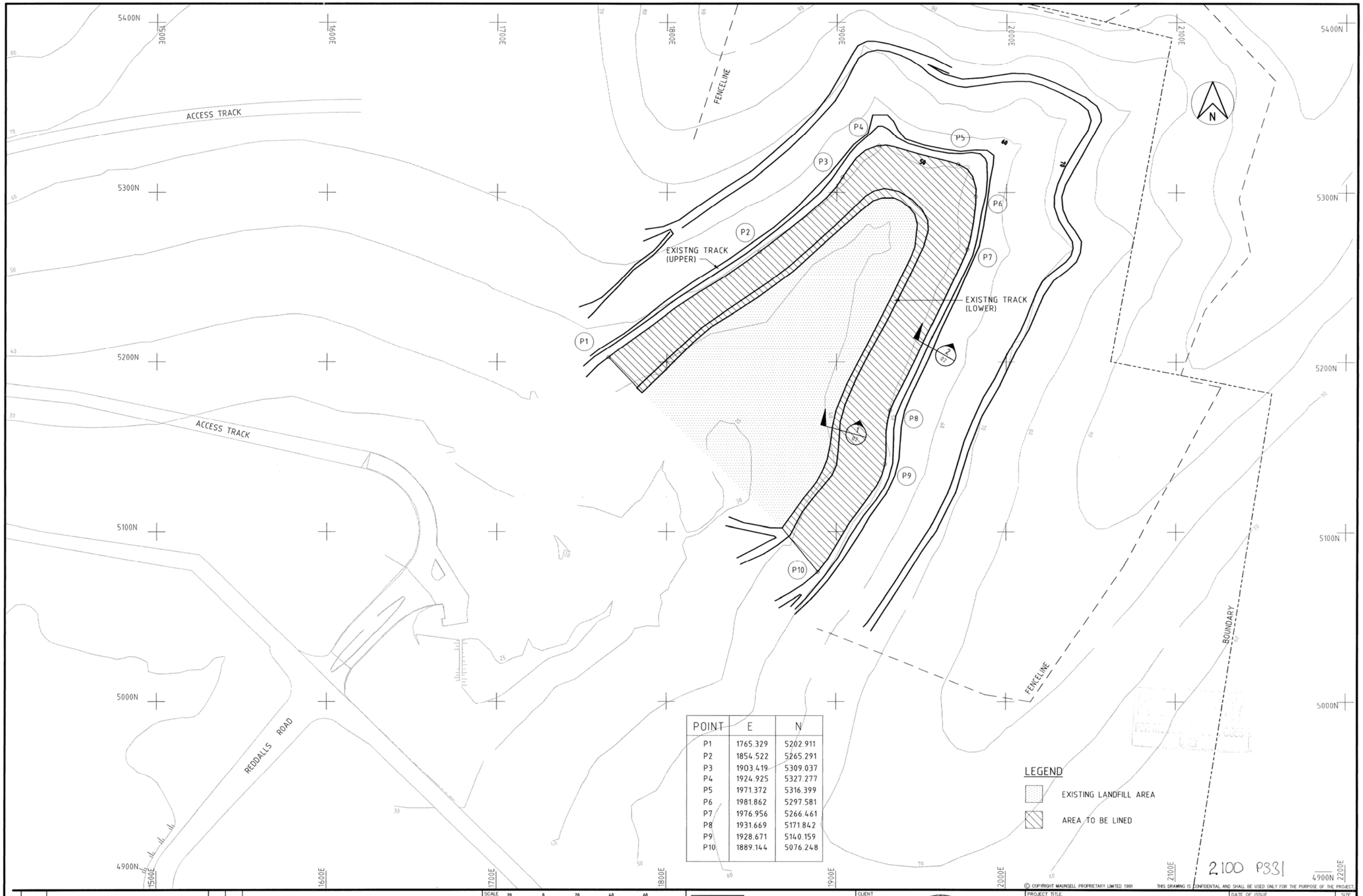
	NAME	SIGNATURE	DATE
QUALITY RECORD			
DRAFTER CHECK	A.MILFORD		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL
DATE OF ISSUE: 23.2.93
SIZE: A0
DRAWING TITLE: LEACHATE AND GROUND WATER COLLECTION SYSTEM
ULTIMATE LANDFORM
CAD REFERENCE: PLAN08.DWG
DATE PLOTTED: 23.2.93
DRG No.: 14892-007
REV.: 03
DRG STATUS: DESIGN COMPLETE



POINT	E	N
P1	1765.329	5202.911
P2	1854.522	5265.291
P3	1903.419	5309.037
P4	1924.925	5327.277
P5	1971.372	5316.399
P6	1981.862	5297.581
P7	1976.956	5266.461
P8	1931.669	5171.842
P9	1928.671	5140.159
P10	1889.144	5076.248

2.100 P331

REV.	DATE	DESCRIPTION	DVR No.	P.D.

SCALE 20 0 20 40 60 METRES 1 : 1000

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	B.G.J.		
DESIGNER CHECK	S.D.G.		
PROJECT DIRECTOR APPROVAL			

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WOLLONGONG INC 1947

PROJECT TITLE: WHYTES GULLY LANDFILL

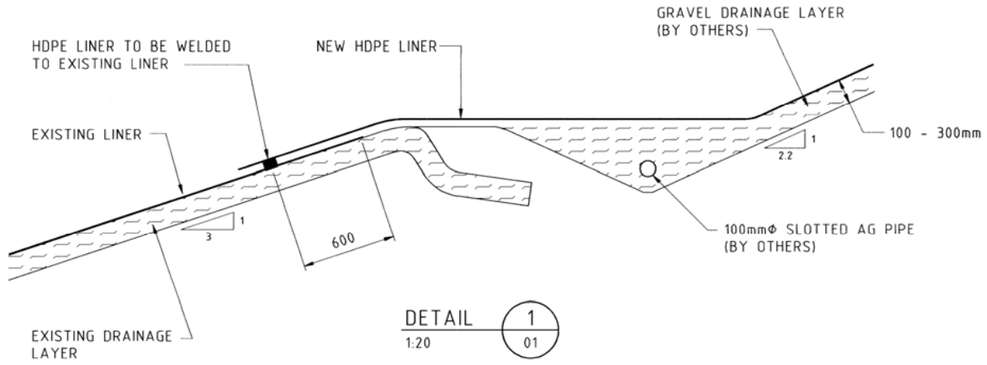
DRAWING TITLE: STAGE 1B EXTENSION OF LINER TO RL50 GENERAL ARRANGEMENT

DATE OF ISSUE | SIZE: A1

CAD REFERENCE: J:\47594\SK001 | DATE PLOTTED: 12/07/94

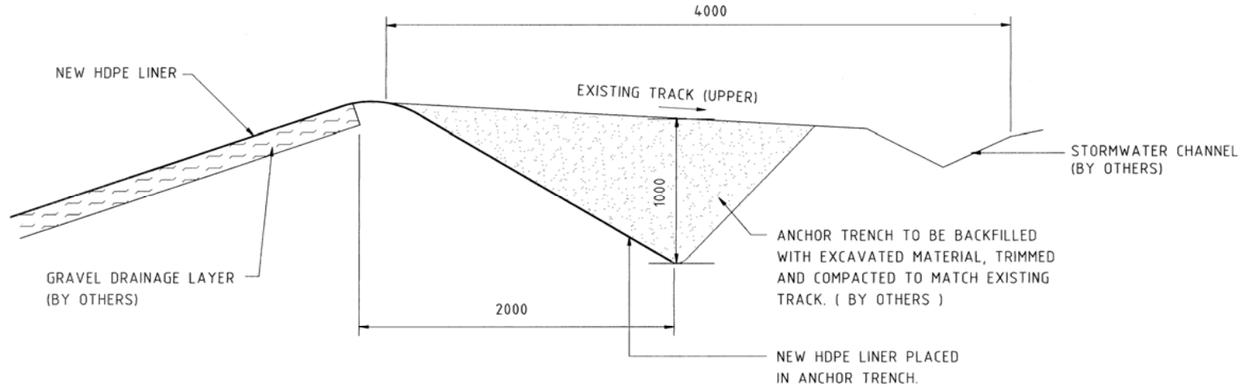
DRG No. 47594/01 | REV. 0

DRG. STATUS: PRELIMINARY



DETAIL 1 / 1:20 / 01

LINER CONNECTION



DETAIL 2 / 1:20 / 01

ANCHOR TRENCH DETAILS

PRELIMINARY
FOR DISCUSSION PURPOSES ONLY

2100 P331

REV.	DATE	DESCRIPTION	DVR No.	P.D.

SCALE: AS SHOWN

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	A.M.		
DESIGNER CHECK	S.D.G.		
PROJECT DIRECTOR APPROVAL			

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL

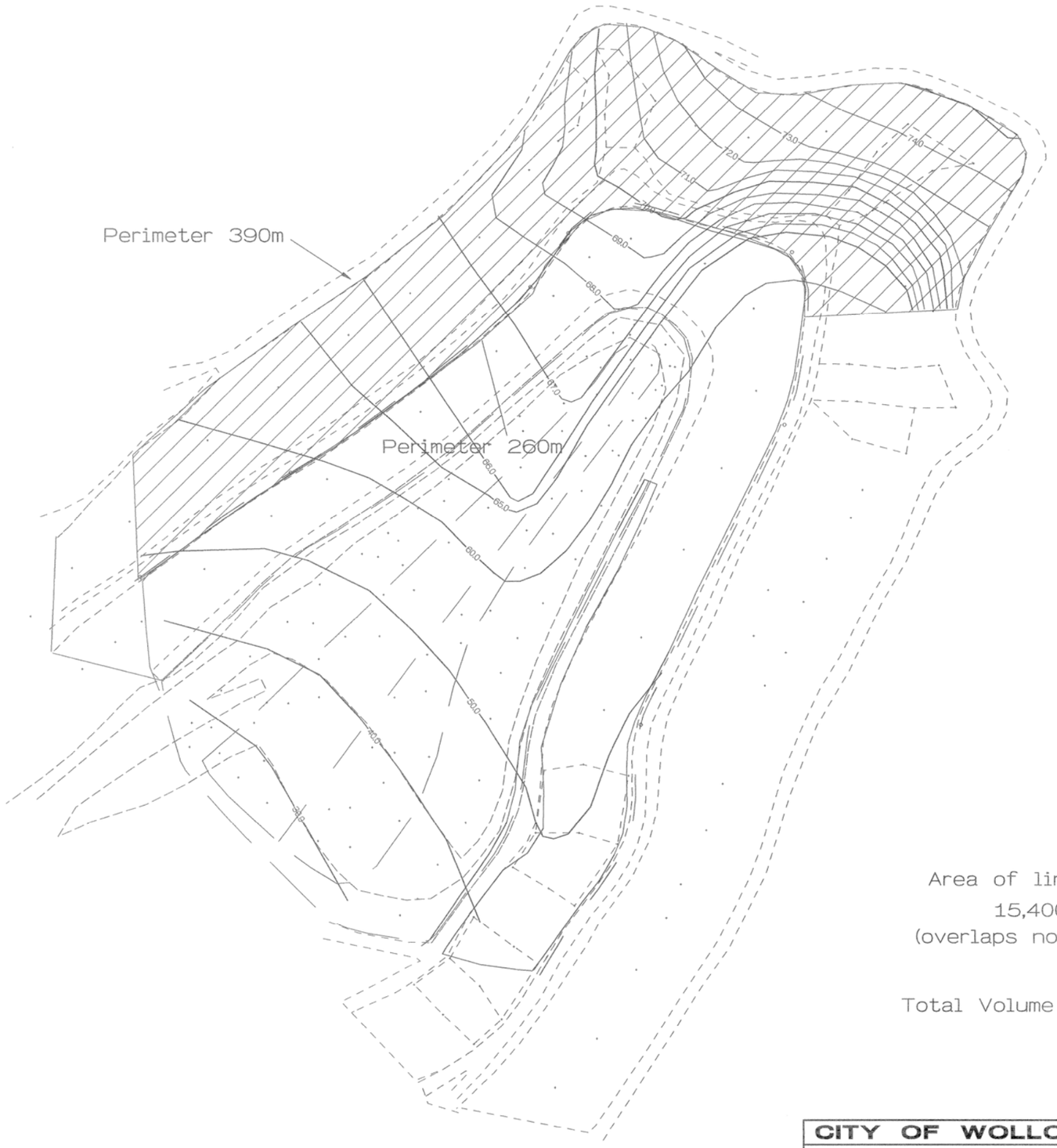
DRAWING TITLE: STAGE 1B
EXTENSION OF LINER TO RL50
LINER DETAILS

DATE OF ISSUE | SIZE: A1

CAD REFERENCE: J:\47594\SK002 | DATE PLOTTED: 29.07.94

DRG No.: 47594/02 | REV.: 0

DRG. STATUS: PRELIMINARY



Area of lining shown
15,4000 M2
(overlaps not included)

Total Volume Lift 3A = 296,000 m3

SCALES

1 : 750

CITY OF WOLLONGONG

WHYTES GULLY
EASTERN GULLY
CONTOURS LIFT 3A

SHEET 1 OF 1 | FILE NO.

DRAWING NO. **2100**

ISSUE **A**

BULK EARTHWORKS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthophoto maps.

Note: 3. See drawings 14892-004 and 14892-005 for cross sections.

Note: 4. Site clearing is limited to all areas within liner access road.

Note: 5. The following base preparation works are to be undertaken.

- Stripping of organic matter and soft topsoil, silt and peaty materials.
- Proof rolling of the base using an 10 tonne minimum vibratory roller to identify soft spots.
- Replacement of soft alluvium with non reactive backfill, and recompaction of the base using the above roller.
- Where extensive and deep cohesive alluvial deposits are encountered, heavy compaction may not be possible. In these instances a compacted granular bridging layer, typically 0.5 metres thick should be placed over the alluvium to provide a firm base for compaction equipment.

Note: 6. Compaction tolerances as detailed in Liner Specification

Note: 7. The following cut batters are to be used in all constructions:

Alluvial Creek Deposits 1V in 2H for periods less than 3 months
1V in 2.5H long term
Residual Soils & Highly Weathered Material 1V in 1H 1V in 1.5H for periods less than 3 months
1V in 1.75H 1V in 2H long term

Note: 8. Stripped topsoil is to be stockpiled and stabilised with hydromulch or reused to cap western gully.

Note: 9. The bulk earthworks should be carried out in stages as dictated by the liner contract. The infrastructure at the base of the gully will not be affected until the final stage of the eastern gully landfill.

Note: 10. Fenceline to be removed as required by Staging

Note: 11. There is to be no tree clearing within 20 metres of the designated forest area

N

SITE BOUNDARY

EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992

EXISTING FENCELINE

RAINFOREST

LINER BOUNDARY & ACCESS ROAD

300 SLOTTED HDPE LEACHATE COLLECTION PIPELINE

EXTENT OF LINING -STAGE 1

RESIDENTIAL ACCESS

BH No 2

BH No 3

BH No 1

STORMWATER TREATMENT PONDS

LEACHATE POND

STORMWATER TREATMENT PONDS

STORM WATER DRAIN

PLANT COMPOUND

RECYCLING AREA

DAM

DAM

REED BEDS

132kV TRANSMISSION LINES

REDDALLS ROAD

GATEHOUSE & WEIGHBRIDGE

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV.	DATE	DESCRIPTION	DVR No.	P.O.
02	5.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

SCALE 10 0 20 40 60 METRES

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	P.FOY		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 824

CLIENT THE CITY OF WOLLONGONG

2926

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: STAGE 1 EXTENT OF LINER AND LEACHATE DRAIN
8 of 9

DATE OF ISSUE: 5.2.93
CAD REFERENCE: PLAN08.DWG
DATE PLOTTED: 23.10.92
ORG No. 14892-008
REV. 0
ORG. STATUS: PRELIMINARY
SIZE: A0

DO NOT SCALE | IF IN DOUBT ASK

WHYTES GULLY - WASTE DISPOSAL FACILITY
LEACHATE & STORMWATER PONDS
CIVIL WORKS
REDDALLS ROAD, KEMBLA GRANGE
for WOLLONGONG CITY COUNCIL

WOLLONGONG
City of Innovation

CONTACTS:-

WOLLONGONGONG CITY COUNCIL - OWNER

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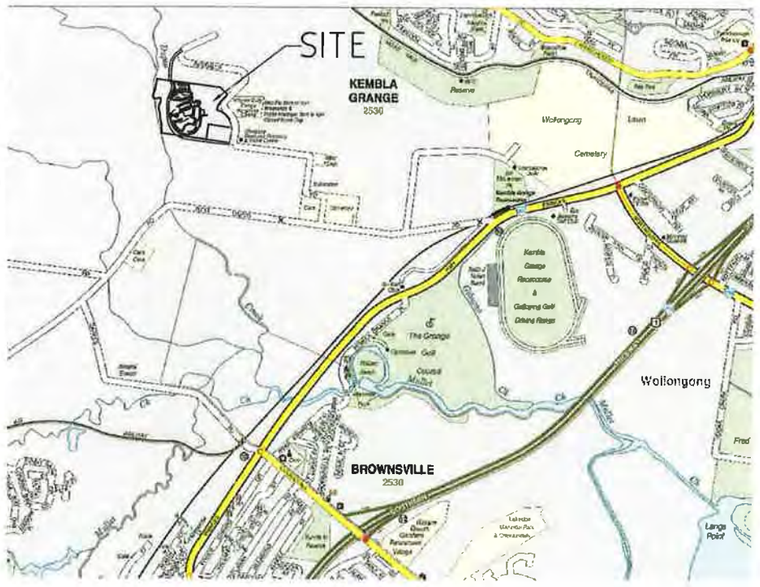
EMAIL steven.roso@forbesrigby.com.au

DRAWING LIST

DWG No.	TITLE
5001	COVER SHEET
5002	SITE MASTER PLAN
5003	SITE MASTER PROFILES
5004	LEACHATE FLOW SCHEMATIC
5005	SITE SURVEY PLAN
5006	SITE LANDSCAPE PLAN
5007	SOIL & WATER MANAGEMENT PLAN
	(CONTRACT PART A)
5008	SOIL & WATER MANAGEMENT PLAN
	(CONTRACT PART B)
5009	SOIL & WATER MANAGEMENT DETAILS
	(PARTS A & B)
5010	LEACHATE PONDS - LAYOUT PLAN
5011	LEACHATE PONDS - CROSS SECTIONS
5012	LEACHATE PONDS - SPILLWAY DETAILS
5013	LEACHATE PONDS - LINER & PENETRATION
	DETAILS
5014	LEACHATE PONDS - PLANT & EQUIPMENT
	DETAILS

DWG No.	TITLE
5015	LEACHATE PONDS - PAPERWORK DETAILS
5016	LEACHATE PONDS - CONTROL PIT DETAILS
5017	LEACHATE PONDS - SURVEY SET OUT
5018	SPARE
5019	SPARE
5020	SWM PONDS - LAYOUT PLAN
5021	SWM PONDS - CROSS SECTIONS
5022	SWM PONDS - GPT GA PLAN & SECTIONS
5023	SWM PONDS - GPT DETAILS
5024	SWM PONDS - WEIR DETAILS
5025	SWM PONDS - OUTLET DETAILS
5026	SWM PONDS - REED BED PLANTING
5027	SWM PONDS - SURVEY SET OUT
5028	SPARE
5029	SPARE

LOCATION PLAN



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N W E S

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	11/08/03
DRAWN BY	CED	11/08/03
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:20000

DATUM MGA/AHD

FORBES RIGBY PTY LTD
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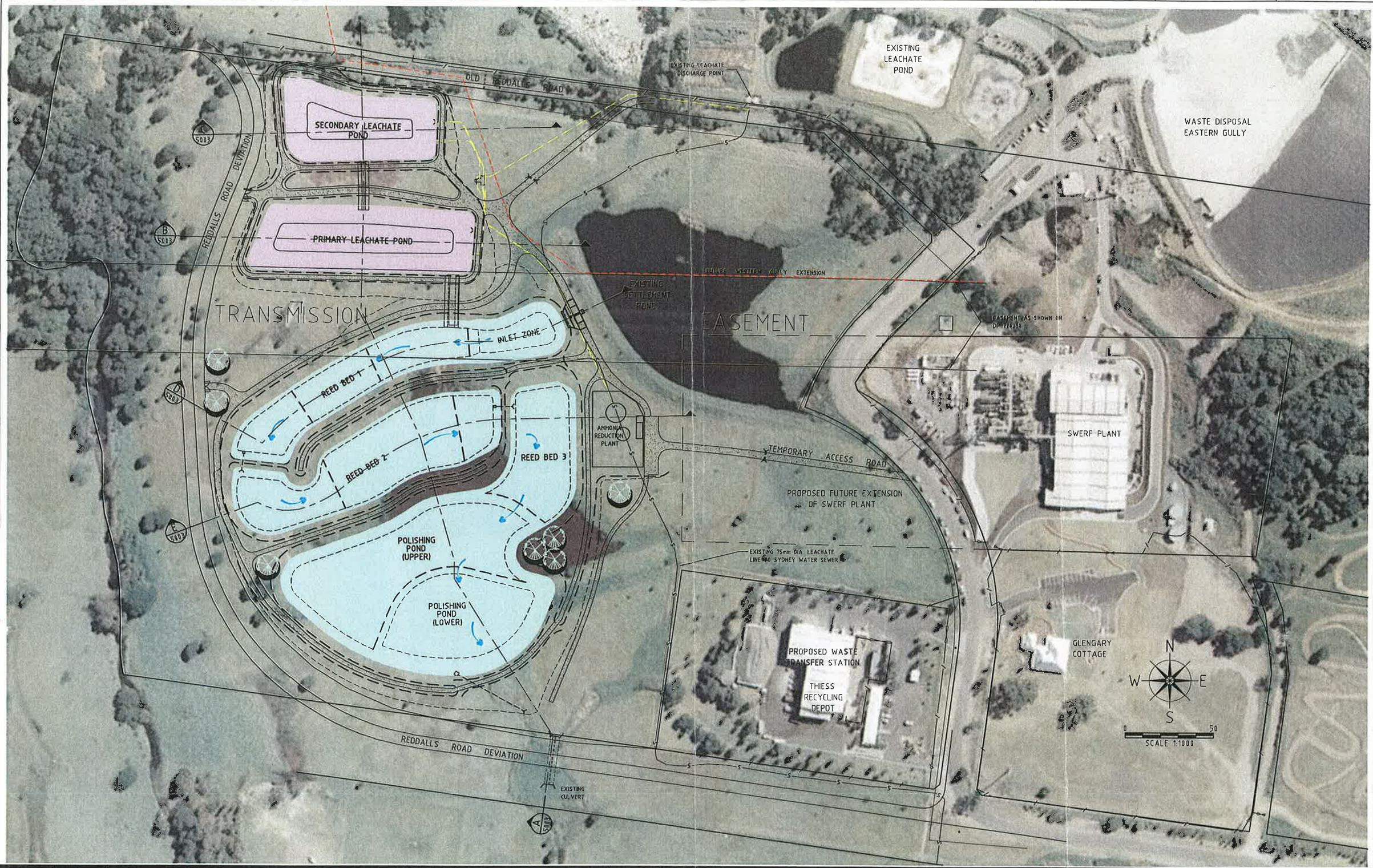
PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
COVER SHEET

Project No.	Com No.	Drawing No.	REV
99095	5	5001	P1

DO NOT SCALE | IF IN DOUBT ASK



REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	08/07/03
DRAWN BY	PCF/ES	08/07/03
DRAFTING CHECK	E.H.Rigby	05/09/032
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SURVEY INFORMATION
By: Wollongong City Council Survey Supplied 13/12/13
By: Masters & Associates Survey Supplied 21/11/13

SCALE: (on A1 Original) 1:1000

DATUM MGA/AHD

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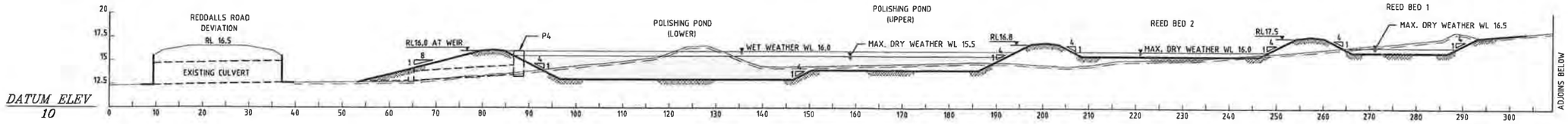
PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

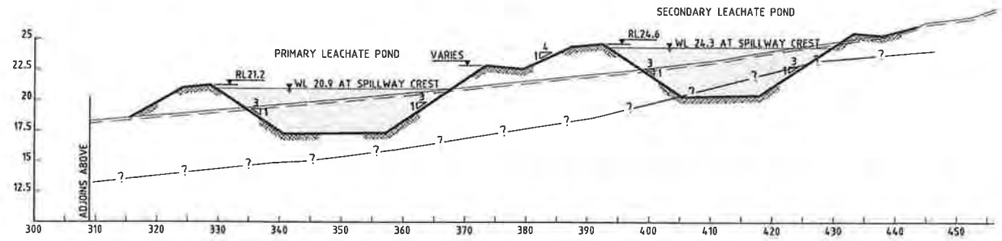
DRAWING TITLE
SITE MASTER PLAN

Project No.	Com No.	Drawing No.	REV
99095	5	5002	P3

September 19, 2013 7:43:23 p.m.
Xrefs: x99195-S-aerial photo DWG x99195-S_BASE DWG

DO NOT SCALE IF IN DOUBT ASK





SECTION A
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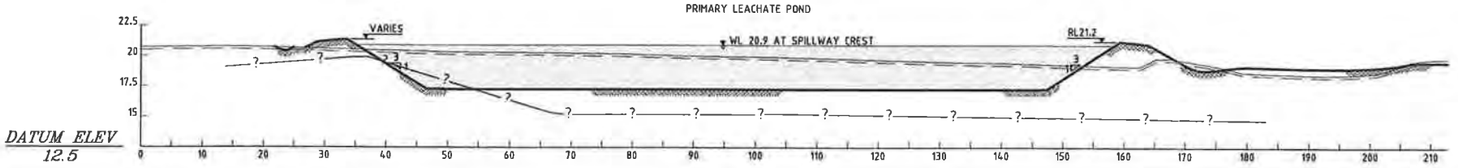
1:250 V



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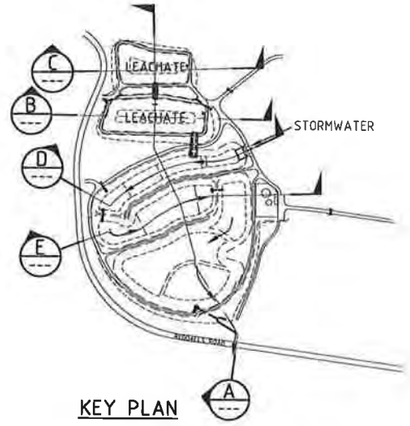
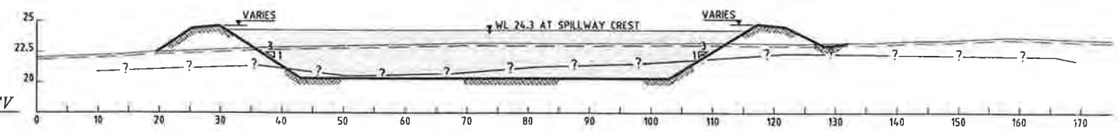


KEY PLAN



SECTION C
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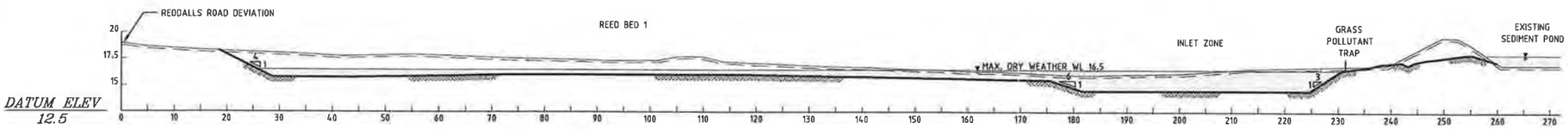
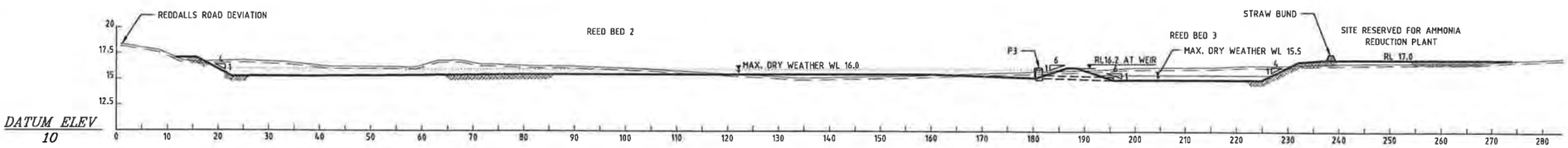
1:250 V



SECTION D
SCALE 1:500 H (S002)
1:250 V



SECTION E
SCALE 1:500 H (S002)
1:250 V

LEGEND:

- PROPOSED DESIGN SURFACE
- WATER LEVEL
- EXISTING GROUND SURFACE
- TOPSOIL
- EXISTING ROCK SURFACE

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF/SR	11/07/03
DRAWN BY	ES	11/07/03
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:500 H 1:250 V

HEIGHT DATUM MGA/AHD

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PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SITE MASTER PROFILES

Project No.	Com No.	Drawing No.	REV
99095	5	5003	P2

DO NOT SCALE IF IN DOUBT ASK

OLD REDDALLS ROAD

REDDALLS ROAD DEVIATION

UPPER POND (SECONDARY)

(TREATED OR UNTREATED LEACHATE & STORAGE)

LOWER POND (PRIMARY)

(UNTREATED LEACHATE STORAGE)

L1 L1a L2 L3 L4 L5 L6 L7

P1

HISTORIC FLOW (LI-50%ile)=90 KL/day (URS/PETI 2003 APPROX. = 1 l/sec

EXISTING CULVERT

EXISTING 75Ø PRESSURE LINE DELIVERING LEACHATE TO SEWER TO-BE-DECOMMISSIONED WHEN NEW PIPEWORK COMPLETED

FUTURE TOE OF EMPLACEMENT

L6 (SUPPLY)

L7 (RETURN)

AMMONIA PLANT

LEGEND

L1(DN 315)	PROPOSED (GRAVITY) DELIVERY LINE FROM EMPLACEMENT TO P1 (L1a 300 BYPASS)(UNTREATED LEACHATE)
L2(DN 315)	PROPOSED (GRAVITY) LEACHATE DELIVERY LINE TO LOWER POND FROM P1(UNTREATED LEACHATE)
L3(DN 160)	PROPOSED (PUMPED) DELIVERY LINE TO UPPER POND FROM P1(UNTREATED LEACHATE)
L4(DN 160)	PROPOSED (PUMPED) RETURN LINE FROM LOWER POND TO P1(UNTREATED LEACHATE)
L5(DN 160)	PROPOSED (PUMPED) RETURN LINE FROM UPPER POND TO P1(UNTREATED OR TREATED LEACHATE)
L6(DN 160)	PROPOSED (GRAVITY) SUPPLY LINE TO PLANT(UNTREATED LEACHATE)
L7(DN 160)	PROPOSED (PUMPED) RETURN LINE FROM PLANT TO P1(TREATED LEACHATE)

(A) SURFACE INTAKE PUMP (PONTOON MOUNTED) NEW (x2)

(B) SURFACE AERATOR (PONTOON MOUNTED) NEW - 4 INITIAL, OTHERS AS REQUIRED

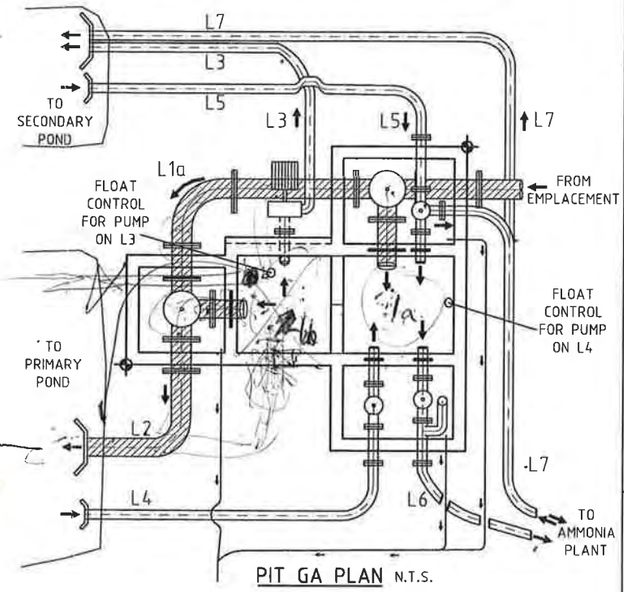
(C) SURFACE AERATOR (PONTOON MOUNTED) EXISTING FROM PREV POND (x3)

(D) AXIAL MIXER (PONTOON MOUNTED) (IF REQUIRED)

N W E S

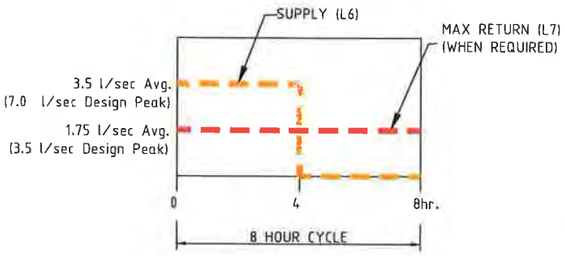
0 50m

SCALE 1:500



PIT GA PLAN N.T.S.

(REFER DWG 5016 FOR DETAILS)



FLOWS L6 & L7

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR/SR	01/01/98
DRAWN BY	PCF/CD	01/01/98
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:500

DATUM MGA/AHD

FORBES RIGBY PTY LTD
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Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE FLOW SCHEMATIC

Project No.	Com No.	Drawing No.	REV
99095	5	5004	P2

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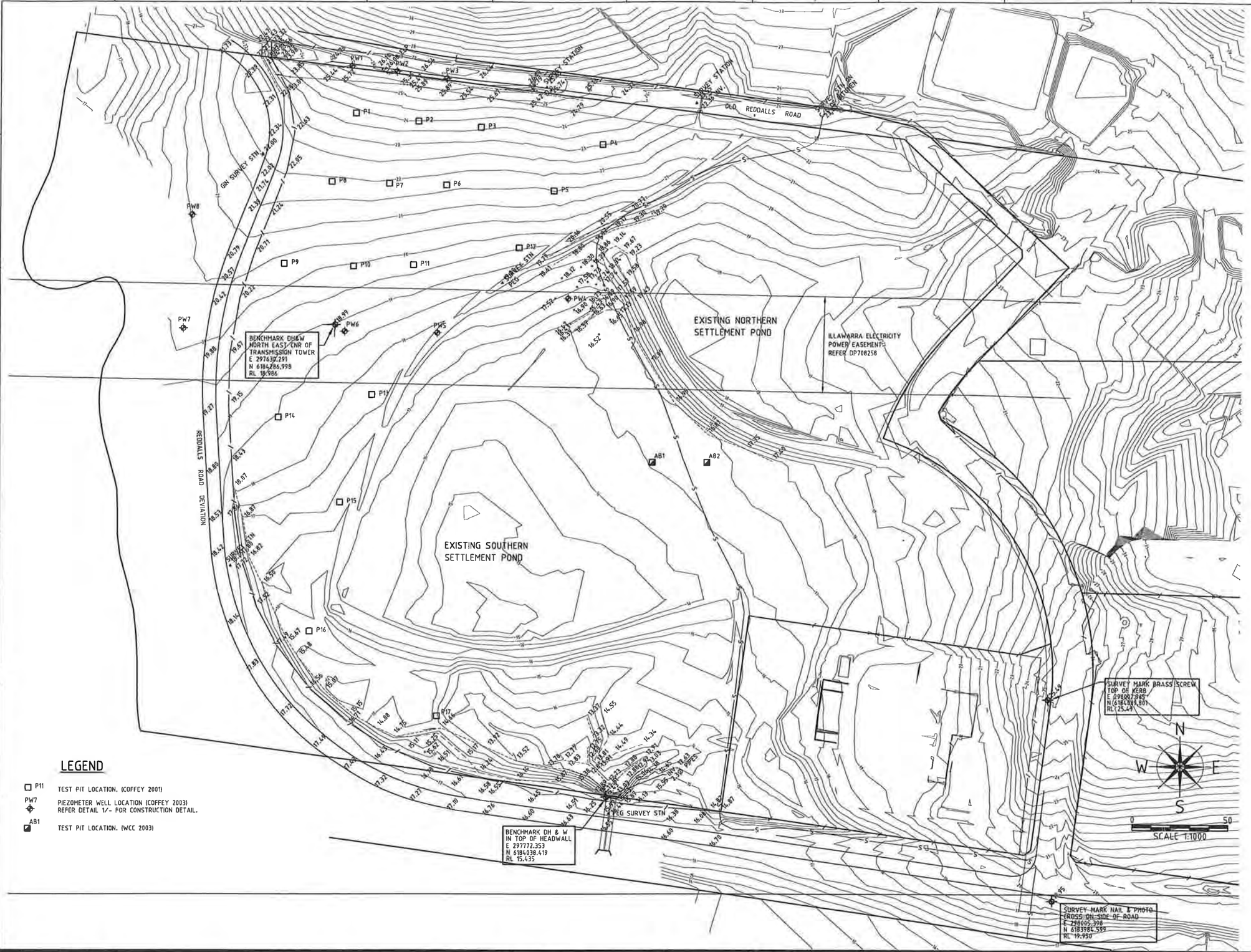

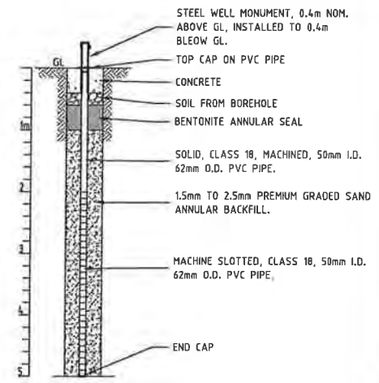

PIEZOMETER WELL CONSTRUCTION
PW1 - PW8

DETAIL 1
N.T.S. ---

LEGEND

- P11 — TEST PIT LOCATION. (COFFEY 2001)
- PW7 — PIEZOMETER WELL LOCATION (COFFEY 2003) REFER DETAIL 1/- FOR CONSTRUCTION DETAIL.
- AB1 — TEST PIT LOCATION. (WCC 2003)

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	08/08/03
DRAWN BY	PCF	12/08/03
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SURVEY INFORMATION
By: Wollongong City Council
Survey Supplied 08/07/03
By: Masters & Associates
Reference: No 506640
Survey Supplied 20/06/03

GEOTECHNICAL REFERENCES
Coffey Report: SC1813/1-ab
Date: 18/12/01
WCC Test Pits: R09

SCALE: (on A1 Original) 1:1000

DATUM MGA/AHD

FORBES RIGBY PTY LTD
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PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SITE SURVEY PLAN

Project No.	Com No.	Drawing No.	REV
99095	5	5005	P1

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ptember 12, 2003 3:37:11 p.m.
efs: x99095-5_BASE.Dwg

DO NOT SCALE IF IN DOUBT ASK

LEGEND

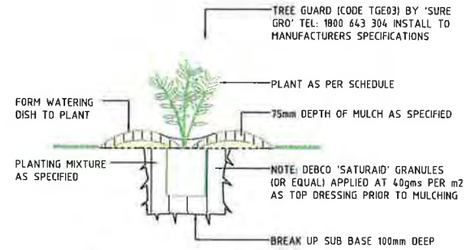
EXISTING CONTOUR

PROPOSED NEW CONTOUR

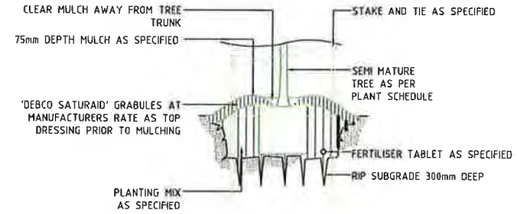
PROPOSED NEW PLANTING AREAS

EXISTING PLANTING AREAS RETAINED

SIGNATURE TREE PLANTING



1 TUBESTOCK TREE PLANTING SECTION NTS



2 SEMI MATURE TREE PLANTING TYPICAL SECTION NTS

PLANT SCHEDULE

Botanical Name	Common Name	No.	Size	Stake
SHRUBS				
Syzygium 'Select Form'	Brush Cherry	175	75mmtube	AA
Callistemon viminalis	Weeping Bottle Brush	75	75mmtube	AA
Westringia fruiticosa	Coastal Rosemary	75	75mmtube	AA
TREES				
Acmena smithii var.	Lilly Pilly	120	75mmtube	
Callistemon salignus	Pink Tips	120	75mmtube	
Casuarina glauca	Swamp Oak	220	75mmtube	
Ficus rubiginosa	Port Jackson Fig	5	100litre	yes(2)
Lophostemon confertus	Brush Box	25	35litre	yes(1)
Melaleuca incana	Grey Honey Myrtle	75	75mmtube	
Melaleuca linariifolia	Snow in Summer	100	75mmtube	
Melaleuca nesophila	Showy Honey Myrtle	75	75mmtube	
Melaleuca stypheliades	Prickly Paperbark	220	75mmtube	
Tristaniopsis laurina	Water Gum	220	75mmtube	

Note: Plant quantities shown on planting plan take precedence over quantities shown on the plant schedule (to be used as a guide only.) The Landscape Contractor shall ensure that the correct quantities are installed as per the planting plan.

NOTE:
THIS IS A REPRODUCTION OF LANDSCAPE ARCHITECTS TAYLOR BRAMMER'S DRAWING 03-175W L01 REV B - LANDSCAPE PLAN, DATED AUGUST 2003.

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	I.B	13/08/03
DRAWN BY	SP/CD	14/08/03
DRAFTING CHECK	E.H.Rigby	09/09/03
DESIGN CHECK	E.H.Rigby	09/09/03/
FINAL APPROVAL	E.H.Rigby	09/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:1000

DATUM MGA/AHD

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PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SITE LANDSCAPE PLAN

Project No.	Com No.	Drawing No.	REV
99095	5	5006	P1

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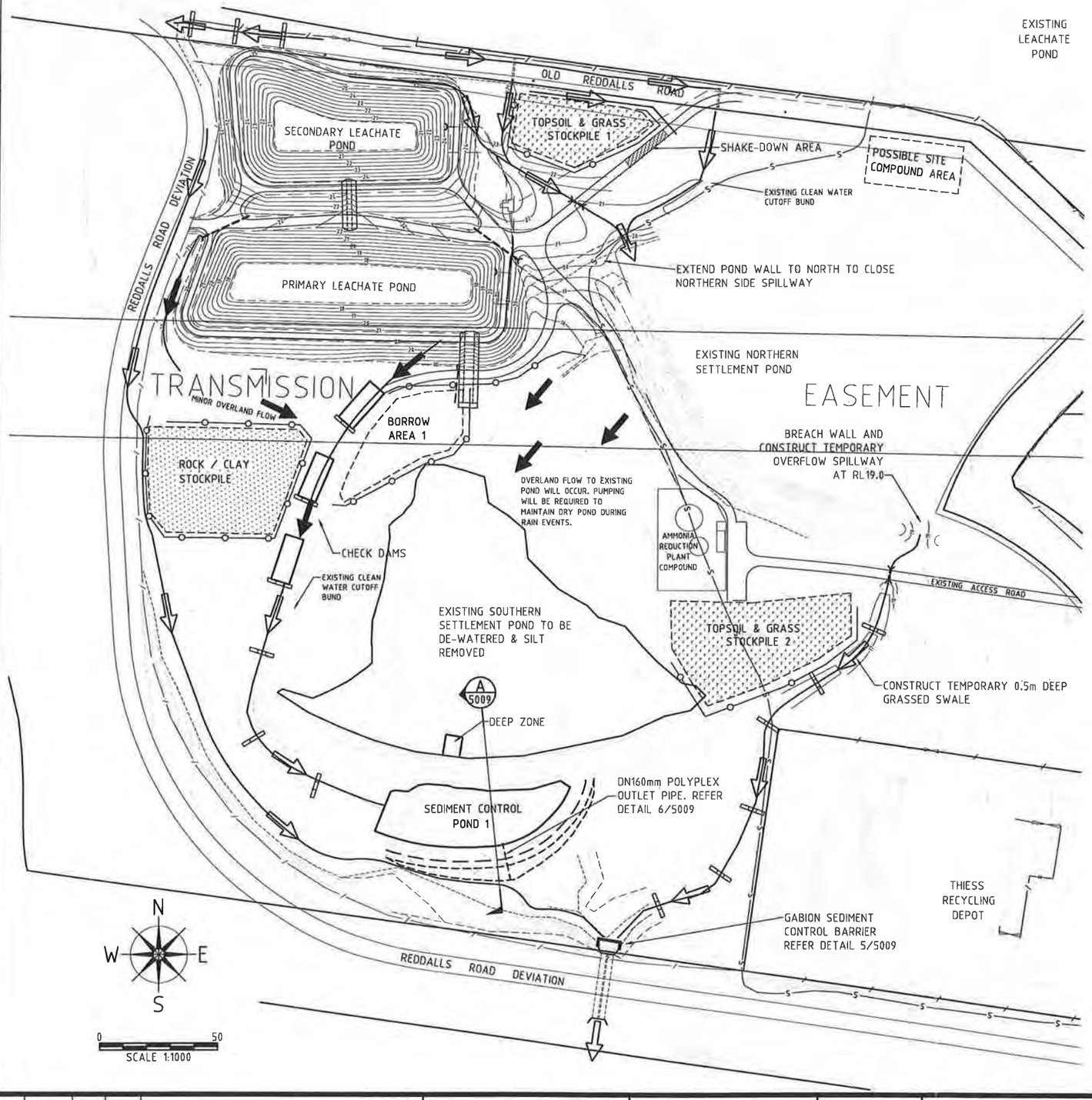

GENERAL NOTES

G1. IDENTIFY THOSE AREAS REQUIRED TO BE DISTURBED BY CONSTRUCTION ACTIVITY AND ENSURE THAT DISTURBANCE IS LIMITED TO THOSE AREAS.

G2. STAGE CONSTRUCTION ACTIVITY AS NECESSARY TO ENSURE GOOD ENVIRONMENTALLY SENSITIVE CONSTRUCTION PRACTICES ARE FOLLOWED.

G3. ALL SURFACE WATER AND EROSION AND SEDIMENT CONTROL MEASURES AS DETAILED ON THE APPROVED MANAGEMENT PLANS MUST BE IN PLACE BEFORE THE COMMENCEMENT OF CONSTRUCTION AND CONTINUE TO OPERATE AFTER COMPLETION OF THE CONSTRUCTION UNTIL THE VEGETATION IS ESTABLISHED.

G4. MEASURES USED TO MANAGE EROSION AND SEDIMENT CONTROL WILL INCLUDE:
a. DIVERSION DRAINS TO CHANNEL CLEAN RUNOFF AWAY FROM CONSTRUCTION AREAS.
b. SEDIMENT CONTROL FENCES TO FILTER RUNOFF FROM DISTURBED AREAS AND STOCKPILES.
c. CHECK DAMS TO FILTER LARGER FLOWS OF SEDIMENT LADEN RUNOFF TO TRAP SEDIMENT.
d. HAY BALE SEDIMENT TRAPS TO RECEIVE SMALLER FLOWS OF SEDIMENT LADEN RUNOFF TO TRAP SEDIMENT.

G5. UNCONTAMINATED RUNOFF FROM AROUND THE CONSTRUCTION SITE SHOULD BE DIVERTED AROUND THE SITE. DIVERSION DRAINS TO BE CONSTRUCTED UPSLOPE OF AREAS TO BE DISTURBED TO CONVEY CLEAN RUNOFF AWAY FROM DISTURBED AREAS AND TO REMOVE THE POTENTIAL OF RUNOFF PASSING ACROSS THE SITE BEING CONTAMINATED BY
a. MATERIALS FROM SITE EXCAVATIONS
b. OILS AND FUELS THAT MAY BE SPILLED FROM EARTHMOVING MACHINERY AND TRUCKS.
c. CEMENT FINES FROM FRESHLY POURED OR SPILLED CONCRETE.
d. HIGH PH WATER FROM THE CONSTRUCTION OF CONCRETE STRUCTURES.

G6. DRAINAGE THROUGH AND FROM DISTURBED AREAS SHOULD BE DESIGNED TO MINIMISE SURFACE FLOW VELOCITIES. DIVERSION OF SURFACE AND ROAD RUNOFF SHOULD BE AWAY FROM FILL BATTERS.

G7. ALL CONSTRUCTION SITE RUNOFF SHOULD BE DISCHARGED INTO GRASSED FIELDS, SEDIMENTATION TRAPS, OR CHECK DAMS DOWN SLOPE OF DISTURBED AREAS TO COLLECT, CONVEY AND TREAT SEDIMENT-LADEN RUNOFF.

G8. FRESHLY FORMED SLOPING BATTERS SHOULD BE STABILISED BY MINIMISING THE BATTERS. ROAD AND EARTHWORKS CUT AND FILL BATTERS SHOULD BE AT A MAXIMUM OF 1V:3H. REVEGETATION TO OCCUR AS SOON AS PRACTICAL.

G9. DIVERSION BANKS SHOULD BE PLACED UPSLOPE AND SILT FENCES SHOULD BE INSTALLED ON THE DOWNSLOPE SIDE OF ALL STOCKPILES.

G10. ALL VEHICLES LEAVING THE SITE MUST BE CLEANED TO PREVENT DIRT/ROCK MATERIAL FROM POLLUTING PUBLIC ROADS.

G11. MEASURES SHALL BE TAKEN TO MINIMISE THE RISK OF EROSION TO DISTURBED AREAS. BARE AREAS SHOULD BE STABILISED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION ACTIVITIES. TEMPORARY STABILISATION TECHNIQUES SUCH AS EROSION MATTING, SEDIMENT SCREENS, HAY BALE ENERGY DISSIPATERS, MULCHING AND GRASS SPECIES ESTABLISHMENT SHOULD BE IMPLEMENTED ON DISTURBED AREAS AS REQUIRED.

G12. REGULAR INSPECTION AND MAINTENANCE OF ALL WORKS AND REHABILITATED AREAS SHALL BE UNDERTAKEN.

G13. MONITORING OF GROUNDWATER SHALL BE UNDERTAKEN TO ENSURE THAT NO UNEXPECTED GROUNDWATER ISSUES ARISE DURING THE CONSTRUCTION PHASE.

G14. FOLLOWING REVEGETATION, EROSION TEMPORARY CONTROL MEASURES ARE TO BE REMOVED. THIS MAY INVOLVE CLEANING AND REMOVAL OF DIVERSION WORKS, HAY BALE SEDIMENT TRAPS AND CHECK DAMS.

G15. EROSION AND SEDIMENT CONTROL STRUCTURES TO BE INSPECTED WEEKLY AND AFTER EVERY STORM AND RUNOFF EVENT TO CHECK THEY ARE OPERATING SATISFACTORILY AND TO SHEDULE ANY MAINTENANCE WORK AND REPAIRS THAT MAY BE REQUIRED. REGULAR MAINTENANCE WILL INCLUDE:
a. SEDIMENT REMOVAL FROM DRAINS AND CHECK DAMS.
b. REPLACEMENT OF HAY BALES AS REQUIRED.
c. REPLACEMENT OF HARDSTAND MATERIALS EG CEMENT STABILISED AGGREGATE AROUND ROADS AS REQUIRED.

G16. WATER CART TO BE AVAILABLE ON SITE FOR DUST REDUCTION PURPOSES AS REQUIRED.

G17. ANY INCIDENTS ON SITE LIKELY TO CAUSE POLLUTION MUST BE REPORTED IMMEDIATELY TO THE SUPERINTENDENT.

G18. ALL WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH "MANAGING STORMWATER, SOIL & CONSTRUCTION" PRODUCED BY THE NSW DEPARTMENT OF HOUSING. (THE BLUE BOOK)

G19. THIS PLAN SHOWS TYPICAL SOIL & WATER MANAGEMENT MEASURES THAT WILL BE REQUIRED BUT IS NOT INTENDED TO LIMIT THE CONTRACTOR TO ANY PARTICULAR CONSTRUCTION METHODOLOGY.

G20. FOR SOIL AND SEDIMENT CONTROL DEVICES DETAILS REFER TO DWG. No 5009.

LEGEND

- CLEAN WATER CUTOFF DRAIN (REFER DETAIL 3/5009)
- CLEAN WATER CUTOFF DRAIN WITH HAYBALES PLACED AT 20m INTERVALS (REFER DETAIL 3/5009)
- DIRTY WATER COLLECTION DRAIN
- SEDIMENT CONTROL FENCE (REFER DETAILS 1/5009)
- HAYBALE SEDIMENT BARRIER (REFER DETAIL 2/5009

SCHEDULE OF OPERATIONS

A01. ESTABLISH SITE COMPOUND OFF OLD REDDALLS ROAD.

A02. ALL SURFACE WATER AND EROSION AND SEDIMENT CONTROL MEASURES AS DETAILED ON THE APPROVED MANAGEMENT PLANS MUST BE IN PLACE BEFORE THE COMMENCEMENT OF CONSTRUCTION AND CONTINUE TO OPERATE AFTER COMPLETION OF THE CONSTRUCTION UNTIL THE VEGETATION IS ESTABLISHED.

A03. FORM CLEANWATER CUTOFF DRAINS. HAYBALES TO BE PLACED AT 20m INTERVALS ACROSS CUTOFF DRAINS WHICH DO NOT DISCHARGE OVER UNDISTURBED GRASS AREAS.

A04. CONSTRUCT GABION SEDIMENT CONTROL BARRIER AT CULVERT OUTLET STRUCTURE UNDER REDDALLS ROAD DEVIATION. HAY BALE FILTER TO BE PLACED ACROSS CULVERT INLET DURING GABION BARRIER CONSTRUCTION.

A05. MODIFY EASTERN END OF EXISTING NORTHERN SEDIMENT POND WALL TO ALLOW OVERFLOW AT RL19.0m. BREACH EXISTING CLEAN WATER CUTOFF BUND AND EXTEND POND WALL TO DIRECT WATER TO NORTHERN SETTLEMENT POND.

A06. INSTALL SEDIMENT CONTROL FENCES, HAYBALE SEDIMENT BARRIERS AND THREE CHECK DAMS (20 x 8 x 1.5m EACH).

A07. DE-WATER EXISTING SOUTHERN SEDIMENT POND (DURING CONSTRUCTION OF LEACHATE PONDS) BY:
a. EXCAVATE DEEP ZONE FOR DE-WATERING LOCATION CLOSE TO SOUTHERN SEDIMENT POND WALL.
b. TEST POND WATER FOR SUSPENDED SOLIDS (MAXIMUM OF 50mg/l) AND GYPSUM DOSE IF REQUIRED.
c. DE-WATER BY PUMPING CLEAN POND WATER OVER POND WALL AT MAX. RATE OF 4.0 l/s UNTIL POND DEPTH IS REDUCED BY 0.5m. CHECK FOR SUSPENDED SOLIDS AND DOSE IF REQUIRED, THEN REDUCE WATER LEVEL BY 0.5m AT MAX. RATE OF 4.0 l/s, CONTINUING THIS PROCEDURE UNTIL POND IS DE-WATERED.

A08. CONSTRUCT SEDIMENT CONTROL POND 1 AT BASE OF FUTURE POLISHING POND (INVERT AT RL13) WITH TRACK ROLLED TEMPORARY WALL.
DE-WATER SEDIMENT POND 1 VIA DN160mm POLYPLEX PIPE AND RISER.
FOLLOWING DE-WATERING OF SOUTHERN SEDIMENT POND BREACH WALL AND ALLOW GROUND TO DE-WATER INTO SEDIMENT CONTROL POND 1.

A09. EXCAVATE SILT MATERIAL FROM OUTER 10m OF SOUTHERN SEDIMENT POND AND PLACE IN PILE AROUND SIDE OF POND TO DE-WATER. ONCE DRY CART TO TOPSOIL AND GRASS STOCKPILE 1 OR 2 FOR REUSE WITH TOPSOIL. CONTINUE THIS PROCESS UNTIL SILT IS FULLY REMOVED FROM POND.

A10. SLASH GRASS ON LEACHATE POND TOPSOIL REMOVAL AREA.

A11. STRIP TOPSOIL AND STOCKPILE IN PREPARED AREA.

A12. EXCAVATE FOR SECONDARY AND PRIMARY LEACHATE PONDS, STOCKPILING ROCK MATERIAL FOR FUTURE USE AND FORMING EMBANKMENTS WITH CLAY MATERIAL AS ABLE. STOCKPILE CLAY MATERIAL IN PREPARED DESIGNATED AREA IF REQUIRED. IF LEACHATE POND DE-WATERING IS REQUIRED DURING CONSTRUCTION, PUMP TO 3 DOWNSTREAM CHECK DAMS.

A13. CLAY FILL MATERIAL IS TO BE STRIPPED FROM BORROW AREA 1 AS REQUIRED.

A14. CONSTRUCT PONDS WITH STRUCTURES.

A15. CONSTRUCT POND MAINTENANCE ROADWAYS WITH SLAG.

A16. TOPSOIL EXTERIOR POND EMBANKMENTS AND UNPAVED POND ROADWAYS.

A17. SOIL AND WATER MANAGEMENT MEASURES TO BE MAINTAINED UNTIL ALL DISTURBED AREAS ARE SATISFACTILY REVEGETATED.

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	29/07/03
DRAWN BY	PCF	30/07/03
DRAFTING CHECK	E.H.Rigby	08/09/05
DESIGN CHECK	E.H.Rigby	08/09/05
FINAL APPROVAL	E.H.Rigby	08/09/05

FOR APPROVAL

SCALE: (on A1 Original) 1:1000

DATUM MGA/AHD

FORBES RIGBY PTY LTD
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PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SOIL AND WATER MANAGEMENT PLAN (CONTRACT PART A)

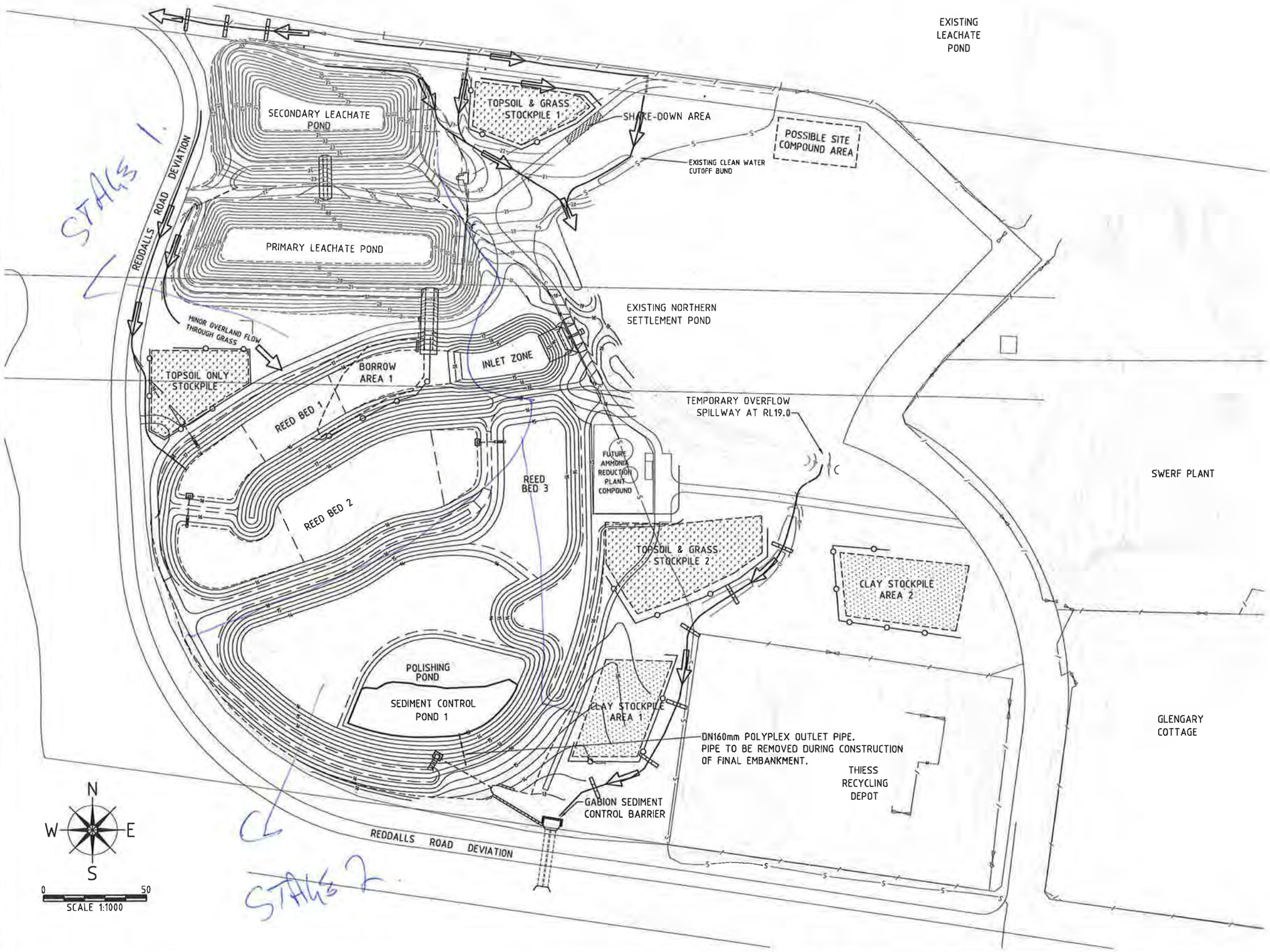
Project No.	Com No.	Drawing No.	REV
99095	5	5007	P1

S:\99095-5_BASE.DWG

DO NOT SCALE IF IN DOUBT ASK

SPRAYGRASS

STAGE 1



STAGE 2

SCHEDULE OF OPERATIONS

S01. FORM CLEANWATER CUTOFF DRAINS, INSTALL SEDIMENT CONTROL FENCES AND HAYBALE SEDIMENT BARRIERS.

S02. ALL SURFACE WATER AND EROSION AND SEDIMENT CONTROL MEASURES AS DETAILED ON THE APPROVED MANAGEMENT PLANS MUST BE IN PLACE BEFORE THE COMMENCEMENT OF CONSTRUCTION AND CONTINUE TO OPERATE AFTER COMPLETION OF THE CONSTRUCTION UNTIL THE VEGETATION IS ESTABLISHED.

S03. SEDIMENT POND 1 TO BE DE-WATERED CONTINUOUSLY VIA DN160mm POLYPLEX PIPE AND RISER TO MAINTAIN MAXIMUM DYNAMIC STORM STORAGE VOLUME.

S04. GABION SEDIMENT CONTROL BARRIER TO BE INSPECTED AT REGULAR INTERVALS AND FILTER FABRIC CLEANED/REPLACED AS REQUIRED.

S05. SLASH GRASS THEN REMOVE GRASS AND TOPSOIL ONLY AS REQUIRED FOR PROGRESSIVE EARTHWORKS (ONE ZONE OF POND AT A TIME). 2600m3 OF GRASS FREE TOPSOIL TO BE STOCPILED FOR PLACEMENT IN REED BED ZONES. TO MINIMUMISE DUST REMOVAL FROM THIS STOCKPILE WATER AND TRACK ROLL TOP AND SIDES OF STOCKPILE TO FORM COMPACTED CRUST SURFACE. REMAINING GRASS AND TOPSOIL MATERIAL TO BE STOCKPILED IN TOPSOIL AND GRASS STOCKPILE 1 OR 2 FOR REUSE.

S06. COMMENCE EXCAVATION WORKS AT POLISHING POND BY EXCAVATING AND CONSTRUCTING SEDIMENT POND SPILLWAY AND ADJACENT EMBANKMENTS. REMOVE EXISTING SOUTHERN SETTLEMENT POND WALL AND PROGRESS CONSTRUCTION TOWARDS INLET ZONE.

S07. SCOUR PROTECTION TO BE PROVIDED ON REED BED 1 EMBANKMENT AT DISCHARGE POINT OF CLEAN WATER CUTOFF DRAIN.

S08. RELAY 200mm TOPSOIL AND GRASS ON RESHAPED SEDIMENT POND BASE AND EMBANKMENTS AS SOON AS POSSIBLE AND WATER TO PROMOTE VEGETATION ESTABLISHMENT. TOPSOIL ONLY TO BE LAID WITHIN REED BEDS AT DEPTH OF 300mm. FOR DETAILS OF REED BED PLANTING REFER TO DWG. No 5026.

S09. SOIL AND WATER MANAGEMENT MEASURES TO BE MAINTAINED UNTIL ALL DISTURBED AREAS ARE SATISFACTORLY REVEGETATED.

NOTE

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NUMBER 5007.

LEGEND

- CLEAN WATER CUTOFF DRAIN (REFER DETAIL 3/5009)
- CLEAN WATER CUTOFF DRAIN WITH HAYBALES PLACED AT 20m INTERVALS (REFER DETAIL 3/5009)
- SEDIMENT CONTROL FENCE (REFER DETAIL 1/5009)
- HAYBALE SEDIMENT BARRIER (REFER DETAIL 2/5009)

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	SR/EHR	01/08/03
DRAWN BY	PCF	13/08/03
DRAFTING CHECK	E.H.Rigby	08/09/03
DESIGN CHECK	E.H.Rigby	08/09/03
FINAL APPROVAL	E.H.Rigby	08/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:1000

HEIGHT DATUM AHD

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PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SOIL AND WATER MANAGEMENT PLAN (CONTRACT PART B)

Project No.	Com No.	Drawing No.	REV
99095	5	5008	P0

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December 12, 2003 3:38:42 p.m.
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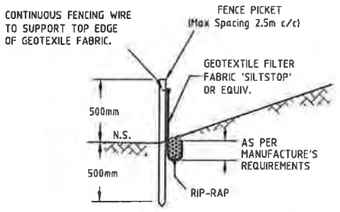
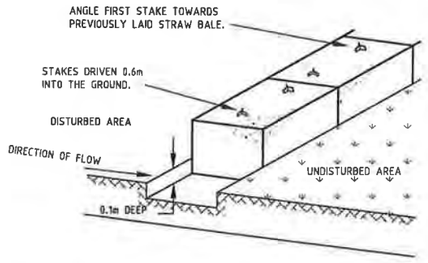


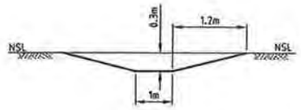
SEDIMENT CONTROL FENCE

DETAIL 1 N.T.S. 5007 & 5008



HAYBALE SEDIMENT BARRIER

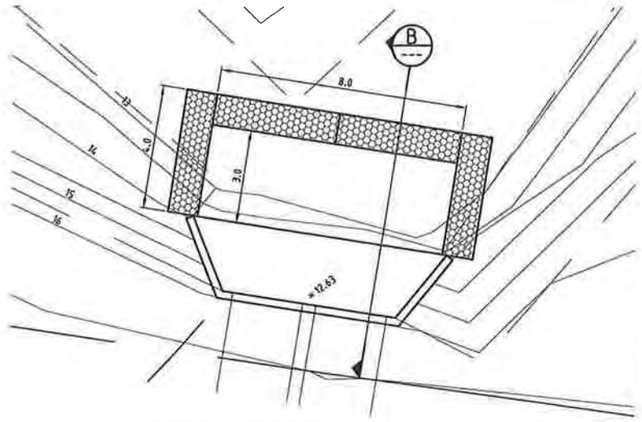
DETAIL 2 N.T.S. 5007 & 5008



CLEAN WATER CUTOFF DRAIN

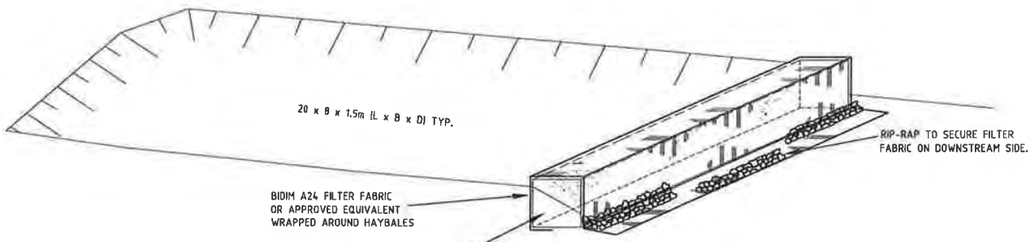
MINIMUM SECTIONAL AREA

DETAIL 3 N.T.S. 5007 & 5008



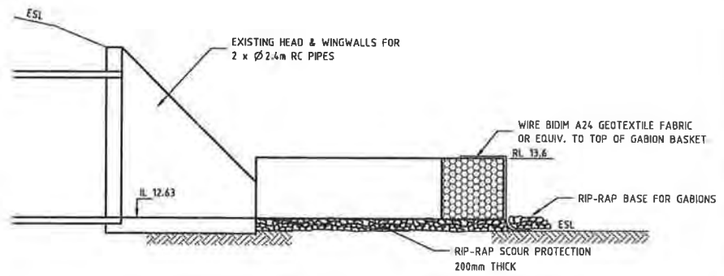
GABION SEDIMENT CONTROL BARRIER

DETAIL 5 SCALE 1:100 5007 & 5008



CHECK DAM

DETAIL 4 N.T.S. 5007 & 5008



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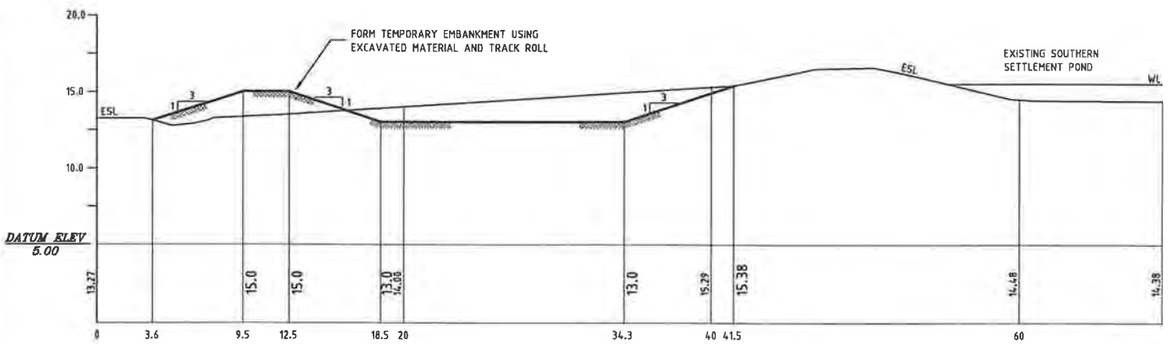
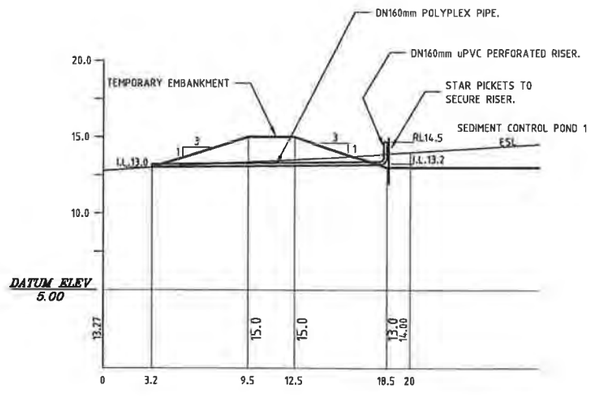


SEDIMENT CONTROL POND 1 (PART A CONSTRUCTION STAGE)

SECTION A SCALE 1:200 5007



OUTLET PIPE

DETAIL 6 SCALE 1:200 5007

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	14/08/03
DRAWN BY	PCF	14/08/03
DRAFTING CHECK	E.H.Rigby	08/09/03
DESIGN CHECK	E.H.Rigby	08/09/03
FINAL APPROVAL	E.H.Rigby	08/09/03

FOR APPROVAL

SCALE: (on A1 Original) AS SHOWN

DATUM MGA/AHD

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PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
SOIL AND WATER MANAGEMENT DETAILS

Project No.	Com No.	Drawing No.	REV
99095	5	5009	P1

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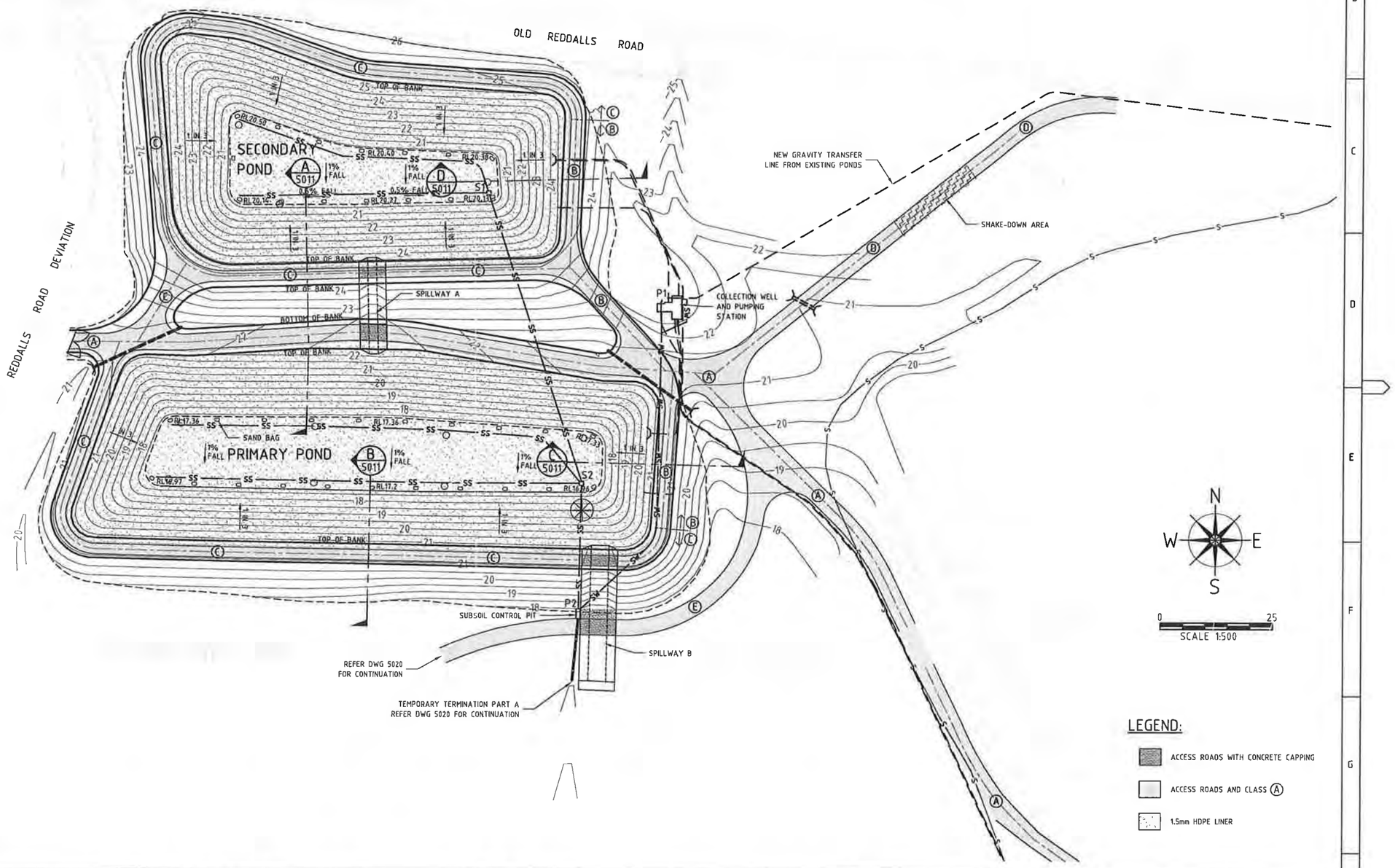

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS

DESIGN BY	PGF	08/07/03
DRAWN BY	ES	08/07/03
DRAFTING CHECK	E.H.Rigby	08/09/03
DESIGN CHECK	E.H.Rigby	08/09/03
FINAL APPROVAL	E.H.Rigby	08/09/03

FOR APPROVAL

SURVEY INFORMATION
By: Wollongong City Council Survey Supplied 08/07/03
By: Masters & Associates Survey Supplied 20/06/03
Co-ordinate System: MGA

SCALE: (on A1 Original) 1:500

HEIGHT DATUM MGA/AHD

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PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE PONDS LAYOUT PLAN

Project No.	Com No.	Drawing No.	REV
99095	5	5010	P1

Plotted: U:\1999\99095-DS WHYTES GULLY - DETAILED DESIGN\DRAWING\BUILDS\5010-LEACHATE PONDS-LAYOUT PLAN.DWG
December 12, 2003 3:40:36 p.m.
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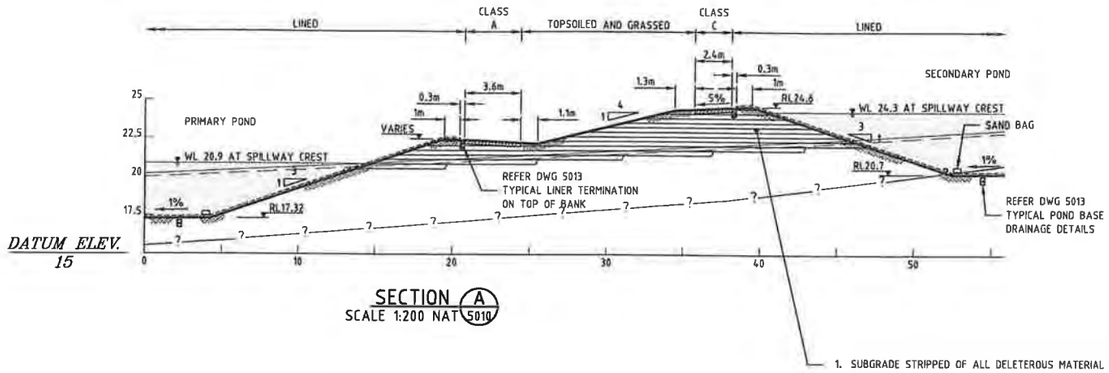

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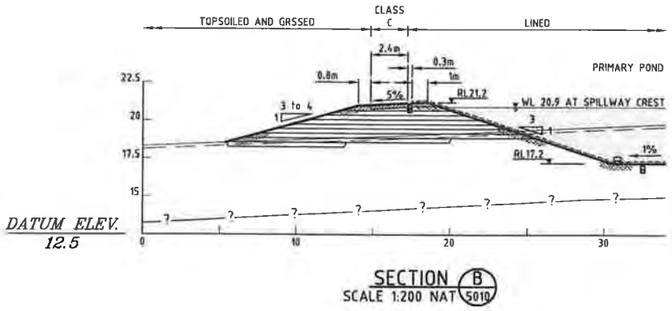

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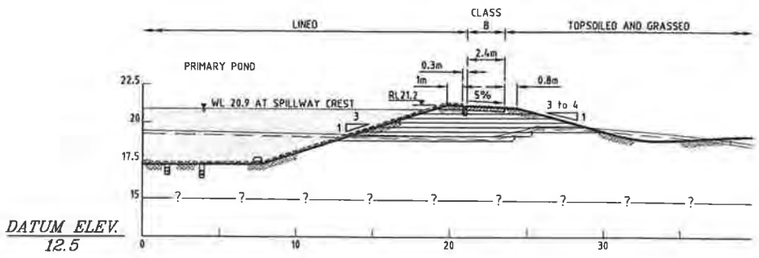
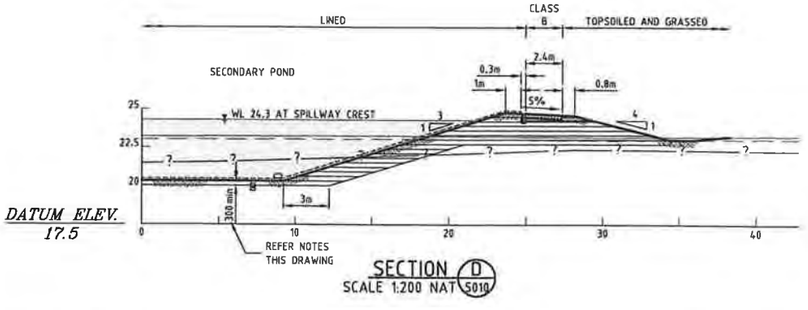
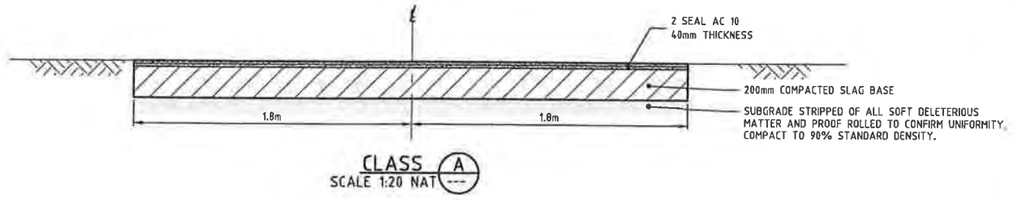


SECTION C
SCALE 1:200 NAT (5010)



SECTION D
SCALE 1:200 NAT (5010)

1. SUBGRADE STRIPPED OF ALL DELETEROUS MATERIAL AND PROOF ROLLED TO CONFORM UNIFORMITY. OVER EXCAVATE AND BACKFILL ANY SOFT OR OTHERWISE UNACCEPTABLE AREAS OF THE SUBGRADE WITH APPROVED SELECT BACKFILL. COMPACT ANY BACKFILL TO THE SAME STANDARD AS THE MAINFILL.
2. SUPPLY AND PLACE APPROVED SELECT FILLING, SPREAD AND COMPACT IN LAYERS TO MINIMUM 98% STANDARD COMPACTION.
3. IN AREAS TO BE LINED;
   A) WHERE ROCK IS ENCOUNTERED, OVER EXCAVATE 200mm NOM DEPTH AND BACKFILL WITH SELECTED CLAY COMPACTING IN LAYERS AS FOR THE MAIN FILL.
   B) COMPACT THE FINAL SURFACE WITH A SMOOTH DRUM ROLLER TO CREATE A SMOOTH UNIFORM SURFACE. REMOVE AND REPLACE MATERIAL IN ANY AREAS WITH A PROJECTING/COURSE FINISH WITH UNIFORM CLAY/SAND BACKFILL AND ROLL TO ACHIEVE THE SPECIFIED SURFACE.
4. EXTEND FILL MINIMUM 1.5m BEYOND FINAL BATTER FACE AND TRIM FACE BACK TO LINE AFTER COMPACTION.



CLASS A
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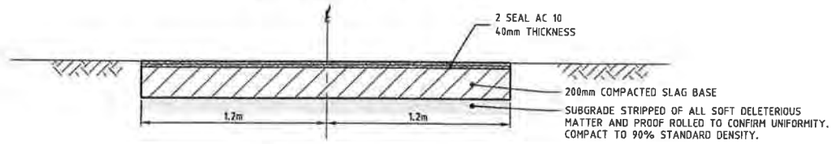

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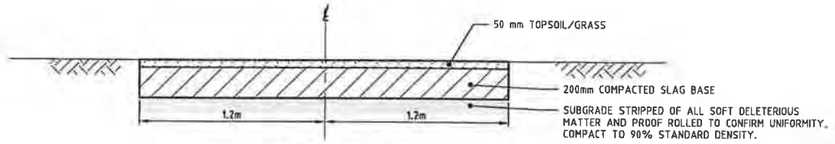

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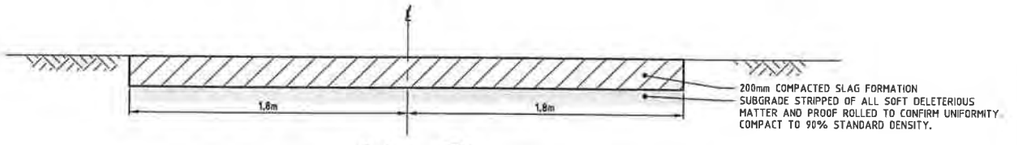

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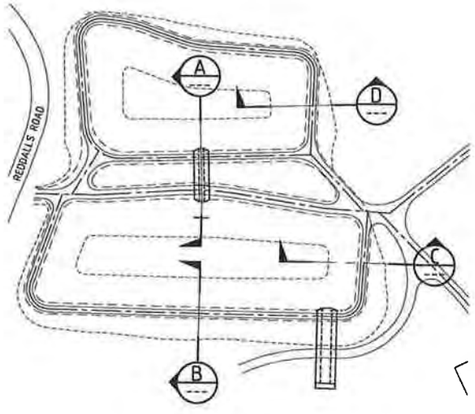
TYPICAL ACCESS ROAD SECTIONS



KEY PLAN

LEGEND:

- PROPOSED DESIGN SURFACE
- WATER LEVEL
- TOPSOIL
- EXISTING ROCK SURFACE
- PROPOSED POND LINER

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	07/08/03
DRAWN BY	ES	07/08/03
DRAFTING CHECK	E.H.Rigby	08/09/03
DESIGN CHECK	E.H.Rigby	08/09/03
FINAL APPROVAL	E.H.Rigby	08/09/03

FOR APPROVAL

SCALE: (on A1 Original)
1:200 NAT
1:20 NAT

HEIGHT DATUM
MGA/AHD

FORBES RIGBY PTY LTD
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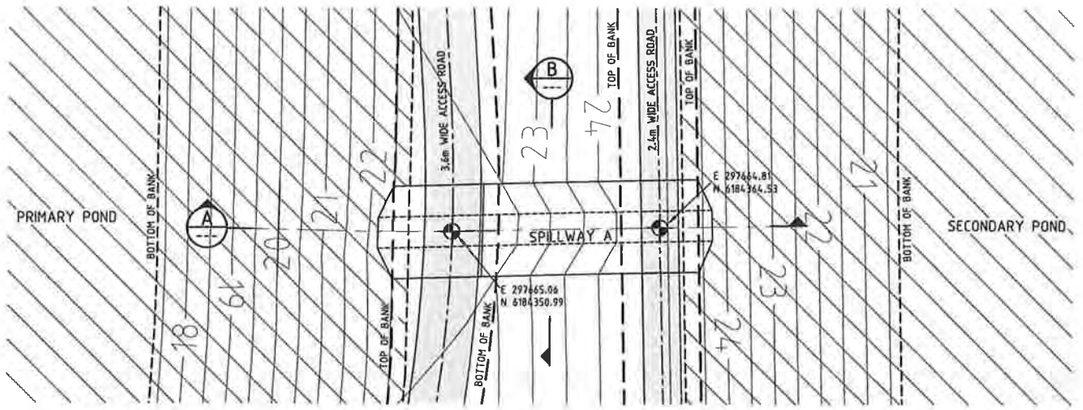
PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE PONDS CROSS-SECTIONS

Project No.	Com No.	Drawing No.	REV
99095	5	5011	P1

DO NOT SCALE IF IN DOUBT ASK



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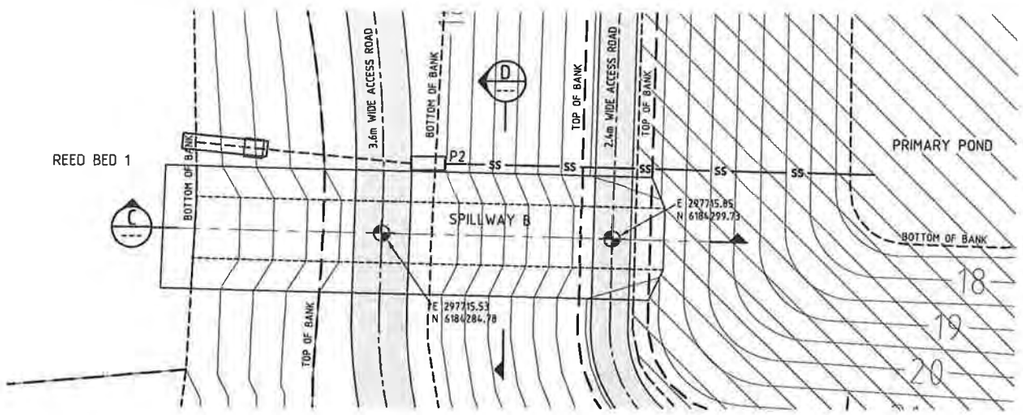

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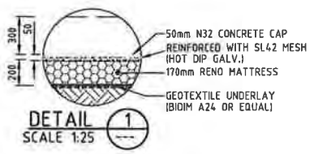

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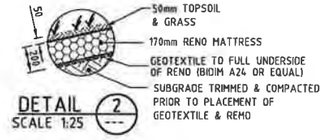

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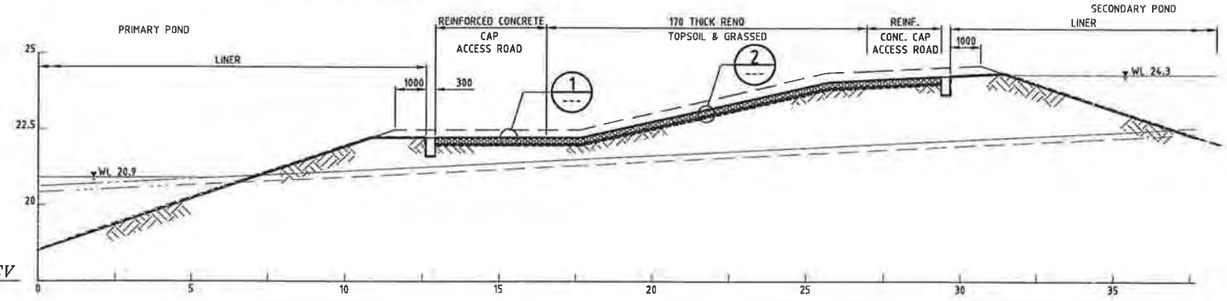

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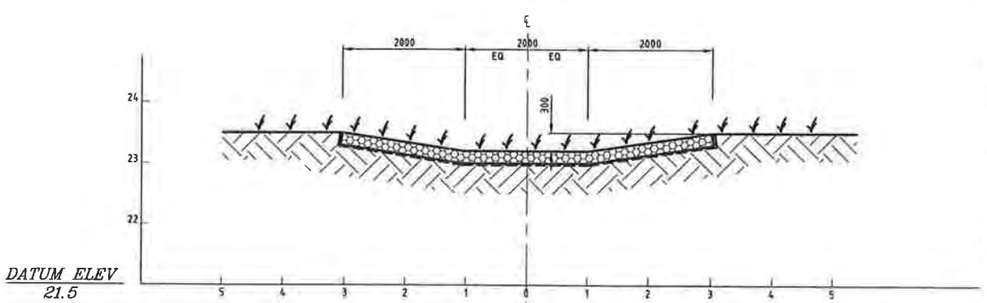

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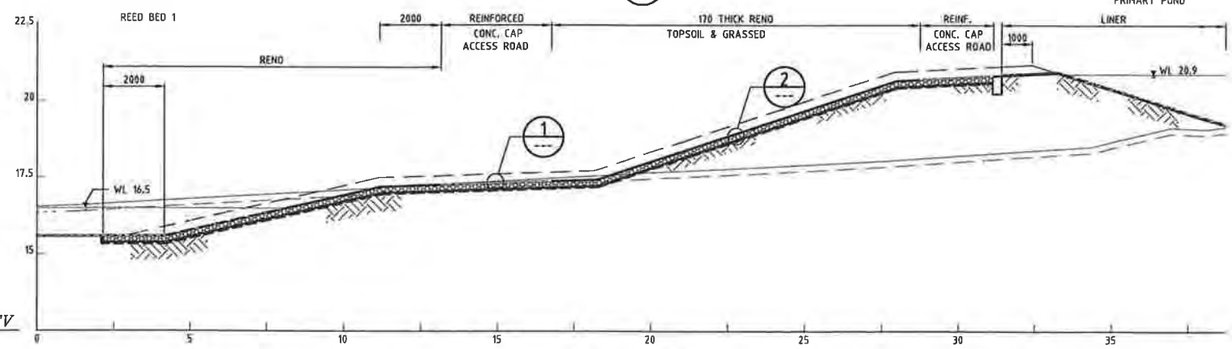

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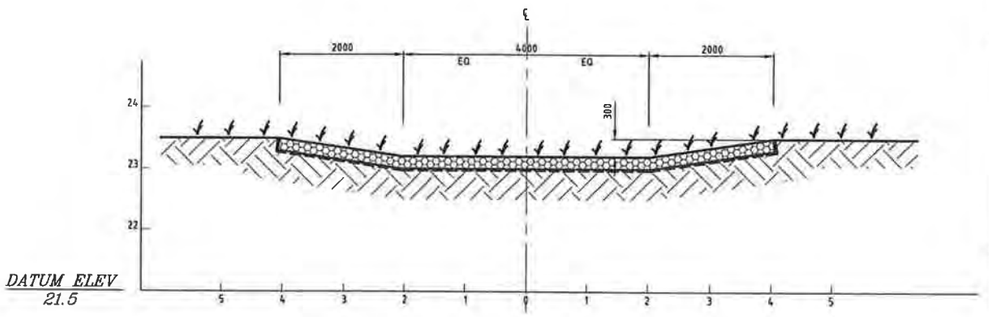

SECTION D
SCALE 1:50 NAT

LEGEND:

- PROPOSED DESIGN SURFACE
- WATER LEVEL
- EXISTING GROUND SURFACE
- TOPSOIL

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	ER	02/09/03
DRAWN BY	ES	02/09/03
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SCALE: (on A1 Original) AS NOTED

HEIGHT DATUM MGA/AHD

FORBES RIGBY PTY LTD
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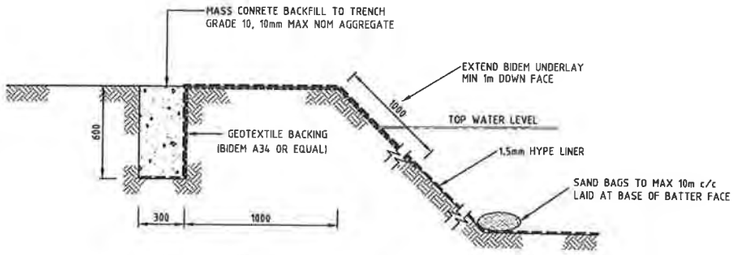
PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

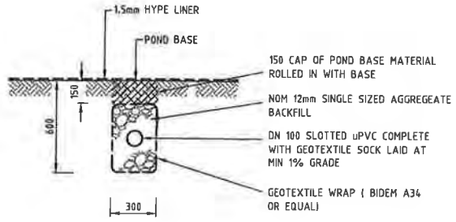
DRAWING TITLE
LEACHATE PONDS SPILLWAY DETAILS

Project No.	Com No.	Drawing No.	REV
99095	5	5012	P0

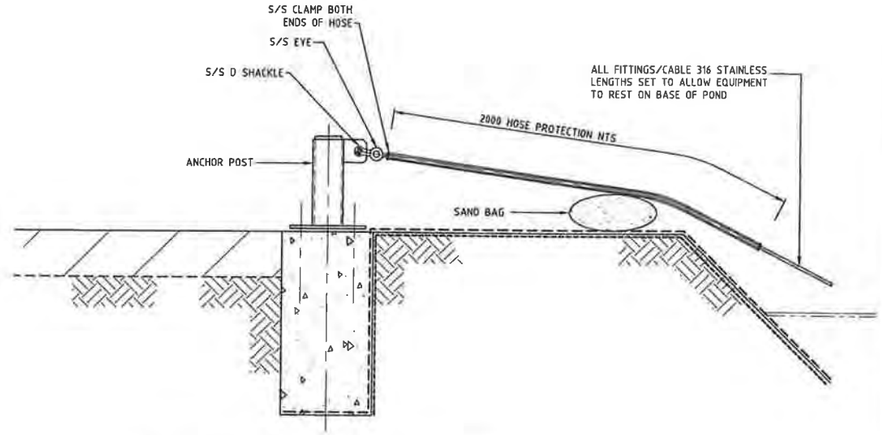
DO NOT SCALE | IF IN DOUBT ASK



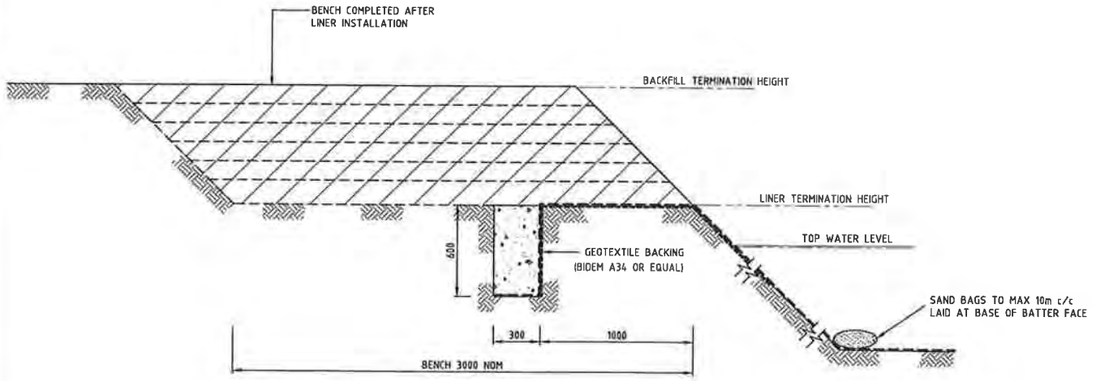
TYPICAL LINER TERMINATION
ON TOP OF BANK
SCALE 1:20



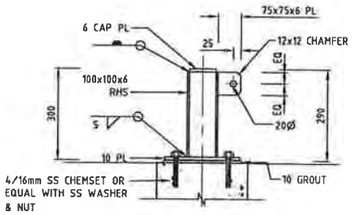
TYPICAL POND BASE
DRAINAGE DETAILS
SCALE 1:20



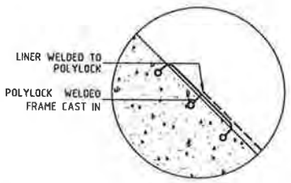
TYPICAL PLANT ANCHORAGE DETAILS
SCALE 1:10



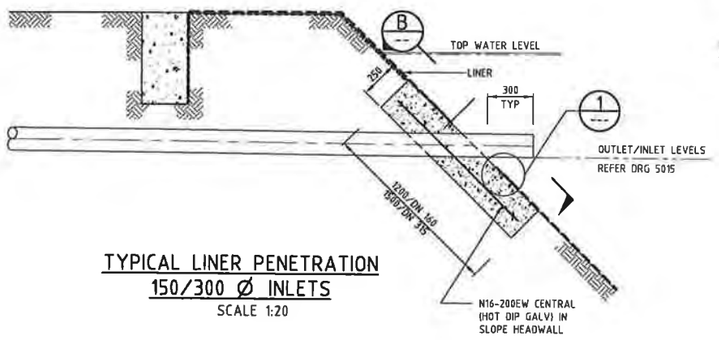
TYPICAL LINER TERMINATION
PART WAY UP BANK
SCALE 1:20



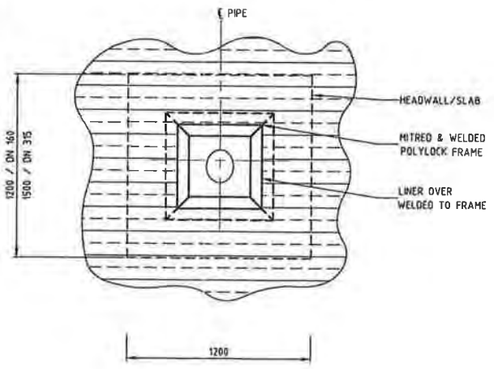
SECTION A
SCALE 1:10



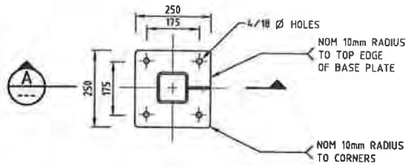
DETAIL 1
SCALE 1:5



TYPICAL LINER PENETRATION
150/300 Ø INLETS
SCALE 1:20



SECTION B
SCALE 1:20



ANCHORAGE POST & BASE
(HOT DIP GALV)

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	25/08/03
DRAWN BY	CED	26/08/03
DRAFTING CHECK	E.H.Rigby	9/9/03
DESIGN CHECK	E.H.Rigby	9/9/03
FINAL APPROVAL	E.H.Rigby	9/9/03

FOR APPROVAL

SCALE: (on A1 Original)
AS NOTED

DATUM
MGA/AHD

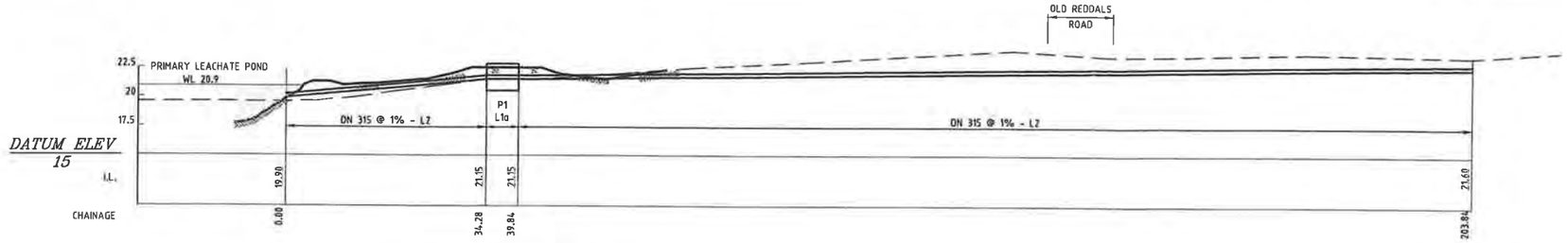
FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

PROJECT TITLE
LEACHATE & STORMWATER
PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE PONDS
LINER & PENETRATION
DETAILS

Project No.	Com No.	Drawing No.	REV
99095	5	5013	P0

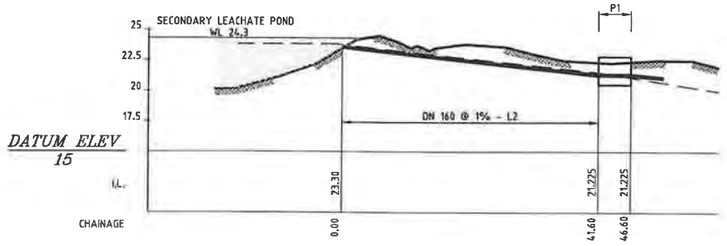
DO NOT SCALE IF IN DOUBT ASK



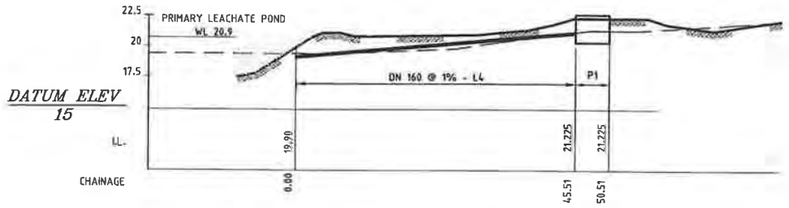
LINE L1, L1a & L2
SCALE 1:500 H
1:250 V

LEGEND:

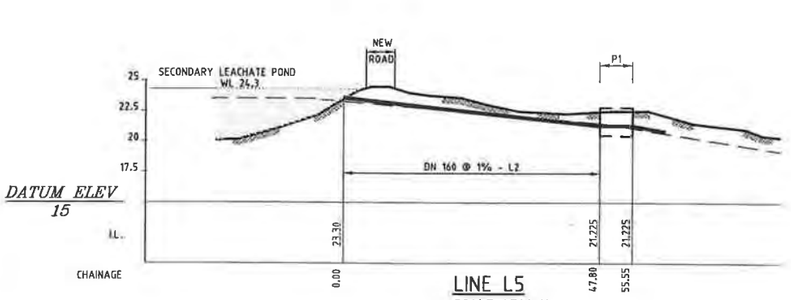
- PROPOSED DESIGN SURFACE
- EXISTING GROUND SURFACE
- PROPOSED PIPES



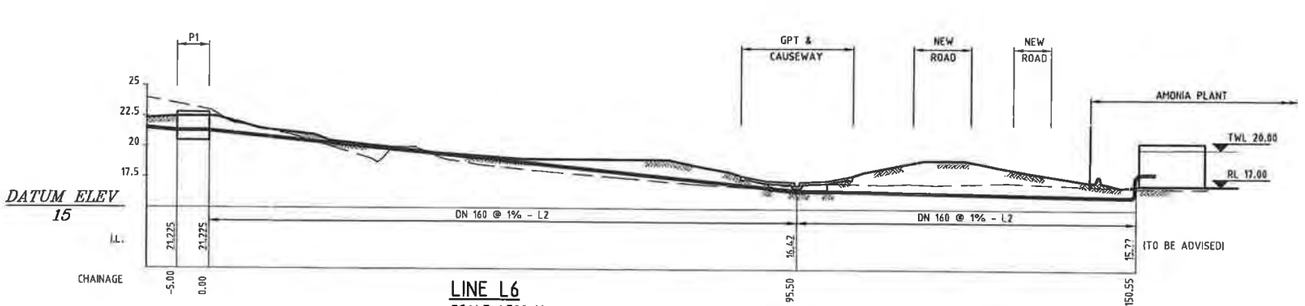
LINE L3
SCALE 1:500 H
1:250 V



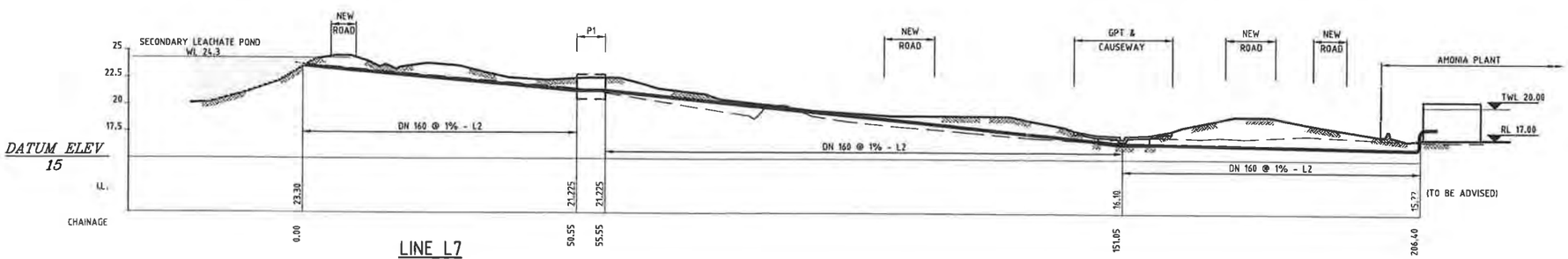
LINE L4
SCALE 1:500 H
1:250 V



LINE L5
SCALE 1:500 H
1:250 V



LINE L6
SCALE 1:500 H
1:250 V



LINE L7
SCALE 1:500 H
1:250 V

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	08/08/03
DRAWN BY	CED	11/08/03
DRAFTING CHECK	E.H.Rigby	9/9/03
DESIGN CHECK	E.H.Rigby	9/9/03
FINAL APPROVAL	E.H.Rigby	9/9/03

FOR APPROVAL

SCALE: (on A1 Original)
1:500 H
1:250 V

DATUM
MGA/AHD

FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

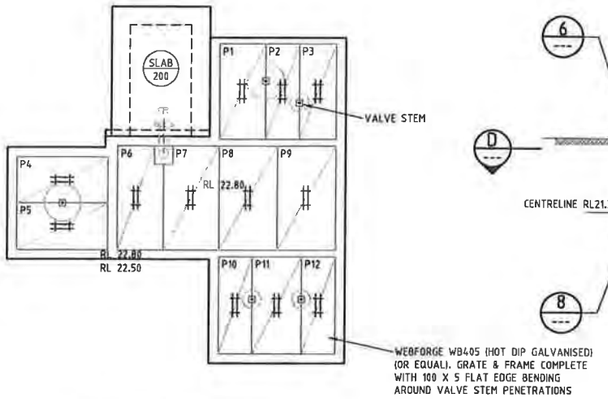
PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE PONDS – PIPEWORK DETAILS

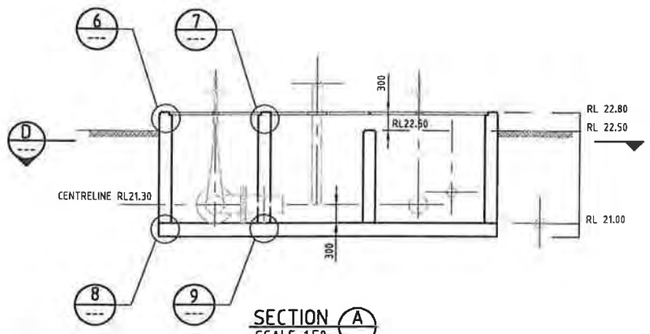
Project No.	Com No.	Drawing No.	REV
99095	5	5015	P1

efs: x99095_5_BASE.DWG

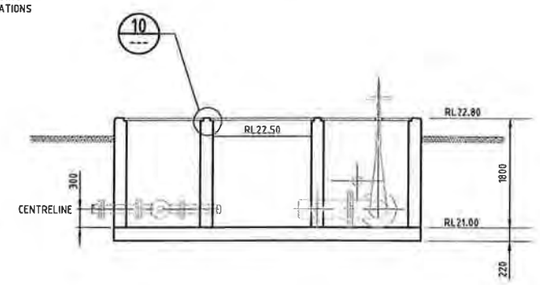
DO NOT SCALE IF IN DOUBT ASK



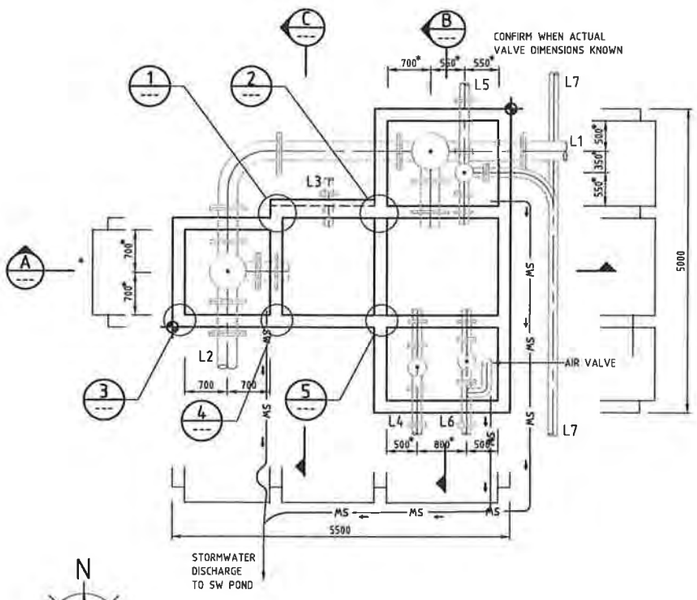
TOP VIEW- GRID COVERS



SECTION A
SCALE 1:50

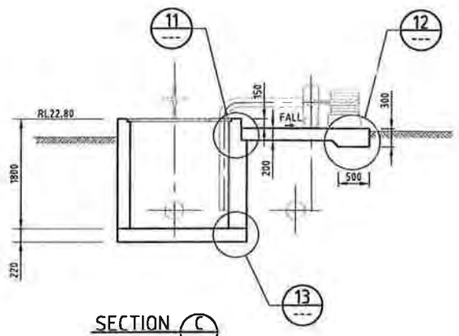


SECTION B
SCALE 1:50



PLAN SECTION - PIT P1

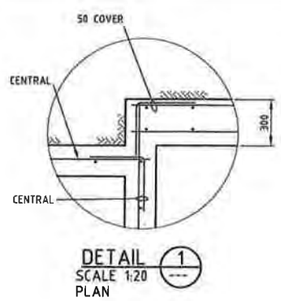
SECTION D
SCALE 1:50



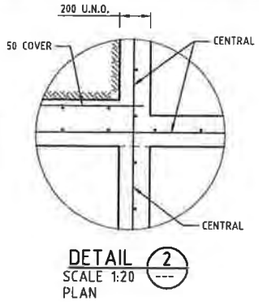
SECTION C
SCALE 1:50

CONCRETE PROPERTIES THIS DRAWING	
BASE	32Mpa, 20mm AGGREGATE NOM. MAX 80mm SLUMP
WALLS	32Mpa, 12mm AGGREGATE NOM. MAX 100mm SLUMP

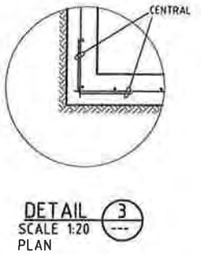
NOTE:
ALL REINFORCING N16-300 c/c U.N.O (HOT DIP GALV)
LAPS 400 U.N.O.



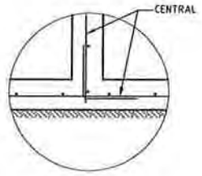
DETAIL 1
SCALE 1:20
PLAN



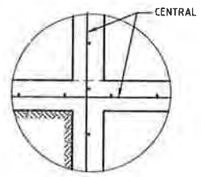
DETAIL 2
SCALE 1:20
PLAN



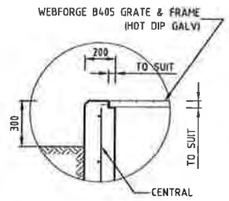
DETAIL 3
SCALE 1:20
PLAN



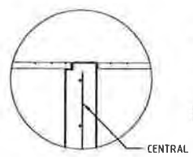
DETAIL 4
SCALE 1:20
PLAN



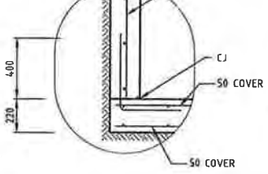
DETAIL 5
SCALE 1:20
PLAN



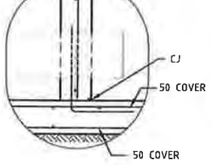
DETAIL 6
SCALE 1:20
ELEVATION



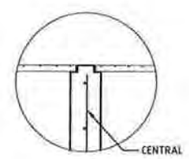
DETAIL 7
SCALE 1:20
ELEVATION



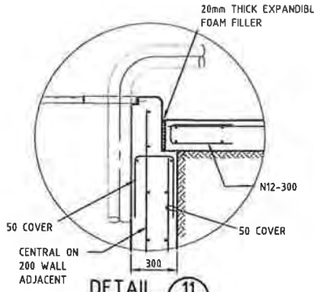
DETAIL 8
SCALE 1:20
ELEVATION



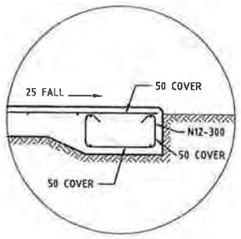
DETAIL 9
SCALE 1:20
ELEVATION



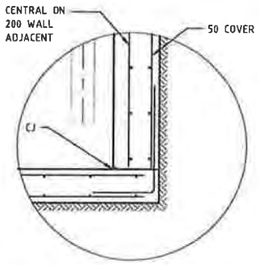
DETAIL 10
SCALE 1:20
ELEVATION



DETAIL 11
SCALE 1:20
ELEVATION



DETAIL 12
SCALE 1:20
ELEVATION



DETAIL 13
SCALE 1:20
ELEVATION

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	10/08/03
DRAWN BY	CEO	11/08/03
DRAFTING CHECK	E.H.Rigby	05/09/03
DESIGN CHECK	E.H.Rigby	05/09/03
FINAL APPROVAL	E.H.Rigby	05/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:50

DATUM MGA/AHD

FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
LEACHATE PONDS CONTROL PIT P1 DETAILS

Project No.	Com No.	Drawing No.	REV
99095	5	5016	P1

DO NOT SCALE IF IN DOUBT ASK

NEW GATES TO MATCH EXISTING FENCE COMPLETE WITH PADLOCK KEYED TO MATCH COUNCIL REQUIREMENTS. (GATE WIDTH 4.2m)

IL RL17.5
STD HW
DN 315 POLYFLEX

IL RL17.0

REED BED 1

REED BED 2

REED BED 3
(RL15.0)

INLET ZONE
(RL14.5)

SITE RESERVED FOR FUTURE AMMONIA REDUCTION PLANT (RL 17.0)

EXISTING ACCESS ROAD

REDDALLS ROAD DEVIATION

POLISHING POND (UPPER)
(RL14.0)

POLISHING POND (LOWER)
(RL13.0)

GPT

GPT 5022/23

P2 5077

P3 5024

P4 5024

P5 5025

A 5021

B 5021

C 5021

D 5021

E 5021

F 5021

G 5024

H 5024

FOR PLAN SETOUT REFER DRAWING 5027

N
W E
S
0 25
SCALE 1:500

LEGEND:

ACCESS ROADS AND CLASS (A)

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	08/07/03
DRAWN BY	ES	08/07/03
DRAFTING CHECK	E.H.Rigby	09/09/03
DESIGN CHECK	E.H.Rigby	09/09/03
FINAL APPROVAL	E.H.Rigby	09/09/03

FOR APPROVAL

SURVEY INFORMATION
By: Wollongong City Council
Survey Supplied 08/07/03
By: Masters & Associates
Survey Supplied 20/06/03
Co-ordinate System: MGA

SCALE: (on A1 Original)
1:500

HEIGHT DATUM
MGA/AHD

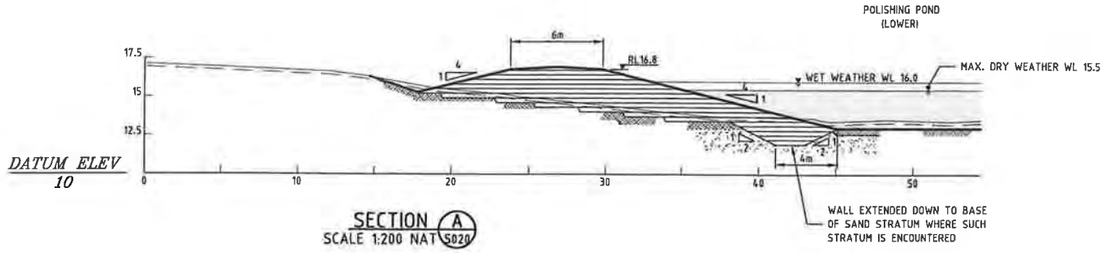
FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC OEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
STORMWATER PONDS LAYOUT PLAN

Project No.	Com No.	Drawing No.	REV
99095	5	5020	P1

DO NOT SCALE IF IN DOUBT ASK



SECTION A
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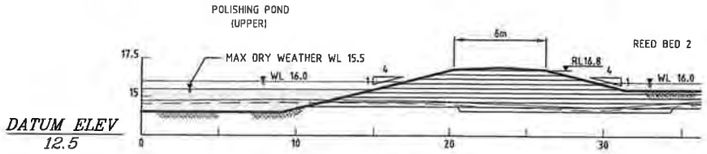
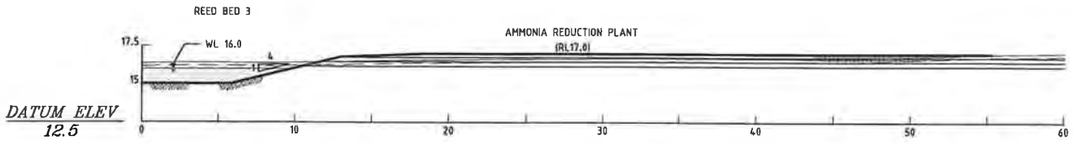
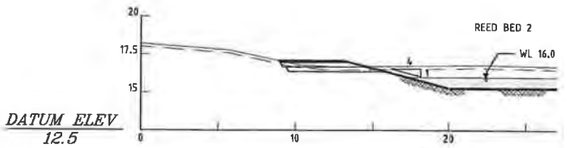


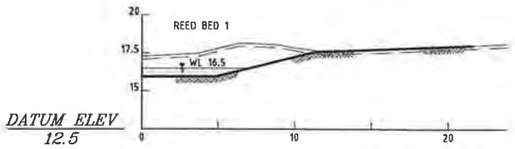
SECTION E
SCALE 1:200 NAT 5020



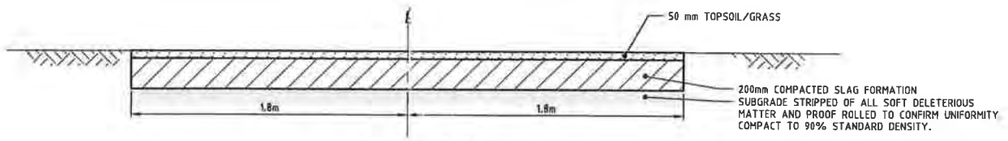
SECTION B
SCALE 1:200 NAT 5020



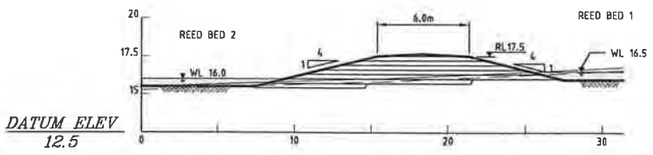
SECTION F
SCALE 1:200 NAT 5020



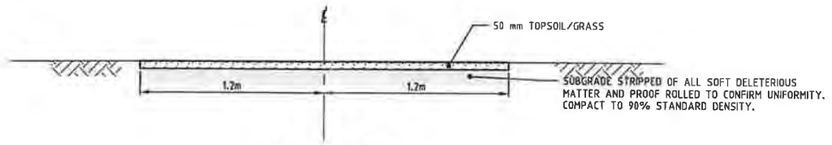
SECTION C
SCALE 1:200 NAT 5020



CLASS E
SCALE 1:20 NAT 5020

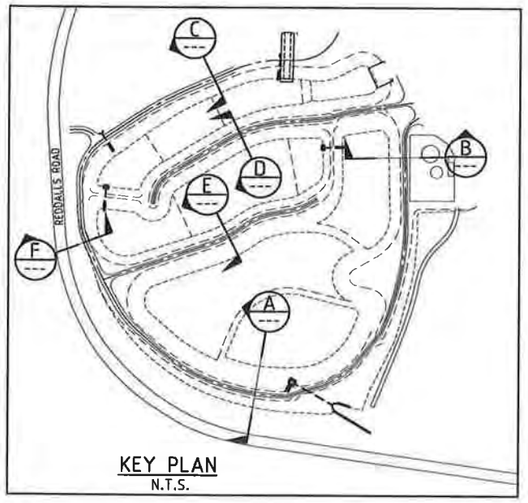


SECTION D
SCALE 1:200 NAT 5020



CLASS F
SCALE 1:20 NAT 5020

TYPICAL ACCESS ROAD SECTIONS



KEY PLAN
N.T.S.

LEGEND:

- PROPOSED DESIGN SURFACE
- WATER LEVEL
- TOPSOIL
- EXISTING ROCK SURFACE
- PROPOSED POND LINER

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	PCF	07/08/03
DRAWN BY	ES	07/08/03
DRAFTING CHECK	R.H.Rigby	09/09/03
DESIGN CHECK	R.H.Rigby	09/09/03
FINAL APPROVAL	R.H.Rigby	09/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:200 NAT

DATUM MGA/AHD

FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

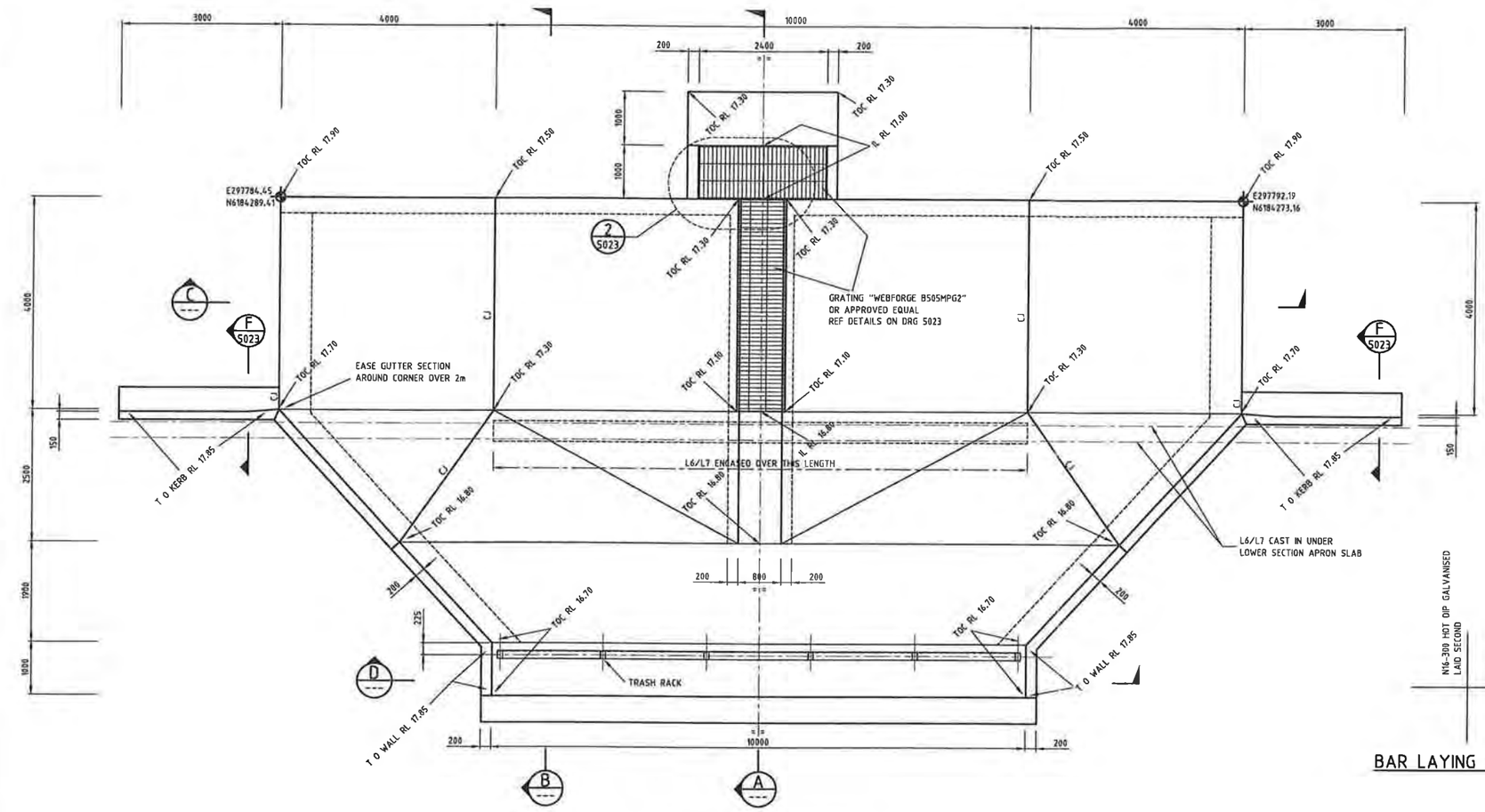
PROJECT TITLE
LEACHATE & STORMWATER PONDS DESIGN
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
STORMWATER PONDS CROSS-SECTIONS

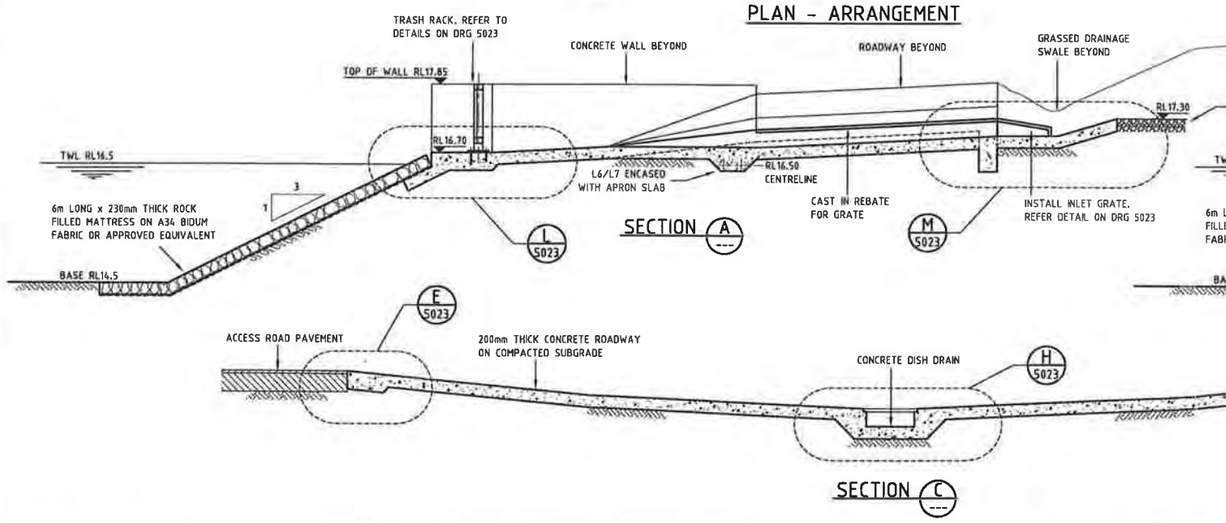
Project No.	Com No.	Drawing No.	REV
99095	5	5021	P1

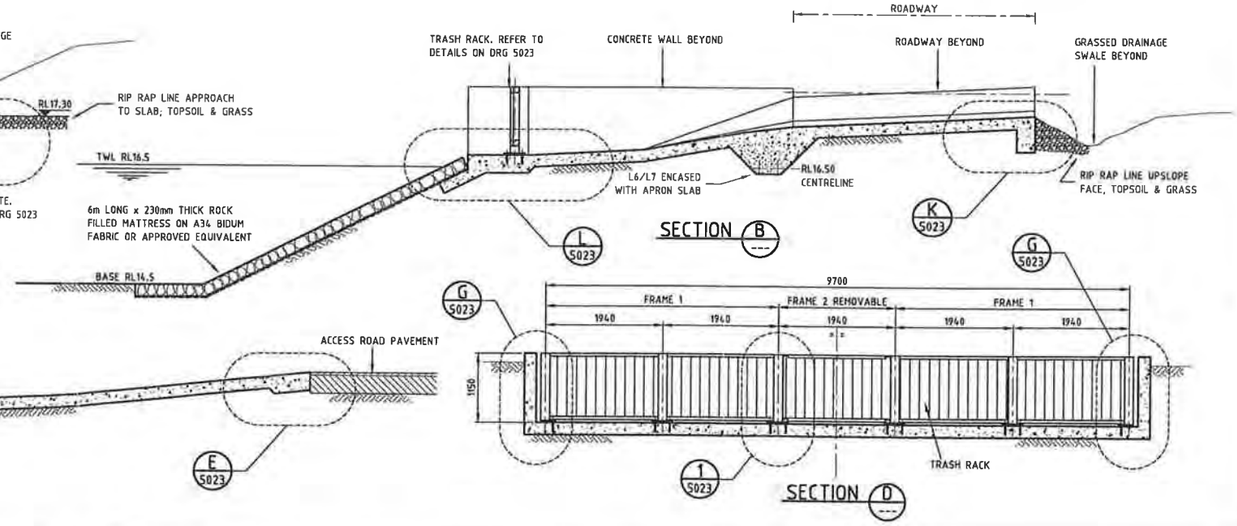
I:\99095\5_BASE.DWG

DO NOT SCALE | IF IN DOUBT ASK



PLAN - ARRANGEMENT





N16-300 HOT DIP GALVANISED
LAID SECOND

BAR LAYING SEQUENCE

CONCRETE

C1. EXECUTE ALL CONCRETE WORK IN ACCORDANCE WITH A.S. 3600 AND THE STANDARDS REFERENCED THEREIN UNLESS OTHERWISE VARIED BY THE CONTRACT DOCUMENTS.

C2. FORMWORK SHALL BE DESIGNED AND ERECTED IN ACCORDANCE WITH THE REQUIREMENTS AND RECOMMENDATIONS OF A.S. 3600 AND A.S. 3610. THE RESPONSIBILITY FOR THE ADEQUACY OF FORMWORK SHALL REST ENTIRELY WITH THE BUILDER.

C3. REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF A.S. 1302, A.S. 1303 AND A.S. 1304 AS APPLICABLE. GALVANISED REINFORCING SHALL COMPLY WITH THE REQUIREMENTS OF A.S. 1650.

C4. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, IT IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.

C5. ALL REINFORCEMENT SHALL BE SUPPORTED AND WIRED TOGETHER TO PREVENT DISPLACEMENT DURING CONSTRUCTION , BEYOND THE TOLERANCES SPECIFIED IN A.S. 3600.

C6. PLACE INDIVIDUAL BAR CHAIRS AT A RATE OF 25/10^2m OF SLAB REINFORCEMENT AREA (750mm CENTRES) AND AS REQUIRED FOR ADEQUATE SUPPORT IN OTHER MEMBERS.

C7. REINFORCEMENT SHALL NOT BE CUT, BENT, HEATED OR WELDED ON SITE WITHOUT THE PROJECT ENGINEERS PRIOR APPROVAL.

C8. DO NOT EMBED ITEMS WITHIN THE REINFORCEMENT COVER, CAST IN ITEMS OR CHASES UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY THE PROJECT ENGINEER.

C9. WHERE THE ENGINEERS ARE ENGAGED TO INSPECT REINFORCEMENT AND/OR SUPERVISE A CONCRETE POUR, A MINIMUM OF 24 HOURS NOTICE SHALL BE GIVEN AND ALL PREPARATORY WORK SHALL HAVE BEEN COMPLETED.

C10. CONCRETE PROPERTIES SHALL BE AS NOTED ON THE DRAWINGS.

C11. DETAILS OF ALL CONCRETE MIXES TO BE PROVIDED FOR ACCEPTANCE PRIOR TO COMMENCEMENT OF CONSTRUCTION. THIS TO INCLUDE DETAILS OF QUANTITY & TYPE OF CEMENT, AGGREGATE & ADMIXTURES.

C12. CONSOLIDATE ALL CONCRETE WITH HIGH SPEED IMMERSION VIBRATORS. DO NOT USE VIBRATORS TO MOVE CONCRETE ACROSS FORMS.

C13. CONSTRUCTION JOINTS SHALL BE LOCATED AS SHOWN ON DRAWINGS. TENDERERS SHALL ALLOW TO HAVE A STANDBY MEANS OF PLACING CONCRETE IN THE EVENT OF A CONCRETE PUMP BREAKDOWN DURING THE MAIN POUR.

C14. ALL CONCRETE SHALL BE CONTINUOUSLY MOIST CURED TO AN EQUIVALENT MATURITY OF 7 DAYS BY COVERING WITH PLASTIC SHEETING. COMMENCE CURING WITHIN TWO HOURS OF FINAL SET. STRIPPING OF TRENCH FORMS MAY COMMENCE AFTER 3 DAYS.

C15. WHERE SPRAYED CURING MEMBRANES ARE USED THEY SHALL COMPLY WITH AS 3799.

C16. CONCRETE PROPERTIES: TYPICAL FOR ALL SLABS AND WALLS

SLABS	32Mpa, 20mm AGGREGATE NOM. MAX 80mm SLUMP
WALLS	32Mpa, 12mm AGGREGATE NOM. MAX 100mm SLUMP

REV	DATE	BY	APP.	DETAILS

DRAWING STATUS		
DESIGN BY	EHR	10/08/03
DRAWN BY	J.L.	11/08/03
DRAFTING CHECK	E.H.Rigby	08/09/03
DESIGN CHECK	E.H.Rigby	08/09/03
FINAL APPROVAL	E.H.Rigby	08/09/03

FOR APPROVAL

SCALE: (on A1 Original) 1:50 U.N.O.

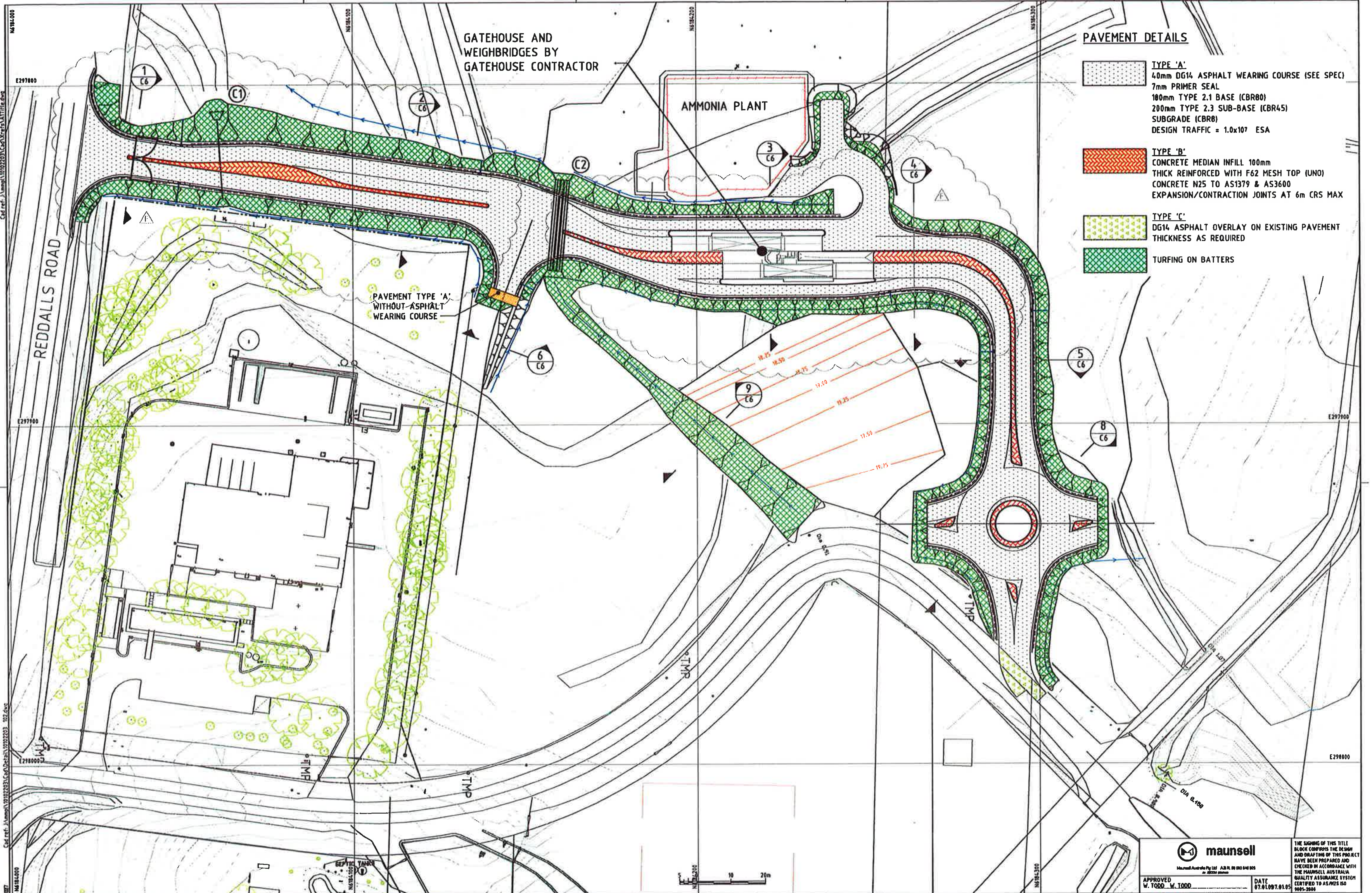
HEIGHT DATUM AHD

FORBES RIGBY PTY LTD
Engineers Planners & Scientists
Quality Endorsed Company, ISO 9001 LIC QEC 10508, Standards Australia
278 KEIRA STREET, WOLLONGONG, NSW 2500
Ph: (02) 4228 4133 Facsimile: (02) 4228 6811 ACN 003 936 981

PROJECT TITLE
LEACHATE & STORMWATER PONDS DOCUMENTATION
WHYTES GULLY WASTE DEPOT
for
WOLLONGONG CITY COUNCIL

DRAWING TITLE
GPT – GA
PLAN & SECTIONS

Project No.	Com No.	Drawing No.	REV
99095	5	5022	P1



ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
E	CONSTRUCTION ISSUE	TMK	G.A.T.	13.09.05
D	AMENDED TOE OF BATTER CH. 10 - 120 (MCA1) RHS	JPC	G.A.T.	23.08.04
C	CULVERT C2 AMENDED	JPC	A. CHAN	01.06.05
B	KERB & CHANNEL, DRAINAGE WORKS, AMMONIA PLANT ACCESS ROAD AMENDED	JPC	A. CHAN	06.05.05
F	ENTRY AND GATEHOUSE/WEIGHBRIDGE AREA AMENDED	PM		11.04.06

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM AHD | SURVEYOR
AZIMUTH MGA | FIELD BOOK
RELATED PLANS

Maunsell
DRAWN RHS RHS — DATE Nov-04
CHECKED PM PM — DATE 07.01.05
DESIGNED RHS RHS — DATE Dec-04
CHECKED PM PM — DATE 06.01.06

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER — DATE 13/4/06
MANAGER DESIGN — DATE

SCALES: AS NOTED
NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE TRANSFER STATION
WEST DAPTO
ACCESS ROAD
LAYOUT PLAN

maunsell
Maunsell Australia Pty Ltd

APPROVED W. TODD W. TODD — DATE 07.01.05

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE MAUNSELL AUSTRALIA QUALITY ASSURANCE SYSTEM CERTIFIED TO AS/NZS ISO 9001-2000

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No. DES7300
FILE NUMBER DES7300
SHEET 2 OF 26 SHEETS
A1 ORIGINAL
DRAWING No. 3299 | SHEET No. C2 | ISSUE F

EXISTING CONDITIONS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthophoto maps.

Note: 3. Drainage and stormwater details from WCC Drawing P331/17 S OF 29 and 9 of 29

Note: 4. Rainforest marked in from aerial photograph

SITE BOUNDARY

CATCH DRAIN

CATCH DRAIN

EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992

EXISTING FENCELINE

SPRAY IRRIGATION OF LEACHATE (TO BE ABANDONED)

RAINFOREST

LEACHATE DRAIN AT BASE OF LANDFILL

750mm Ø PCPC

750Ø PCPC

CATCH DRAIN

EXISTING FENCELINE

DRAIN

WATER

RESIDENTIAL ACCESS

2 x 750mm Ø RCP

STORM

VOLUME= 4,250m STORMWATER TREATMENT PONDS TWL=24.

LEACHATE POND TWL=25.6 VOLUME=8000m

LEACHATE RECIRCULATION PUMP

STORMWATER TREATMENT PONDS TWL=24.0 VOLUME= 3000m

DAM

PLANT COMPOUND

GRADED OPEN CHANEL @ 1%

SPILLWAY

DETENTION AREA

DH No 1

1000mm Ø RCP

DAM

DAM

2 x 900 Ø RCP

REED BEDS

6 x 1050 Ø RCP

375 Ø RCP

132kV TRANSMISSION LINES

REDDALLS ROAD

GATEHOUSE & WEIGHBRIDGE

4WD TRACK

DAM

EXISTING FENCELINE

5600N 5500N 5400N 5300N 5200N 5100N 5000N 4900N

1300E 1400E 1500E 1600E 1700E 1800E 1900E 2000E 2100E 2200E

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV	DATE	DESCRIPTION	CHK'D	A.D.
1	11/97	GENERAL REVISION		

	NAME	SIGNATURE	DATE
QUALITY RECORD			
CHAPTER CHECK	P BOY		
DESIGNER (MEAN)	E MABEW		
PROJECT DIRECTOR APPROVAL	D MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF

MAUNSELL PROPRIETARY LIMITED

A C N 004 846 834

1249 SHT 1 P331

PROJECT TITLE: EASTERN GULLY MANAGEMENT

DRAWING TITLE: WHYTES GULLY LANDFILL WOLLONGONG KEMBLA GRANGE SITE PLAN : EXISTING FACILITIES

DATE OF ISSUE

SIZE: A0

DAO REFERENCE: PLAN01.DWG

DATE PLOTTED: 23.10.92

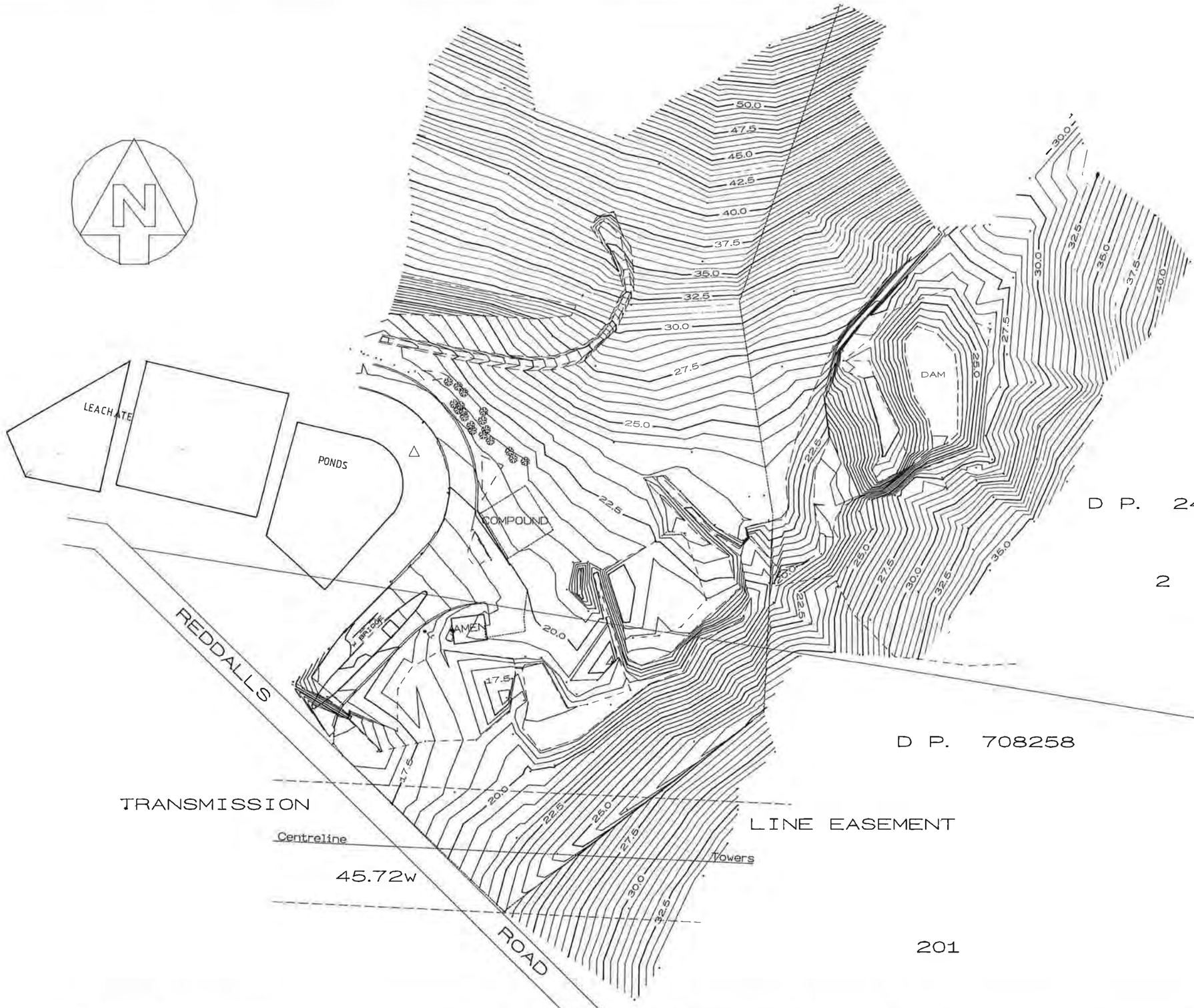
JOB No.: 14892-001

REV: 01

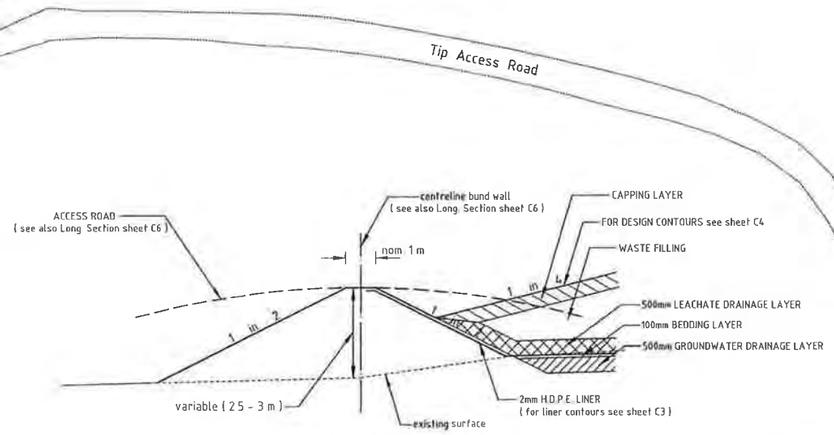
DOC. STATUS: FINAL

1 OF 8

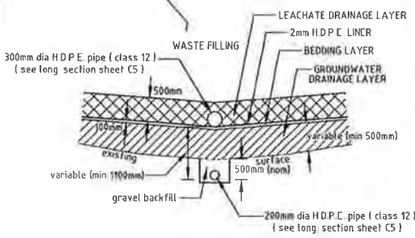
SV01-1



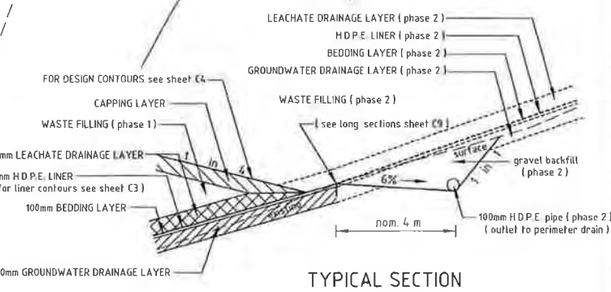
SCALES	DATUM	RELATED PLANS					DRAWN	CHECKED	RECOMMENDED	APPROVED	CITY OF WOLLONGONG		SHEET OF	FILE NO.	
1 : 750	A.H.D.								MANAGER	DIRECTOR WORKS & TECHNICAL SERVICES					
	SURVEYOR B.H. 2/92						DESIGNED	CHECKED			WHYTES GULLY WASTE DEPOT		DRAWING NO.		ISSUE
	BOOKS L 91/12	ESTIMATE No.					PASSED	DATE	DATE	DATE	WEST DAPTO		943		1
			NO.	AMENDMENTS	DRAWN	APPR'D	DATE								



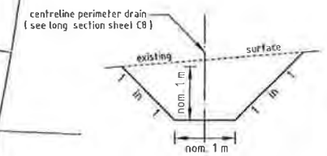
TYPICAL SECTION
BUND WALL AND ACCESS ROAD
N.T.S.



TYPICAL SECTION
LEACHATE AND GROUNDWATER DRAINS
N.T.S.



TYPICAL SECTION
CATCH DRAIN
N.T.S.



TYPICAL SECTION
PERIMETER DRAIN
N.T.S.

Tip Access Road

Temporary Leachate Line
Connection To Existing
(see long. section sheet C5)

Bund Wall and Access
Earthworks: fill 3650 cu.m.
(see long. section sheet C6)

existing leachate line (300 dia H.D.P.E. pipe)

existing leachate line (300 dia H.D.P.E. pipe)
existing groundwater drainage line (200 dia H.D.P.E. pipe)

existing stormwater settlement pond

existing leachate pond

existing leachate pond

REDDALLS ROAD

weighbridge

PROPOSED ADDITIONAL LEACHATE PONDS

POND 1

POND 2

existing settlement pond

TRANSMISSION

E.D.L. ACCESS ROAD

PROPOSED LEACHATE LINE EXTENSION TO NEW PONDS
(see long. section sheet C5)

EASEMENT

Perimeter drain
(see typical section)
(also long. section sheet C8)

Leachate And Groundwater Lines
(see typical section)
(also long. sections sheet C5)

refer detail sheet C6

Limits of Filling (to R.L.83 - phase 4)
(see design contours sheet C4)

Limits of Filling (to R.L.58 - phase 3)
(see design contours sheet C4)

Limits of Filling (to R.L.46 - phase 2)
(see design contours sheet C4)

Limits of Filling (to R.L.37 - phase 1)
(see design contours sheet C4)

Catch Drain 1
Earthworks: cut and fill 10 cu.m.
cut and spoil 625 cu.m.
(see typical section)
(also long. section sheet C9)

Catch Drain 2
Earthworks: cut and fill 100 cu.m.
cut and spoil 465 cu.m.
(see typical section)
(also long. section sheet C9)

Catch Drain 3
Earthworks: cut and fill 3 cu.m.
cut and spoil 204 cu.m.
(see typical section)
(also long. section sheet C9)

30 wide

A

B

PRELIMINARY PLAN ONLY - NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		DEC 99

DATUM AHD | SURVEYOR B.Hogan/M Kubik | DRAWN R.Pittaway Nov 99
AZIMUTH ISG | FIELD BOOKS F83/1,F93/1 | CHECKED | DATE
RELATED PLANS 1475,1320,2565 | DESIGNED R.Pittaway Nov 99 | CHECKED | DATE

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER | MANAGER DESIGN
DATE | DATE

SCALES: 1 : 1000

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE DEPOT
REDDALLS ROAD WEST DAPTO
EASTERN GULLY LANDFILL STAGE 3
LAYOUT PLAN

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42 277111

DESIGN OFFICE No	DES3791		A1 ORIGINAL
FILE NUMBER	SU16391		
SHEET 1 OF 14 SHEETS			
DRAWING No.	SHEET No	ISSUE	
2761	C1	1	

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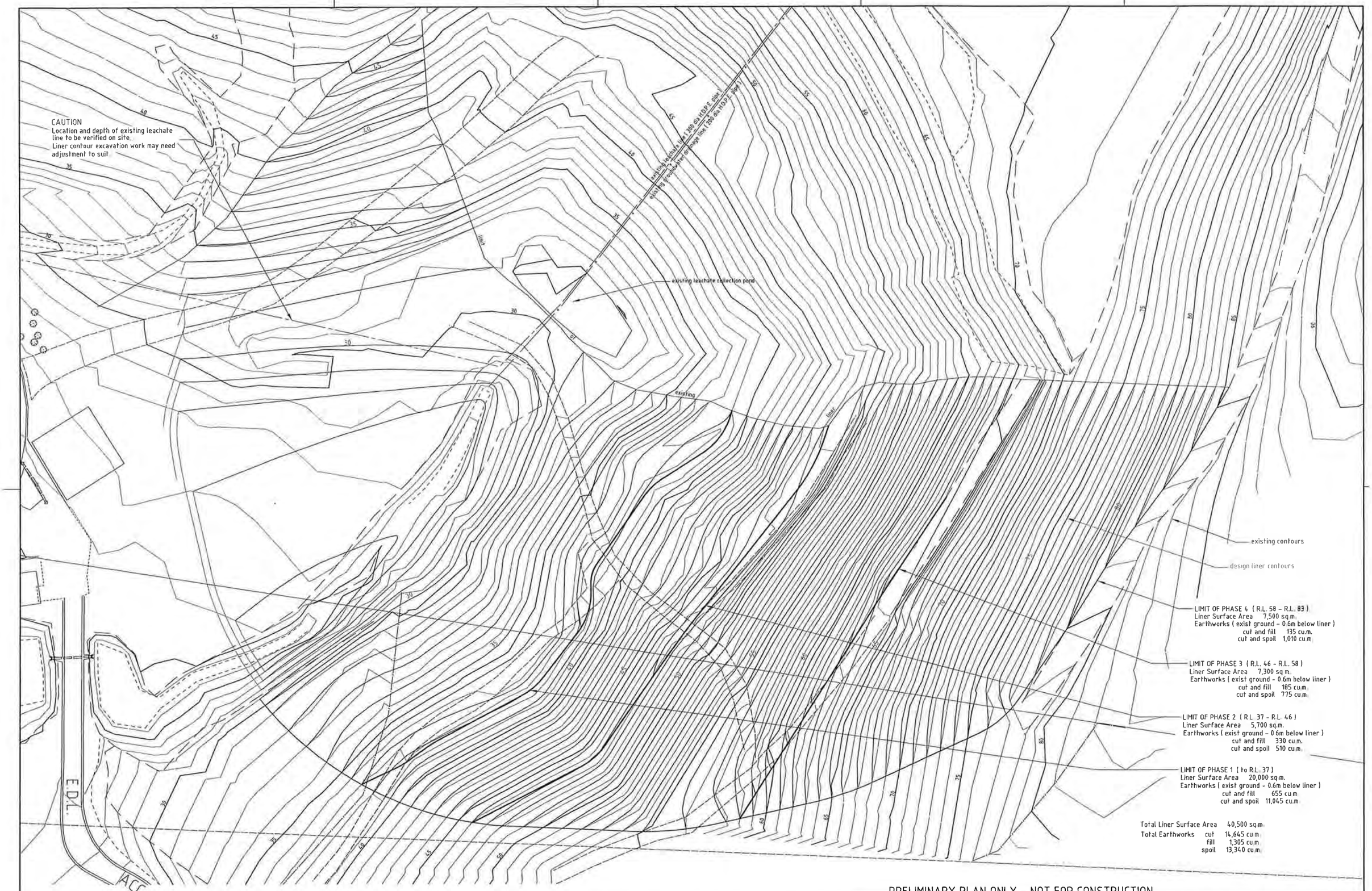

PRELIMINARY PLAN ONLY – NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		DEC 99

DATUM AHD	SURVEYOR B.Hogan/M.Kubik	DRAWN R.Pittaway	DATE Nov 99	
AZIMUTH ISG	FIELD BOOKS F83/1,F93/1	CHECKED	DATE	
RELATED PLANS 1475,1320,2565		DESIGNED R.Pittaway	DATE Nov 99	
		CHECKED	DATE	

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: 1 : 500

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE DEPOT
REDDALLS ROAD WEST DAPTO
EASTERN GULLY LANDFILL STAGE 3
LINER CONTOURS

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No	DES3791		A1 ORIGINAL
FILE NUMBER	SU16391		
SHEET 3 OF 14 SHEETS			
DRAWING No. 2761	SHEET No. C3	ISSUE 1	

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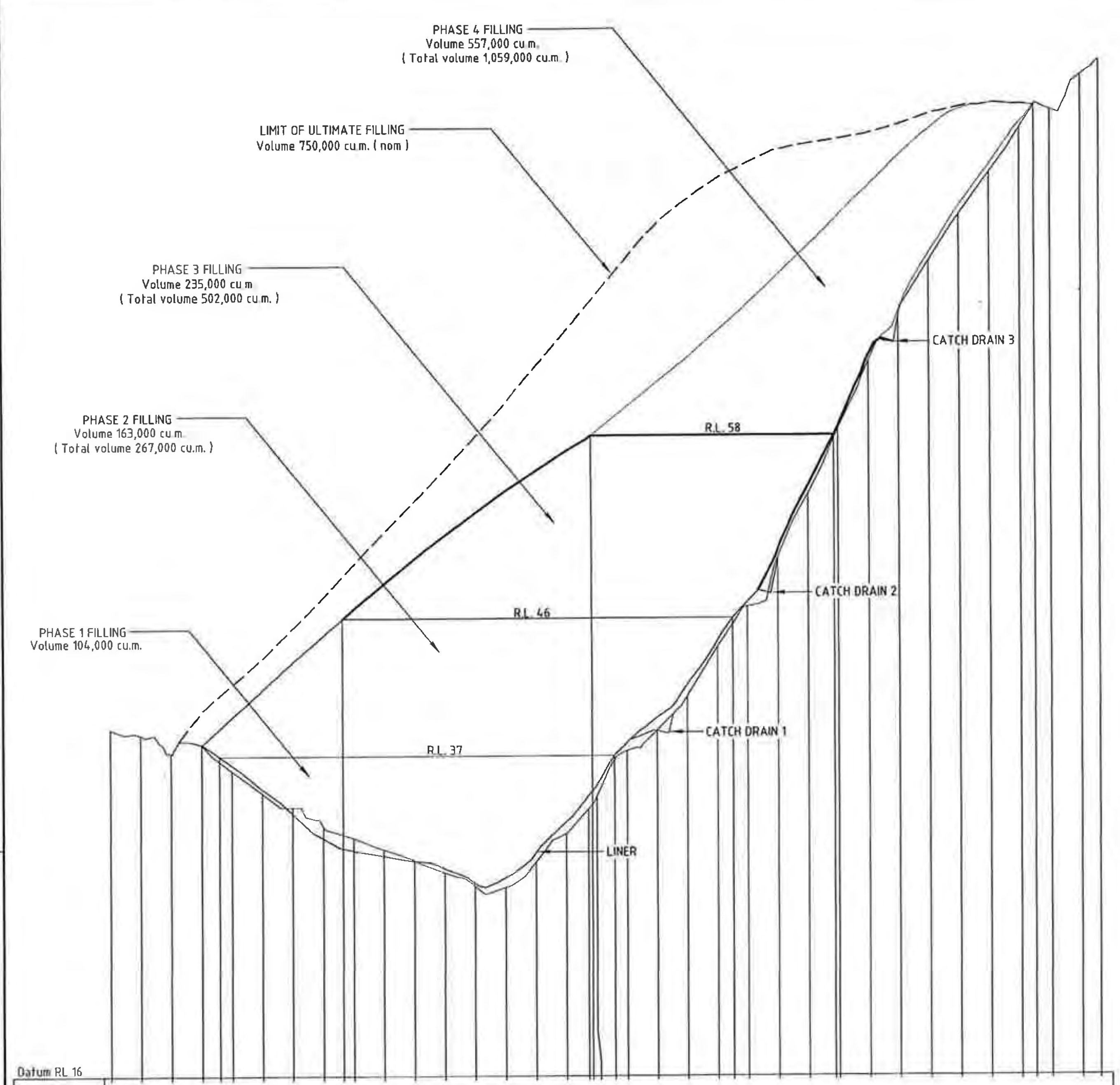

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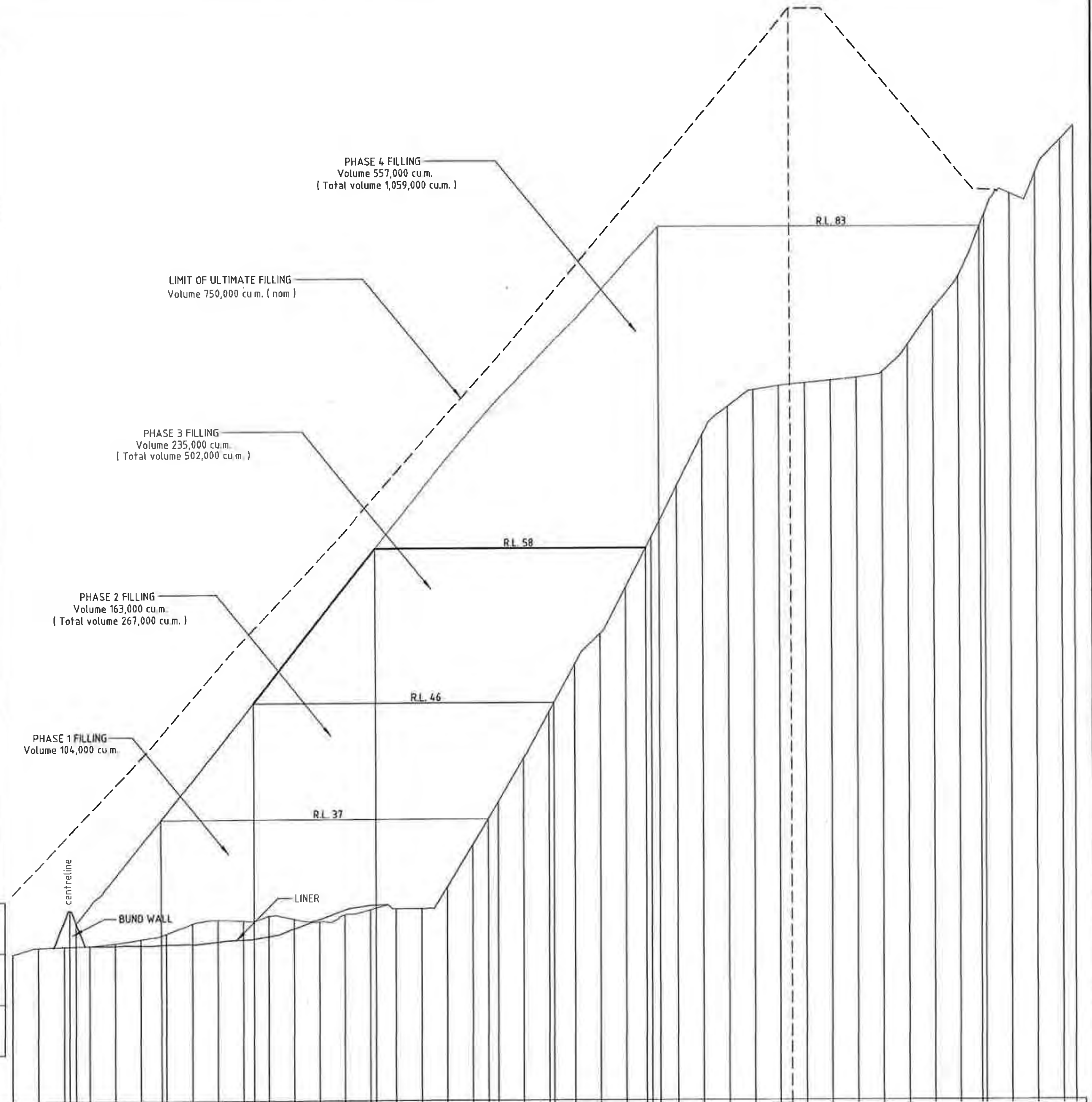
EXISTING LEVEL	38.756, 38.401, 37.192, 37.767, 36.047, 34.554, 33.639, 32.395, 31.629, 30.879, 30.158, 29.35, 28.477, 28.397, 30.033, 31.88, 33.49, 34.325, 37.306, 38.639, 40.843, 44.06, 46.733, 49.971, 54.114, 58.351, 62.791, 65.72, 69.3, 72.337, 75.117, 78.02, 79.244, 81.504, 82.467
CHAINAGE	0, 10, 20, 30, 30.068, 35.786, 40, 50, 60, 70, 76.595, 80, 90, 100, 110, 120, 130, 140, 150, 157.26, 158.538, 160, 165.795, 170, 180, 190, 200, 205.051, 210, 220, 230, 238.624, 240, 250, 260, 270, 280, 290, 300, 304.715, 310, 320, 326.09

TYPICAL SECTION B



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TYPICAL SECTION A

PRELIMINARY PLAN ONLY - NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		DEC 99

DATUM AHD | SURVEYOR B.Hogan/M.Kubik | DRAWN R.Pittaway | DATE Nov 99
AZIMUTH ISG | FIELD BOOKS F83/1,F93/1 | CHECKED | DATE
RELATED PLANS 1475,1320,2565 | DESIGNED R.Pittaway | DATE Nov 99 | CHECKED | DATE

APPROVED (FOR COUNCIL USE ONLY) — SENIOR DESIGN ENGINEER, DATE — MANAGER DESIGN, DATE

SCALES: HOR 1 : 1000, VERT 1 : 200

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE DEPOT
REDDALLS ROAD WEST DAPTO
EASTERN GULLY LANDFILL STAGE 3
TYPICAL SECTIONS (A and B)

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No DES3791
FILE NUMBER SU16391
SHEET 7 OF 14 SHEETS
DRAWING No. 2761 | SHEET No. C7 | ISSUE 1
A1 ORIGINAL

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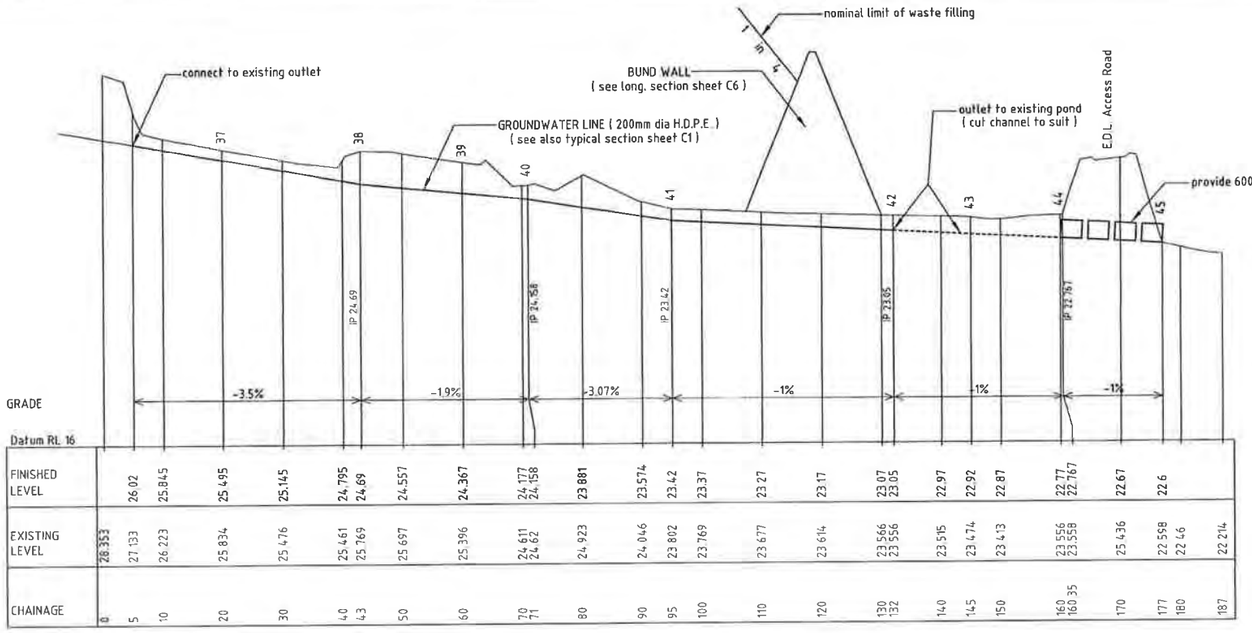
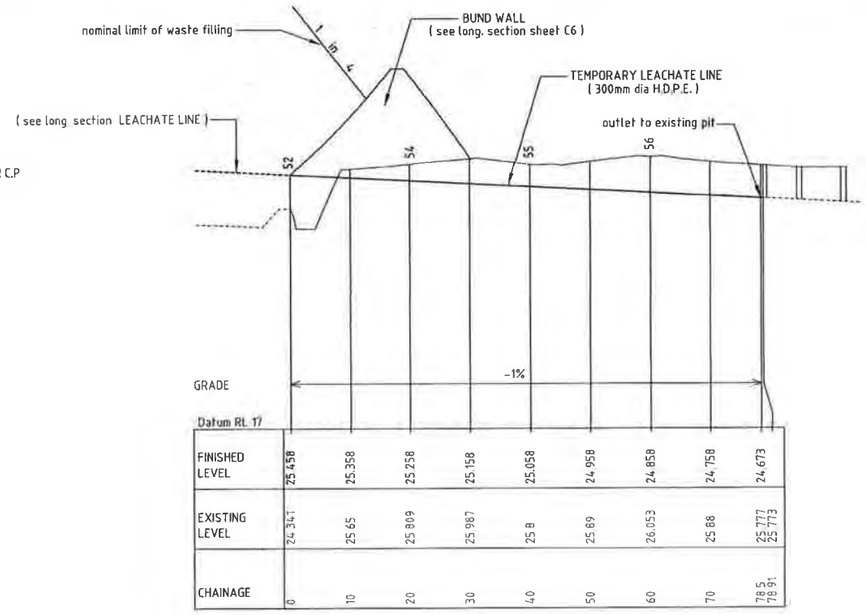
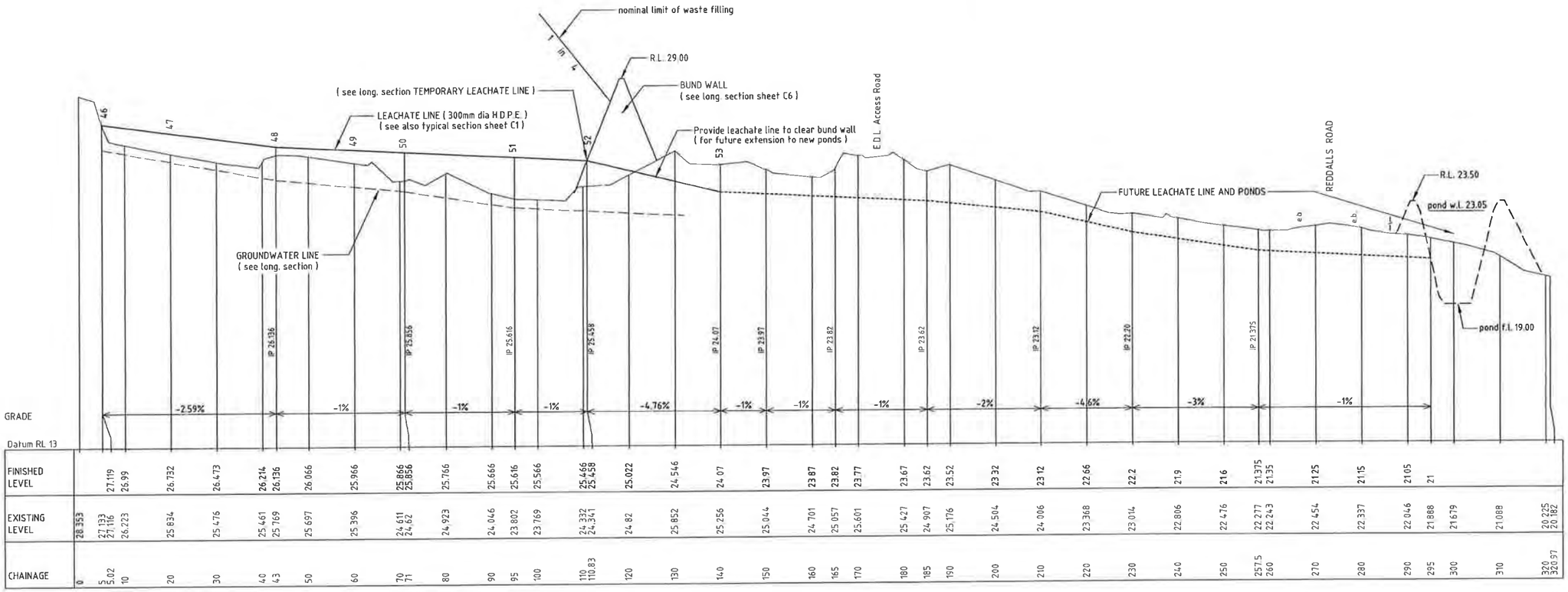


LONGITUDINAL SECTION GROUNDWATER LINE



LONGITUDINAL SECTION TEMPORARY LEACHATE LINE



LONGITUDINAL SECTION LEACHATE LINE

PRELIMINARY PLAN ONLY - NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		DEC 99

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM AHD	SURVEYOR B.Hogan/M.Kubik	DRAWN R.Pittaway	DATE Nov 99	APPROVED (FOR COUNCIL USE ONLY)
AZIMUTH ISG	FIELD BOOKS FBJ/1,F93/1	CHECKED	DATE	SENIOR DESIGN ENGINEER / MANAGER DESIGN
RELATED PLANS 1475,1320,2565		DESIGNED R.Pittaway	DATE Nov 99	DATE / DATE
		CHECKED	DATE	

SCALES: HOR 1 : 500 / VERT 1 : 100

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE DEPOT
REDDALLS ROAD WEST DAPTO
EASTERN GULLY LANDFILL STAGE 3
LONG. SECTIONS (Groundwater and Leachate)

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No	DES3791		A1 ORIGINAL
FILE NUMBER	SU16391		
SHEET 5 OF 14 SHEETS			
DRAWING No.	SHEET No.	ISSUE	
2761	C5	1	

BULK EARTHWORKS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthephoto maps.

Note: 3. See drawings 14892-004 and 14892-005 for cross sections.

Note: 4. Site clearing is limited to all areas within liner access road

Note: 5. The following base preparation works are to be undertaken.

+ Stripping of organic matter and soft topsoil, silt and peaty materials.
+ Proof rolling of the base using an 10 tonne minimum vibratory roller to identify soft spots.
+ Replacement of soft alluvium with non reactive backfill, and recompaction of the base using the above roller.
+ Where extensive and deep cohesive alluvial deposits are encountered, heavy compaction may not be possible. In these instances a compacted granular bridging layer, typically 0.5 metres thick should be placed over the alluvium to provide a firm base for compaction equipment.

Note: 6. Compaction tolerances as detailed in Liner Specification

Note: 7. The following cut batters are to be used in all constructions:

Alluvial Creek Deposits	1V in 2H	for periods less than 3 months
	1V in 2.5H	long term
Residual Soils & Highly Weathered Material	1V in 1H	1V in 1.5H for periods less than 3 months
	1V in 1.75H	1V in 2H long term

Note: 8. Stripped topsoil is to be stockpiled and stabilised with hydromulch or reused to cap western gully.

Note: 9. The bulk earthworks should be carried out in stages as dictated by the liner contract. The infrastructure at the base of the gully will not be affected until the final stage of the eastern gully landfill.

Note: 10. Fenceline to be removed as required by Staging

Note: 11. There is to be no tree clearing within 20 metres of the designated forest area

SITE BOUNDARY

EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992

EXISTING FENCELINE

RAINFOREST

LINER BOUNDARY & ACCESS ROAD

300 SLOTTED HDPE LEACHATE COLLECTION PIPELINE

EXTENT OF LINING -STAGE 1

RESIDENTIAL ACCESS

BH No 2

BH No 3

BH No 1

STORMWATER TREATMENT PONDS

LEACHATE POND

STORMWATER TREATMENT PONDS

STORM WATER DRAIN

PLANT OPERATING AREA

RECYCLING AREA

DAM

DAM

REED BEDS

132kV TRANSMISSION LINES

REDBALLS ROAD

GATEHOUSE & WEIGHBRIDGE

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV	DATE	DESCRIPTION	DRAWN	A.H.
02	5.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

	NAME	SIGNATURE	DATE
QUALITY RECORD			
DRAFTER CHECK	P POY		
DESIGNER CHECK	E MADEW		
PROJECT DIRECTOR APPROVAL	D MACLEOD		

COMPLETION OF THE QUALITY RECORD TO EVIDENCE THAT THE DESIGN AND DRAWINGS HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 848 834

CLIENT: THE CITY OF WOLLONGONG

2926

PROJECT TITLE: WHYTES GULLY LANDFILL

DRAWING TITLE: STAGE 1 EXTENT OF LINER AND LEACHATE DRAIN

DATE OF ISSUE: 5.2.93 — SIZE: A0

CAD REFERENCE: PLAN2.DWG — DATE PLOTTED: 23.10.92

DRG No.: 14892-008 — REV.: 0

DRG STATUS: PRELIMINARY

8 of 9

2926

WHYTES GULLY
WASTE DISPOSAL AREA

LOT 2
(W.C.C. OWNER)

LOT 203
(W.C.C. OWNER)

EASEMENT FOR TRANSMISSION LINE

TRANSMISSION LINE

REDDALLS RD

D. P. 240557

D. P. 628538

D. P. 776338

D. P. 708258

D. P. 636535

D. P. 823270

PT 33

862829

203

561

202

301

UN

DESIGNED FINISHED LEVELS

PM 55455 RL 26.085

PM 55454 RL 94.708

A	ISSUED TO EPA	M.K.	B.H.	JUNE/00
ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE

DATUM AHD	SURVEYOR B.HOGAN	DRAWN M.K.	DATE JUNE/2000	APPROVED	
AZIMUTH	FIELD BOOKS F.B.W.G.	CHECKED B.H. B. Hogan	DATE JUNE/2000	SENIOR DESIGN ENGINEER	MANAGER DESIGN
RELATED PLANS 331		DESIGNED	DATE	DATE	DATE
		CHECKED	DATE		

SCALES: 1 : 2000

NORTH POINT: NORTH

PLAN NOT FOR CONSTRUCTION

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL AREA
WEST DAPTO
CONTOURS AT 19th JUNE 2000

WOLLONGONG City of Diversity
DESIGN DIVISION
Ph. 02 42 277111

DESIGN OFFICE NUMBER OES5346			A1 ORIGINAL
FILE NUMBER SU16245			
SHEET 1 OF 1 SHEETS			
DRAWING No. 2882	SHEET No. SV1	ISSUE A	

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

models 4, 5, 6, 7, 8, 9, 10, 18

limit of litter fence overhang

PROPOSED ACCESS RD (5m wide)

limit of existing liner

access road to tip site

access road to tip site

stormwater pond

leachate pond

leachate pond

300 dia HDPE leachate line

300 dia HDPE leachate line

100 dia HDPE groundwater drainage line

overflow

REDDALLS ROAD

5 x 1050 dia R.C.P's

pond water level 19.15

TRANSMISSION LINE EASEMENT 30 WIDE

ADDITIONAL LINING PERIMETER 808 m. o/a
LINING SURFACE AREA 11,360 sq.m. (not incl. overlaps)
(PLAN AREA 10,352 sq.m.)

existing contours as at Dec '97

REFERENCE
directory J:\CADMaster\4d\Project\rip\2565
project 2565

NO.	AMENDMENTS	DRAWN	APPR'D	DATE

DATUM A.H.D.
FIELD BOOKS
DRAWN R.Pittaway DATE Jan '98
CHECKED DATE
SURVEYOR B. Hogan
RELATED PLANS 1475
DESIGNED DATE
CHECKED DATE

APPROVED FOR CONSTRUCTION
SENIOR DESIGN ENGINEER DATE
MANAGER DESIGN DATE

SCALES 1 : 1000

NORTH POINT NORTH

CITY OF WOLLONGONG

WHYTES GULLY
WASTE DISPOSAL AREA
STAGE II - 2 (eastern gully)

WOLLONGONG City of Diversity

DESIGN OFFICE NUMBER DES 2127
FILE NUMBER
SHEET 2 OF 3 SHEETS
DRAWING TYPE R
DRAWING NO. 2565
SHEET No. C2
ISSUE 1

REFERENCE – " J:\CADMaster\4D\Project\rip\3015 Reddalls Rd sewerage line DES6310 "
Project – 3015

Access road to tip

leachate treatment ponds

weighbridge

ROAD

artificial wetlands

REDDALLS

settlement pond

70 mm I.D. flexible H.D.P.E. pressurised leachate line (to Sydney Water pumping station)

" THIESS " Recycling Depot

settlement pond

'Glengarry' Cottage

REDDALLS ROAD

" Tubemakers "

0.35
2.5
35.8
88
2.0
48.35
2.0
72.2
0.35
1.25
28.35
11
1.8
69.3

NOTE : offsets shown are to approx. trench centreline

750 mm
500 mm
centreline
fibre optic cable (cable laid between 1 m to 15 m from boundary)
70 mm I.D. flexible H.D.P.E. pressurised leachate line
300 mm

TYPICAL TRENCH
(diagrammatic only)

PRELIMINARY PLAN ONLY – NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		Feb 01

DATUM AHD | SURVEYOR B.Hogan | DRAWN R.Pittaway | DATE Feb 2001
AZIMUTH ISG | FIELD BOOKS F83/1 F93/1 | CHECKED | DATE
RELATED PLANS | DESIGNED | DATE
CHECKED | DATE

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ____ DATE ____
MANAGER DESIGN ____ DATE ____

SCALES: 1 : 1000

NORTH POINT

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

CITY OF WOLLONGONG

Sketch plan showing location of sewerage line from Whytes Gully treatment ponds to West Dapto Road
Reddalls Road West Dapto

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No	DES6310		A1 ORIGINAL
FILE NUMBER	SU17663		
SHEET 1 OF 2 SHEETS			
DRAWING No.	SHEET No.	ISSUE	
3015	SK1	1	

ISSUE 2_4D

REFERENCE - " J:\CADMaster\4D\Project\rip\3015 Reddalls Rd sewerage line DES6310 "
Project - 3015

" Sydney Water "

" War cemetery "

" A.P.C. Socotherm "

" Integral Energy " sub - station

" Kembla Grange cemetery "

" Tubemakers "

" Tubemakers "

ROAD

REDDALLS

REDDALLS

ROAD

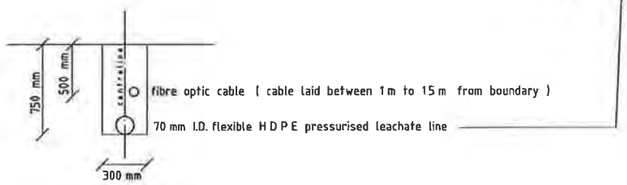
ROAD

DAPTO

WEST

70 mm I.D. flexible H D P E pressurised leachate line (to Sydney Water pumping station)

NOTE : offsets shown are to approx. trench centreline



TYPICAL TRENCH
(diagrammatic only)

PRELIMINARY PLAN ONLY - NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
1	Issued for discussion	R.P.		Feb 01

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM AHD	SURVEYOR D.Hogan	DRAWN R.Pattaway	DATE Feb 2001
AZIMUTH ISG	FIELD BOOKS F83/1 F93/1	CHECKED	DATE
RELATED PLANS		DESIGNED	DATE
		CHECKED	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ____ DATE ____

MANAGER DESIGN ____ DATE ____

SCALES: 1 : 1000

NORTH POINT: NORTH

CITY OF WOLLONGONG

Sketch plan showing location of sewerage line from Whytes Gully treatment ponds to West Dapto Road
Reddalls Road West Dapto

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No	DES6310		A1 ORIGINAL
FILE NUMBER	SU17663		
SHEET 2 OF 2 SHEETS			
DRAWING No. 3015	SHEET No SK2	ISSUE 1	

ISSUE 2_40

lot 3
D. P. 240557
own: Mr J.C.Lucas
P.O Box 613
Dapto 2530

lot 2
D. P. 240557
own: Wollongong City Council
41 Burelli St
Wollongong 2521

REDDALLS ROAD

existing artificial wetlands and treatment ponds

EASTERN GULLY

lot 2
D. P. 240557
own: Wollongong City Council
41 Burelli St
Wollongong 2521

for detail refer sheet C1

TRANSMISSION EASEMENT

existing settlement pond

lot 203
D. P. 708258
own: Wollongong City Council
41 Burelli St
Wollongong 2521

E.D.L. PLANT

lot 301
D P 776338
own: Wollongong City Council
41 Burelli St
Wollongong 2521

Dapto

existing settlement pond

lot 203
D. P. 708258
own: Wollongong City Council
41 Burelli St
Wollongong 2521

lot 1
D. P. 58522
own: B H P
P.O. Box 1854
Wollongong 2500

" THIESS " RECYCLING DEPOT

" Glengarry " cottage

SITE OF FUTURE TRANSFER STATION
(Refer plan 1475 sheet 2 issue 7)

Dapto

for detail refer sheet C2

lot 1
D. P. 230137
own: Tubemakers Of Australia Ltd
Private Bag 3
Kembla Grange 2530

for detail refer sheet C3

Information Bay

SHEET INDEX

Sheet No	Description
C1	Plan & Long Section (00 - 345)
C2	Plan & Long Section (330 - 675)
C3	Plan & Long Section (660 - 935.851)
C4	Cross Sections Deviation (00 - 210)
C5	Cross Sections Deviation (244.822 - 450)
C6	Cross Sections Deviation (480 - 690)
C7	Cross Sections Deviation (720 - 911.118)
C8	Soil & Sediment Control
C9	Culvert Long Section / Junction Detail
C10	Set out Detail (00 - 345)
C11	Set out Detail (330 - 675)
C12	Set out Detail (660 - 935.851)

FOR LANDSCAPE WORKS REFER PLAN 2816

REFERENCE: J:\CADMaster\4D\Project\rip\2991 Reddalls Rd Deviation DES6246
PROJECT: Cover sheet

APPROVED FOR CONSTRUCTION

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
A	Issued for construction	R.P.	K.M.	Apr '01

DATUM AHD | SURVEYOR B.Hogan/M.Kubik | AZIMUTH ISG | FIELD BOOKS F83/1 F93/1 | RELATED PLANS 1475/2633

		DATE
DRAWN	R.Pittaway	Jan 2001
CHECKED	S.Walsh	Apr 2001
DESIGNED	R.Pittaway	Jan 2001
CHECKED	K.Mathieson	Apr 2001

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER — DATE 22/9/01
MANAGER DESIGN — DATE 23/9/01

SCALES: 1 : 1000

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL AREA
REDDALLS ROAD WEST DAPTO
Deviation West Of Thiess Recycling Depot
COVER SHEET

WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42 277111

DESIGN OFFICE No.	DES6246
FILE NUMBER	SU17558
SHEET 0 OF 12 SHEETS	
DRAWING No.	2991
SHEET No.	C0
A1 ORIGINAL	
ISSUE	A

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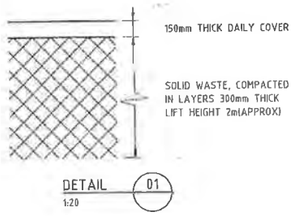
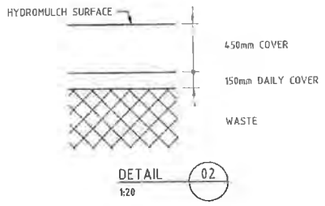


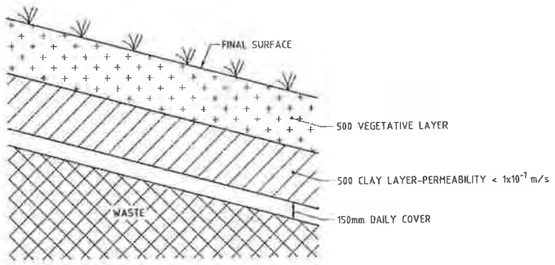
DETAIL 01 1:20

DAILY COVER



DETAIL 02 1:20

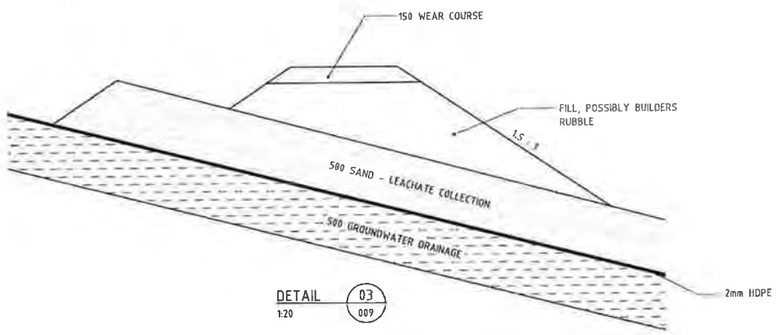
INTERIM COVER - FACES EXPOSED FOR > 3 MONTHS - MIN GRADE 3%



DETAIL 03 1:20

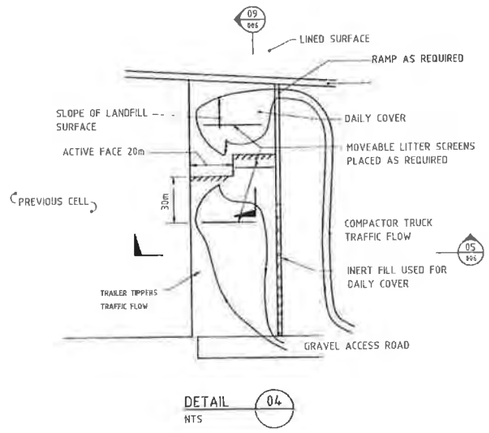
FINAL CAP DETAILS

COVER DETAILS



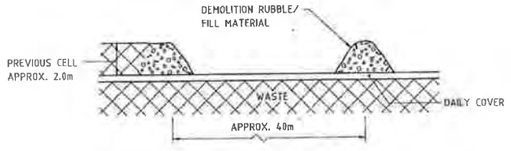
DETAIL 03 009 1:20

TEMPORARY ACCESS ROAD DETAIL



DETAIL 04 NTS

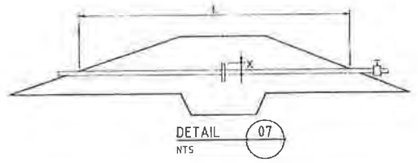
TYPICAL CELL LAYOUT



DETAIL 05 006 NTS

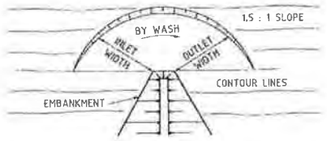
CELL SEPARATION BERM

CELL LAYOUT DEATILS



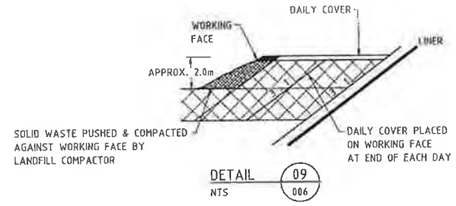
DETAIL 07 NTS

TYPICAL EMBANKMENT DETAILS



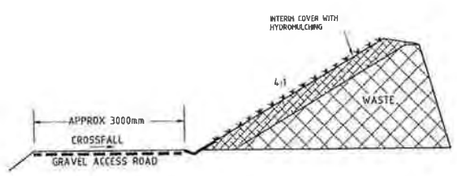
DETAIL 08 NTS

TYPICAL SPILLWAY DETAIL



DETAIL 09 006 NTS

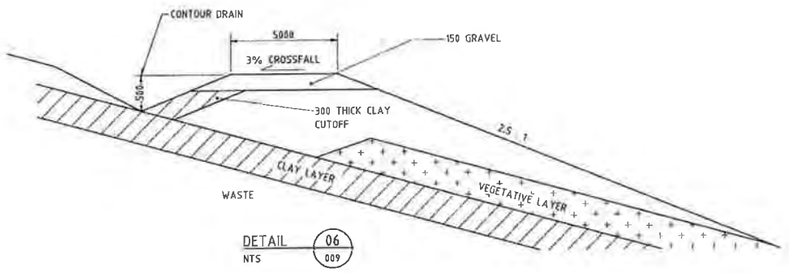
TYPICAL FILLING SEQUENCE



DETAIL 10 NTS

DRAINAGE AND ACCESS FROM INTERIM COVER

FILLING SEQUENCE TO INTERIM COVER

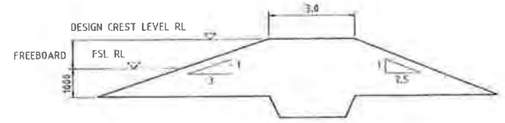


DETAIL 06 009 NTS

ACCESS ROAD DETAIL - FINAL COVER

DAM SPECIFICATIONS (M)

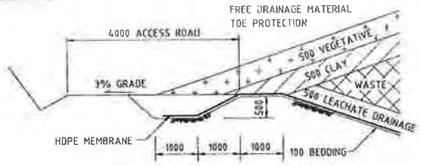
	SPILLWAY			PIPE OUTLET		L	CREST LEVEL
	FREEBOARD	INLET	OUTLET	x	Ø		
DAM 1	0.75	7.5	18	1.9	0.15	19	19.75



DETAIL 11 NTS

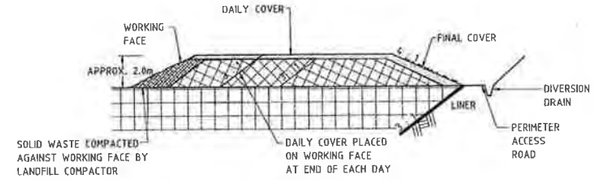
TYPICAL EMBANKMENT CROSS SECTION

SEDIMENT DAM DETAILS



DETAIL 13 1:50 009

EDGE DETAILS



DETAIL 14 NTS

TYPICAL FILLING FOR FINAL COVER - BACK FACE

FILLING SEQUENCE TO FINAL COVER

MATERIAL TYPES

GROUNDWATER DRAINAGE

BEDDING

FREE DRAINING MATERIAL

LEACHATE DRAINAGE

PROTECTIVE LAYER

VEGETATIVE LAYER

CLAY LAYER

OPERATION DETAIL NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION.
2. OPERATIONAL DETAILS ARE FURTHER OUTLINED IN THE WHYTES GULLY LANDFILL MANAGEMENT PLAN.

1320 P331

REV	DATE	DESCRIPTION	CHK'D	W.D.
02	16.3.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	A.FRANKLAND		
DESIGNER CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.McLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 846 834

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL

DRAWING TITLE: OPERATIONAL DETAILS

DATE OF ISSUE: 17-3-93

SIZE: A0

CAD REFERENCE: PLAN04.DWG

DATE PLOTTED: 16.3.93

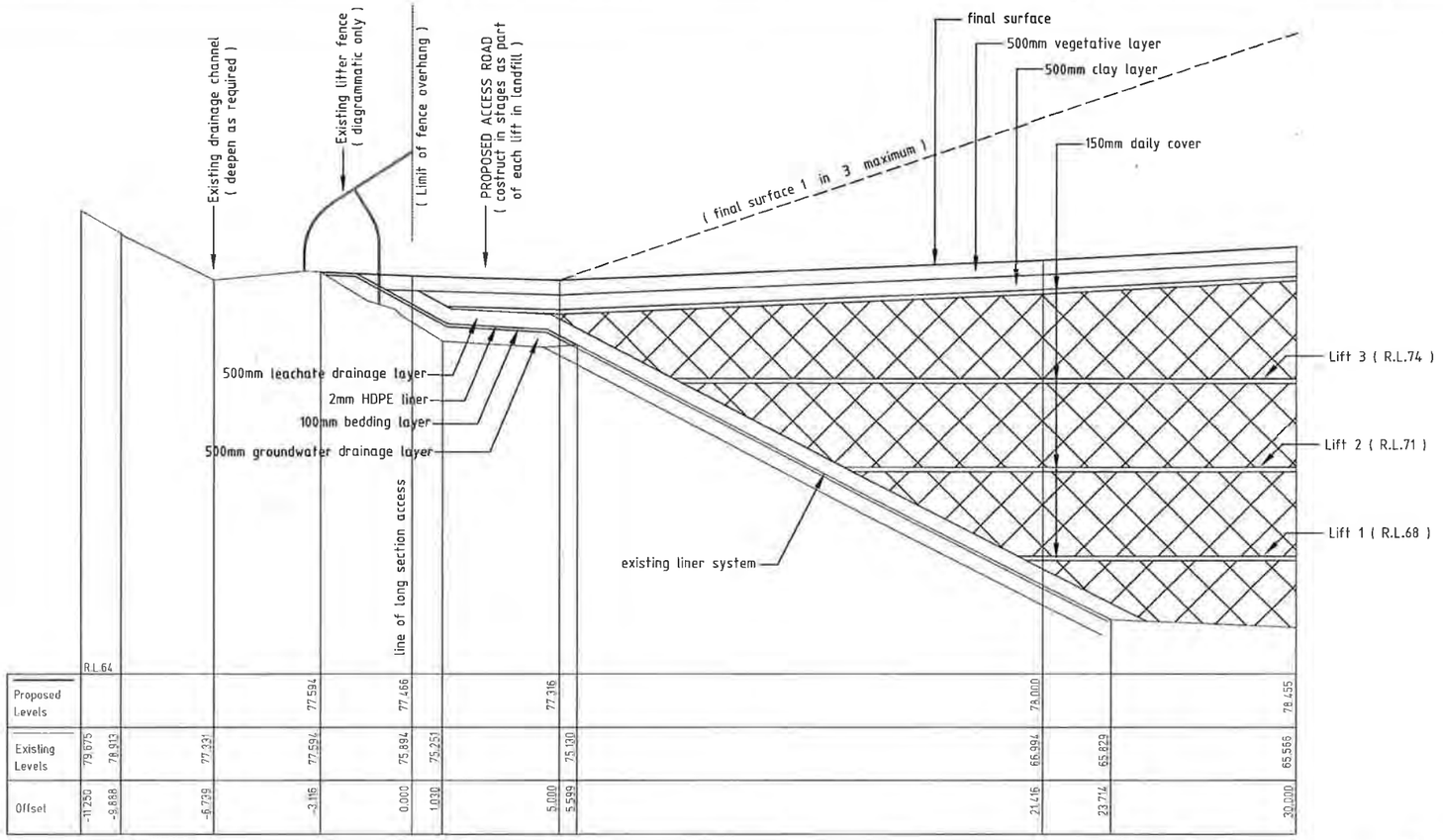
DRG No: 14892-006

REV: 02

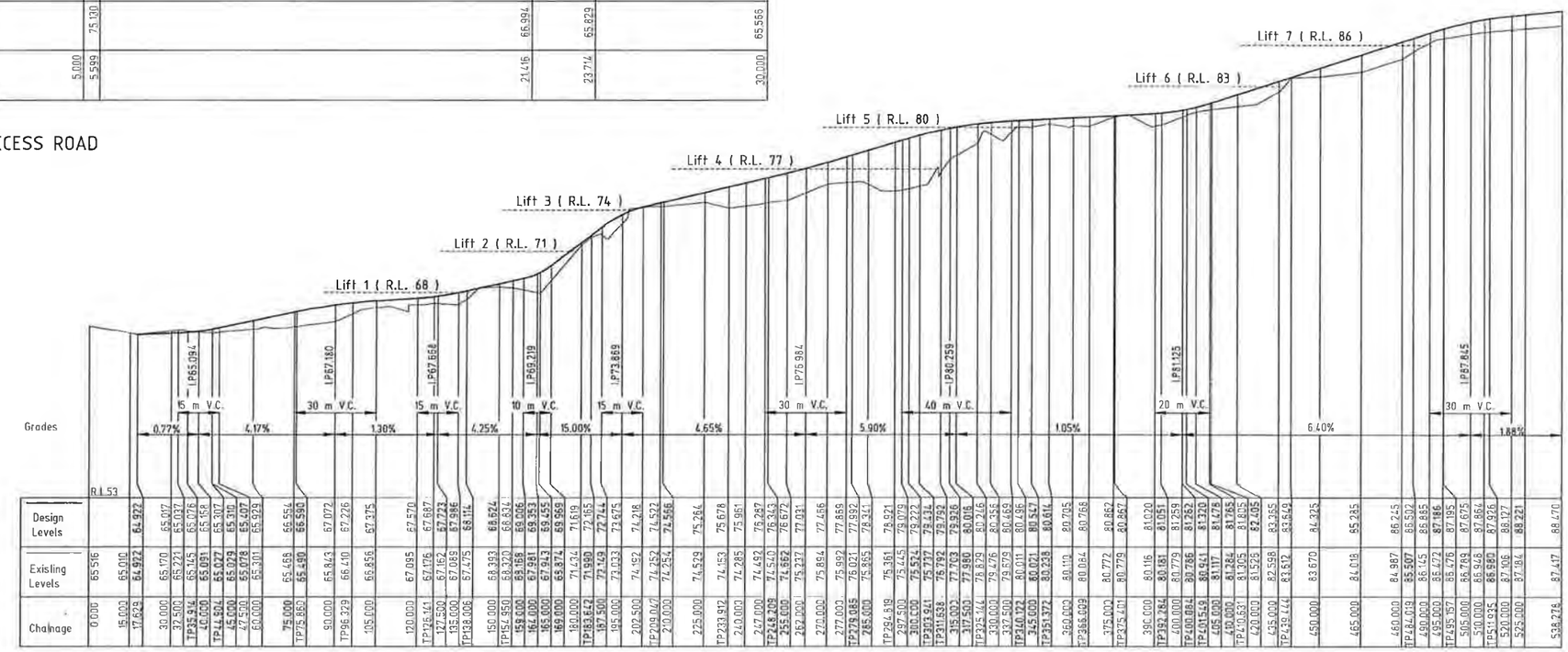
DRG STATUS: DESIGN COMPLETE

6 OF 9

models 16, 17, 22



TYPICAL SECTION ACCESS ROAD
Scale 1 : 100



LONGITUDINAL SECTION ALONG access

SCALES		CITY OF WOLLONGONG		DESIGN OFFICE NUMBER DES 2127	DRAWING TYPE
Horiz 1 : 1000		WHYTES GULLY		FILE NUMBER	R
Vert 1 : 200		WASTE DISPOSAL AREA	WOLLONGONG City of Diversity	SHEET 3 OF 3 SHEETS	
		STAGE II - 2 (eastern gully)		DRAWING NO. 2565 / SHEET No. C3	ISSUE 1

EXISTING CONDITIONS

Note: 1. These drawings are not to be used as contract drawings and are for the use of Wollongong City Council day labour construction.

Note: 2. The contour data has been prepared from council stadia survey of western gully tipping face and of base of the eastern gully. The surrounding contours have been extrapolated using orthophoto maps.

Note: 3 Drainage and stormwater details from WCC Drawing P331/17 S OF 29 and 9 of 29

Note: 4. Rainforest marked in from aerial photograph

SITE BOUNDARY
CATCH DRAIN
EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992
LEACHATE DRAIN AT BASE OF LANDFILL
750mm Ø RCP
2 x 750mm Ø RCP
CATCH DRAIN
RESIDENTIAL ACCESS
VOLUME=4200m³ STORMWATER TREATMENT PONDS TWL=24.2
LEACHATE POND TWL=25.6 VOLUME=8000m³
LEACHATE RECIRCULATION PUMP
STORMWATER TREATMENT PONDS TWL=24.0 VOLUME=3000m³
PLANT ONFARM
GRADED GRASS CHANNEL @ 1%
SPILLWAY
RECYCLING AREA
BH No 1
100mm Ø RCP
2 x 900 Ø RCP
6 x 1050 Ø RCP
375 Ø RCP
DAM
DAM
REED BEDS
132kV TRANSMISSION LINES
REDDALLS ROAD
GATEHOUSE & WEIGHBRIDGE
4WD TRACK
STORM
EXISTING FENCELINE
SPRAY IRRIGATION OF LEACHATE (TO BE ABANDONED)
RAINFOREST
MIXED WOODLAND
DAM
EXISTING FENCELINE

1320 P331 SV01

REV.	DATE	DESCRIPTION	DWR No.	P.D.
02	10.2.93	GENERAL REVISION		
01	1.1.92	GENERAL REVISION		

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

SCALE 10 0 25 50 75 METRES

	NAME	SIGNATURE	DATE
QUALITY RECORD:			
DRAFTER CHECK:	P POY		
DESIGNER CHECK:	E MADEW		
PROJECT DIRECTOR APPROVAL:	D MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

MAUNSELL PROPRIETARY LIMITED
A.C.N. 004 836 824

THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: SITE PLAN : EXISTING FACILITIES
DRG REFERENCE: PLAN01DWG
DRG NO: 14892-001
REV: 02
DRG STATUS: PRELIMINARY
DATE OF ISSUE: 10.2.93
SIZE: A0
DATE PLOTTED: 10.2.93
1 OF 9

EXISTING CONDITIONS

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION
2. THE CONTOUR DATA HAS BEEN PREPARED FROM COUNCIL STADIA SURVEY OF WESTERN GULLY TIPPING FACE AND OF BASE OF THE EASTERN GULLY. THE SURROUNDING CONTOURS HAVE BEEN EXTRAPOLATED USING ORTHOPHOTO MAPS
3. DRAINAGE AND STORMWATER DETAILS FROM WCC DRAWING P331/17 5 OF 29 AND 9 OF 29
4. RAINFOREST MARKED IN FROM AERIAL PHOTOGRAPH

SITE BOUNDARY
CATCH DRAIN
CATCH DRAIN
EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992
LEACHATE DRAIN AT BASE OF LANDFILL
750mm Ø PCPC
750Ø PCPC
EXISTING FENCELINE
SPRAY IRRIGATION OF LEACHATE (TO BE ABANDONED)
RAINFOREST
MIXED WOODLAND
RESIDENTIAL ACCESS
2 x 750mm Ø RCP
VOLUME =200m³ STORMWATER TREATMENT PONDS TWL=24.3
LEACHATE POND TWL=25.6 VOLUME=8000m³
LEACHATE RECIRCULATION PUMP
STORMWATER TREATMENT PONDS TWL=24.8 VOLUME = 3000m³
PLANT UNPOUND
GRADED OPEN CHANEL @ 1%
SPILLWAY
RECYCLING AREA
BH No 1
1600mm Ø RCP
2 x 900 Ø RCP
6 x 1050 Ø RCP
375 Ø RCP
DAM
DAM
REED BEDS
132kV TRANSMISSION LINES
GATEHOUSE & WEIGHBRIDGE
REDDALLS ROAD
4WD TRACK
STORMWATER
FENCELINE
EXISTING FENCELINE
DAM

1320 P331

P2	29.1.93	GENERAL REVISION	
P1	3.11.92	GENERAL REVISION	
PATH	DATE	DESCRIPTION	DRAWING No. / P.M.

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

SCALE 1:5 0 50 100 150 METRES

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTED CHECK	A.WILFORD		
DESIGNED CHECK	E.MADEW		
PROJECT DIRECTOR APPROVAL	D.MACLEOD		

COMPILATION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMABLE WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

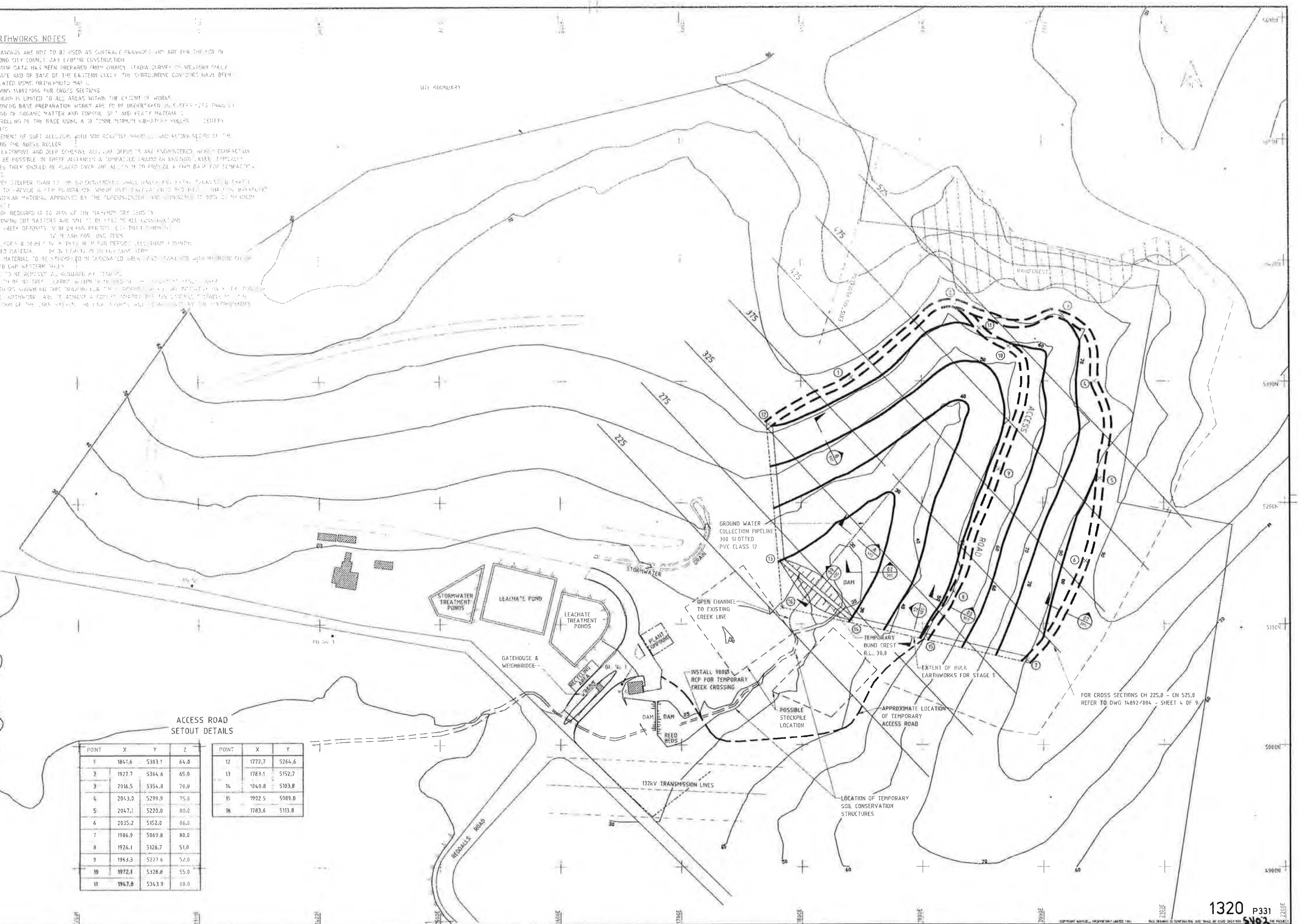
MAUNSELL PROPRIETARY LIMITED
A.C.N 004 840 884

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: SITE PLAN : EXISTING FACILITIES
DATE OF ISSUE: 29.1.93
SIZE: A0
CAD REFERENCE: PLAN01.DWG
DATE PLOTTED: 29.1.93
DRG No.: 14892-001
REV.: 02
DRG STATUS: DESIGN COMPLETE
1 OF 9

BULK EARTHWORKS NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION
2. THE CONTOUR DATA HAS BEEN PREPARED FROM COUNCIL STADIA SURVEY OF WESTERN GULLY TIPPING FACE AND OF BASE OF THE EASTERN GULLY. THE SURROUNDING CONTOURS HAVE BEEN EXTRAPOLATED USING ORTHOPHOTO MAPS.
3. SEE DRAWING 14892/004 FOR CROSS SECTIONS
4. SITE CLEARING IS LIMITED TO ALL AREAS WITHIN THE EXTENT OF WORKS
5. THE FOLLOWING BASE PREPARATION WORKS ARE TO BE UNDERTAKEN [illegible]
   - STRIPPING OF ORGANIC MATTER AND TOPSOIL [illegible] AND PEATY MATERIAL
   - PROOF ROLLING OF THE BASE USING A 10 TONNE MINIMUM VIBRATORY ROLLER [illegible] IDENTIFY SOFT SPOTS
   - REPLACEMENT OF SOFT ALLUVIUM WITH NON REACTIVE BACKFILL AND RECOMPACTION OF THE BASE USING THE ABOVE ROLLER
   - WHERE EXTENSIVE AND DEEP COHESIVE ALLUVIAL DEPOSITS ARE ENCOUNTERED HEAVY COMPACTION MAY NOT BE POSSIBLE. IN THESE INSTANCES A COMPACTED GRANULAR BRIDGING LAYER TYPICALLY [illegible] METRES THICK SHOULD BE PLACED OVER THE ALLUVIUM TO PROVIDE A FIRM BASE FOR COMPACTION EQUIPMENT.
6. FOR SLOPES STEEPER THAN [illegible] THE SUPERINTENDENT SHALL DIRECT ANY EXTRA EXCAVATION THAT IS REQUIRED TO PROVIDE A FIRM FOUNDATION. WHERE OVER EXCAVATION IS REQUIRED [illegible] SHALL BE BACKFILLED WITH GRANULAR MATERIAL APPROVED BY THE SUPERINTENDENT AND COMPACTED TO 95% OF MAXIMUM DRY DENSITY
7. COMPACTION REQUIRED IS TO 95% OF THE MAXIMUM DRY DENSITY
8. THE FOLLOWING CUT BATTERS ARE NOT TO BE EXCEEDED IN ALL CONSTRUCTIONS
   ALLUVIAL CREEK DEPOSITS [illegible] FOR PERIODS LESS THAN [illegible] MONTHS
   [illegible] FOR LONG TERM
   RESIDUAL SOILS & [illegible] FOR PERIODS LESS THAN [illegible] MONTHS
   WEATHERED MATERIAL [illegible] FOR LONG TERM
9. STRIPPED MATERIAL TO BE STOCKPILED IN DESIGNATED AREA [illegible] REUSED TO CAP WESTERN GULLY
10. FENCING TO BE REMOVED AS REQUIRED BY [illegible]
11. THERE IS TO BE NO TREE CLEARING WITHIN [illegible]
12. THE CONTOURS SHOWN ON THIS DRAWING FOR [illegible] OF THESE EARTHWORKS ARE TO ACHIEVE A FINISHED SHAPE [illegible] INSTALLATION OF THE LINER SYSTEM [illegible] BY THE SUPERINTENDENT



ACCESS ROAD SETOUT DETAILS

POINT	X	Y	Z
1	1841.6	5303.1	64.0
2	1927.7	5364.6	65.0
3	2016.5	5354.8	70.0
4	2043.0	5299.9	75.0
5	2047.1	5220.0	80.0
6	2035.2	5152.0	86.0
7	1986.9	5069.8	80.0
8	1926.1	5126.7	51.0
9	1963.3	5227.6	52.0
10	1972.1	5328.8	55.0
11	1947.8	5343.9	60.0

POINT	X	Y
12	1772.7	5264.6
13	1783.1	5152.7
14	1840.8	5103.8
15	1902.5	5089.8
16	1783.6	5113.8

1320 P331 SV02

REV.	DATE	DESCRIPTION		
03	15.3.93	GENERAL REVISION		
02	19.2.93	GENERAL REVISION		
01	3.11.92	GENERAL REVISION		

SCALE 20 0 20 40 60 METRES

QUALITY RECORD	NAME	SIGNATURE	DATE
DRAFTER CHECK	A MILFORD		
DESIGNER CHECK	E MADEW		
PROJECT DIRECTOR APPROVAL	D MACLEOD		

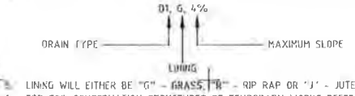
COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 848 824

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: BULK EARTHWORKS CONTOURS STAGE 1
DATE OF ISSUE: 19.2.93
SIZE: A0
CAD REFERENCE: PLAN02.DWG
DATE PLOTTED: 17.3.93
DRG No. 14892-002
REV. 03
DRG. STATUS: DESIGN COMPLETE

STORMWATER NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION
2. THE CONTOUR DATA HAS BEEN PREPARED FROM COUNCIL STADIA SURVEY OF WESTERN GULLY TIPPING FACE AND BASE OF THE EASTERN GULLY. THE SURROUNDING CONTOURS HAVE BEEN EXTRAPOLATED USING 14000 ORTHOPHOTO MAPS.
3. SEE DRAWING 14892/006 FOR DETAILS OF STORMWATER DRAIN CROSS SECTIONS
4. DRAINS ARE TO BE GRADED TO SUIT NORMAL TOPOGRAPHY WITH MAXIMUM SLOPE AS SHOWN



5. LINING WILL EITHER BE "G" - GRASS, "R" - RIP RAP OR "J" - JUTE
6. FOR SOIL CONSERVATION STRUCTURES OF TEMPORARY WORKS REFER TO DRAWING 14892/005
7. FOR DRAINAGE FROM INTERIM COVER SEE OPERATIONAL DETAILS ON DRAWING 14892/006
8. DRAINAGE FROM BASE OF THE EASTERN GULLY LANDFILL DURING STAGES 1 & 2 WILL BE VIA NATURAL STREAM BEDS.
9. DURING CLOSURE OF THE WESTERN GULLY SITE ALL STORMWATER FROM THE TIPPING FACE WILL BE DRAINED TO THE LINED EASTERN LANDFILL.
10. DRAINAGE VIA EXISTING PIPE SYSTEM WILL REMAIN UNALTERED
11. THE DAM LOCATION SHOWN ON THIS PLAN IS PRELIMINARY ONLY. DETAILED LOCATION WILL BE VERIFIED IN THE FIELD WITH A MORE DETAILED SURVEY.
12. DURING LINER CONSTRUCTION WHILE TIPPING IS STILL TAKING PLACE ON THE WESTERN GULLY ALL CLEAN STORMWATER IS TO BE DIVERTED ACROSS THE FRONT FACE OF WESTERN GULLY. AFTER WESTERN GULLY HAS BEEN CAPPED AND REACHED FINAL LANDFORM, ALL CLEAN STORMWATER FROM TOP OF CATCHMENT WILL BE DIVERTED ALONG THE WESTERN GULLY ACCESS ROAD.
13. THE CONSTRUCTION OF STAGE 1 OF THE LANDFILL WILL BE THE SUBJECTED DETAIL DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR IN CONSULTATION WITH COUNCIL.

CULVERT SCHEDULE

CULVERT No	CULVERT	Q m^3/s	HW m	TW m	SLOPE %	VELOCITY m/s	REMARKS
3	3 x 750Ø RCP	3.0	1.141	0.5	2.0	4.109	SCOUR PROTECTION AT OUTLET/INLET
4 & 5	2 x 600Ø RCP	1.5	1.268	0.5	2.0	3.997	SCOUR PROTECTION AT OUTLET/INLET
6	3 x 900Ø RCP	3.8	1.103	0.5	2.0	4.312	SCOUR PROTECTION AT OUTLET
7	2 x 900Ø RCP	6.0 *	1.295	0.5	2.0	4.599	SCOUR PROTECTION AT OUTLET
8	1 x 450Ø RCP	0.3	0.742	0.5	2.0	3.137	SCOUR PROTECTION AT OUTLET
9	2 x 1050Ø RCP	9.6 *	1.018	0.5	2.0	1.785	SCOUR PROTECTION AT OUTLET

* COMBINED WITH EXISTING CULVERT

LEGEND

- STORMWATER CHANNEL
- SCOUR PROTECTION
- CULVERT & HEADWALL/ INLET STRUCTURE

SITE BOUNDARY
EXISTING CATCH DRAIN
EXISTING TIPPING FACE CONTOURS AS OF AUGUST 1992
ACCESS ROAD TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY
TO BE CONSTRUCTED AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)
DIVERSION TO TAKE PLACE AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN GULLY (SEE NOTE 12)
EXISTING FENCELINE
RAINFOREST
CATCH DRAIN TO DIVERT INTO ROAD DRAIN AFTER FINAL LANDFORM HAS BEEN ACHIEVED ON THE WESTERN FACE (SEE NOTE 12)
CULVERT (3)
CULVERT (4)
CULVERT (5)
EXISTING 750Ø PIPE D1,R,20%
FOR ACCESS ROAD CROSS SECTION SEE 14892-006
2:1 BATTER (FILL)
DURING STAGE 1 ALL STORMWATER IN THIS AREA TO BE TREATED AS LEACHATE
360mm HIGH EARTH MOUNT
LINER BOUNDARY AND ACCESS ROAD
RESIDENTIAL ACCESS
EXISTING CULVERTS (1) 2x750mmØ PIPES
500mm HIGH EARTH MOUNT
LEACHATE POND 500mm DEPRESS SPILLWAY
STORMWATER POND
LEACHATE POND
10m
CULVERT No (8)
CLAY LINING
SPILLWAY
CULVERT No (7)
PICKETING AREA
BH No 1
2x900Ø CULVERT EXISTING
SPILLWAY DAM
CULVERT No (9)
5x1050Ø CULVERT EXISTING
CULVERTS (6) TO BE CONSTRUCTED AFTER STAGE 1
375 Ø RCP
132kV TRANSMISSION LINES
D1,R,20%
AFTER THE STAGE 1 ACCESS ROAD IS CONSTRUCTED STORMWATER WILL BE DIVERTED ALONG THE ACCESS ROAD
D1,G,20% TO BE CONSTRUCTED IN STAGE 2
DAM 1
EXISTING NATURAL STREAM BED
REDDALLS ROAD
GATEHOUSE AND WEIGHBRIDGE
OUTLET FOR GROUNDWATER (SEE 14892/008 FOR LOCATION AND 14892/007 FOR DETAILS)

CO-ORDINATES ARE BASED ON INTERGRATED SURVEY GRID (ISG) VALUES.

REV.	DATE	DESCRIPTION	DRAWN	P.D.
02	26.3.93	GENERAL REVISION		
01	5.11.92	GENERAL REVISION		

	METRES	NAME	SIGNATURE	DATE
QUALITY RECORD				
DRAFTER CHECK		A.MILFORD		
DESIGNER CHECK		E.MADEW		
PROJECT DIRECTOR APPROVAL		D.MACLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF.

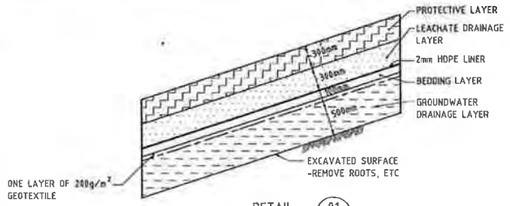
MAUNSELL PROPRIETARY LIMITED
A.C.N 004 848 824

CLIENT: THE CITY OF WOLLONGONG

PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: DRAINAGE PLAN ULTIMATE LANDFORM
DATE OF ISSUE: 26.3.93
SIZE: A0
CAD REFERENCE: PLAN3.DWG
DATE PLOTTED: 24.3.93
DWG No.: 14892-003
REV.: 02
DWG STATUS: DESIGN COMPLETE

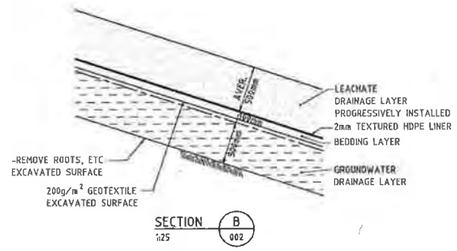
3 OF 9

1320 P331



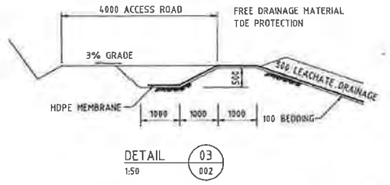
DETAIL 01 / 007
1:25

LINER SYSTEM DETAILS - FLAT SLOPES
IE: ≯ 1 IN 4



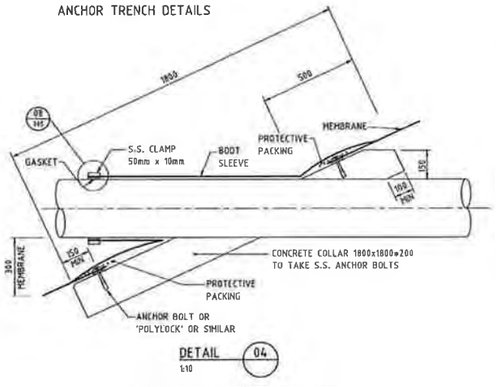
SECTION B / 002
1:25

LINER SYSTEM DETAILS - STEEP SLOPES
IE: 1 IN 4 OR STEEPER



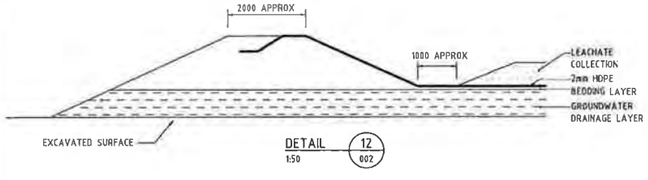
DETAIL 03 / 002
1:50

ANCHOR TRENCH DETAILS



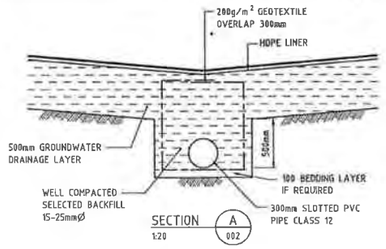
DETAIL 04 / 002
1:10

MEMBRANE/PIPE PENETRATION DETAIL



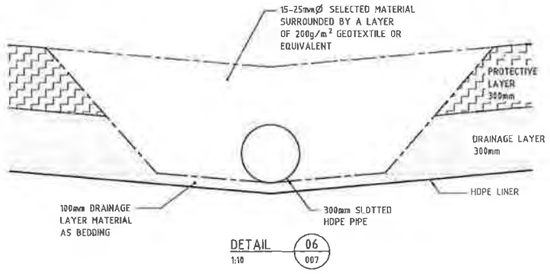
DETAIL 12 / 002
1:50

EDGE OF LINER DETAIL



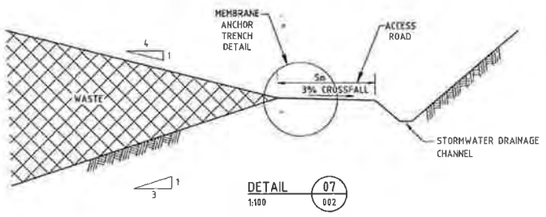
SECTION A / 002
1:20

GROUNDWATER DRAIN



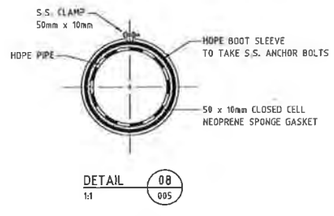
DETAIL 06 / 007
1:10

LEACHATE DRAIN DETAIL



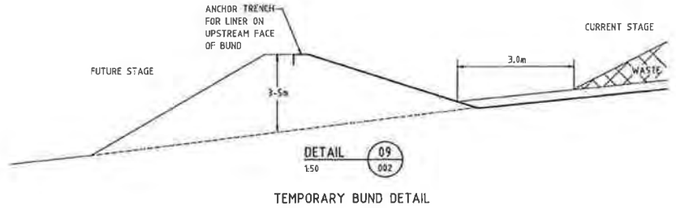
DETAIL 07 / 002
1:100

PERIMETER ACCESS ROAD



DETAIL 08 / 005
1:1

CLAMP DETAIL



DETAIL 09 / 002
1:50

TEMPORARY BUND DETAIL

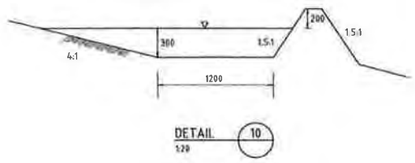
LEGEND

MATERIAL TYPES

- GROUNDWATER DRAINAGE
- BEDDING
- FREE DRAINING MATERIAL
- LEACHATE DRAINAGE
- PROTECTIVE LAYER
- VEGETATIVE LAYER
- CLAY LAYER

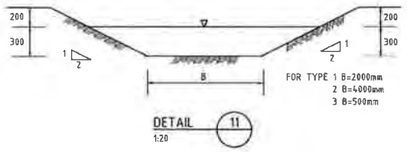
LINE TYPES

- TEXTURED 2mm HDPE LINE
- GEOTEXTILE
- LEACHATE PIPELINE
- GROUNDWATER PIPELINE



DETAIL 10 / 120
1:20

CONTOUR DRAIN DETAIL - TYPE 4



DETAIL 11 / 120
1:20

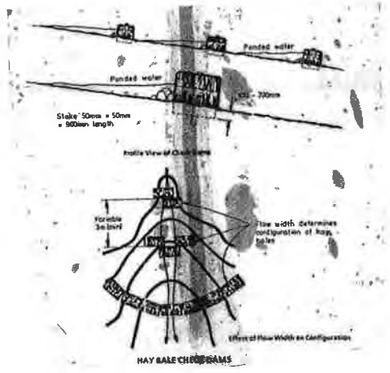
STORMWATER DRAIN DETAIL - TYPE 1,2 & 3

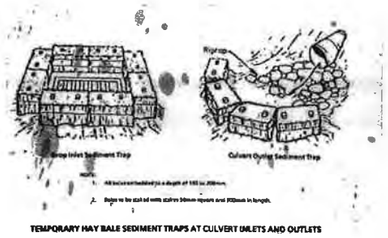
NOTE:
THESE LININGS FOR STORMWATER DRAINS
- RIP RAP
- GRASS
- JUTE

STORMWATER DRAIN DETAILS

CONSTRUCTION DETAIL NOTES

1. THESE DRAWINGS ARE NOT TO BE USED AS CONTRACT DRAWINGS AND ARE FOR THE USE OF WOLLONGONG CITY COUNCIL DAY LABOUR CONSTRUCTION.
2. LINER CONSTRUCTION DETAILS ARE PRELIMINARY TO GIVE INDICATION OF SCHEME OF WORKS AND TYPE OF DRAINAGE LAYERS REQUIRED.
3. FOR SPECIFICATION OF DRAINAGE LAYER SEE THE LANDFILL MANAGEMENT PLAN OR CONSULTANTS SPECIFICATION.
4. THE NEED FOR DAM 2 SHOULD BE EVALUATED AFTER DAM 1 HAS BEEN CONSTRUCTED.
5. THE VELOCITY ON THE SPILLWAY OF DAMS IS TO BE LIMITED TO 2m³/S





TEMPORARY HAY BALE SEDIMENT TRAPS AT CULVERT INLETS AND OUTLETS

TEMPORARY SOIL CONSERVATION WORKS FOR EASTERN GULLY

LINER & LEACHATE COLLECTION CONSTRUCTION DETAILS

1320 P331

REV	DATE	DESCRIPTION	DWN	APP
B2	16.2.93	GENERAL REVISION		
B1	3.11.93	GENERAL REVISION		

SCALE: AS SHOWN

	NAME	SIGNATURE	DATE
QUALITY POLICY			
DRAFTER CHECK	A.MILFORD		
DESIGNER CHECK	E.HADEV		
PROJECT DIRECTOR APPROVAL	D.McLEOD		

COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED AS CONFORMING WITH THE REQUIREMENTS OF THE CLIENT BRIEF

MAUNSELL PROPRIETARY LIMITED
A.C.N 004 848 884

CLIENT: THE CITY OF WOLLONGONG

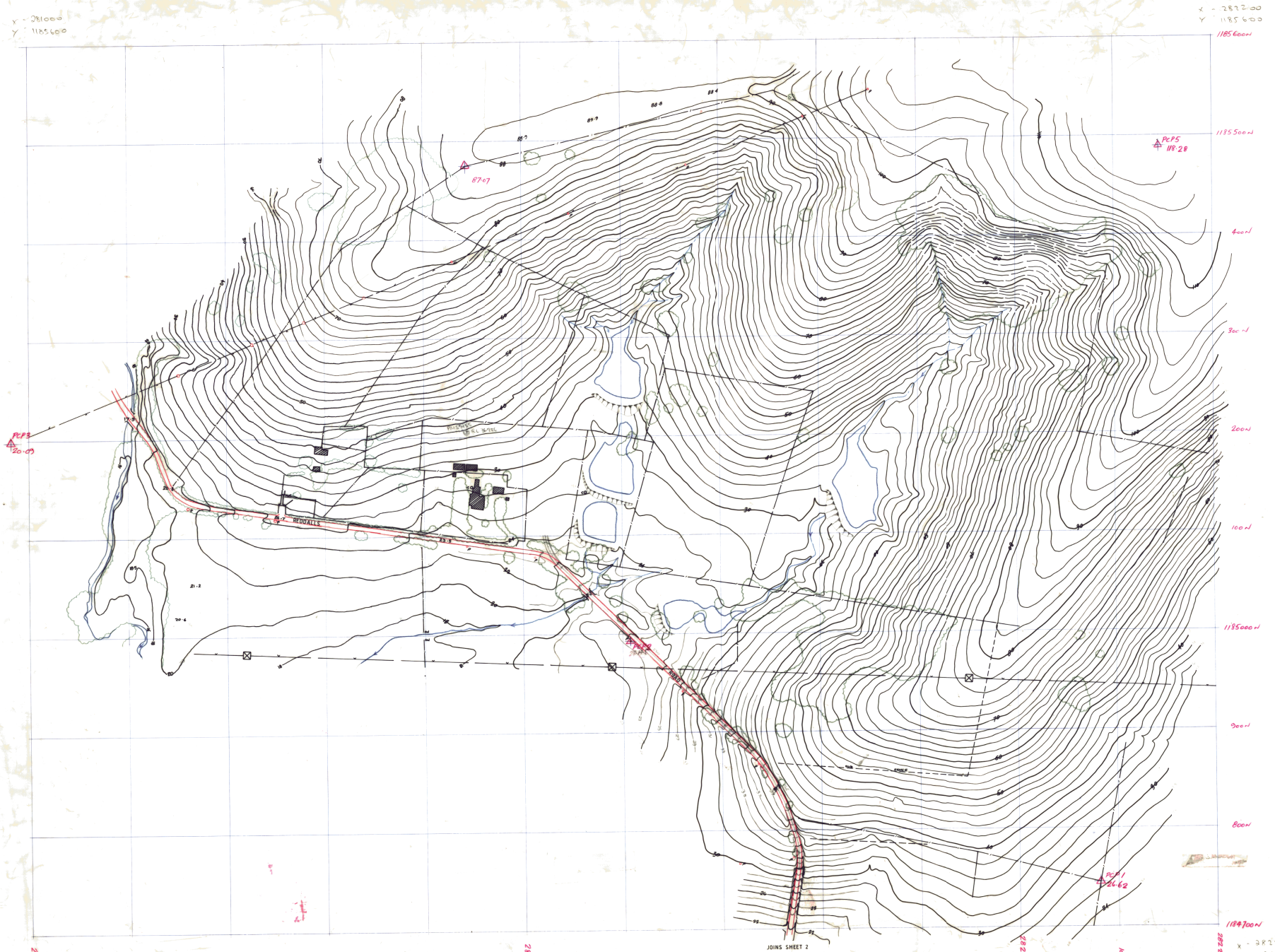
PROJECT TITLE: WHYTES GULLY LANDFILL
DRAWING TITLE: CONSTRUCTION DETAILS
DATE OF ISSUE: 16.2.93
SIZE: A0
CAD REFERENCE: PLAN95.DWG
DATE PLOTTED: 16.2.93
JOB No: 14892-005
REV: 02
SHEET No: 5 OF 9
STATUS: DESIGN COMPLETE

1320 SH5 P331

STAGE 1 (Approx. 15 year life)

P331/1

ULTIMATE LANDFORM AS FILLED



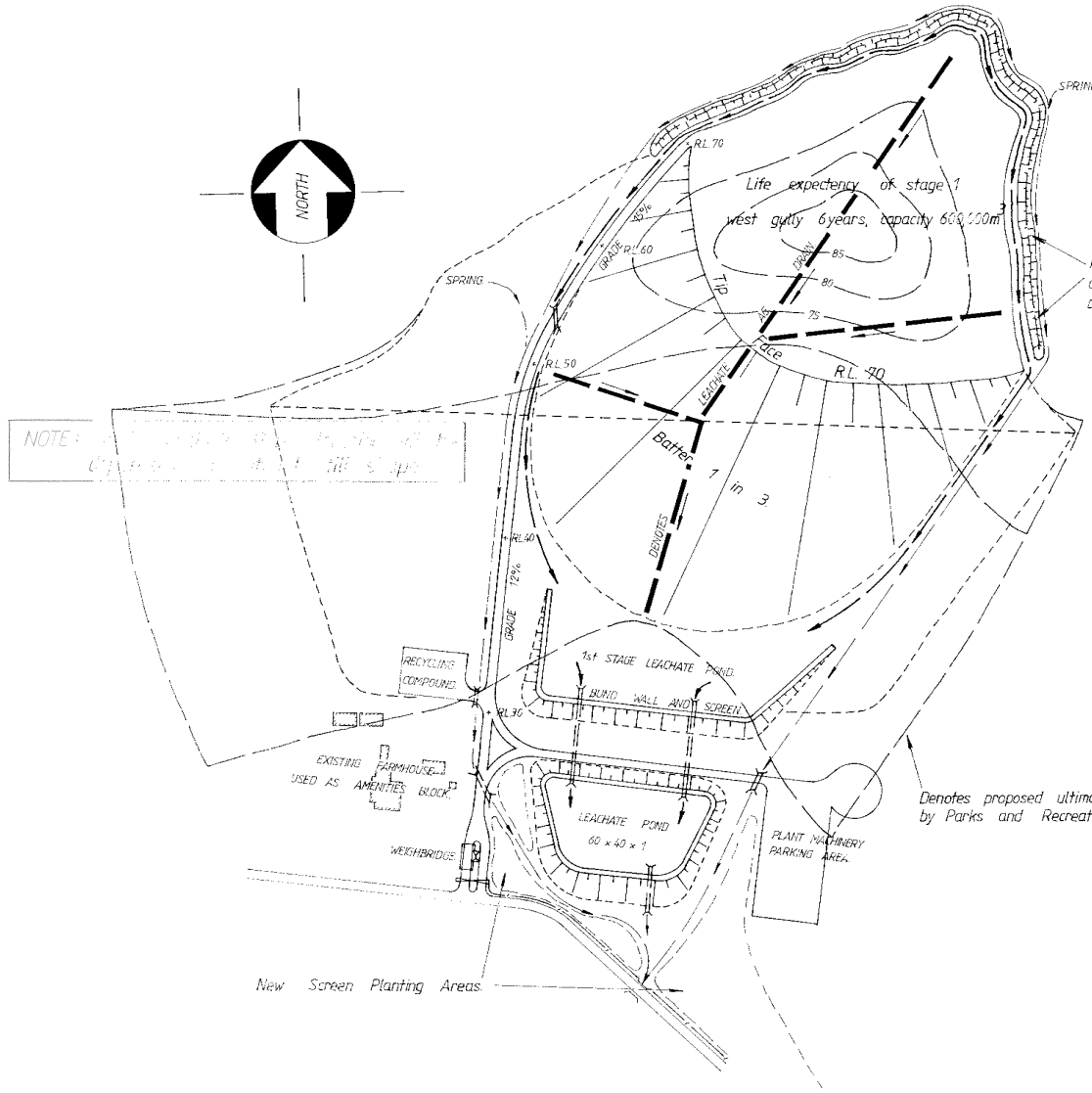
WHYTES GULLY - W. DAPTO RD.
1:1500
2M V.I.

SV01-1
P 331/2
Sheet 1 of 2

Total length of long Section = 1342.92

P 331/2-SV02-1
Sheet 2 of 2

WHYTES GULLY - W. DAPTO RD EXTN 1:1500



SCHEDULE OF ULTIMATE LANDFILL DETAILS.

VOLUME OF GARBAGE	1,115,000m^3
AREA OF GARBAGE	9·6ha
QUANTITY OF TOPSOIL TO BE STOCKPILED.	20,000m^3
QUANTITY OF POROUS MATERIAL STOCKPILED.	40,000m^3

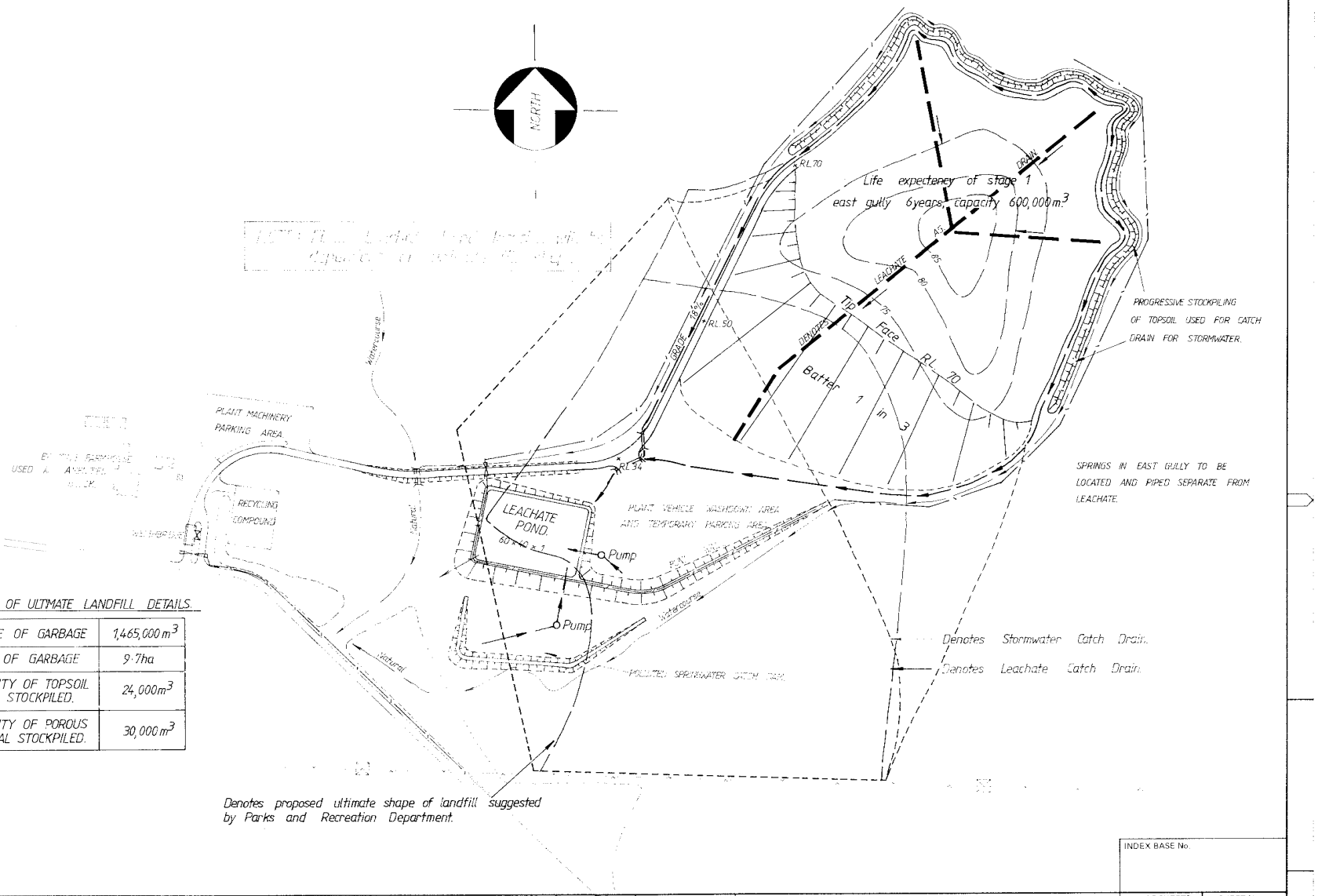
INDEX BASE No.

SCALES	FIELD INSPECTION DESIGN ENGINEER		COUNCIL APPROVAL	CITY OF WOLLONGONG	No. OF SHEETS	SHEET No.
1:1500	DATE		DATE		4	1
DATUM A.H.D. / SURVEYOR / DRAWN L.J. / DATE 8-82 / RELATED PLANS			MINUTE No.	WHYTES GULLY REFUSE SITE WEST GULLY STAGE 1 DEVELOPMENT GENERAL ARRANGEMENT. METHOD 1.	DRAWING No.	P331/3
FILE No. / BOOKS / CHECKED / DATE			CITY ENGINEER			
ESTIMATE No.	AMENDMENTS	D'MAN / DATE	DATE			

558x398mm

TRIMMING EDGE

A2



SCHEDULE OF ULTIMATE LANDFILL DETAILS.

VOLUME OF GARBAGE	1,465,000 m^3
AREA OF GARBAGE	9·7ha
QUANTITY OF TOPSOIL TO BE STOCKPILED.	24,000 m^3
QUANTITY OF POROUS MATERIAL STOCKPILED.	30,000 m^3

SCALES 1:1500

FIELD INSPECTION
DESIGN ENGINEER
DATE

DATUM	SURVEYOR	DRAWN	DATE	RELATED PLANS
A.H.D.		L.J.	8-82	
FILE No.	BOOKS	CHECKED	DATE	

ESTIMATE No. | AMENDMENTS | D'MAN | DATE

COUNCIL APPROVAL
DATE
MINUTE No.
CITY ENGINEER
DATE

CITY OF WOLLONGONG

WHYTES GULLY REFUSE SITE
EAST GULLY STAGE 1 DEVELOPMENT
GENERAL ARRANGEMENT.
METHOD 1.

INDEX BASE No.

No. OF SHEETS	SHEET No.
	2

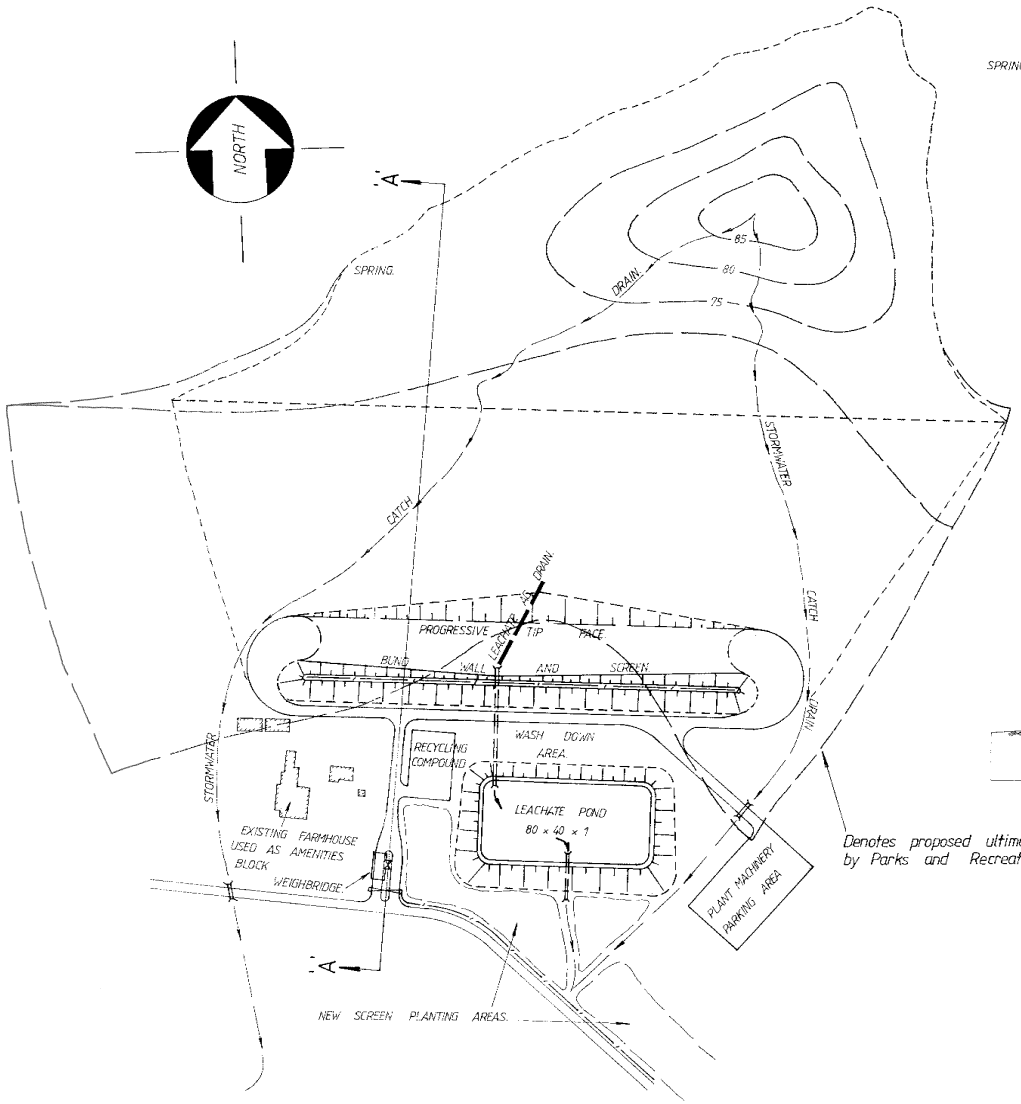
DRAWING No.

P331/3

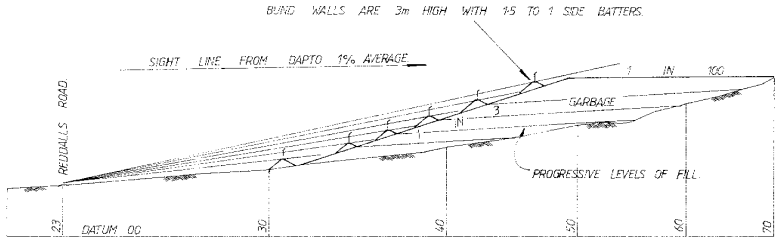
558x398mm

A2

TRIMMING EDGE



Denotes proposed ultimate shape of landfill suggested by Parks and Recreation Department.



SECTION 'A - A'

SCALE 1:1500 NATURAL

Denotes Stormwater Catch Drain.

Denotes Leachate Catch Drain.

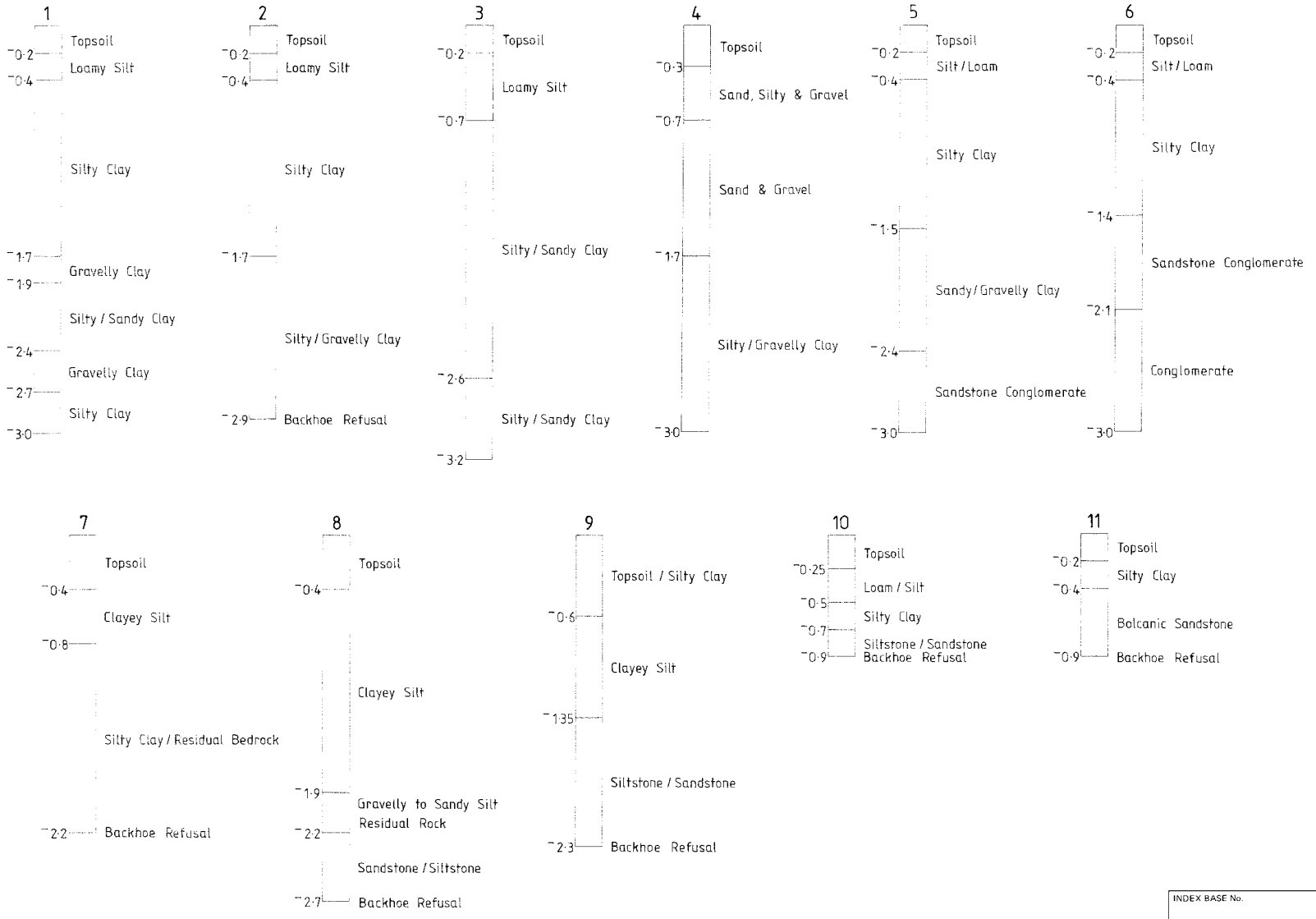
INDEX BASE No.

SCALES	FIELD INSPECTION DESIGN ENGINEER					COUNCIL APPROVAL	CITY OF WOLLONGONG	No. OF SHEETS	SHEET No.
1:1500	DATE					DATE		4	3
DATUM	SURVEYOR	DRAWN	DATE	RELATED PLANS		MINUTE No.	WHYTES GULLY REFUSE SITE WEST GULLY SIGHT SCREENING PROVISIONS FOR FILLING METHOD 2.	DRAWING No.	
A.H.D.		L.J.	8-82			CITY ENGINEER		P331/3	
FILE No.	BOOKS	CHECKED	DATE			DATE			
				ESTIMATE No.	AMENDMENTS	D'MAN DATE			

558×398mm

TRIMMING EDGE

A2



SCALES 1 : 20			FIELD INSPECTION DESIGN ENGINEER DATE					COUNCIL APPROVAL DATE MINUTE No. CITY ENGINEER DATE	INDEX BASE No.
DATUM	SURVEYOR	DRAWN S.A.B.	DATE 8/82	RELATED PLANS					No. OF SHEETS 4 / SHEET No. 4
FILE No.	BOOKS	CHECKED	DATE						DRAWING No. P 331/3
				ESTIMATE No.	AMENDMENTS	D'MAN	DATE		

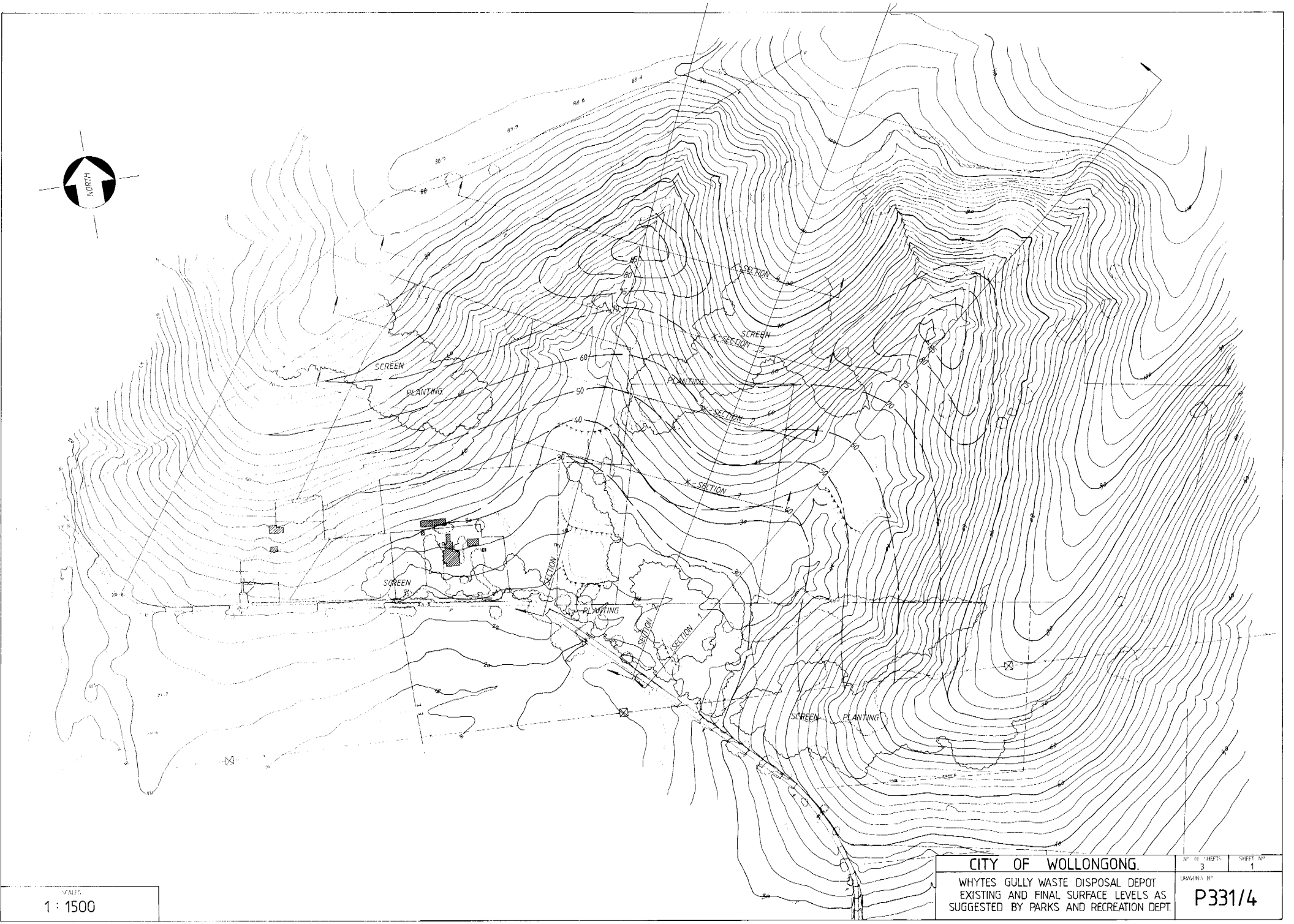
CITY OF WOLLONGONG

WHYTES GULLY REFUSE SITE
BORE HOLE DETAILS

558x398mm

A2

TRIMMING EDGE



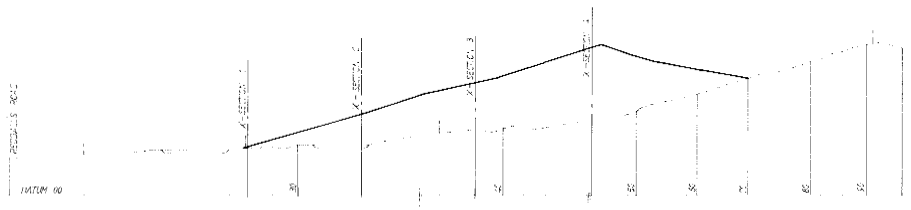
SCALES
1 : 1500

CITY OF WOLLONGONG.

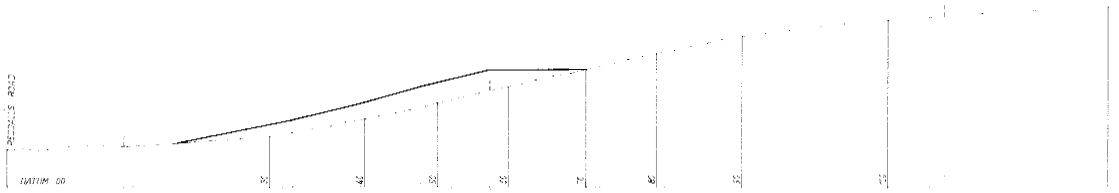
WHYTES GULLY WASTE DISPOSAL DEPOT
EXISTING AND FINAL SURFACE LEVELS AS
SUGGESTED BY PARKS AND RECREATION DEPT.

Nº OF SHEETS	SHEET Nº
3	1

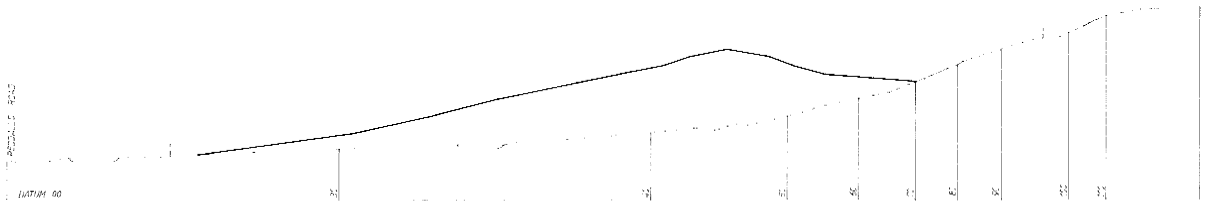
DRAWING Nº
P331/4



SECTION 3.



SECTION 2.



SECTION 1.

SCALES
1:1500 Nat.

INDEX PLAN No.

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL DEPOT
EXISTING AND FINAL SURFACE LEVELS AS
SUGGESTED BY PARKS AND RECREATION DEPT.

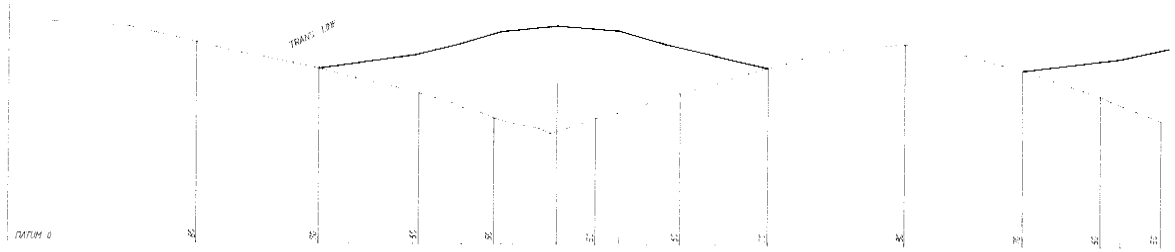
SHEETS 3 | SHEET No. 2

DRAWING No.
P331/4

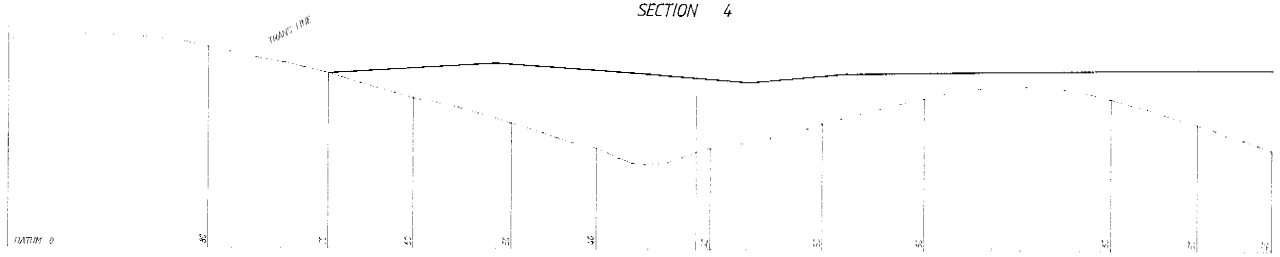
MAGX

A1/2

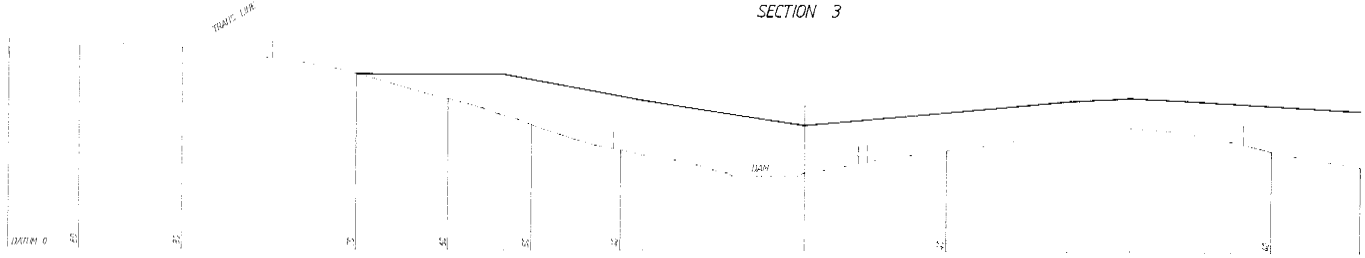
566 x 801mm
TRIMMING EDGE



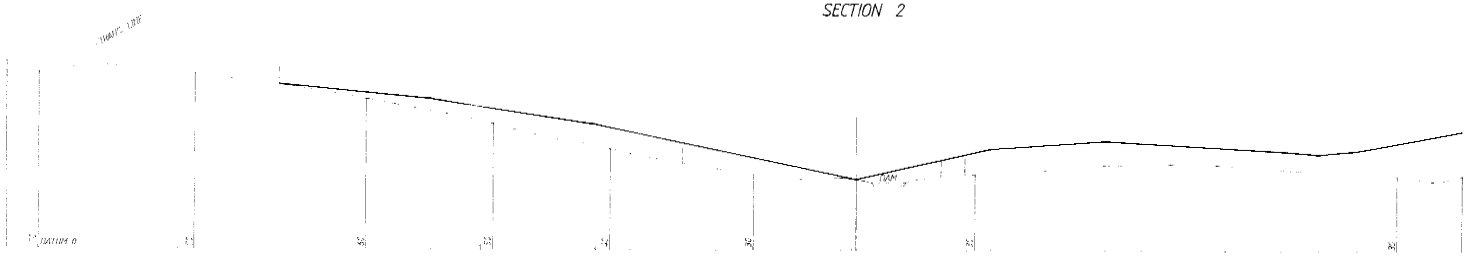
SECTION 4



SECTION 3



SECTION 2



SECTION 1

SCALES
1:1000 Nat.

INDEX BASE No.

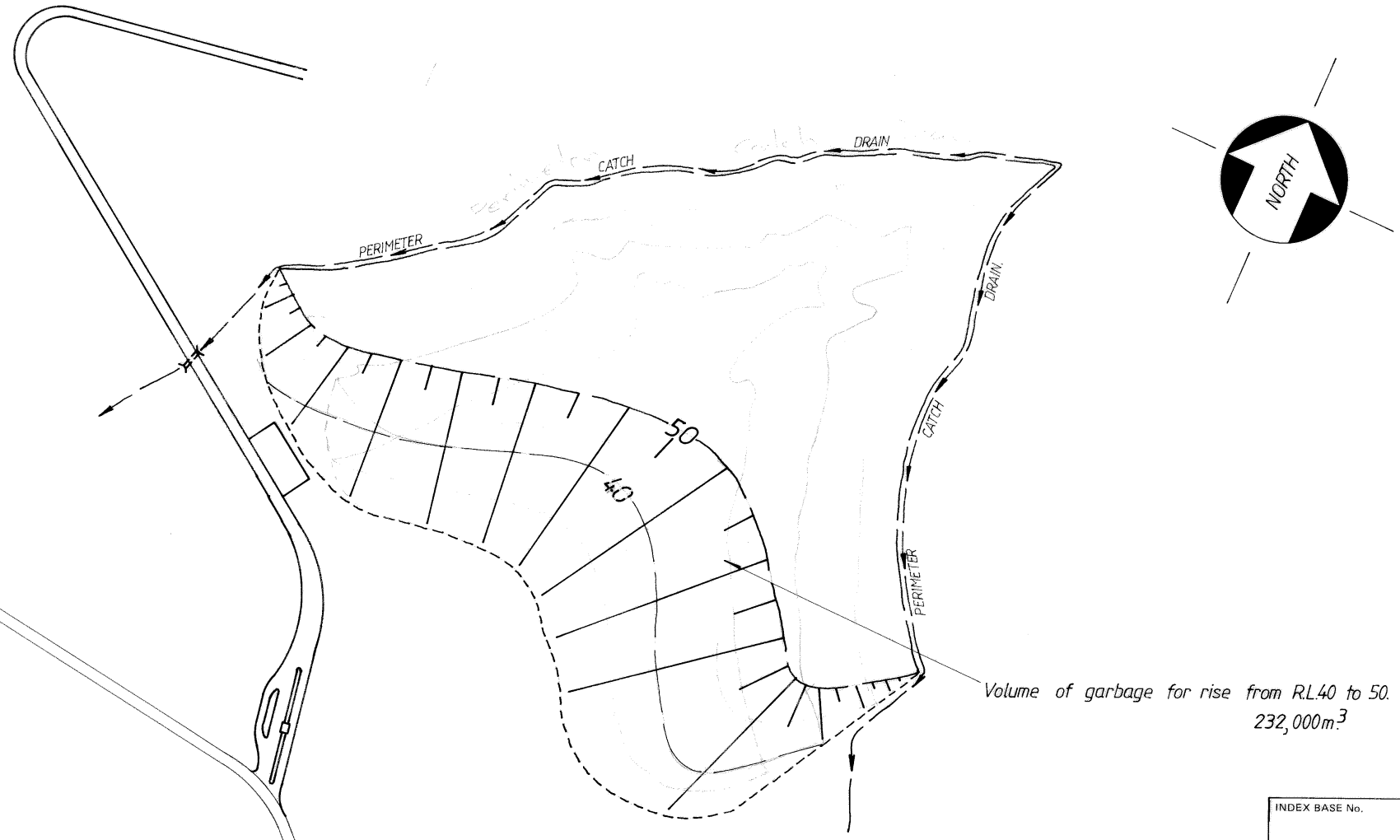
CITY OF WOLLONGONG

WHYTES GULLY
WASTE DESPOSAL DEPOT
CROSS-SECTIONS WEST GULLY.

DRAWING No.
P331/4

MAGX A1/2

566 x 801mm
TRIMMING EDGE

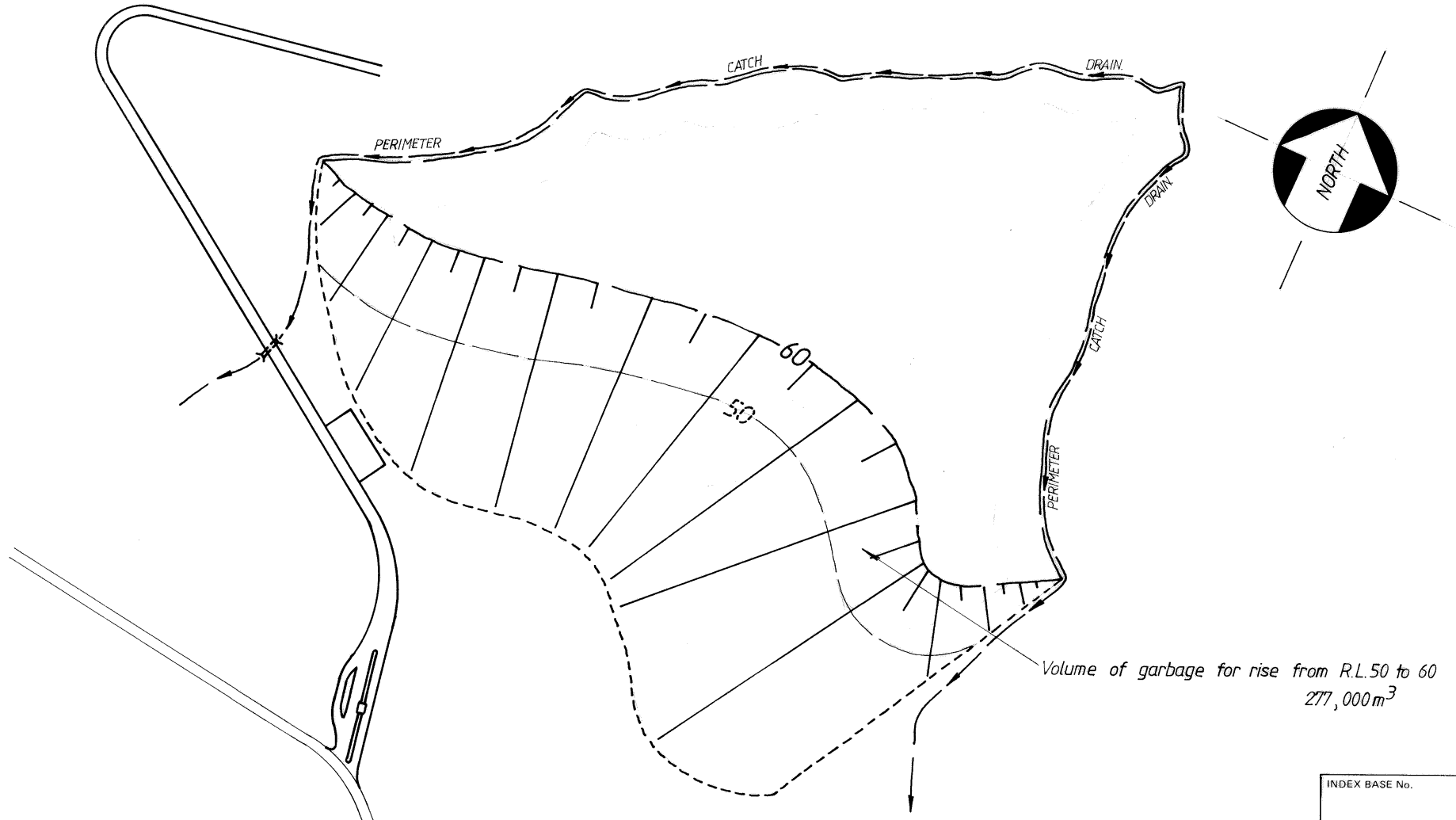


DATE COUNCILS APPROVAL	SCALE 1:1500	FILE No.	CITY OF WOLLONGONG	INDEX BASE No.
MINUTE No.	DRAWN L. J.	DATE 11-10-82		No. OF SHEETS 4 / SHEET No. 1
CITY ENGINEER	CHECKED	DATE	WHYTES GULLY PROGRESSIVE FILL OVERLAY.	DRAWING No. P331/5
DATE	RELATED PLANS P331/5	ESTIMATE No.		

394 x 283mm

TRIMMING EDGE

A3



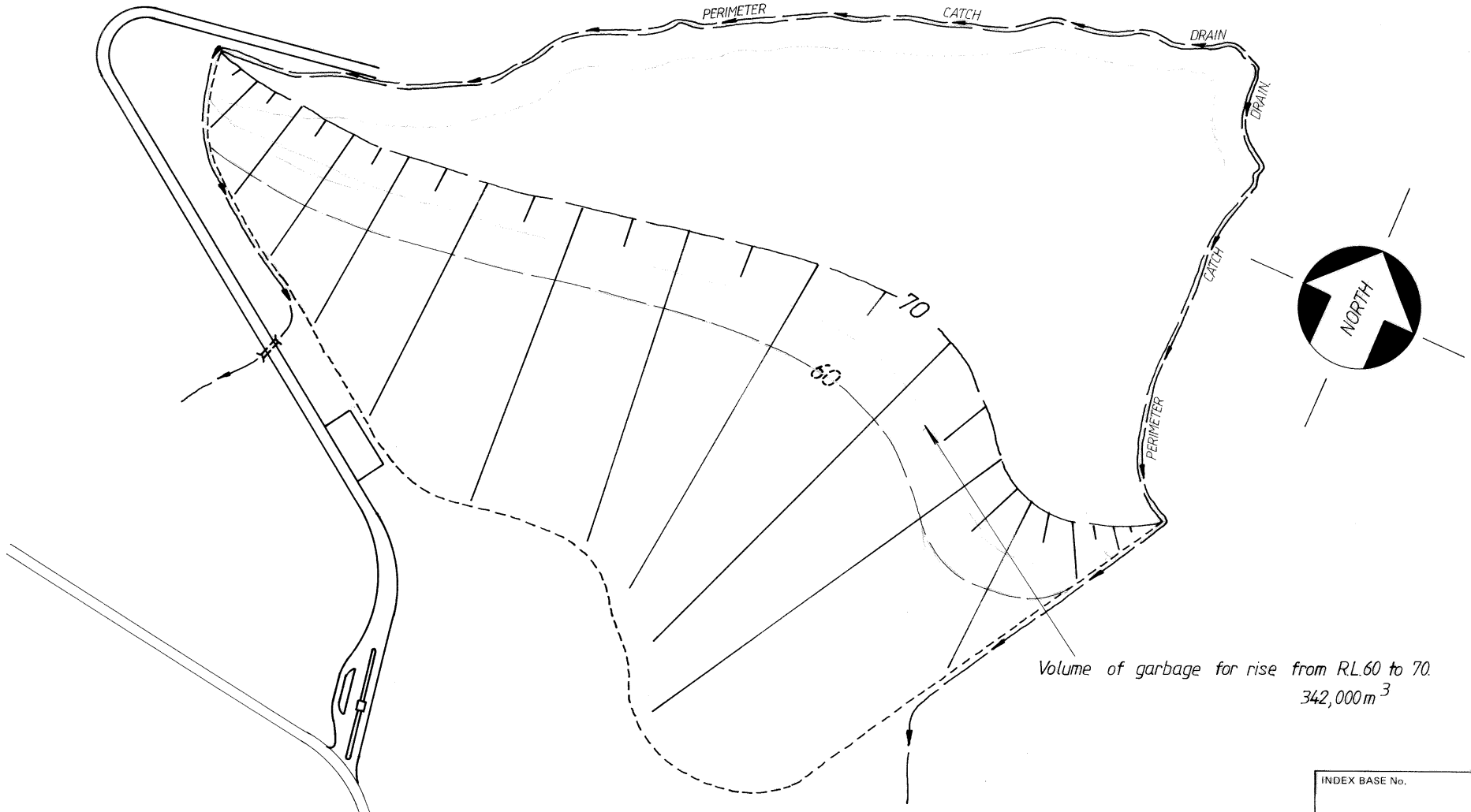
DATE COUNCILS APPROVAL	SCALE 1:1500	FILE No.	CITY OF WOLLONGONG
MINUTE No.	DRAWN L.J.	DATE 11-10-82	WHYTES GULLY PROGRESSIVE FILL OVERLAY.
CITY ENGINEER	CHECKED	DATE	
DATE	RELATED PLANS P331/5	ESTIMATE No.	

INDEX BASE No.	
No. OF SHEETS 4	SHEET No. 2
DRAWING No.	P331/5

394 x 283mm

TRIMMING EDGE

A3



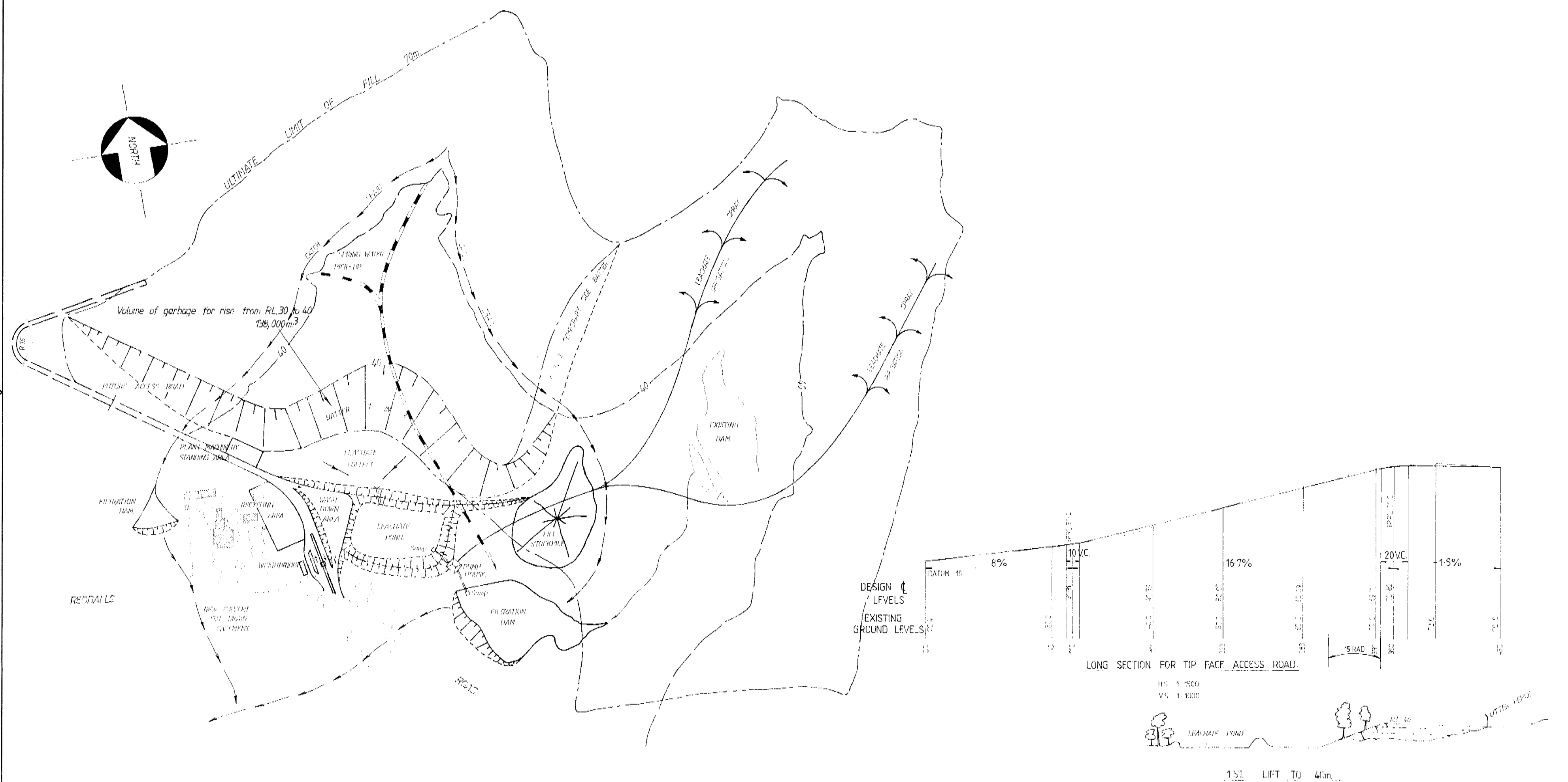
DATE COUNCILS APPROVAL	SCALE 1:1500	FILE No.	CITY OF WOLLONGONG
MINUTE No.	DRAWN L.J.	DATE 11-10-82	
CITY ENGINEER	CHECKED	DATE	WHYTES GULLY PROGRESSIVE FILL OVERLAY.
DATE	RELATED PLANS P331/5	ESTIMATE No.	

INDEX BASE No.	
No. OF SHEETS 4	SHEET No. 3
DRAWING No.	P331/5

394 x 283mm

A3

TRIMMING EDGE



ESTIMATE 1137 (Prelim only.)

CITY OF WOLLONGONG

No. OF SHEETS 4 | SHEET No. 4

WHYTES GULLY
OPERATIONS DIAGRAM
FOR WEST GULLY.

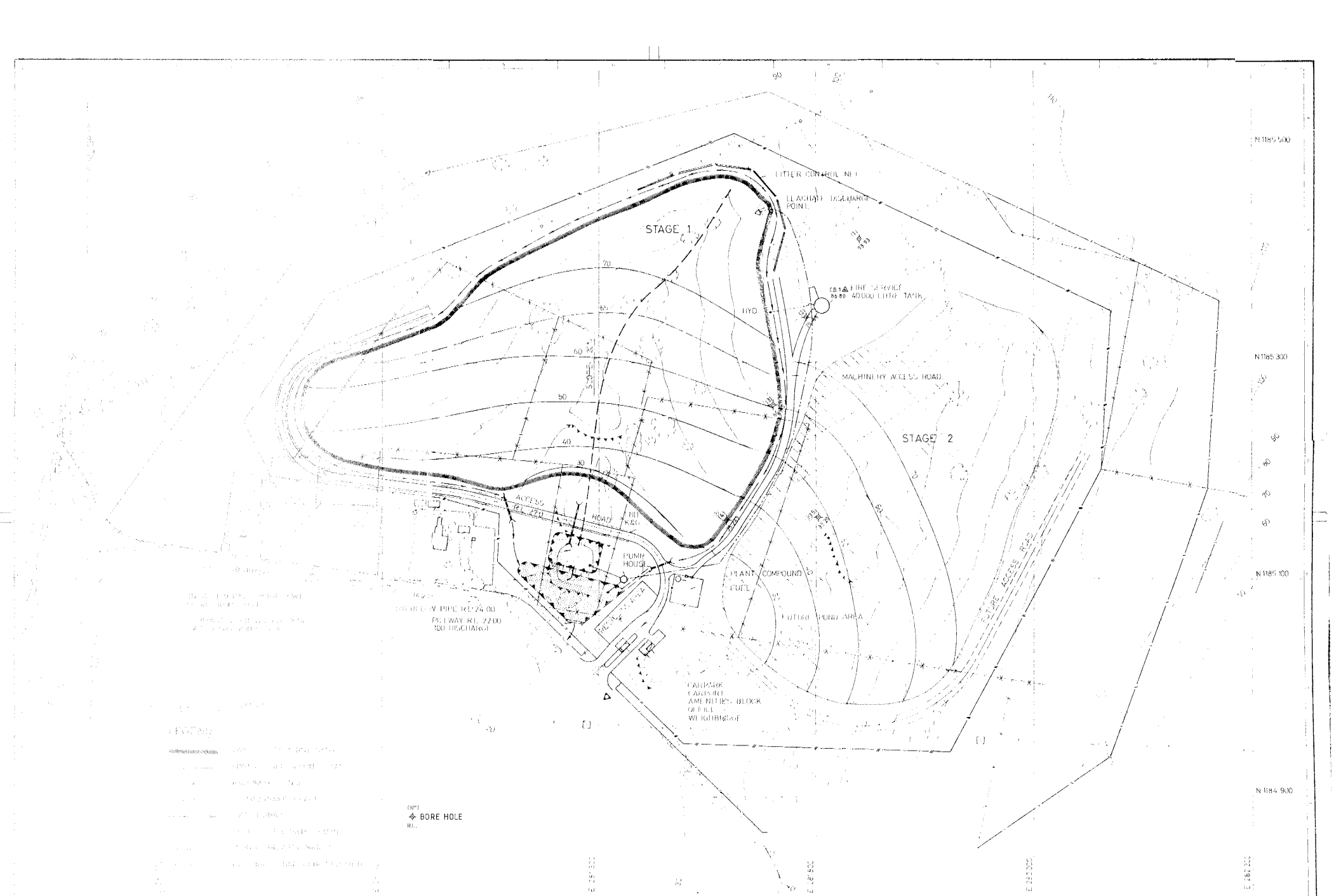
DRAWING No. P331/5

INDEX BASE No.

SCALES 1:1500

MAGX A1/2

TRIMMING EDGE



BORE HOLES 14/2/91
SURVEYOR: B. HOGAN
BOOK N°: L91/1

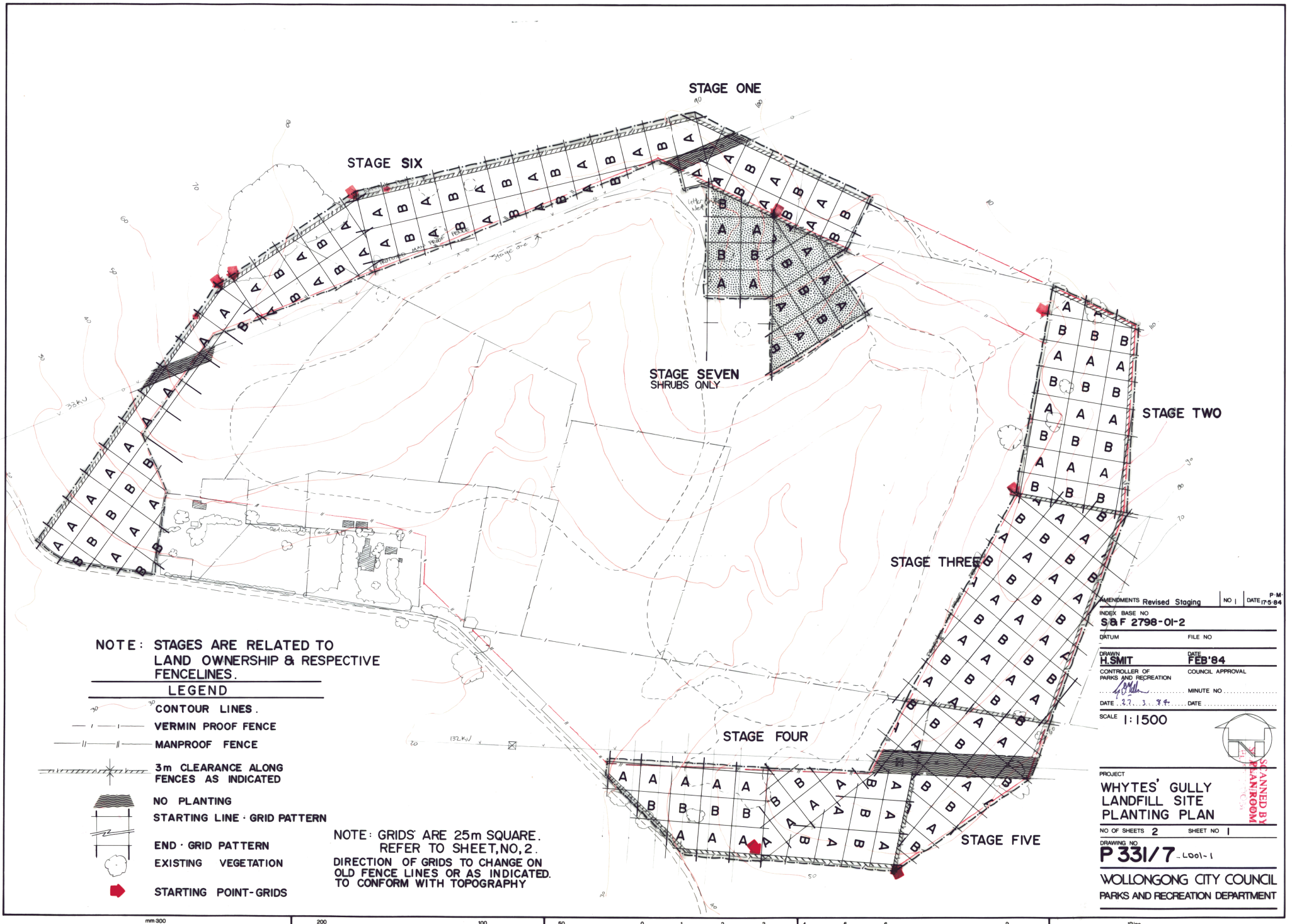
SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON
SCOTT & FURPHY CONSULTING GROUP

1:1500
DRAWN: S.H.
TRACED: D.G.

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
GENERAL LAYOUT PLAN

P331/6



NOTE: STAGES ARE RELATED TO LAND OWNERSHIP & RESPECTIVE FENCELINES.

LEGEND

- CONTOUR LINES.
- VERMIN PROOF FENCE
- MANPROOF FENCE
- 3m CLEARANCE ALONG FENCES AS INDICATED
- NO PLANTING
- STARTING LINE · GRID PATTERN
- END · GRID PATTERN
- EXISTING VEGETATION
- STARTING POINT-GRIDS

NOTE: GRIDS ARE 25m SQUARE. REFER TO SHEET, NO, 2.
DIRECTION OF GRIDS TO CHANGE ON OLD FENCE LINES OR AS INDICATED. TO CONFORM WITH TOPOGRAPHY

AMENDMENTS Revised Staging | NO 1 | DATE 17-5-84 P.M.

INDEX BASE NO S&F 2798-01-2

DATUM | FILE NO

DRAWN H.SMIT | DATE FEB'84

CONTROLLER OF PARKS AND RECREATION | COUNCIL APPROVAL

MINUTE NO

DATE 27.3.84 | DATE

SCALE 1:1500

PROJECT
WHYTES' GULLY LANDFILL SITE PLANTING PLAN

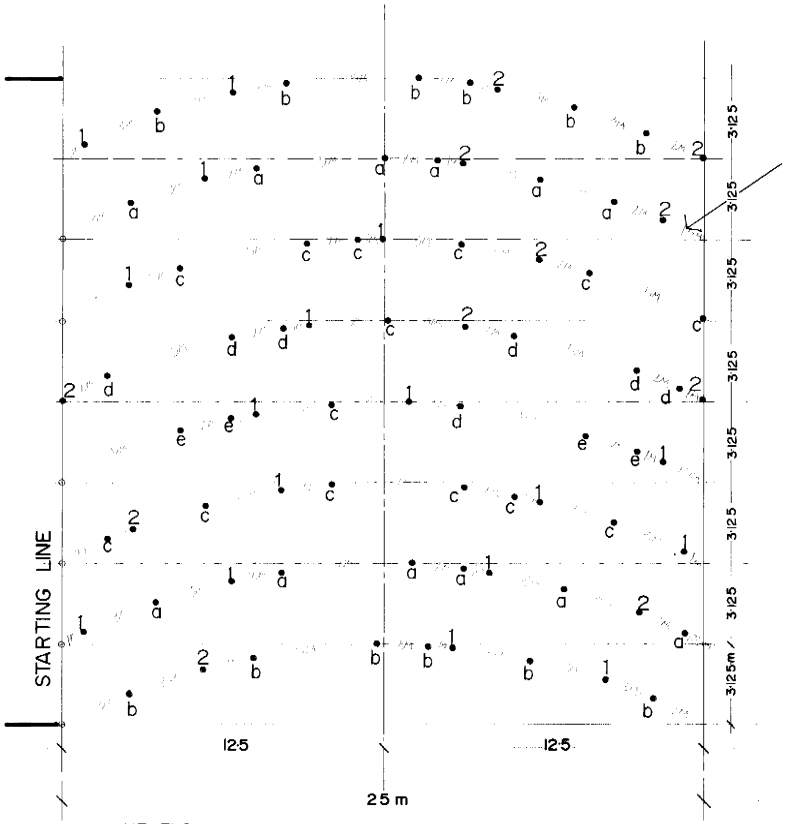
NO OF SHEETS 2 | SHEET NO 1

DRAWING NO P 331/7 - L001-1

WOLLONGONG CITY COUNCIL
PARKS AND RECREATION DEPARTMENT

mm 300 200 100 50 0 1 2 3 4 5 6 9 12ins

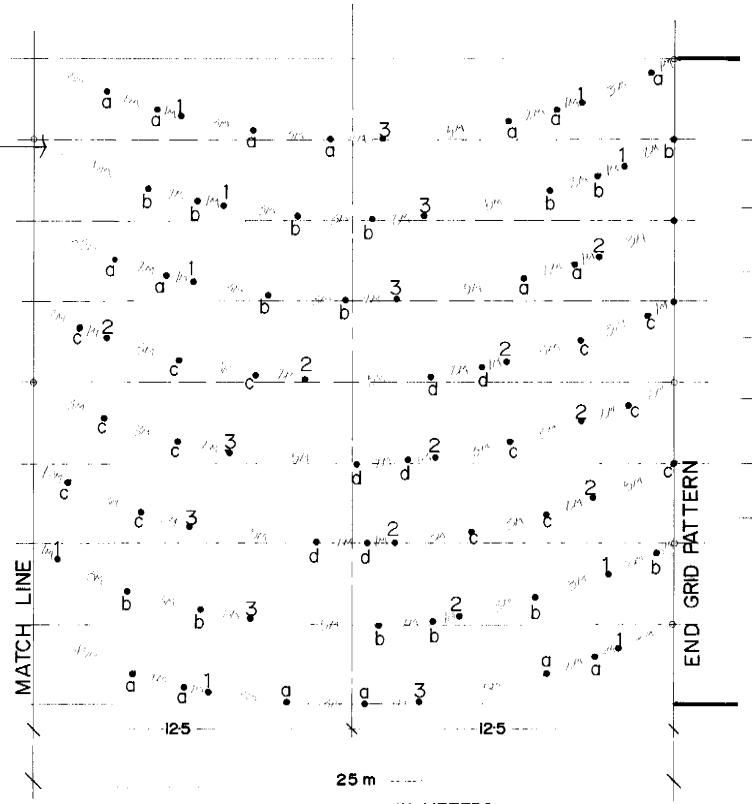
A1



IN METERS - ·1·3·3·2·5·2· PATTERN FOR SPACING PLANTS ALONG RIP LINES

GRID-A

KEY			NUMBER
1	EUCALYPTUS	tereticornis	17
2	EUCALYPTUS	sieberi	11
a	ACACIA	binervata	12
b	ACACIA	mearnsii	12
c	CALLISTEMON	salignus	14
d	DODONAEA	triquetra	7
e	BACKHOUSIA	myrtifolia	4
		GRID-A TOTAL	77



GRID-B

IN METERS ·1·3·3·2·5·2·

KEY			NUMBER
1	EUCALYPTUS	tereticornis	9
2	EUCALYPTUS	quadrangulata	9
3	MELALEUCA	styphelioides	7
a	ACACIA	binervata	17
b	ACACIA	mearnsii	15
c	ACACIA	implexa	14
d	ACMENA	smithii	7
		GRID-B TOTAL	78

AMENDMENTS	NO	DATE
INDEX BASE NO		
DATUM	FILE NO	
DRAWN H.SMIT.	DATE FEB '84	
CONTROLLER OF PARKS AND RECREATION	COUNCIL APPROVAL	
	MINUTE NO	
DATE 29.3.84	DATE	
SCALE 1:200		

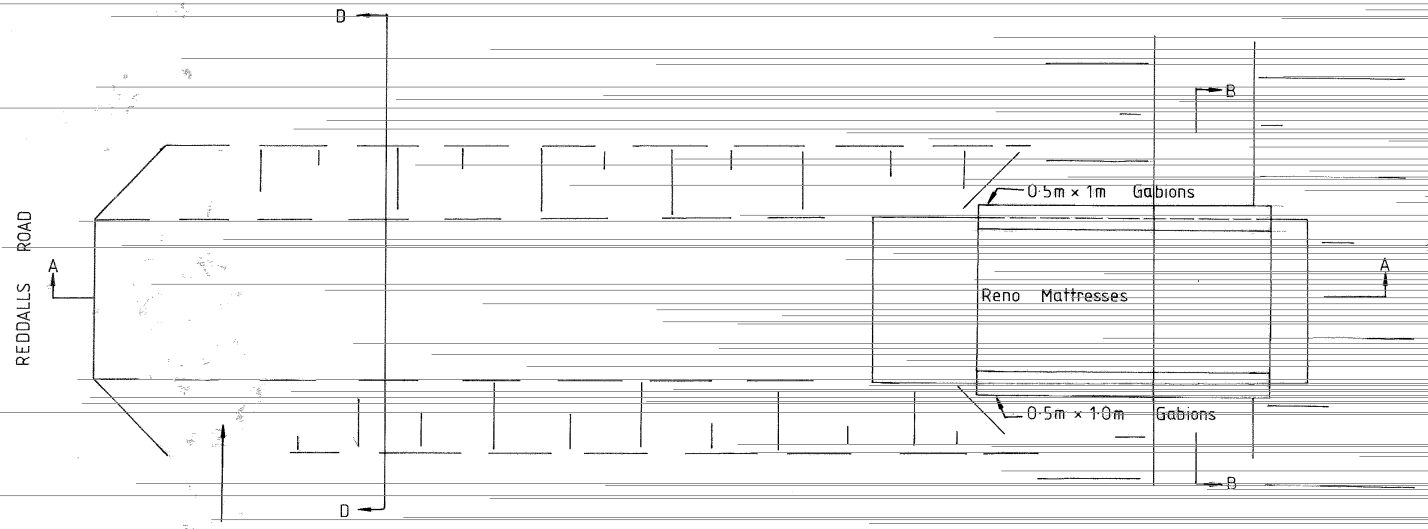
PROJECT
WHYTES GULLY
LANDFILL SITE
LANDSCAPE PLAN

NO OF SHEETS 2 SHEET NO 2

DRAWING NO
P331/7

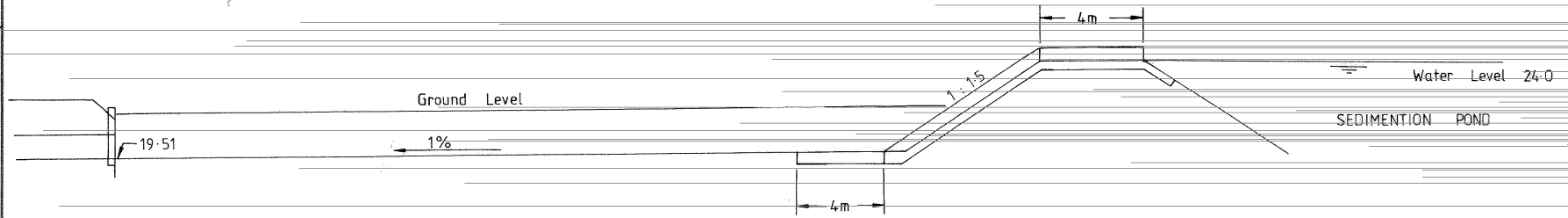
WOLLONGONG CITY COUNCIL
PARKS AND RECREATION DEPARTMENT

A1

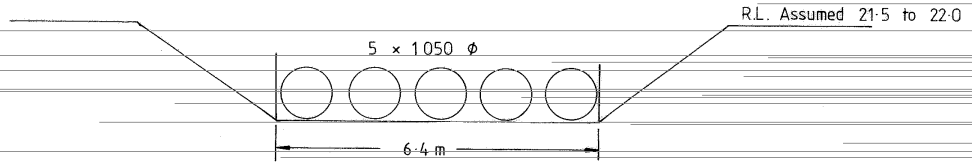


Spillway - Gabions
Section B-B

Grass Channel From Spillway To Pipe Culvert.



Section A-A



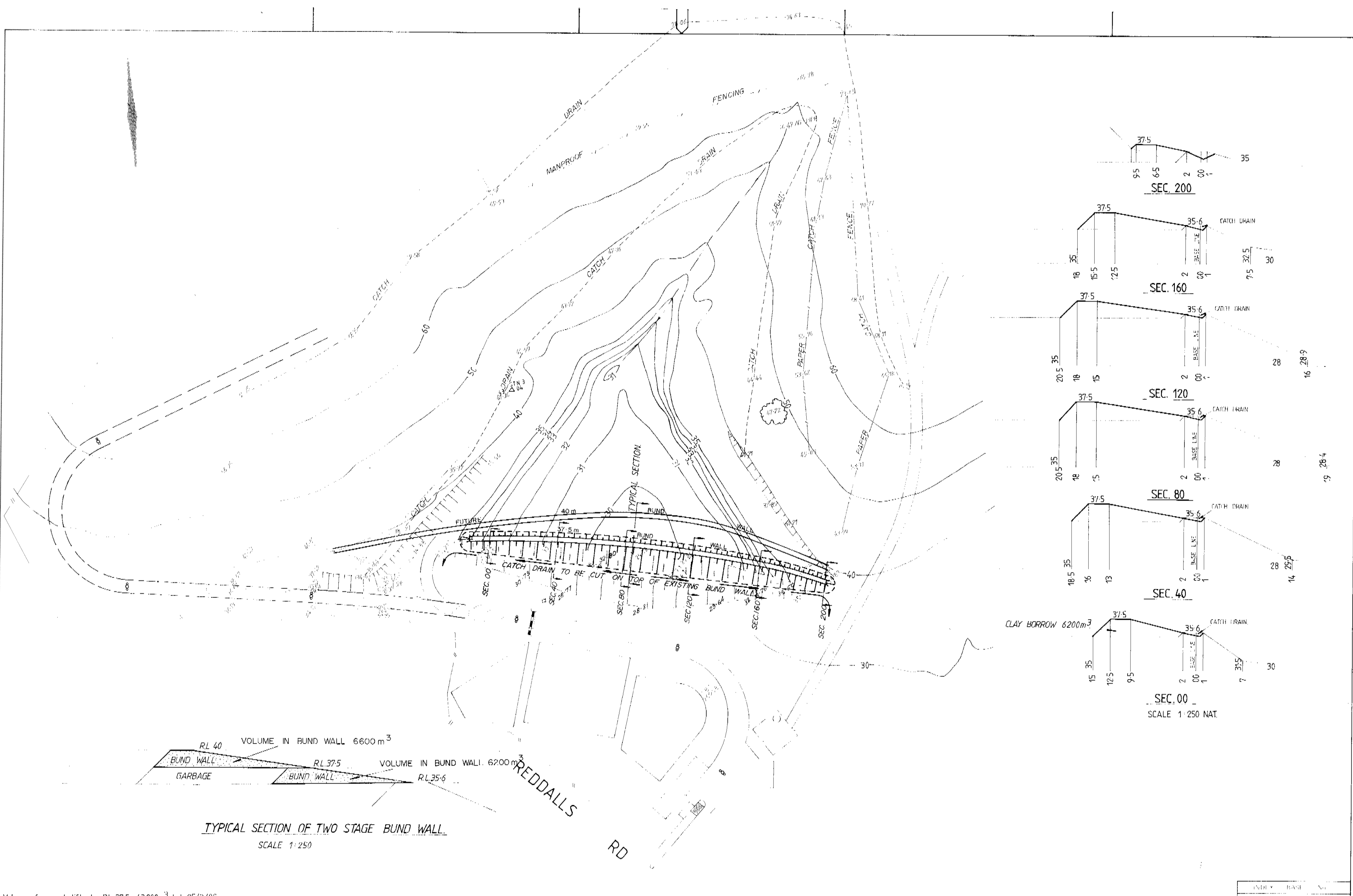
Section D-D

DATE COUNCILS APPROVAL	SCALE N.S	FILE No.	CITY OF WOLLONGONG	INDEX BASE No. / No. OF SHEETS / SHEET No.
MINUTE No.	DRAWN S.A.D.	DATE 7/84		DRAWING No.
CITY ENGINEER	CHECKED	DATE	Sketch of Proposed Spillway & Grassed Channel Whyte's Gully Land Fill	P331/9
DATE	RELATED PLANS	ESTIMATE No.		

394x283mm

RIMMING EDGE

A3



Volume of second lift to RL 37.5 = 43800 m³ L.J. 25/3/85

STARTING DATE OF TIP 24-10-84

PLAN / LONG. SECTION	SCALES 1:1000				
DATUM A.H.D.	SURVEYOR R. MORRIS	DRAWN L.J.	DATE 3/85	DESIGNED	DATE
FILE No. G 130/1/12	BOOKS RM 3/84	CHECKED	DATE		

RELATED PLANS

1319/1 — ESTIMATE No.

22-3-85 — DATE

AMENDMENTS

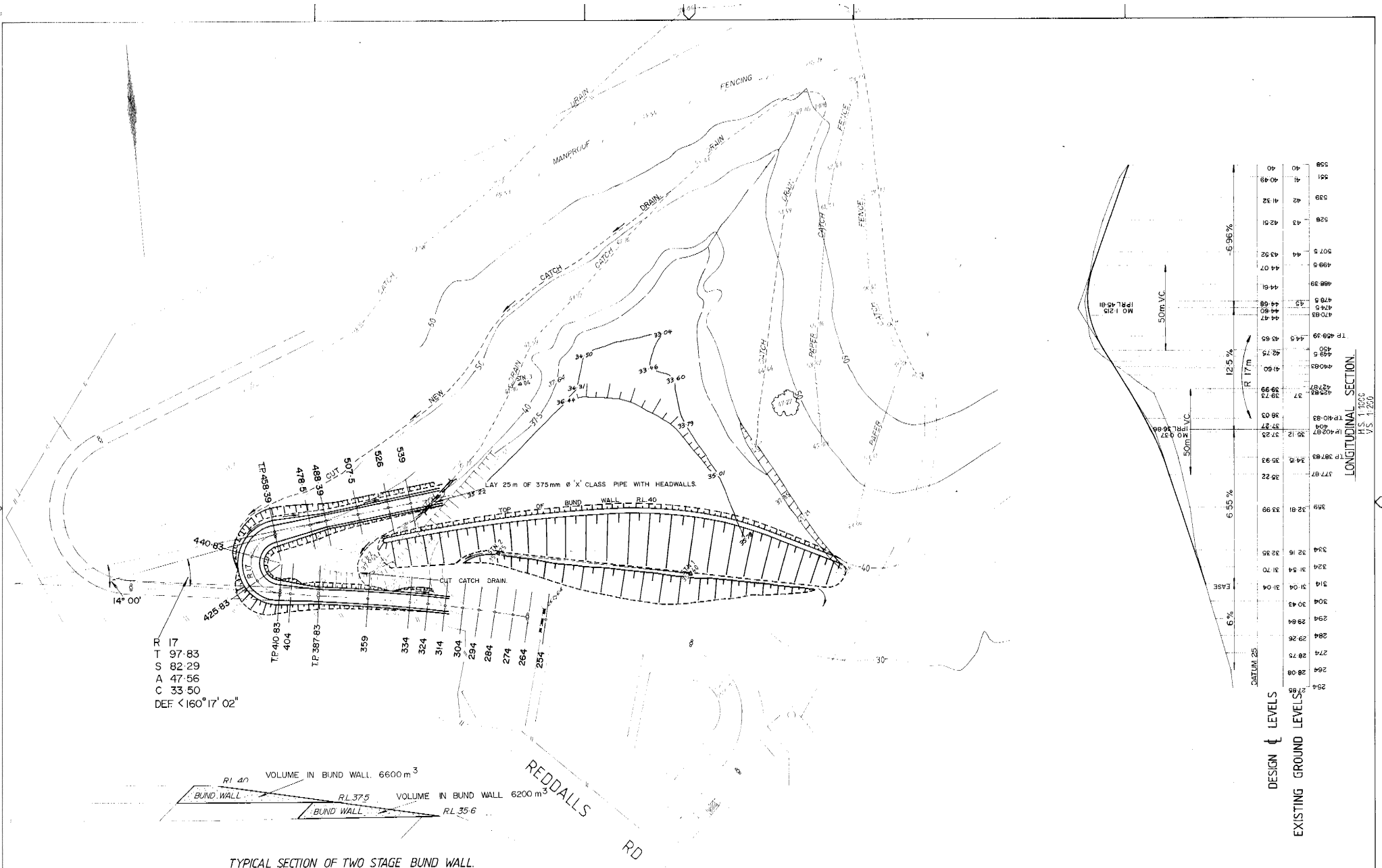
CITY OF WOLLONGONG

WHYTES GULLY
ASSOCIATED WORKS TO LIFT RL37.5

SHEET 1 OF 1

DRAWING No. P 331/10/1

MAGX A1



TYPICAL SECTION OF TWO STAGE BUND WALL.

SCALE 1:250

Volume of lift to R.L 40 - 41,500 m³ L.J. 19/4/85
Volume of second lift to R.L 37.5 - 43,800 m³ L.J. 25/3/85 — —VOLUMES OF GARBAGE.
Volume of first lift to R.L 35 - 41,270 m³ M.J.T. 21.6.84

Levels marked thus 33·79 indicate limit of garbage fill.

STARTING DATE OF TIP 24-10-84

PLAN	1:1000	HORIZ	1:1000				
LONG	1:200	VERT					
DR	L.J.	19.4.84	L.J.	19.4.84			
CHK							
APP							

1319

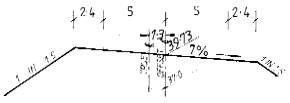
CITY OF WOLLONGONG

WHYTES GULLY ACCESS ROAD
TO TIP FACE TO SUIT LIFT R.L.40
PLAN AND LONG. SECTION.

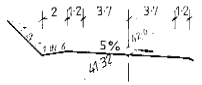
DRAWING NO. P 331/10/2

MAGX A1

314

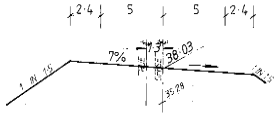


425·83

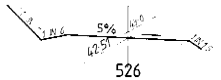


539

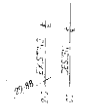
304



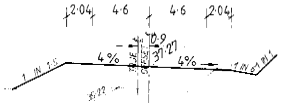
T.P. 410·83



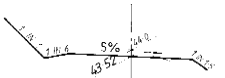
526



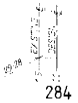
294



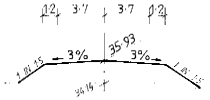
404



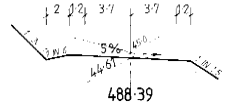
507·5



284

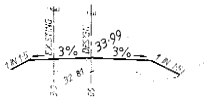


387·83



488·39

274



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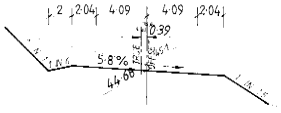
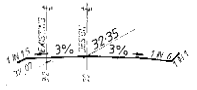


478·5

264



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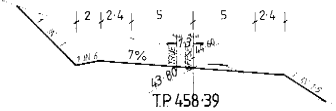
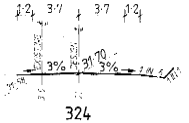


T.P 458·39

254



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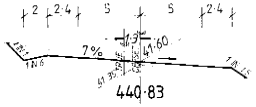


440·83

INDEX	BASE	No.

CITY OF WOLLONGONG

WHYTES GULLY
ACCESS ROAD TO TIP FACE TO
SUIT LIFT R.L.40. CROSS SECTIONS

No. OF SHEETS	SHEET No.
2	2

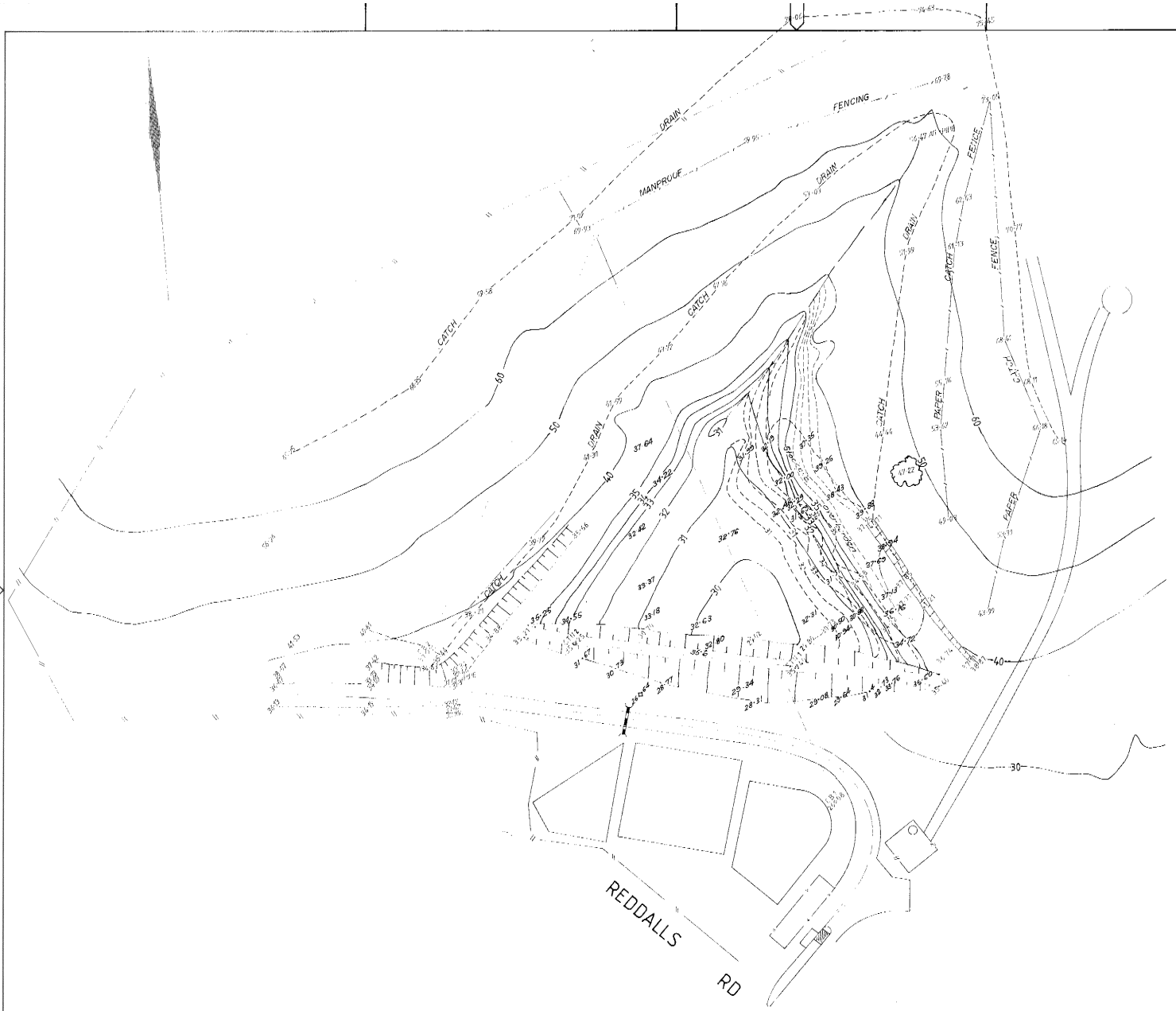
DRAWING No.
P 331/10/2

SCALES
1:200 Nat.

566 x 801mm

TRIMMING EDGE

MAGX A1/2



Volume of first lift to R.L. 35 = 41,270 m³ MAX 20 m

STARTING DATE OF TIP 24-10-84

PLAN / LONG. SECTION	SCALES: 1:1000 HORIZ. / VERT.	FIELD INSPECTION DESIGN ENGINEER / DATE									COUNCIL APPROVAL DATE / MINUTE No. / CITY ENGINEER / DATE	**CITY OF WOLLONGONG**	INDEX	BASE	No.
DATUM A.H.D.	SURVEYOR R. MORRIS	DRAWN	DATE	DESIGNED	DATE	RELATED PLANS	ESTIMATE Nos	DATE	AMENDMENTS	D'MAN	DATE		SHEET No.	SHEETS	
FILE No. G 130/1/32	BOOKS RM 3/84	CHECKED	DATE										DRAWING No. P 331/10		

MAGX A1

666 x 801mm

TRIMMING EDGE

Volume

STARTING DATE OF TIP 24-10-84

CITY OF WOLLONGONG

PLAN
LONG
DATUM AHD
FILE No. G 130/1142

AMENDMENTS

DRAWING No. P 331/10

MAGX A1

566 x 801

TRIMMING EDGE

PLANT SCHEDULE

Am	Acacia mearnsii	269		
Ab	Acacia binervata	164		
Ad	Acacia decurrens	44		
As	Acmena smithii	47		
Cg	Casuarina glauca	260		
Cn	Casuarina nana	100		
Cm	Callistemon macropuntatus	35		
Ee	Eucalyptus eugenioides	107		
Et	Eucalyptus tereticornis	31		
Ep	Eucalyptus pilularis	25		
Lp	Leptospermum petersonii	17		
Ml	Melaleuca linariifolia	92		
Ms	Melaleuca styphelioides	99		
Rs	Rhagodia spinescens var. deltophylla	100		

ALTERNATIVE SPECIES

Am	Acacia elata	38
	Acacia spectabilis	60
	Pittosporum phillyraoides	87
	Eucalyptus leucoxylon	69
Ab	Hakea eriantha	70
	Acacia melanoxylon	35
	Acacia floribunda	47
Ad	Acacia melanoxylon	17
	Acacia decurrens	27
Cg	Casurina glauca	112
Et	Westringia 'Wynyabbie Gem'	100
	Melaleuca laterita	35
Ee	Eucalyptus tereticornis	107
	Eucalyptus eugenioides	31

NOTE: adjust plants to suit site conditions

AMENDMENTS	NO	DATE
INDEX BASE NO		
DATUM	FILE NO	
DRAWN	DATE	
CONTROLLER OF PARKS AND RECREATION	COUNCIL APPROVAL	
	MINUTE NO	
DATE	DATE	
SCALE		

PROJECT

WHYTES GULLY

PLANTING OF MAIN ENTRANCE AMENITY BLOCK & BATTERS

NO OF SHEETS | SHEET NO

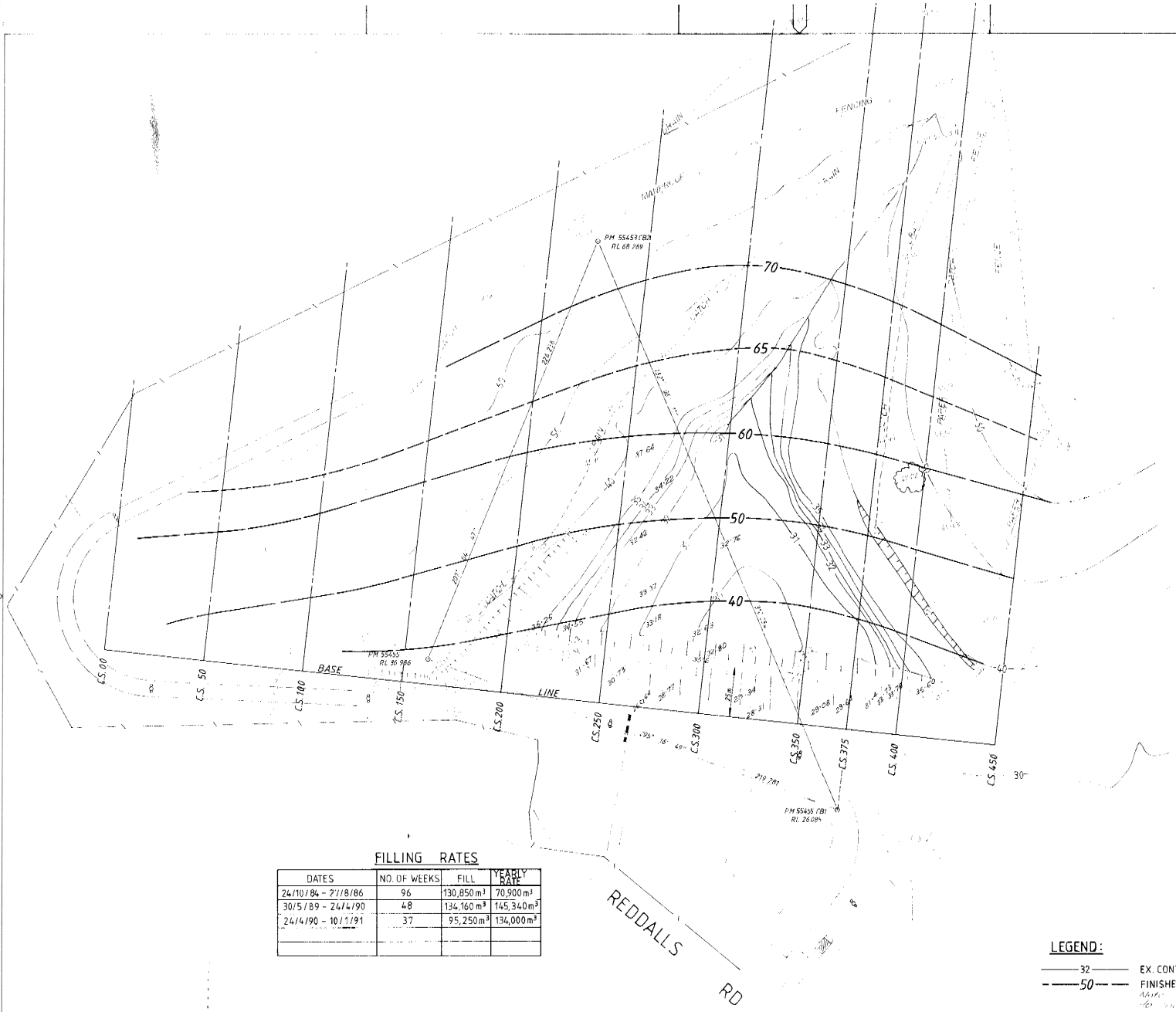
DRAWING NO

P 331/11

WOLLONGONG CITY COUNCIL

PARKS AND RECREATION DEPARTMENT

A1



FILLING RATES

DATES	NO. OF WEEKS	FILL	YEARLY RATE
24/10/84 – 27/8/86	96	130,850 m³	70,900 m³
30/5/89 – 24/4/90	48	134,160 m³	145,340 m³
24/4/90 – 10/1/91	37	95,250 m³	134,000 m³

LEGEND:

32 — EX. CONTOURS AS AT 24/10/84.

50 — FINISHED CONTOURS

STARTING DATE OF TIP 24-10-84

CITY OF WOLLONGONG

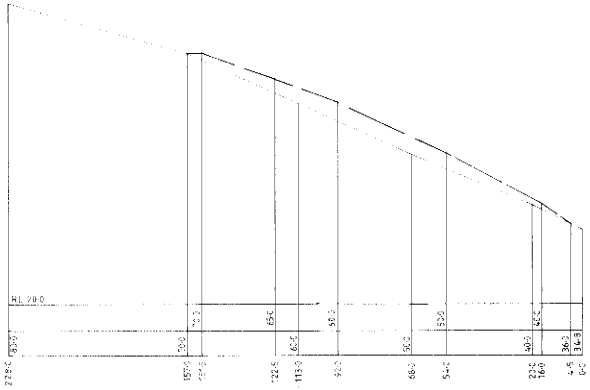
WHYTES GULLY WASTE DISPOSAL DEPOT
FILL CONTROL PLAN

P 331/12

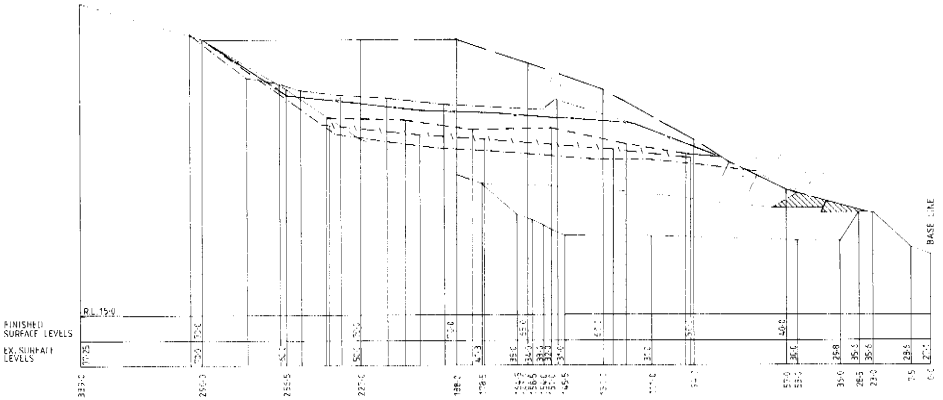
K.IRVINE 9/86

L86/7

MAGX A1



C.S.150



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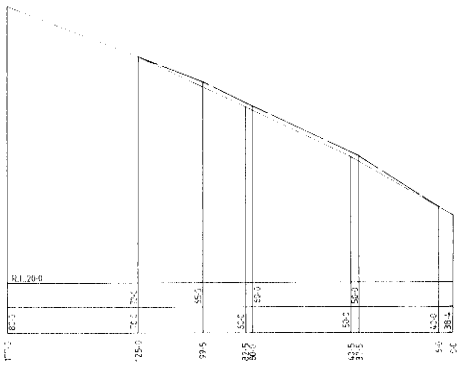

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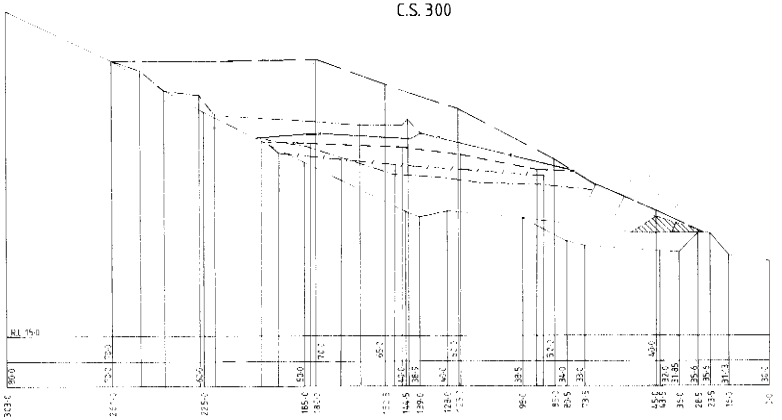

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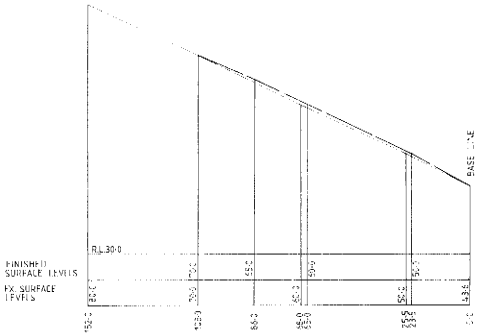
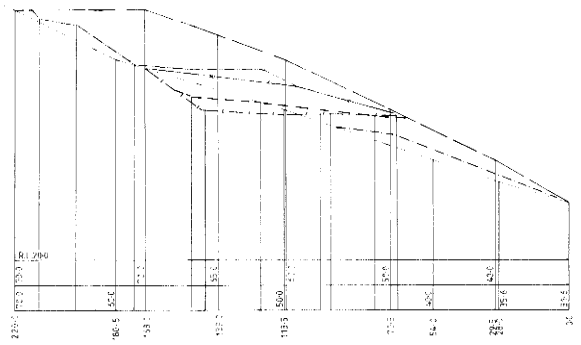


C.S.50



C.S.200

LEGEND :

- SURVEYED 10/1/91
- SURVEYED 24/4/90
- SURVEYED 30/5/89
- SURVEYED 4/11/88
- SURVEYED 3/3/88
- SURVEYED 27/8/86.

BUND WALL AS CONSTRUCTED.
FUTURE BUND WALL.

DRAWN: K.IRVINE 9/86

SCALES
HORIZ. 1:1000
VERT. 1:500

CITY OF WOLLONGONG

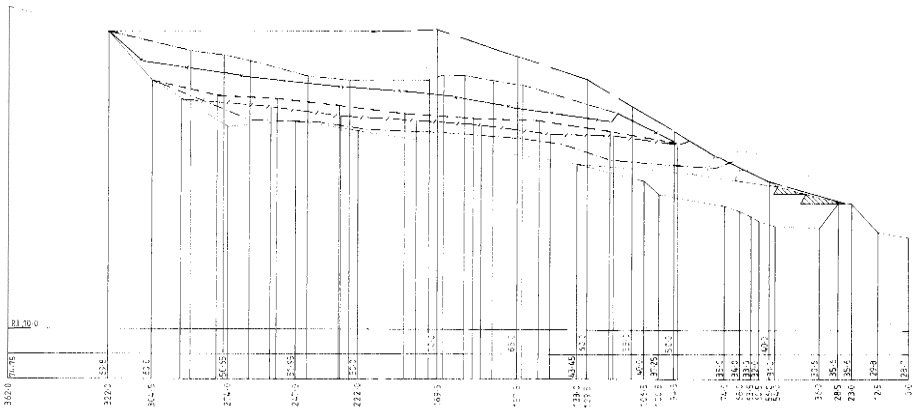
WHYTES GULLY WASTE DISPOSAL DEPOT
CROSS SECTIONS THROUGH TIPPING AREA

INDEX BASE No.

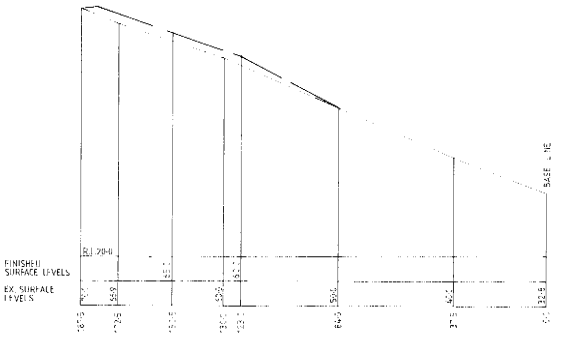
DRAWING No. P331/12

MAGX A1/2

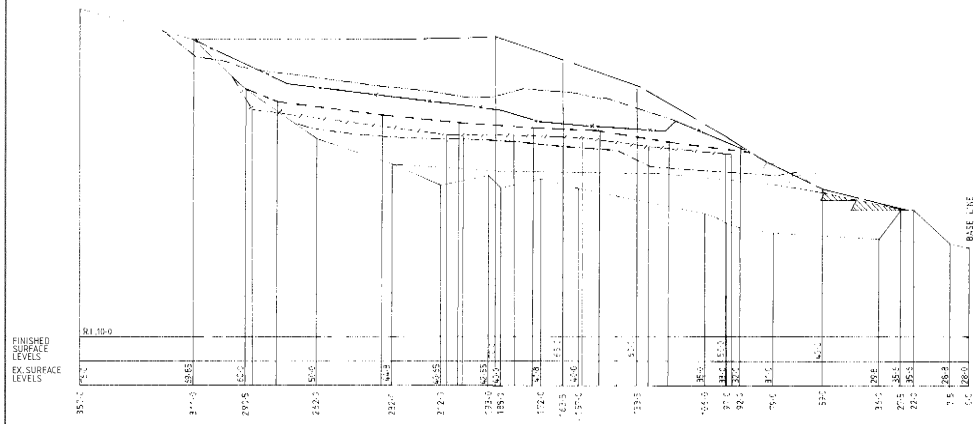
TRIMMING EDGE



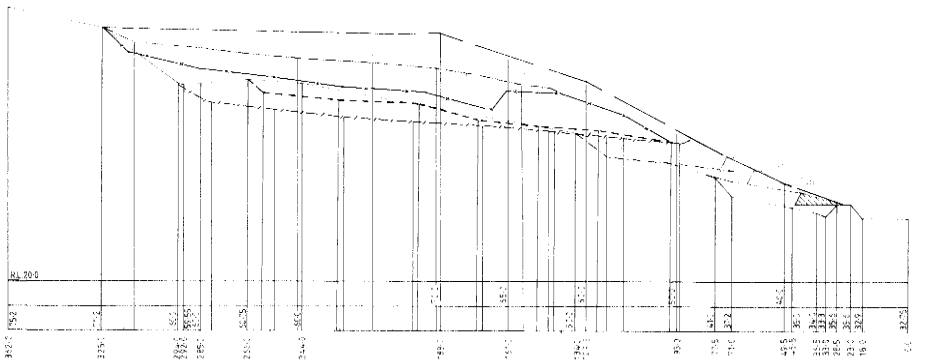
C.S.375



C.S.450



C.S.350



C.S.400

SURVEYED 10/1/91
SURVEYED 24/4/90
SURVEYED 3/3/88
SURVEYED 30/5/89
SURVEYED 4/11/88
SURVEYED 27/8/86.

LEGEND:

BUND WALL AS CONSTRUCTED.
FUTURE BUND WALL.

DRAWN: K.IRVINE 9/86

SCALES
HORIZ. 1:1000
VERT. 1:500

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL DEPOT
CROSS SECTIONS THROUGH TIPPING AREA

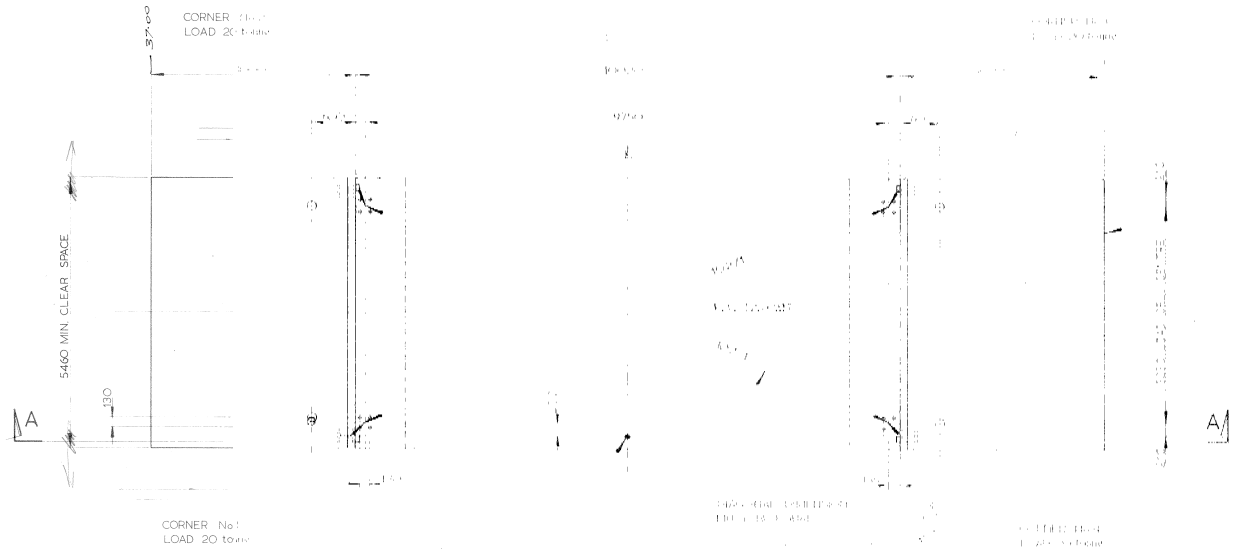
INDEX	BASE	No.

SHEETS	SHEET No.
3	3

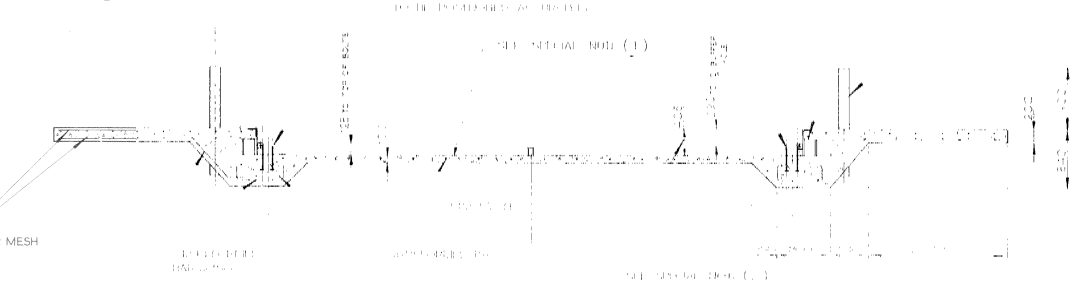
DRAWING No.
P331/12

MAGX A1/2

TRIMMING EDGE



DETAIL B



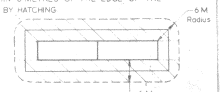
NOTE: SPACING OF C12 BARS CAN BE INCREASED TO 220 FOR 1000 EITHER SIDE OF CENTRE LINE

DETAIL ITEM 5 & 6

SECTION AA

SPECIAL NOTATIONS

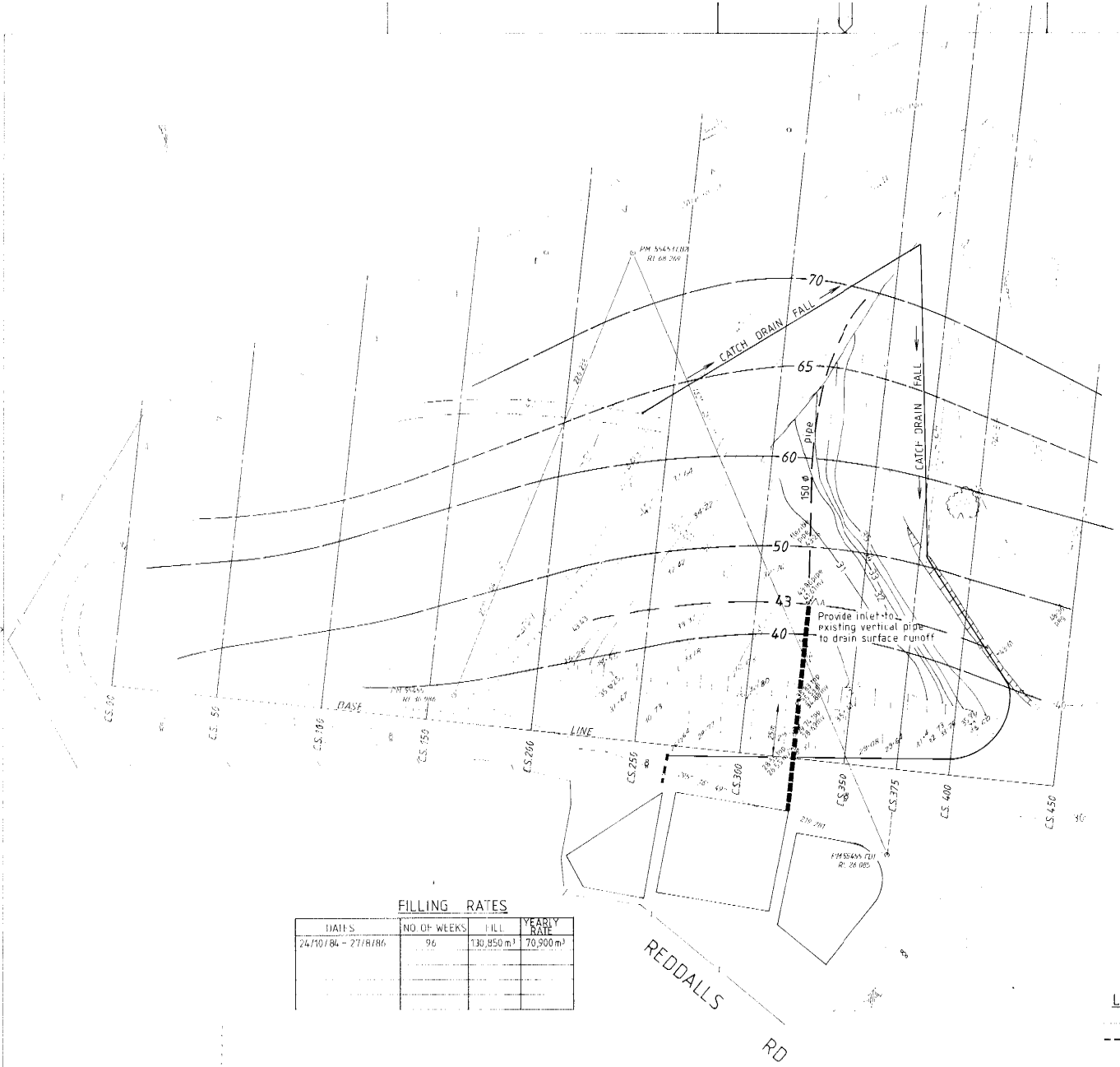
1. FOUNDATION BASE TO BE SLOPED TO PREVENT THE ACCUMULATION OF WATER BENEATH THE WEIGHBRIDGE.
2. THIS DIMENSION IS MINIMAL & MUST BE MAINTAINED TO PROVIDE 150 mm CLEARANCE BENEATH WEIGHBRIDGE TO COMPLY WITH WEIGHTS & MEASURES REQUIREMENTS
3. 32.0 O.D. STEEL CONDUIT, MALE THREAD M32×1.5 CONDUIT THREAD, PROJECTING 70 mm (MINIMUM) ABOVE GROUND LEVEL THIS CONDUIT SHALL BE PROVIDED ON THE WEIGHCABIN SIDE OF THE FOUNDATION
4. TO COMPLY WITH WEIGHTS & MEASURES REQUIREMENTS THE WEIGHBRIDGE INDICATOR SHALL BE POSITIONED WITHIN 6 METRES OF THE EDGE OF THE WEIGHBRIDGE PLATFORM, AS INDICATED BY HATCHING
5. SOIL BEARING CAPACITY TO BE NOT LESS THAN 200kPa



AVERY AUSTRALIA LIMITED

P331/13

679 x 960 mm. B1



NOTES 1: 150 ϕ subsoil pipe to be laid on existing surface and covered with 300mm slag sand, before covering with fresh garbage.

2. Tip surface to be worked so that fall is toward the 150 ϕ subsoil pipe and from north to south so that runoff from tip surface can reach new inlet to vertical pipe adjacent to Station A

FILLING RATES

DATES	NO. OF WEEKS	FILL	YEARLY RATE
24/10/84 - 27/8/86	96	130,850 m³	70,900 m³

LEGEND:

- 32 — EX. CONTOURS AS AT 24/10/84.
- 50 — FINISHED CONTOURS
- LEACHATEPIPE LEVELS 12/87
- 43 — EX. CONTOUR AT 12/87

STARTING DATE OF TIP 24.10.84

SCALES 1:1000

DATUM AHD | SURVEYOR R MORRIS | DRAWN DEW | DATE 12/87

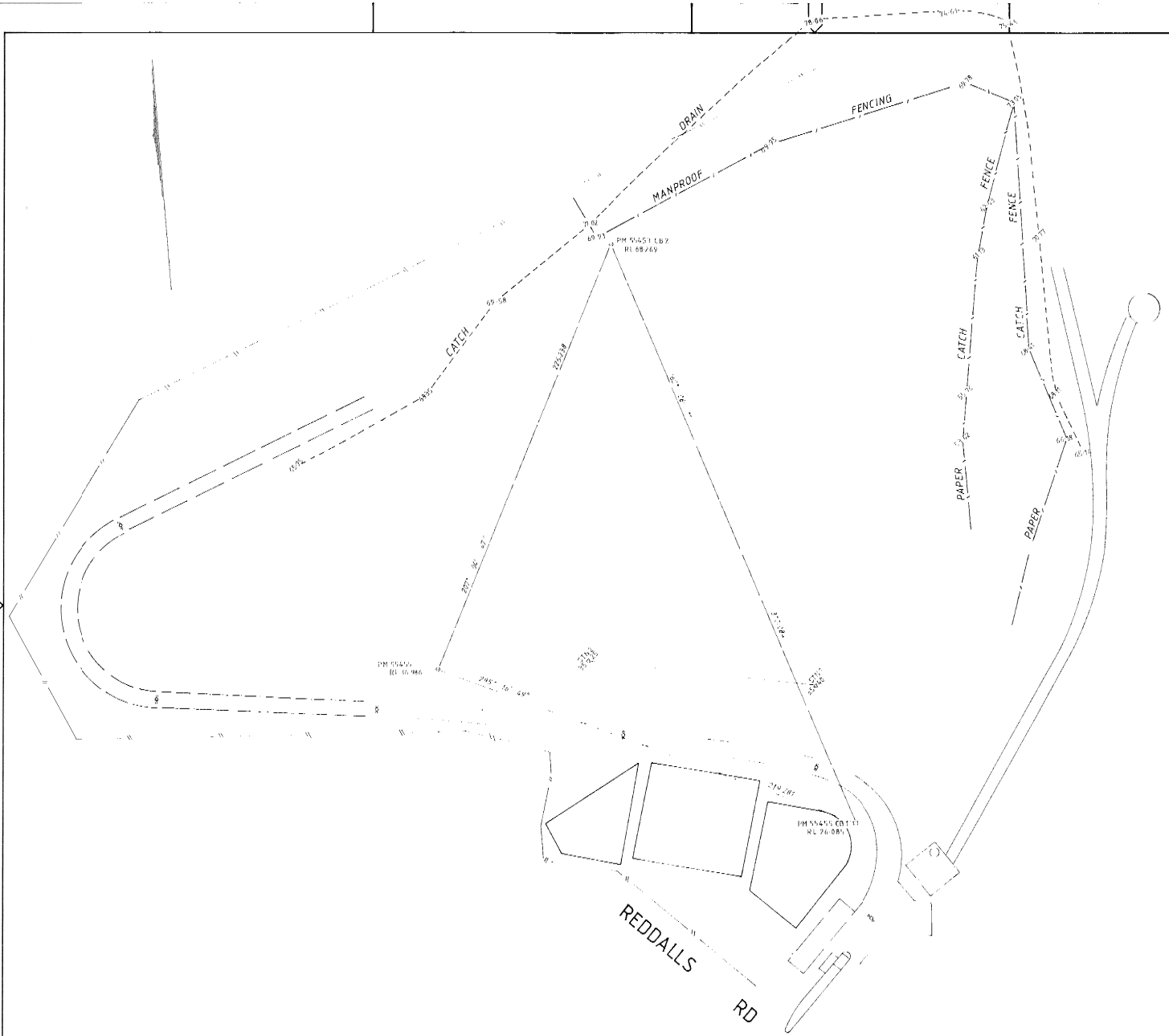
FILE No. | BOOKS 1.86/7

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL DEPOT
FILL CONTROL PLAN
LEACHATE LINE

P 331/14

MAGX A1



PLAN / LONG. SECTION	SCALES HORIZ. 1:1000 VERT.					FIELD INSPECTION DESIGN ENGINEER DATE				COUNCIL APPROVAL DATE MINUTE No. CITY ENGINEER DATE	**CITY OF WOLLONGONG** WHYTES GULLY WASTE DISPOSAL DEPOT	INDEX	BASE	No.
DATUM A.H.D.	SURVEYOR	DRAWN	DATE	DESIGNED	DATE	RELATED PLANS	ESTIMATE Nos	DATE	AMENDMENTS	D'MAN	DATE			DRAWING No. P 331/15
FILE No.	BOOKS	CHECKED	DATE											

566 x 801mm

TRIMMING EDGE

MAGX A1

AHD	B HOGAN	DEW	3/88	P331/12 for cross sections			COUNCIL APPROVAL DATE MINUTE No. CITY ENGINEER DATE	**CITY OF WOLLONGONG**
	L88/2				AMENDMENTS	DMAN DATE		WHYTES GULLY WASTE DISPOSAL DEPOT LEVELS AS AT 3/3/88

INDEX BASE No. — SHEET 1 — DRAWING No. P331/16

MAGX A1

PLAN
LONG.
DATUM
A.H.
FILE

F.B.

SEE P.331/12 FOR SECTIONS

AMENDMENTS

COUNCIL APPROVAL
DATE
CONSULTING
CITY ENGINEER
DATE

CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL DEPOT
LEVELS AS AT 4/11/88

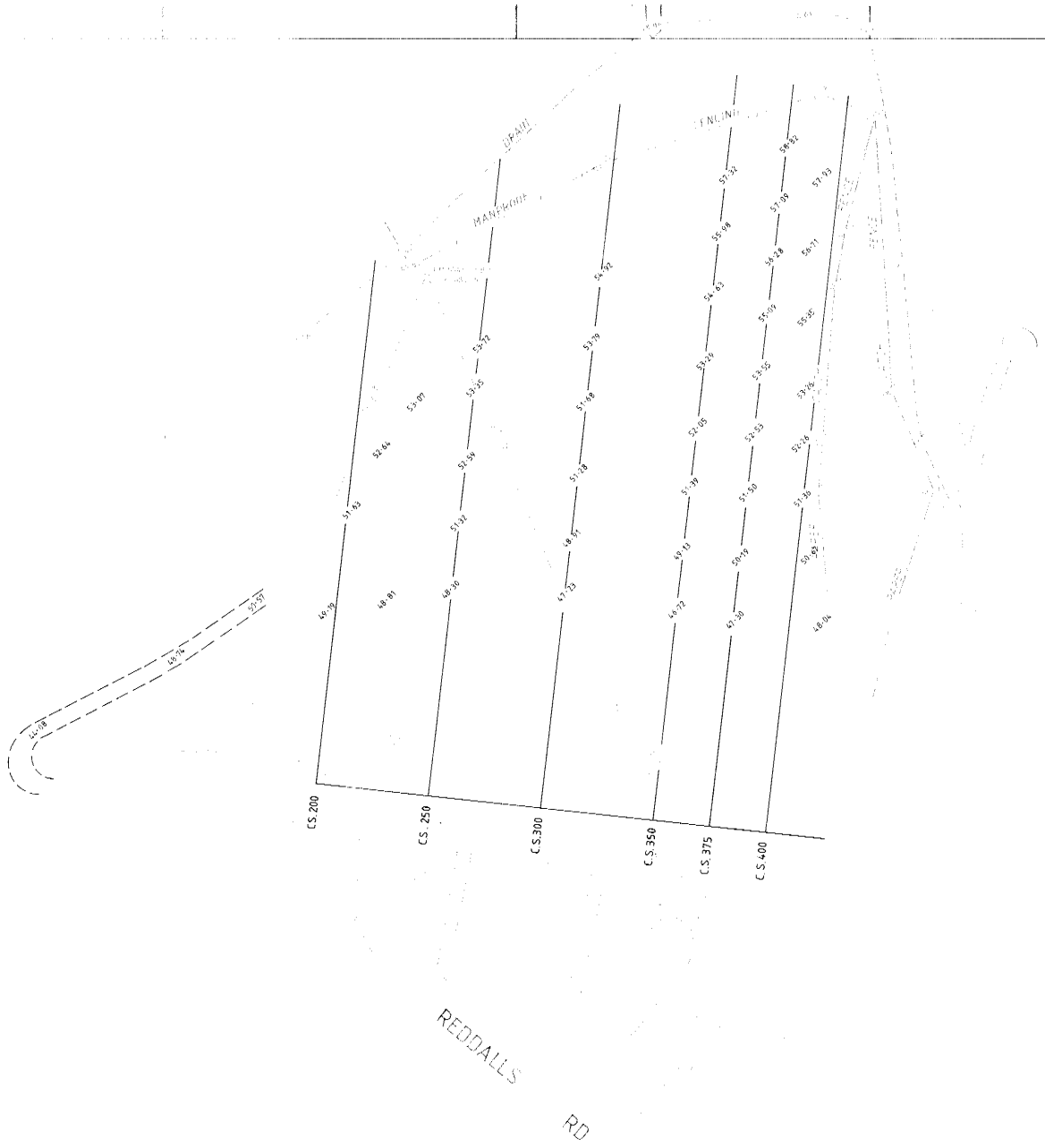
INDEX BASE No.

SHEET No. 2

DRAWING No. P 331/16

MAGX A1

566 x 80



F.B.

SEE P331/12 FOR SECTIONS

CITY OF WOLLONGONG

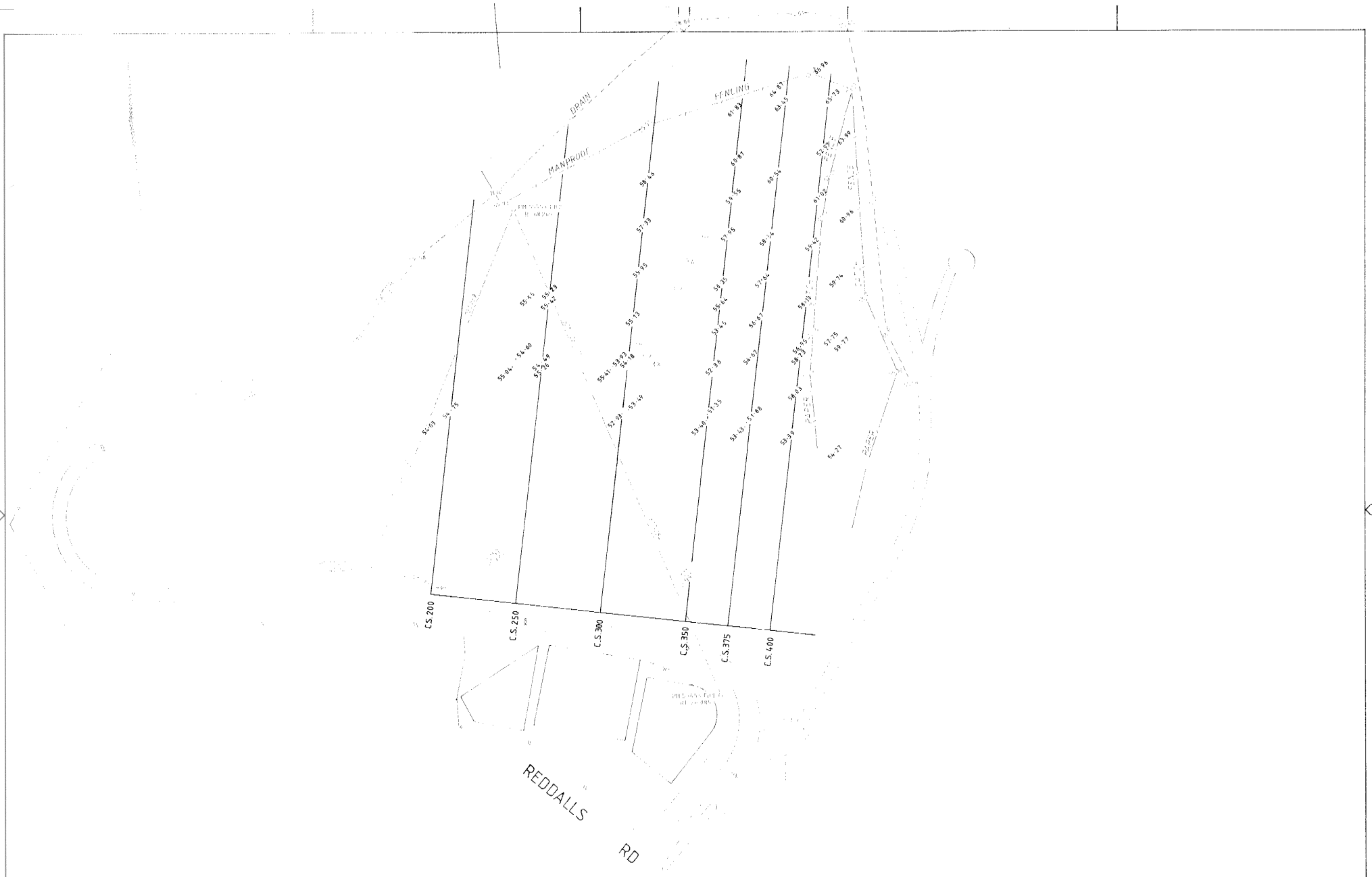
WHYTES GULLY WASTE DISPOSAL DEPOT

LEVELS AS AT 30/5/89

P 331/16

MAGX

A1



B. HOGAN
L 88/2
M.A.P.
6/90
P331/12 for cross sections

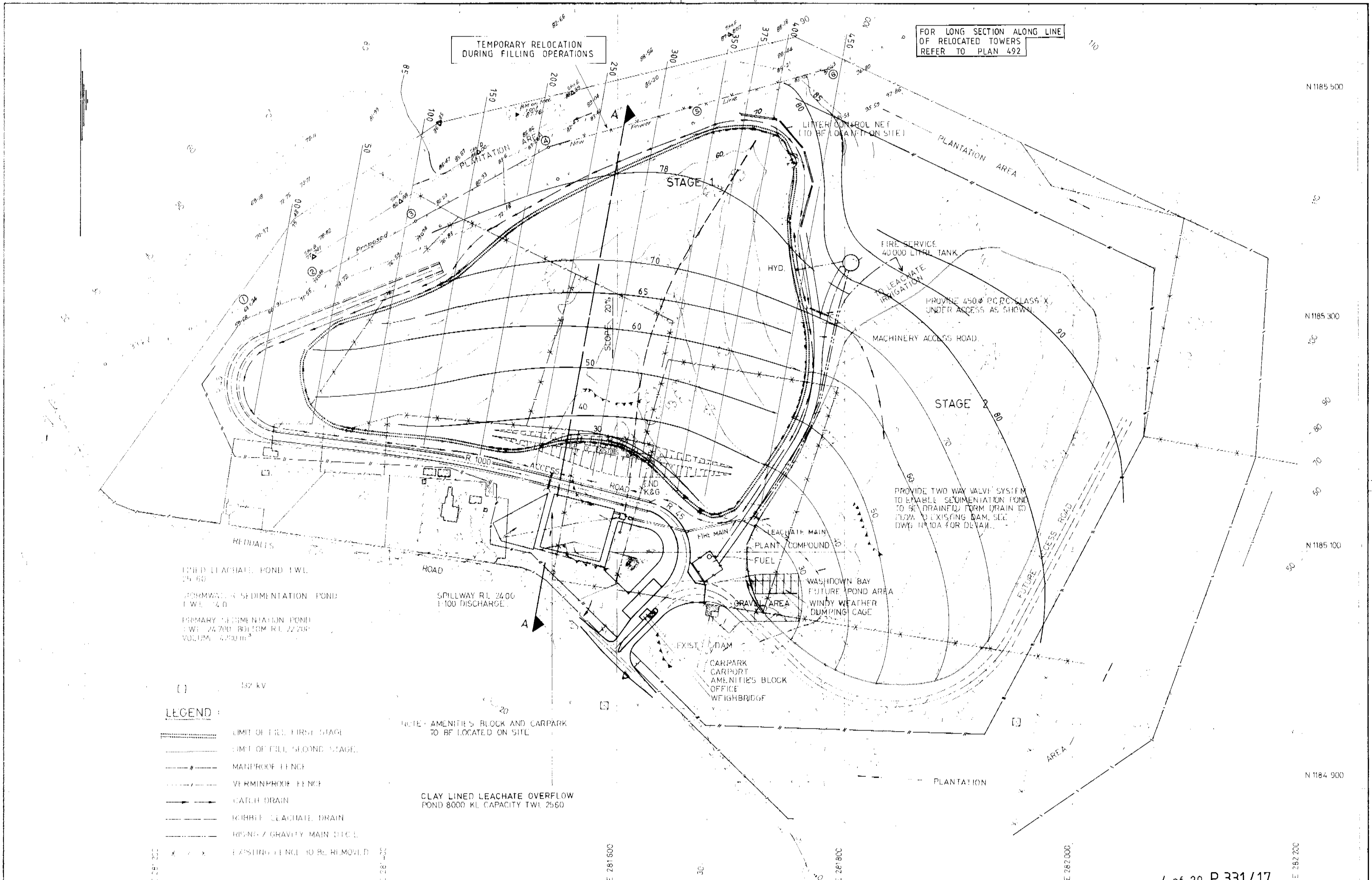
CITY OF WOLLONGONG

WHYTES GULLY WASTE DISPOSAL DEPOT

LEVELS AS AT 24/4/90

P 331/16

MAGX A1



4 of 29 P 331/17

Rev	Description	Date
A	[illegible]	28.5.84
A	[illegible]	"
A	[illegible]	"
B	PRIMARY SED. POND ADDED	31.5.84
C	Design contours 80, 81, 85	22.11.90

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CONSULTING ENGINEERS & PLANNERS
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CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

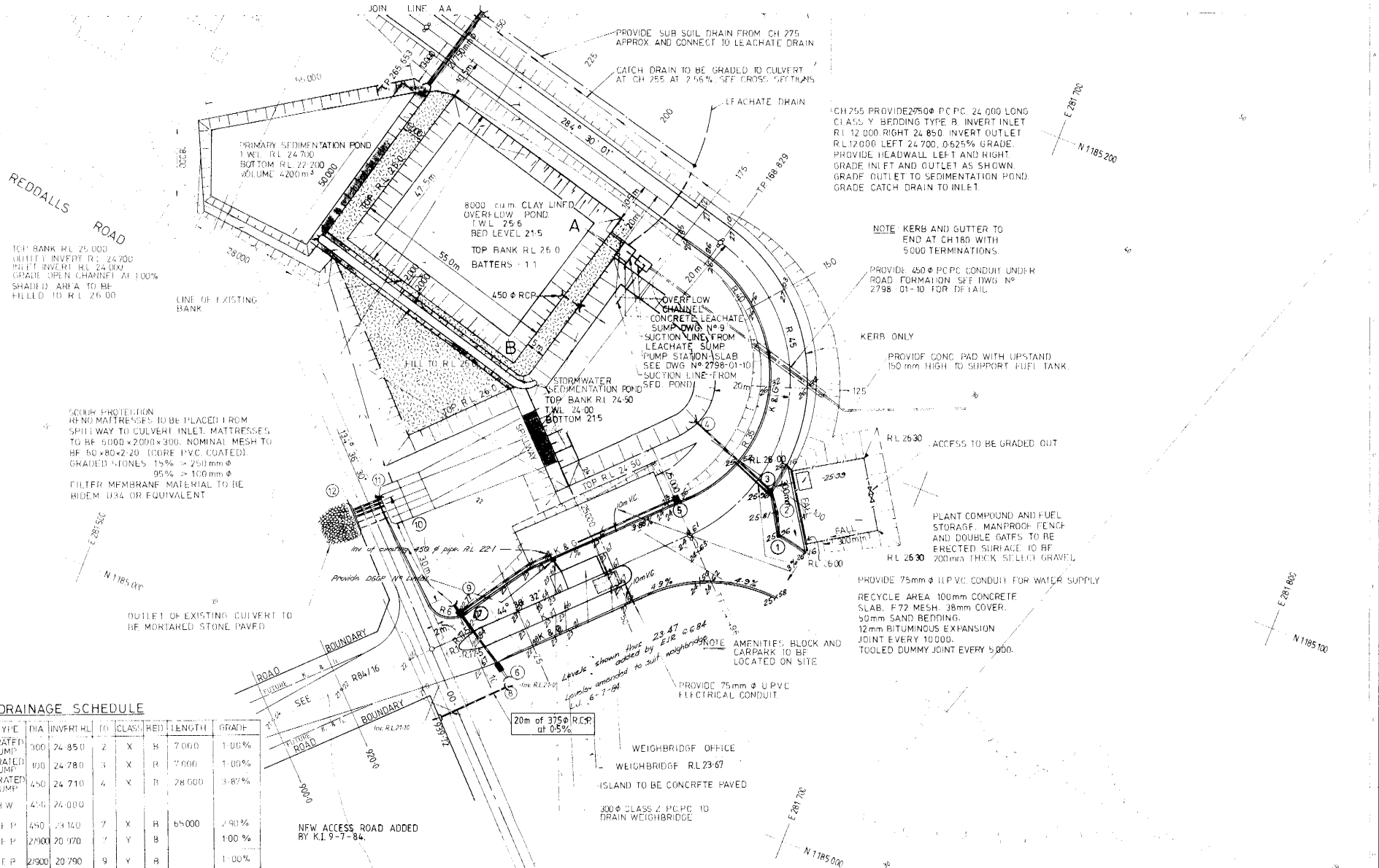
SCOTT & FURPHY CONSULTING GROUP

Scale 1 : 1500
S HOLLIS
S.H.
D.G.
Date 2.4.84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
GENERAL LAYOUT PLAN

2798-01-2B



DRAINAGE SCHEDULE

N°	LOCATION		TYPE	DIA	INVERT RL		CLASS	RED	LENGTH	GRADE	
1	WASH BAY		GRATED SUMP	300	24.850	2	X	B	7.000	1.00%	
2	WASH BAY		GRATED SUMP	300	24.780	3	X	B	7.000	1.00%	
3	WASH BAY		GRATED SUMP	450	24.710	4	X	B	28.000	3.87%	
4	SED. POND		H.W.	450	24.000						
5	75.000	9.430 L	S.E.P.	450	23.140	7	X	B	65.000	2.90%	
6	15.000	11.500 R	S.E.P.	2/900	20.970	7	Y	B		1.00%	
7	11.000	5.430 L	S.E.P.	2/900	20.790	9	Y	B		1.00%	
8	15.800	14.000 R	H.W.	2/900	21.000	9	Y	B	24.400	1.00%	GRADE INLET
9	10.800	9.000 L	H.W.	2/900	20.756	10	Y			1.00%	GRADE OUTLET
10	OPEN CHANNEL FROM (9)				20.500					1.00%	
11	AS SHOWN		H.W.	3/1050	19.51	12	X	B	8.000	1.00%	
12	AS SHOWN		H.W.	3/1050	EXIST					1.00%	

 P331/17

A	DRAINAGE LAYOUT ALT	12-1-84	
B	SHAPE OF PONDS ALT	11-4-84	
C	SED. POND REDUCED	28-5-84	
C	LINE 4 IN 7 ADDED	"	
C	CONDUITS ADDED	28-5-84	
D	PRIMARY V.LIM PD ADDED	31-7-84	

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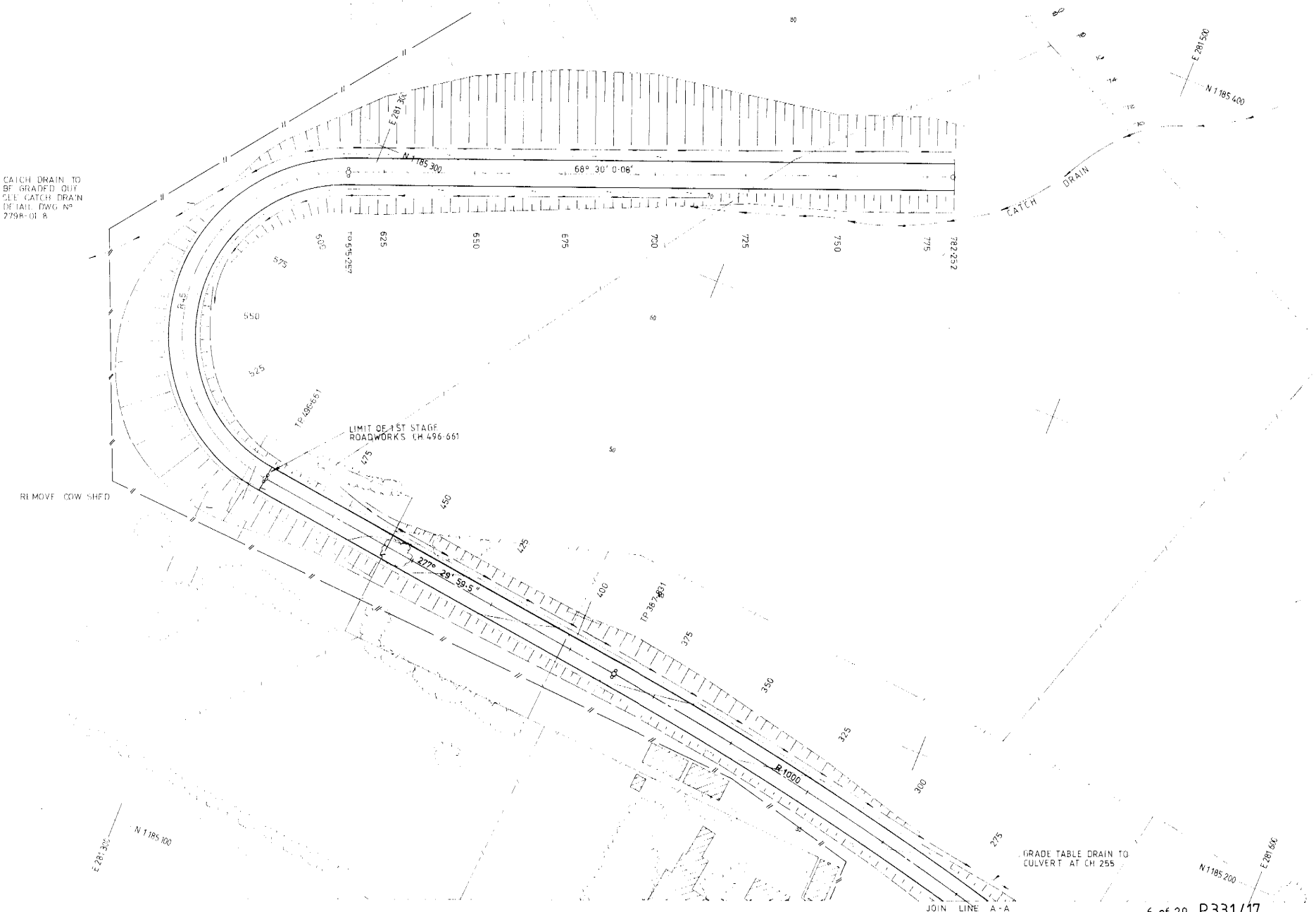
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON
SCOTT & FURPHY CONSULTING GROUP

SCALE: 1:500
DRAWN: S. HOLLIS
DESIGN: S.H.
CHECKED: D.G.
APPROVED: DATE: 2-8-84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
DETAIL PLAN OF ENTRY AREA

DRAWING No. 2798-01-3D



6 of 29 P331/17

A	LIMIT OF ROADWORKS	25 5 84		
NO.	AMENDMENT	DATE	REVISION	DESCRIPTION

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
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CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

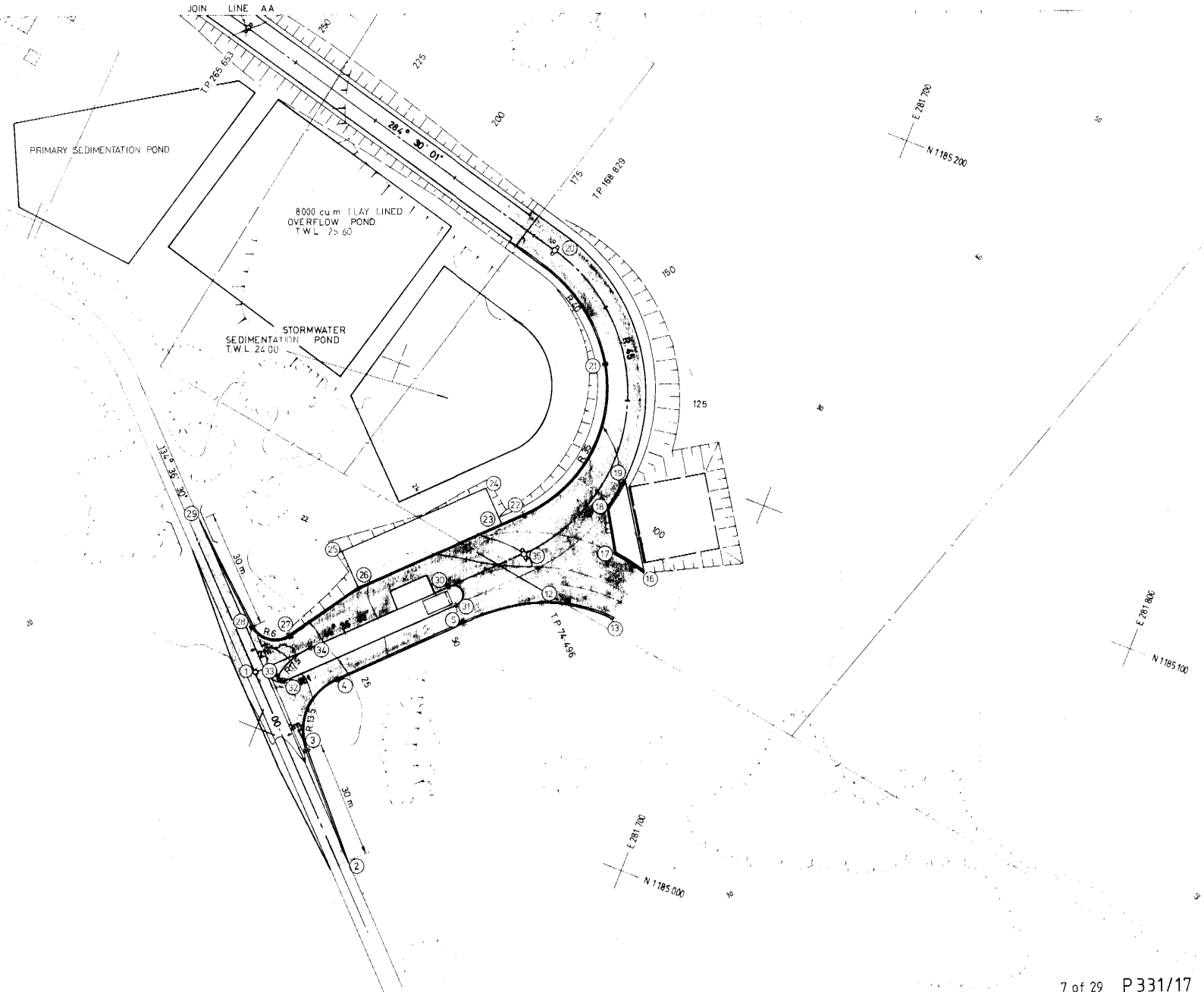
SCOTT & FURPHY CONSULTING GROUP

SCALE: 1:500
PROJECT MANAGER: S. HOLLIS
DESIGN: S.H.
DRAWN: D.G.
APPROVED: DATE: 2-4-84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
DETAIL PLAN

DRAWING No. 2798-01-4 A



POINT No.	NORTHING	EASTING
1	1 185 013.345	281 595.099
2	1 184 978.2[illegible]	281 634.573
3	1 185 000.747	281 614.420
4	1 185 019.191	281 614.912
5	1 185 045.122	281 640.492
~~6~~	~~1 185 045.180~~	~~281 648.977~~
~~7~~	~~1 185 043.756~~	~~281 647.572~~
~~8~~	~~1 185 034.772~~	~~281 638.710~~
~~9~~	~~1 185 019.603~~	~~281 654.087~~
~~10~~	~~1 185 033.570~~	~~281 667.865~~
~~11~~	~~1 185 045.540~~	~~281 655.731~~
12	1 185 055.597	281 665.522
13	1 185 056.507	281 675.413
16	1 185 070.978	281 677.784
17	1 185 072.669	281 670.800
18	1 185 084.273	281 663.463
19	1 185 091.307	281 664.932
20	1 185 141.548	281 626.646
21	1 185 120.272	281 648.592
22	1 185 076.188	281 644.448
23	1 185 071.857	281 640.175
24	1 185 078.879	281 633.056
25	1 185 050.403	281 604.966
26	1 185 043.380	281 612.085
27	1 185 025.170	281 599.740
28	1 185 023.994	281 590.854
29	1 185 043.638	281 568.091
30	1 185 052.144	281 633.372
31	1 185 048.633	281 636.932
32	1 185 013.820	281 602.591
33	1 185 014.875	281 600.319
34	1 185 023.312	281 604.931
35	1 185 063.379	281 647.415

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE
A	SEDIM. POND REDUCED AMEN. BLOCK REMOVED	28.5.84			
B	PRIMARY SED. POND AMDED	31.8.84			

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CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

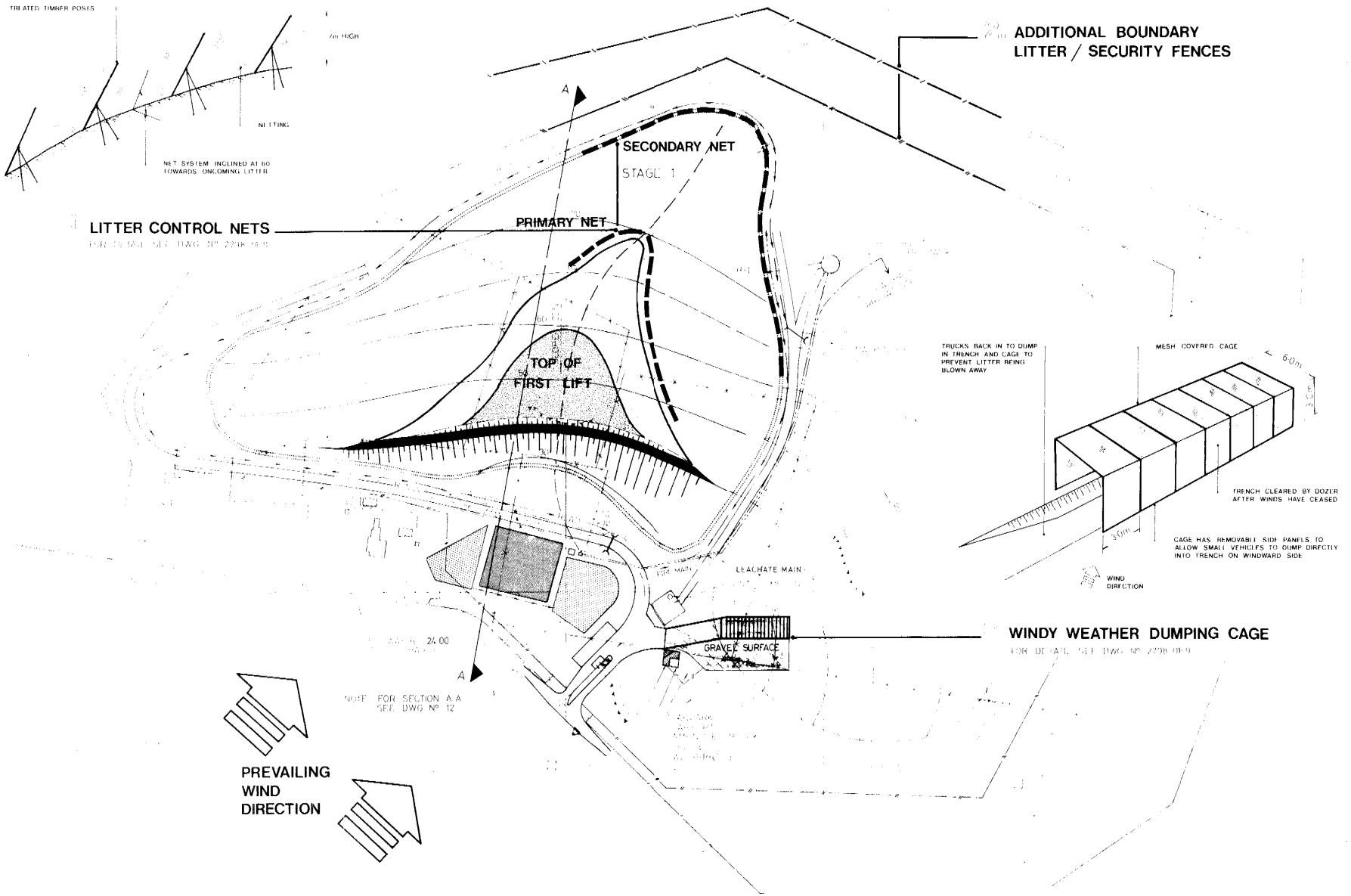
SCOTT & FURPHY CONSULTING GROUP

SCALES	1:500
PROJECT MANAGER	S. HOLLIS
DESIGN	S.H
DRAWN	D.G
APPROVED	DATE 2.4.84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
SETOUT PLAN

DRAWING NO. 2798-01-5B



LITTER CONTROL SYSTEM

 P331/17

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
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CANBERRA A.C.T. 2617
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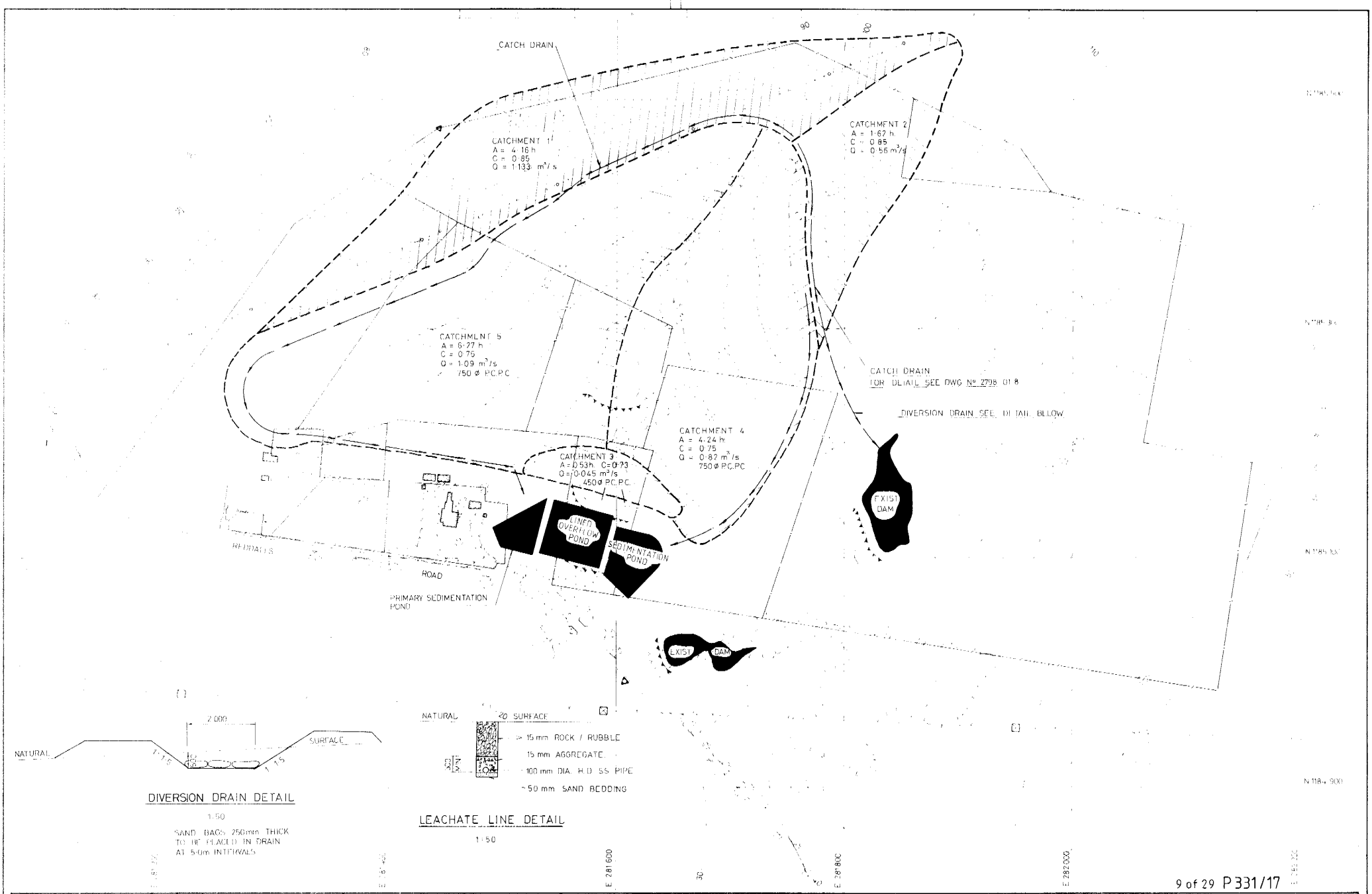
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
GENERAL LAYOUT PLAN

2798-01-6B



9 of 29 P331/17

A	SEDIMENTATION POND REMOVED	28.5.84	SH
B	PRIMARY SED. POND ADDED	30.5.84	SH

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CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

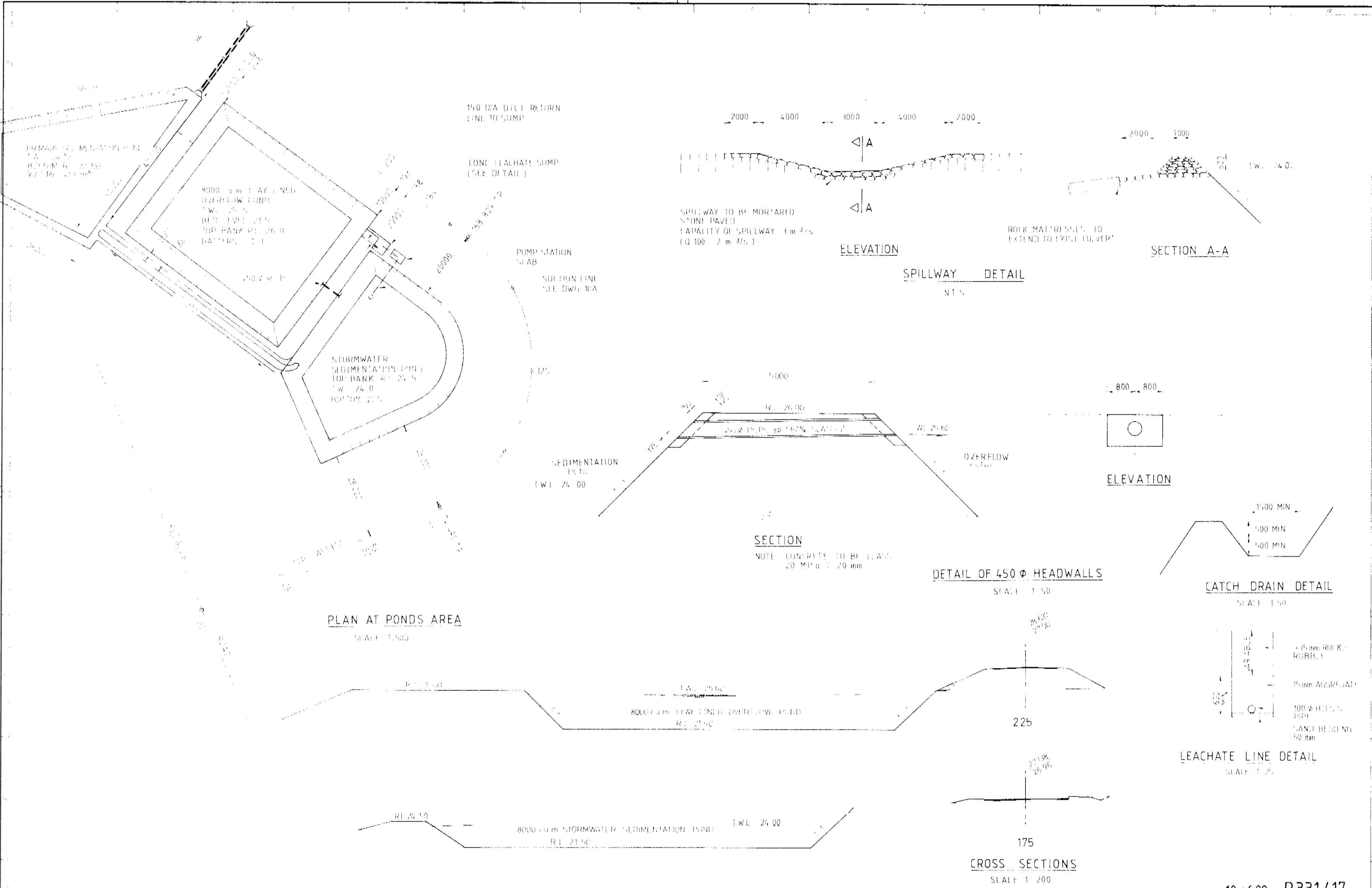
SCOTT & FURPHY CONSULTING GROUP

SCALE: 1 : 1500
PROJECT MANAGER: S. HOLLIS
DESIGN: S.H
DRAWN: D.G
ASSESSED:
DATE: 2·4·84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
CATCHMENT PLAN

2798 - 01 - 7B



10 of 29 P331/17

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CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

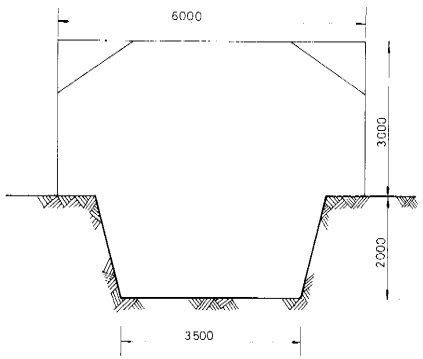
SCOTT & FURPHY CONSULTING GROUP

SCALES: AS SHOWN
PROJECT MANAGER: S. HOLLIS

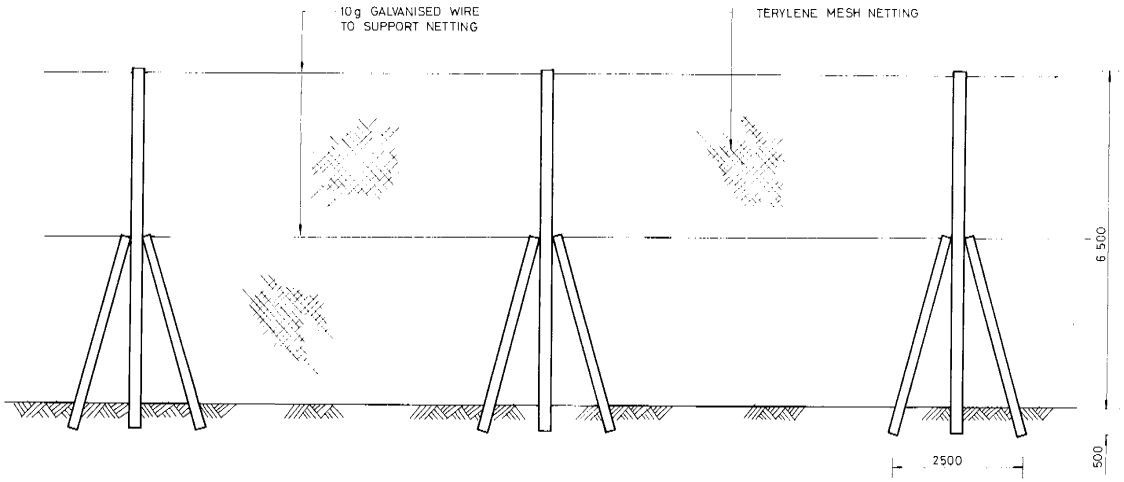
WOLLONGONG CITY COUNCIL

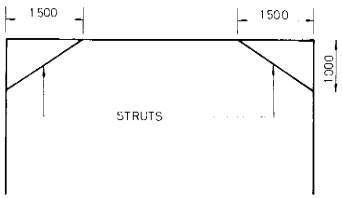
WHYTES GULLY LANDFILL SITE
FILTRATION, LEACHATE POND DETAIL

DRAWING No. 2798-01-8 B

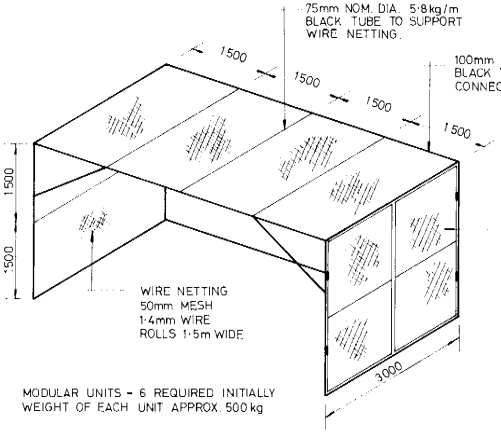


ELEVATION





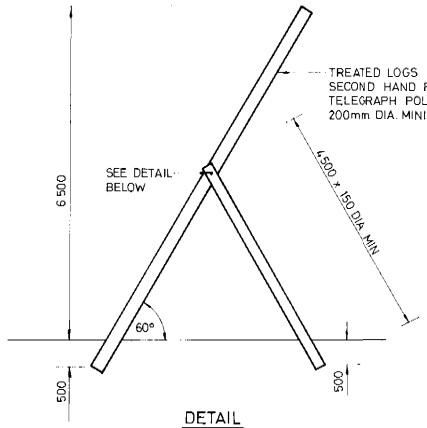
DETAIL



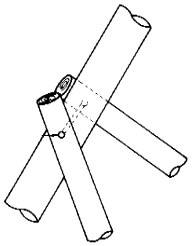
MODULAR UNITS - 6 REQUIRED INITIALLY
WEIGHT OF EACH UNIT APPROX. 500 kg

DETAIL

WINDY WEATHER DUMPING CAGE DETAILS



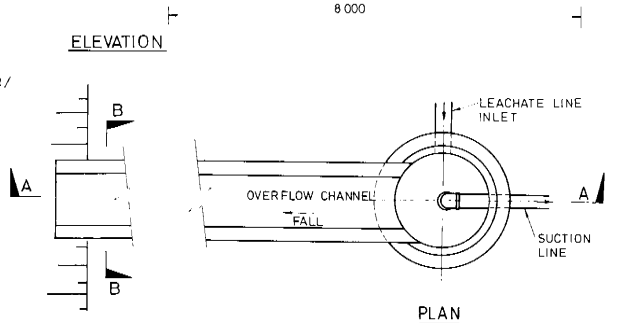
DETAIL



GATES MADE WITH 75mm NOM. DIA. 3·2mm WALL THICKNESS BLACK TUBE HINGED AS SHOWN.

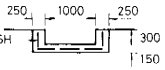
DETAIL

LITTER CONTROL NET DETAILS

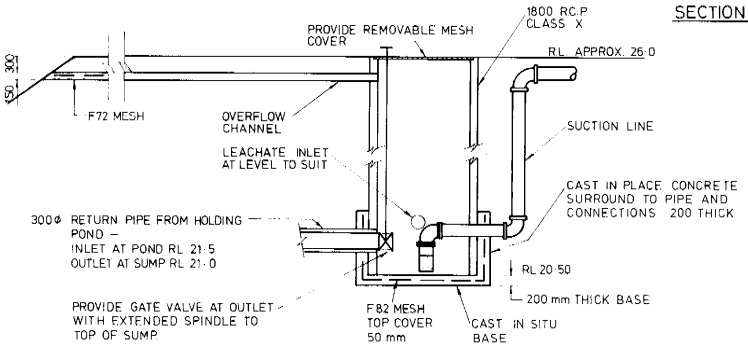


ELEVATION

PLAN



SECTION B B



SECTION A-A

LEACHATE SUMP

 P 331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE
A	LEACHATE SUMP AMENDED 25·5·84				

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CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

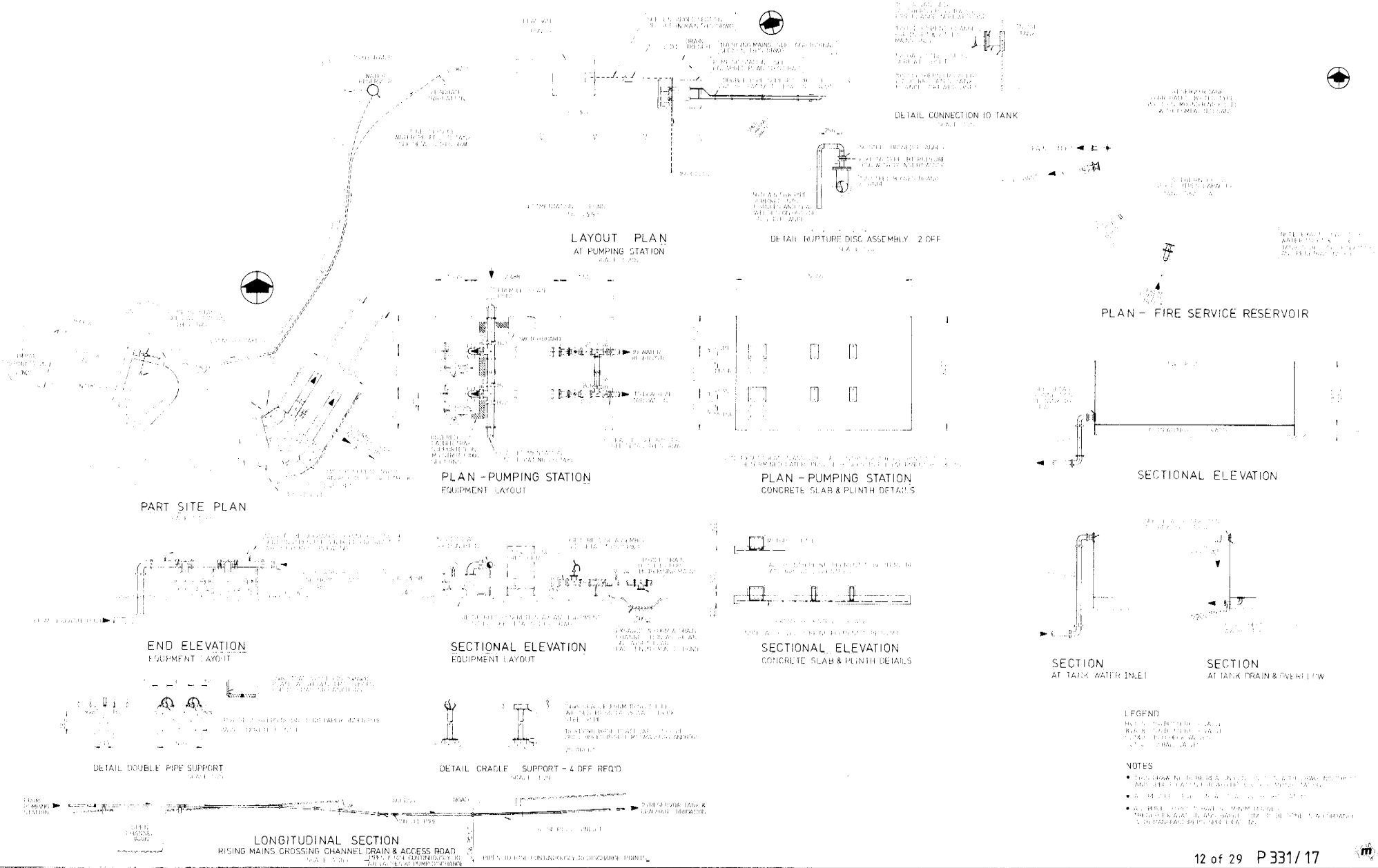
SCOTT & FURPHY CONSULTING GROUP

SCALES	1:50
PROJECT MANAGER	S. HOLLIS
DESIGN	S H
DRAWN	D. Z
APPROVED	DATE 26·6·84

WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
LEACHATE SUMP, LITTER CONTROL NET AND WINDY WEATHER DUMPING CAGE DETAILS

DRAWING No.
2798-01-9A



NO	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE
A	REVISED LAYOUT AS AMENDED	78.6.NA			
	DRAIN TO EXIST DAM ADDED	78.6.NA			

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
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TELEPHONE (062) 51207
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON
SCOTT & FURPHY CONSULTING GROUP

DRAWN	S.H.
PROJECT MANAGER	S. HOLLIS

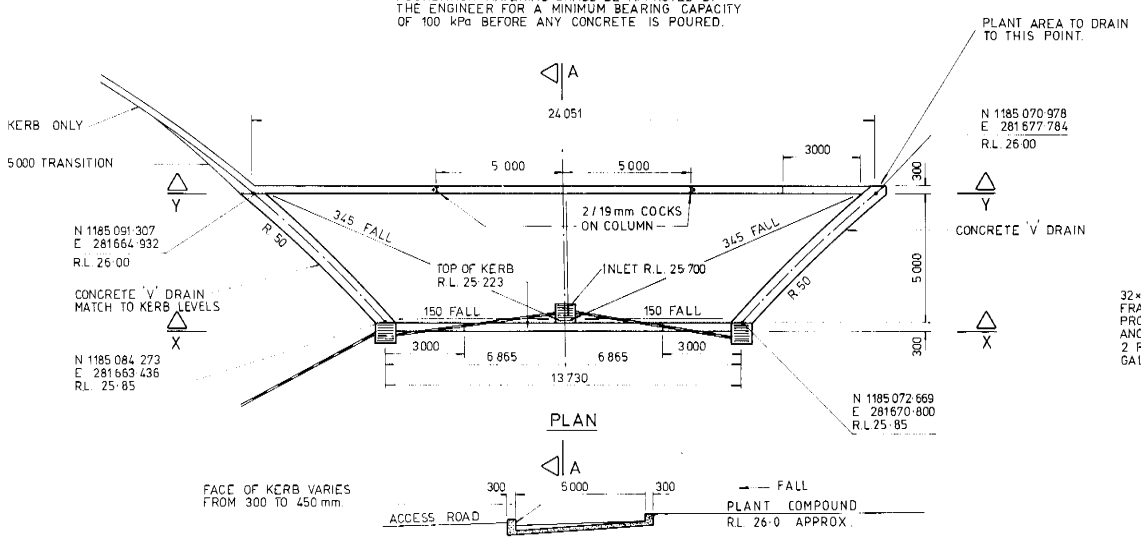
WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE

PUMPING ARRANGEMENT

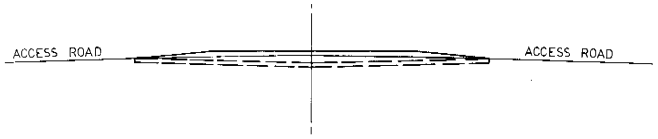
DRAWING No. 2798-01-10 A

NOTE : WASHDOWN BAY 150 mm THICK 20 MPa CONCRETE ON 50 mm SAND BEDDING REINFORCED WITH F82 MESH PLACED CENTRALLY.
FOUNDATION MATERIAL SHALL BE APPROVED BY THE ENGINEER FOR A MINIMUM BEARING CAPACITY OF 100 kPa BEFORE ANY CONCRETE IS POURED.

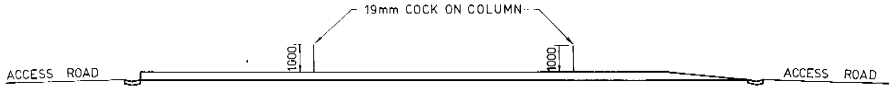


PLAN

SECTION A A



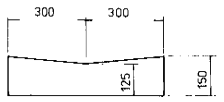
ELEVATION X X



ELEVATION Y Y

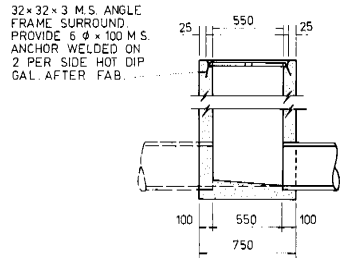
SCALE 1 : 100

WASH DOWN BAY

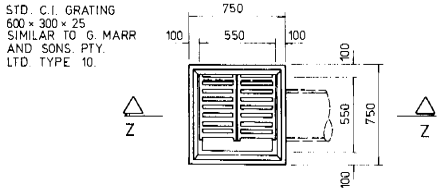


CONCRETE V DRAIN

SCALE 1 : 10



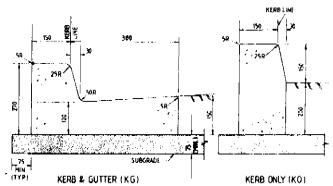
SECTION Z Z



PLAN

GRATED SUMP

SCALE 1 : 20



REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE
A	LEVELS AMENDED	25·5·84			

SCOTT & FURPHY ENGINEERS PTY. LTD.
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TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

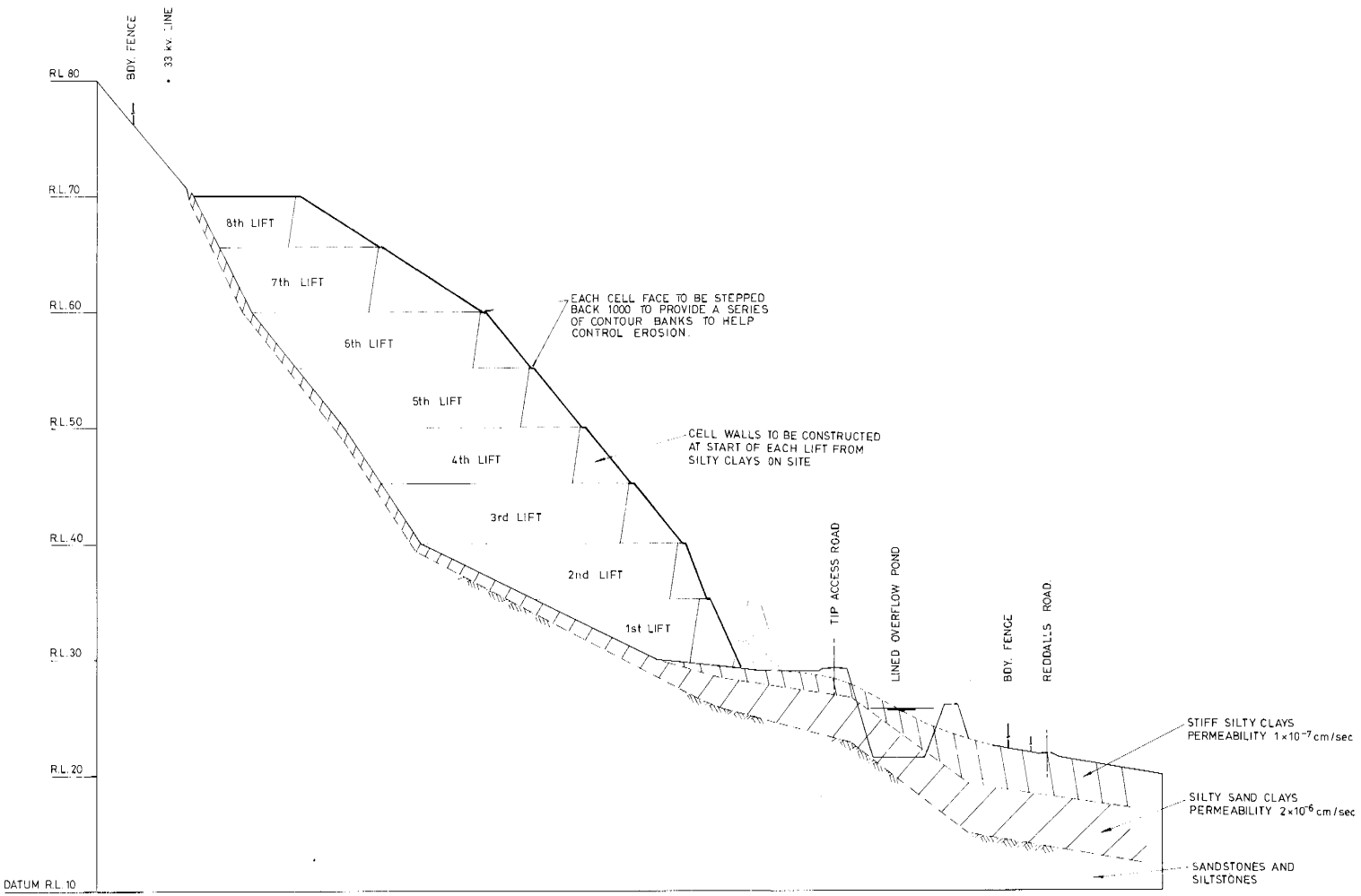
SCOTT & FURPHY CONSULTING GROUP

SCALES	AS SHOWN
PROJECT MANAGER	S. HOLLIS
DESIGN	S.H.
DRAWN	D.G.
APPROVED	DATE 21.4.86

WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
WASH DOWN BAY AND
GRATED SUMP DETAILS

DRAWING No. 2798·01·11A



SECTION A-A

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

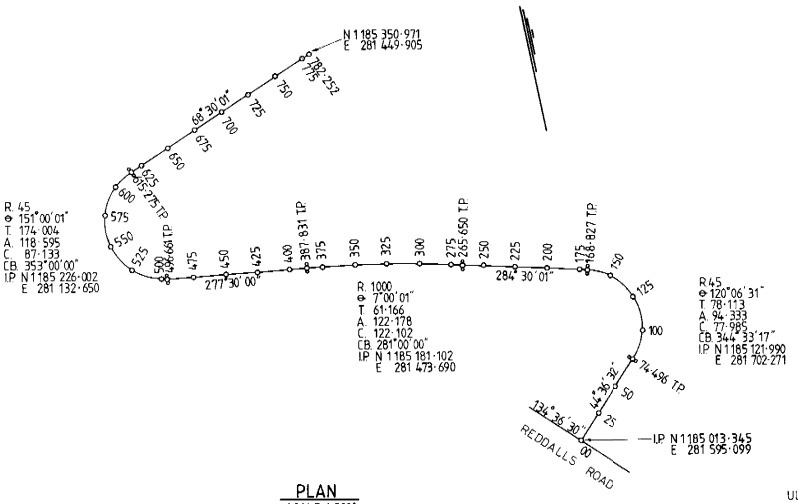
SCOTT & FURPHY CONSULTING GROUP

SCALE	HOR. 1:1000 VER 1:200
PROJECT MANAGER	S. HOLLIS
DESIGN	S. H.
DRAWN	D. G.
APPROVED	DATE 2.4.96

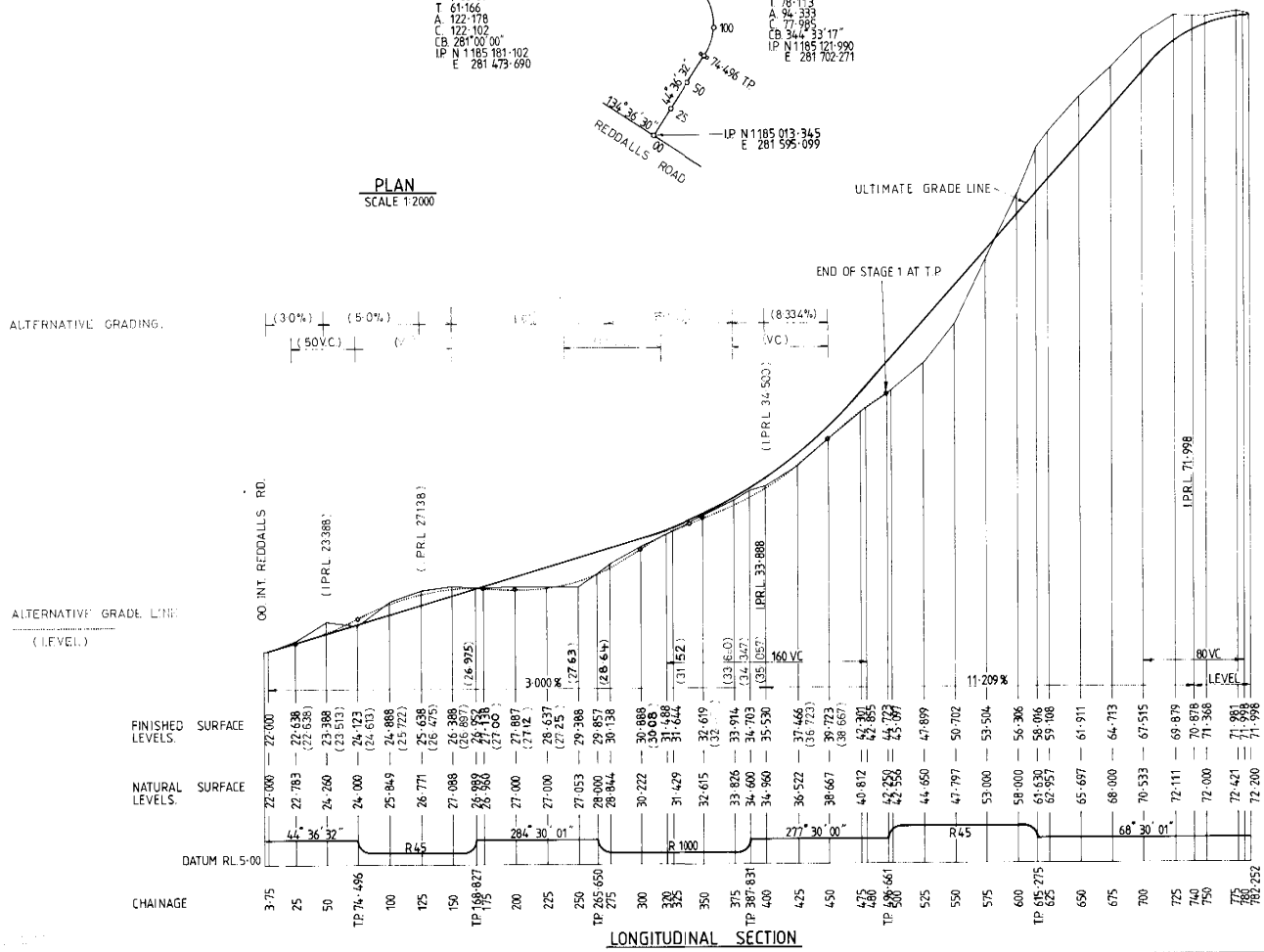
WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
SECTION THROUGH SITE "A-A"

DRAWING No. 2798-01-12



PLAN
SCALE 1:2000



LONGITUDINAL SECTION

P 331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE
A	ALT GRADE SHOWN.	9·4·84			

SCOTT & FURPHY ENGINEERS PTY. LTD
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

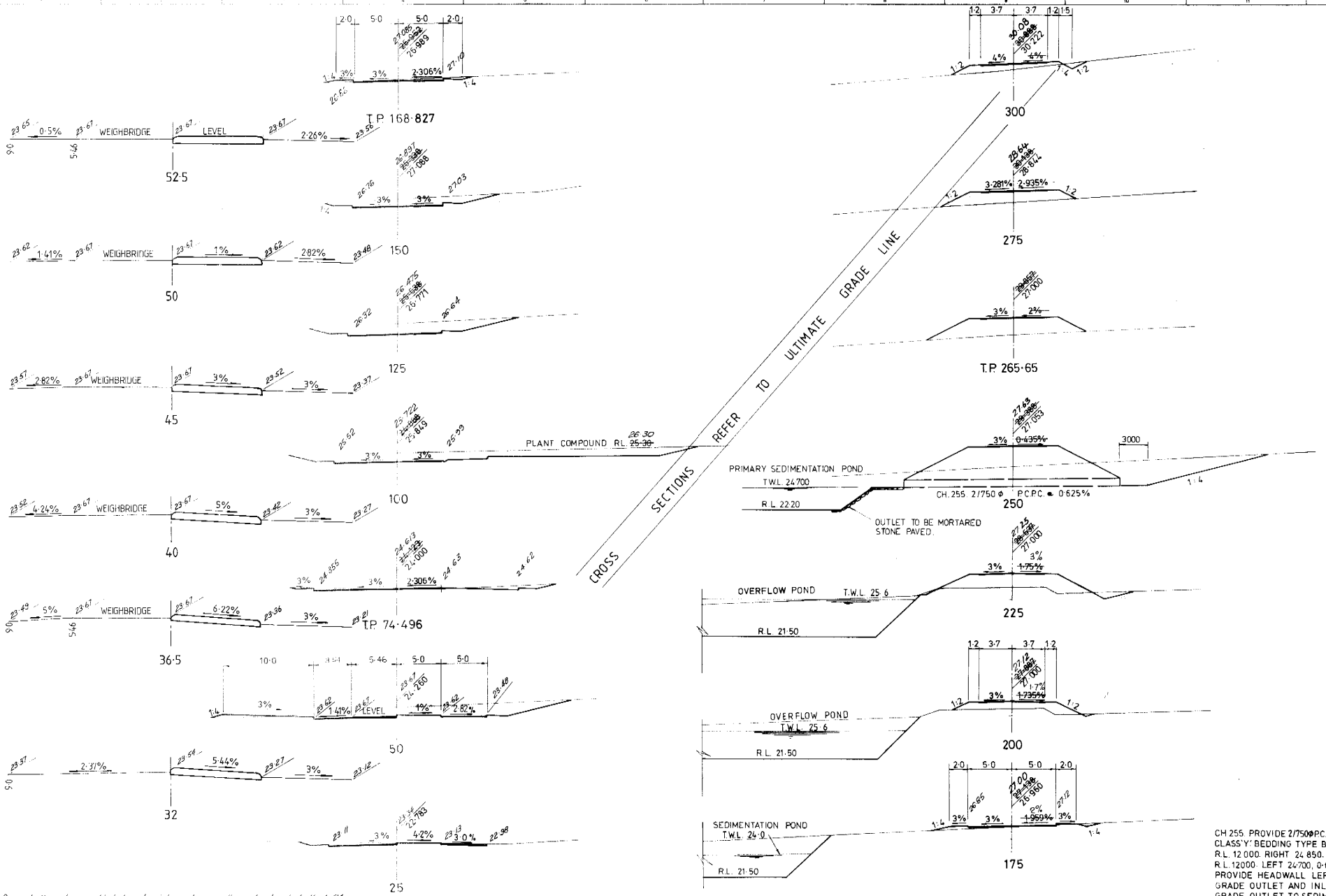
SCOTT & FURPHY CONSULTING GROUP

SCALES	1:200 VER 1:2000 HOR
PROJECT MANAGER	S. HOLLIS
DESIGN	
DRAWN	DR
APPROVED	DATE 2·4·84

WOLLONGONG CITY COUNCIL

WHYTES' GULLY LANDFILL SITE
PLAN AND LONGITUDINAL SECTION

DRAWING No. 2798-01-13-A



CH 255. PROVIDE 2/750ø PC.P.C. 24·000 LONG CLASS 'Y' BEDDING TYPE B. INVERT INLET R.L. 12·000. RIGHT 24·850. INVERT OUTLET R.L. 12000. LEFT 24·700. 0·625% GRADE. PROVIDE HEADWALL LEFT AND RIGHT. GRADE OUTLET AND INLET AS SHOWN. GRADE OUTLET TO SEDIMENTATION POND. GRADE CATCH DRAIN TO INLET.

Revised X-sections added to suit existing slip roadhouse levels I.J. 16·1·84
Revised X-sections added to suit weighbridge I.J. 6·1·84
Lip Levels and Revised G/ Levels added E.J.R. 27.6.84

16 of 29 P331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
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CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON
SCOTT & FURPHY CONSULTING GROUP

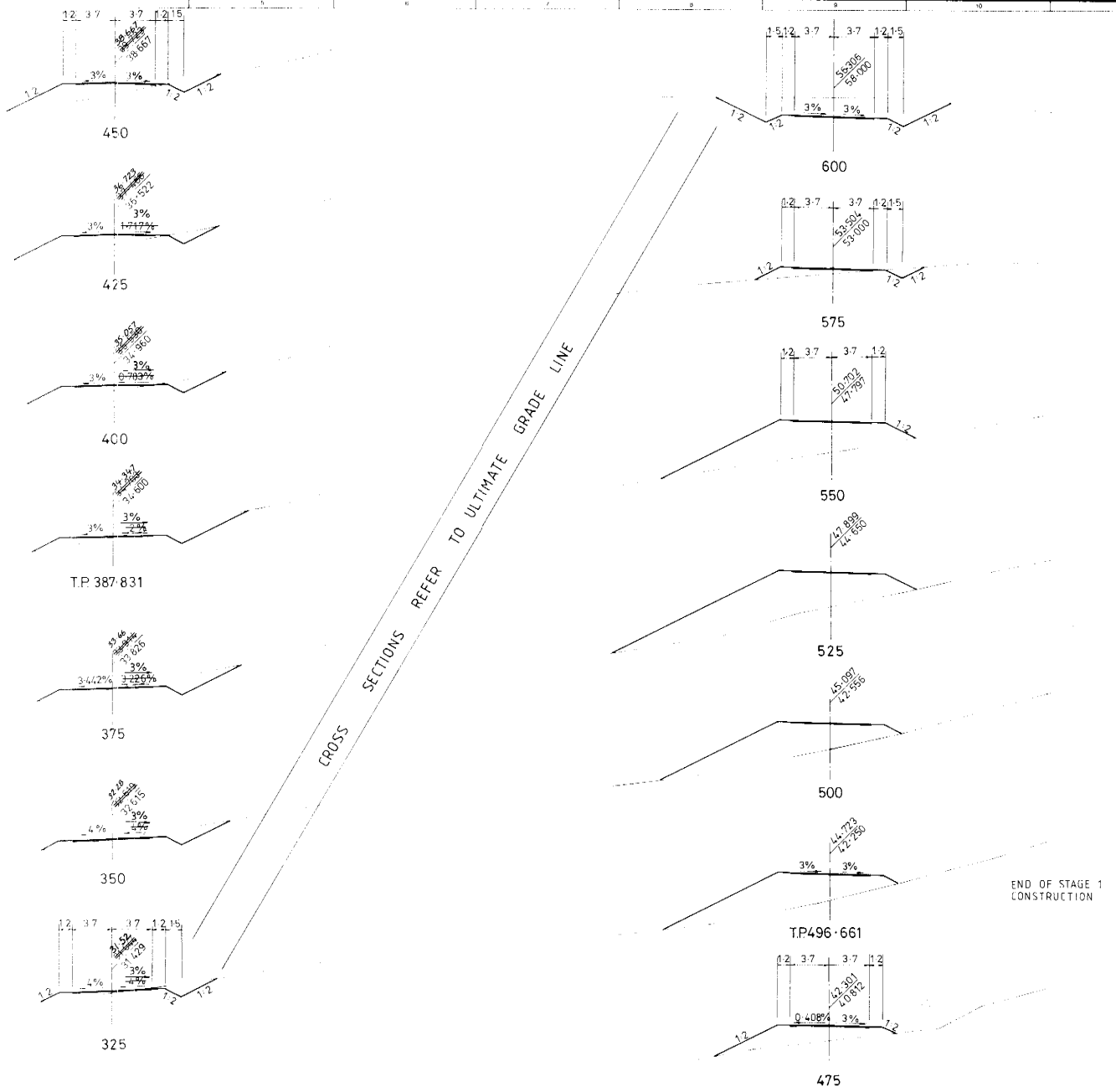
SCALES	1:200
PROJECT MANAGER	S. HOLLIS
DESIGN	S. H.
DRAWN	D. G.
APPROVED / DATE	24.84

WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
CROSS SECTIONS
CH 25 TO CH 300

DRAWING No. 2798-01-14

SIZE A1 841 x 594



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CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

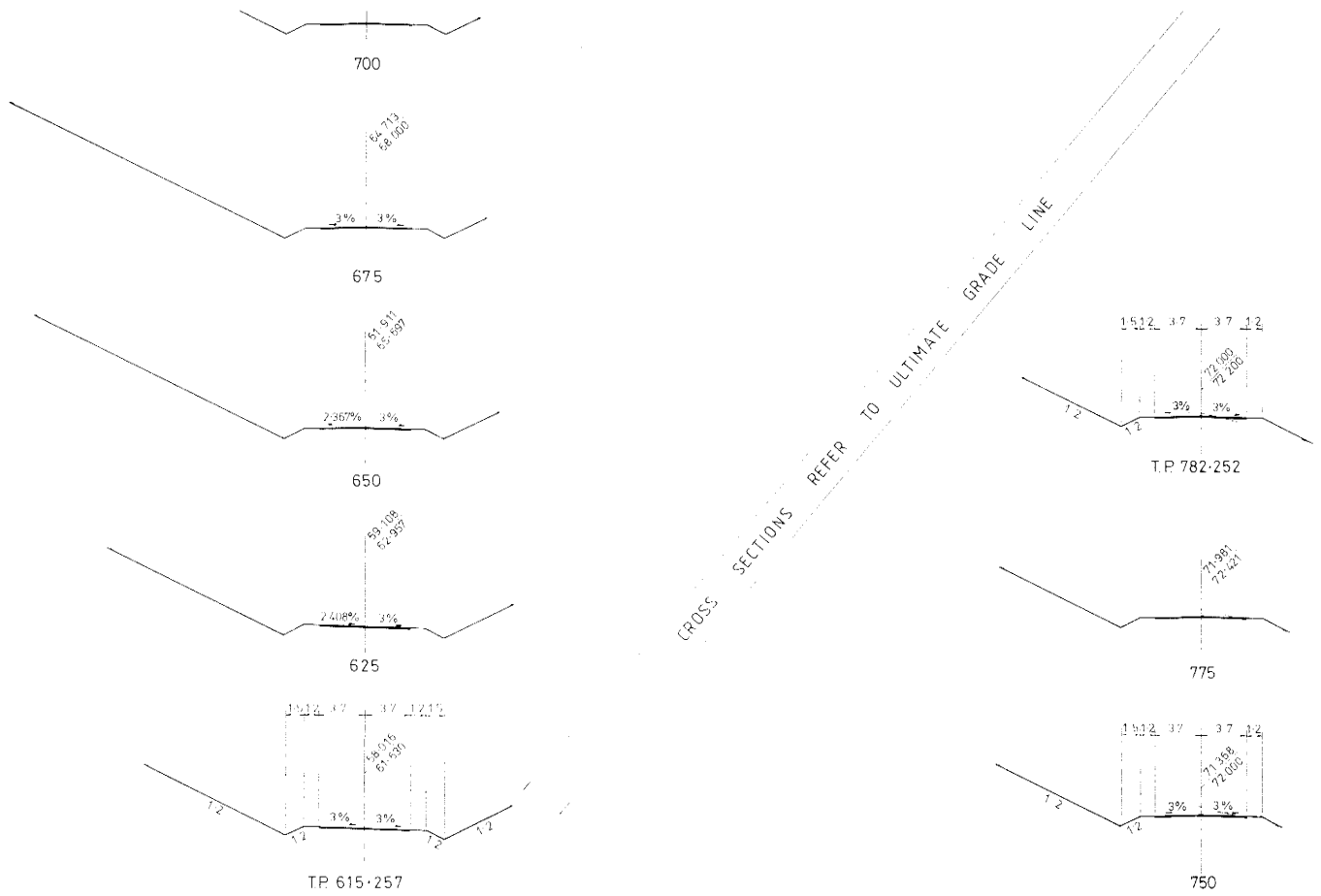
SCOTT & FURPHY CONSULTING GROUP

SCALES	1:200
PROJECT MANAGER	S HOLLIS
DESIGN	S.H
DRAWN	D.G.
APPROVED	DATE 24.84

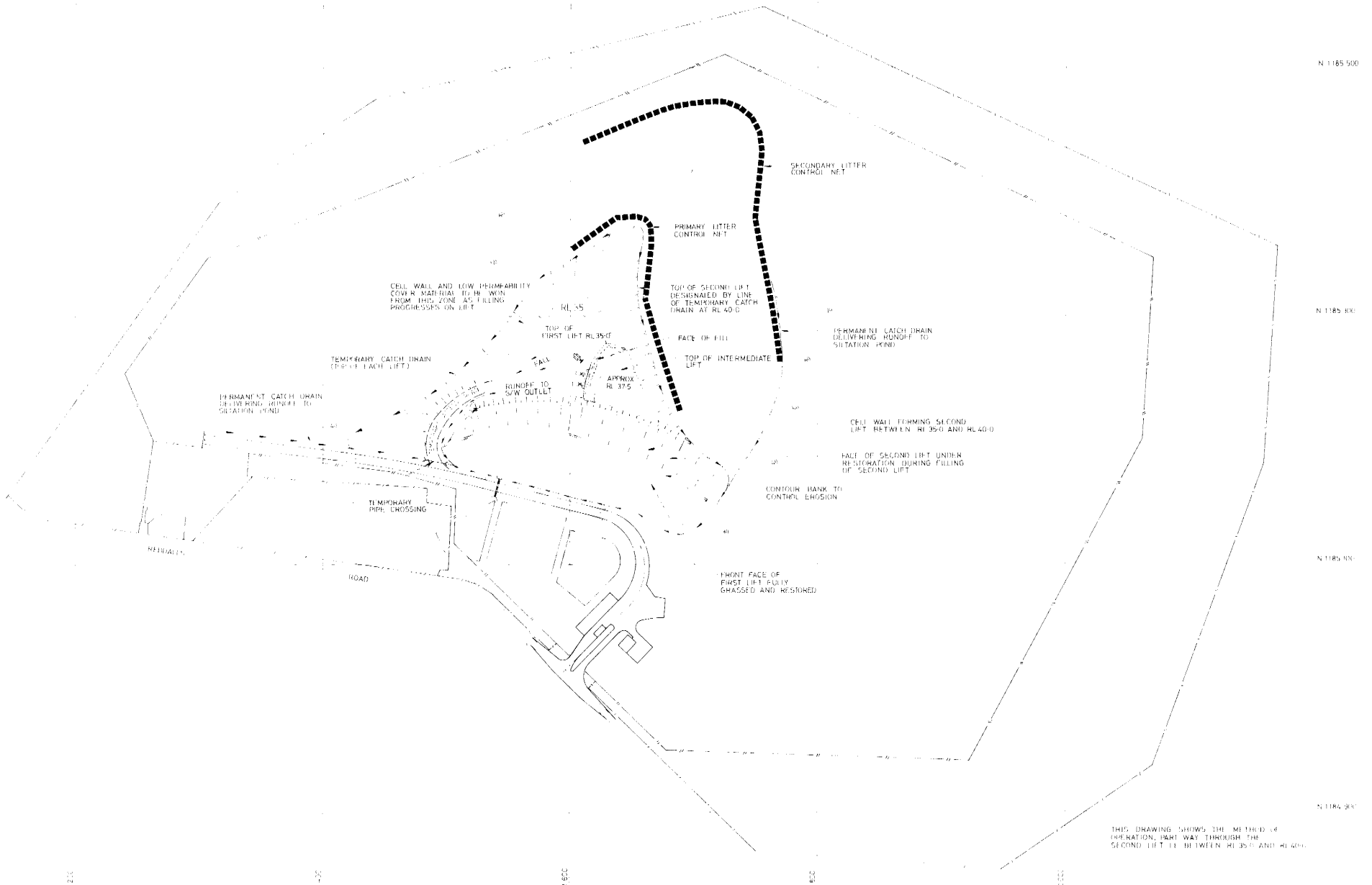
WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
CROSS SECTIONS
CH 325 TO CH 600

DRAWING No. 2798-01-15



SCOTT & FURPHY ENGINEERS PTY. LTD. CONSULTING ENGINEERS & PLANNERS 74 EMU BANK, BELCONNEN TOWN CENTRE CANBERRA A.C.T. 2617 TELEPHONE (062) 512077 AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON	SCOTT & FURPHY CONSULTING GROUP	SCALE: 1:200 PROJECT MANAGER: S. HOLLIS DESIGN: S.H. DRAWN: D.D. APPROVED: DATE:	WOLLONGONG CITY COUNCIL WHYTES GULLY LANDFILL SITE CROSS SECTIONS CH T.P. 615·257 TO CH T.P. 782·252	DRAWING No. 2798-01-16



SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

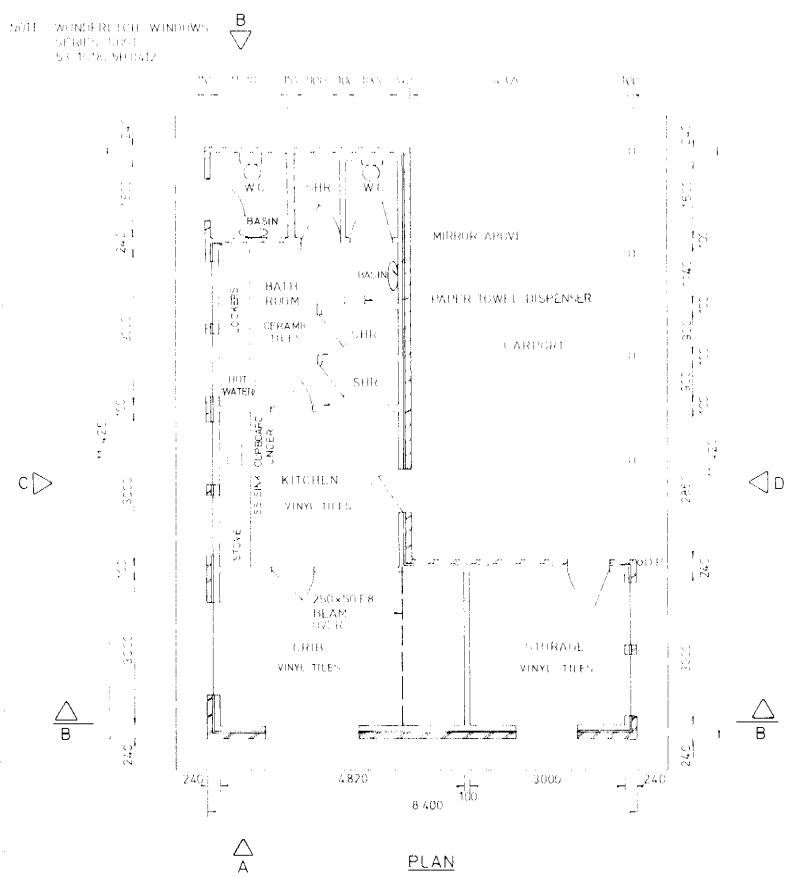
1:1500

S. HOLLIS
S.H
D.R

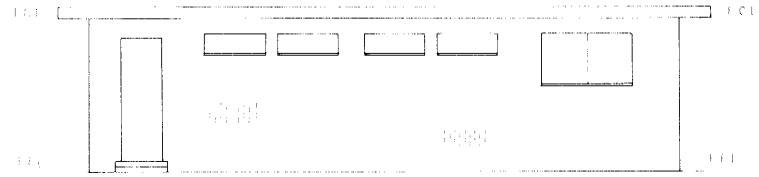
WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
OPERATING DIAGRAM

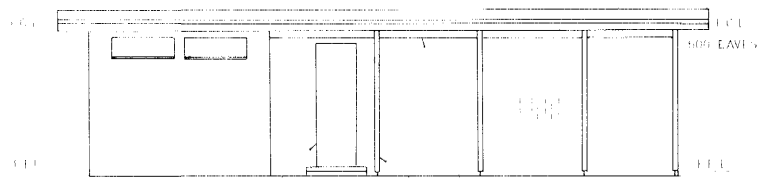
2798-01-17A



PLAN

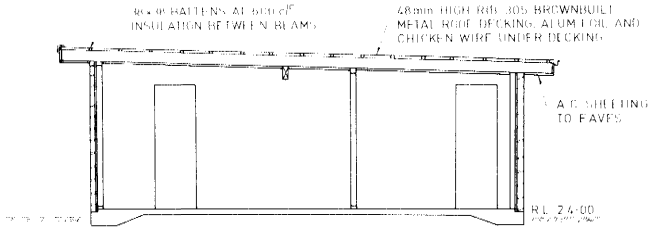


ELEVATION C



ELEVATION D

150×38 F.B. BEAM UNDER 100×100 OREGON POSTS AT 2000c/c BOLTED TO STEEL LEGS SET IN CONCRETE



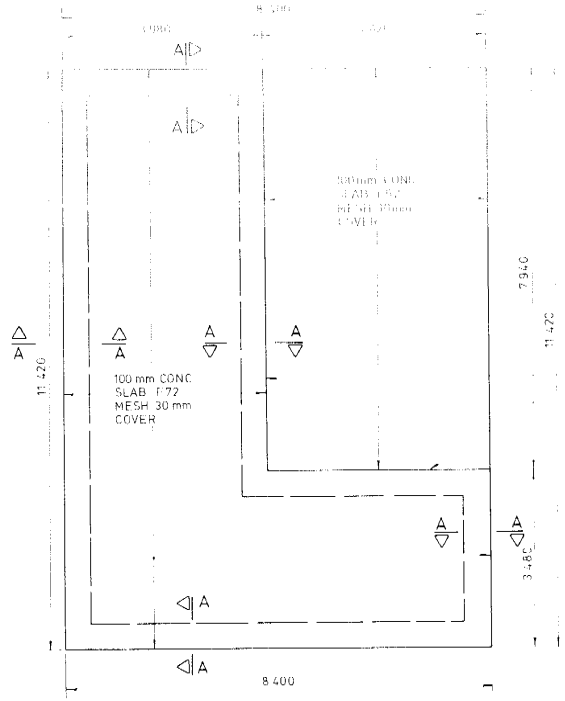
SECTION B-B

NOTES

1. ALL EXTERNAL DOOR FACES TO BE PROTECTED WITH 3mm STEEL PLATE TO PREVENT VANDALISM OR BREAK INS.
2. ALL EXTERNAL WINDOWS TO BE FITTED WITH 1.81 ARC MESH CUT TO FORM SHUTTERS WELDED TO 38×38×3 L. FRAMES AND LOXINED TO EXTERNAL WALLS.
3. 150 mm HIGH TILE SKIRTING TO BE PLACED IN ALL WET AREAS WITH CERAMIC TILES.

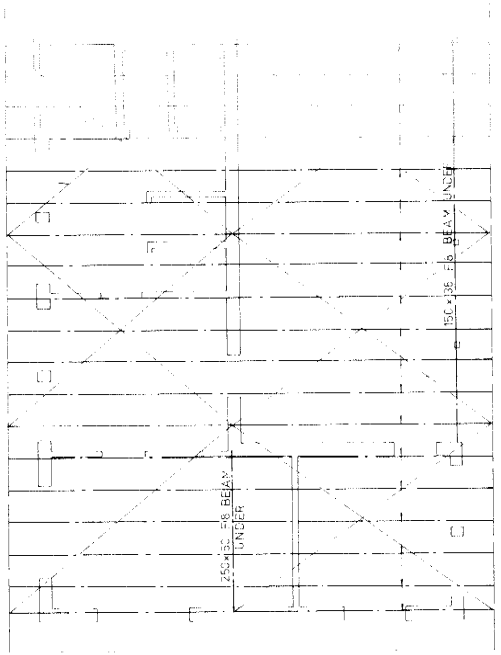
 P331/17

SCOTT & FURPHY ENGINEERS PTY. LTD. CONSULTING ENGINEERS & PLANNERS 74 EMU BANK, BELCONNEN TOWN CENTRE CANBERRA A.C.T. 2617 TELEPHONE (062) 512077 AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON	SCOTT & FURPHY CONSULTING GROUP	SCALE 1:500 PROJECT MANAGER S. HOLLER DESIGN S.H. DRAWN D.G. APPROVED DATE	WOLLONGONG CITY COUNCIL WHYTES GULLY LANDFILL SITE PROPOSED AMENITIES BLOCK	DRAWING No. 2798-01-18

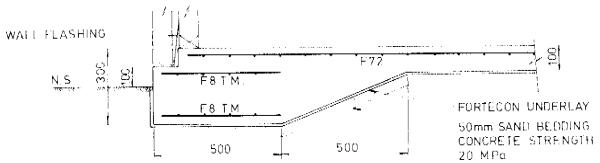


FOUNDATION PLAN

12mm BITUMASTIC JOINT



BEAM PLAN



SECTION A-A
SCALE 1:10

NOTES:

1 ROOF BEAMS TO BE TIED DOWN TO FLOOR SLAB WITH METAL STRAPS OR M16 BOLTS.

2 ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH A.S 1684 - 1979 "LIGHT TIMBER FRAMING CODE".

3 DECKING TO BE FIXED TO BEAMS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND TO SATISFY THE WIND LOAD REQUIREMENTS WITHIN A TERRAIN CATEGORY 3 WIND AREA.

 P331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

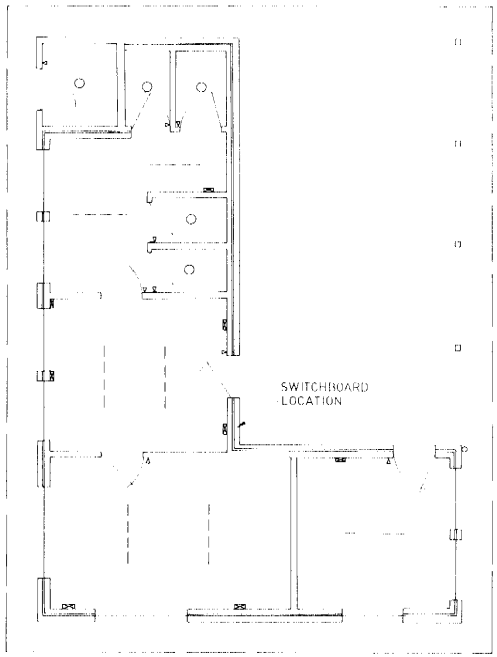
SCOTT & FURPHY CONSULTING GROUP

SCALE	1:50
PROJECT MANAGER	S. HOLLIS
DESIGN	S.H.
DRAWN	D.G.
APPROVED	DATE 24.5.84

WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
PROPOSED AMENITIES BLOCK

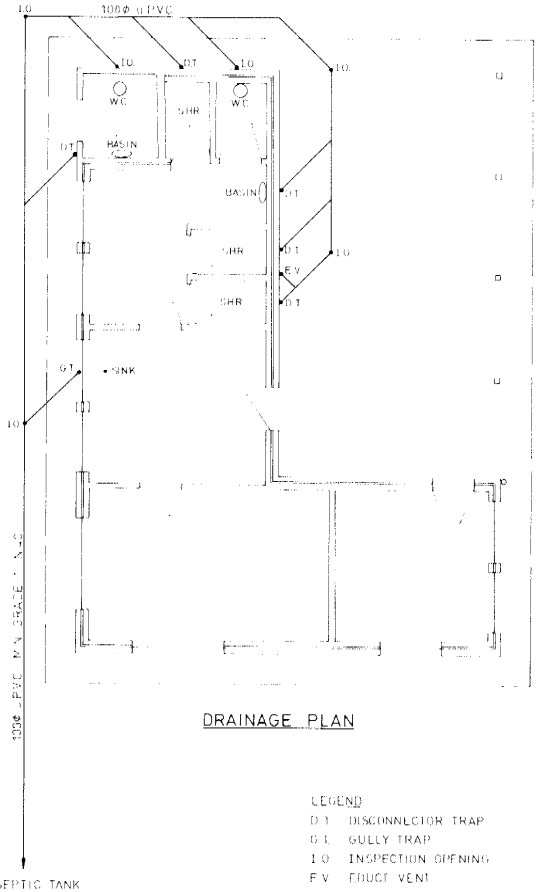
DRAWING No. 2789 - 01 - 19



ELECTRICAL LAYOUT

LEGEND

- 40 W FLUORESCENT LIGHT FITTINGS
- INCANDESCENT LIGHT FITTINGS
- LIGHT SWITCHES
- DOUBLE POWER POINTS



TO SEPTIC TANK

DRAINAGE PLAN

LEGEND

- D.T. DISCONNECTOR TRAP
- G.T. GULLY TRAP
- I.O. INSPECTION OPENING
- F.V. FOUCT VENT

 P331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
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TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

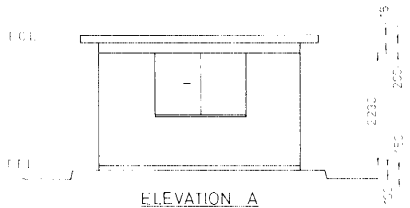
SCOTT & FURPHY CONSULTING GROUP

SCALE	1:50
DESIGN MANAGER	S. HOLLIS
DESIGN	S.H.
DRAWN	D.G.
APPROVED	DATE 4.84

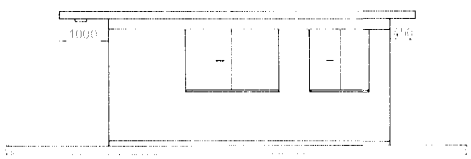
WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
PROPOSED AMENITIES BLOCK
ELECTRICAL LAYOUT AND DRAINAGE PLAN

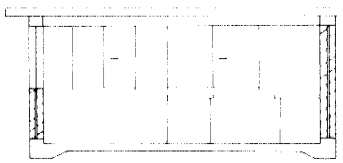
DRAWING No. 2798 01 20



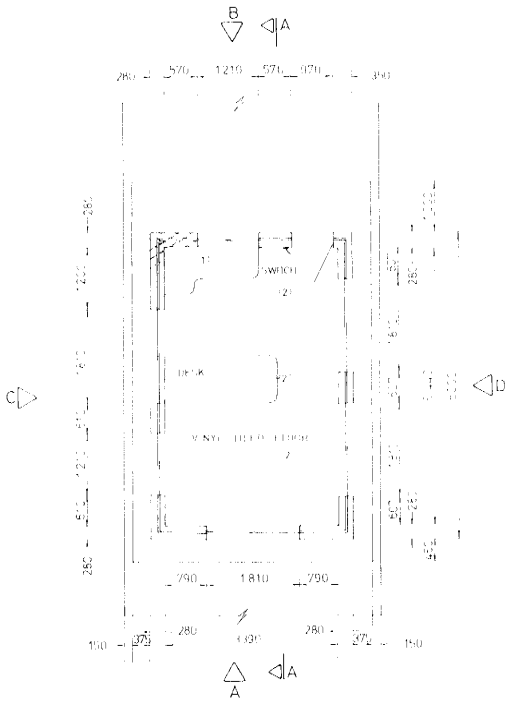
ELEVATION A



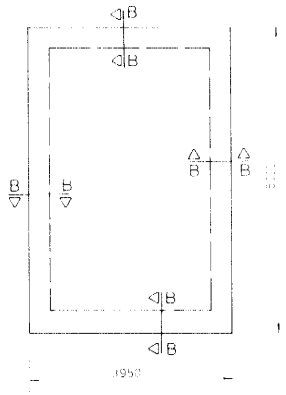
ELEVATION C



SECTION A - A

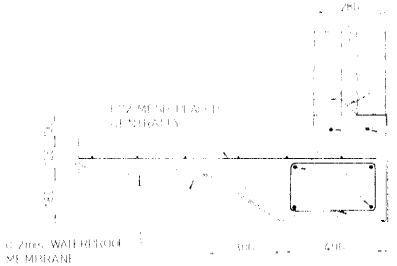


FLOOR PLAN
SCALE 1:50



FOUNDATION PLAN

ROOF DETAIL
SCALE 1:10

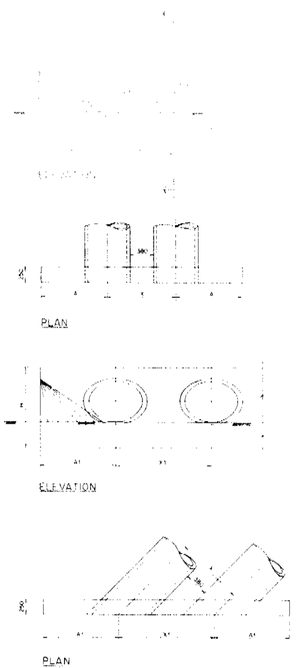


FLOOR DETAIL - SECTION B B
SCALE 1:10

NOTES:

23 of 29 P 331/17

SCOTT & FURPHY ENGINEERS PTY. LTD. CONSULTING ENGINEERS & PLANNERS 74 EMU BANK, BELCONNEN TOWN CENTRE CANBERRA A.C.T. 2617 TELEPHONE (062) 512077 AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON	SCOTT & FURPHY CONSULTING GROUP	WOLLONGONG CITY COUNCIL WHYTES GULLY LANDFILL SITE DETAILS OF WEIGHBRIDGE OFFICE 2798-01-21

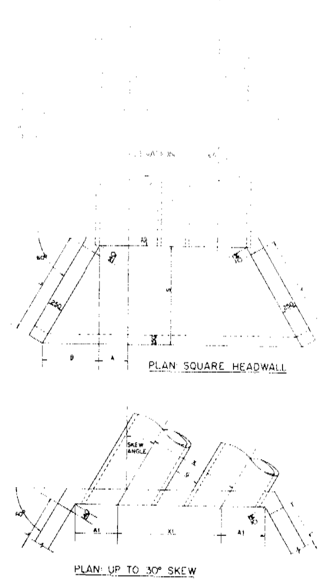


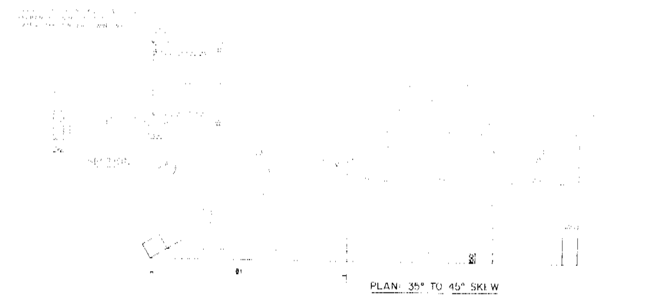
NOMINAL PIPE SIZE d	D	H	A	X	Q	AC
	SKEW 0°					
375	445	970	653	825	0.56	0.32
450	533	1058	788	913	0.72	0.37
525	616	[illegible]	918	996	0.90	0.42
600	699	1224	1049	1079	[illegible]	0.47
675	78[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	SKEW 15°					
	D	H	A1	X1	Q	AC
375	AS	AS	656	854	[illegible]	0.33
450			790	947	[illegible]	[illegible]
525	FOR	FOR	92[illegible]	[illegible]	[illegible]	[illegible]
600			1057	[illegible]	[illegible]	0.49
675	0°	0°	1185	1202	[illegible]	0.54
	SKEW 30°					
375	AS	AS	662	953	[illegible]	[illegible]
450			799	1054	[illegible]	[illegible]
525	FOR	FOR	931	[illegible]	[illegible]	0.48
600			1063	1246	[illegible]	0.54
675	0°	0°	[illegible]	[illegible]	[illegible]	0.60
	SKEW 45°					
375	AS	AS	677	[illegible]	[illegible]	[illegible]
450			817	[illegible]	[illegible]	[illegible]
525	FOR	FOR	952	[illegible]	[illegible]	[illegible]
600			1087	1526	[illegible]	0.66
675	0°	0°	1224	[illegible]	[illegible]	0.73

Q - CUBIC METERS OF CONCRETE REQUIRED FOR TWO ENDWALLS FOR FIRST CELL

AC - CUBIC METERS OF CONCRETE REQUIRED FOR [illegible] ADDITIONAL CELL

ALL CONCRETE SHALL BE CLASS [illegible] MPa [illegible]





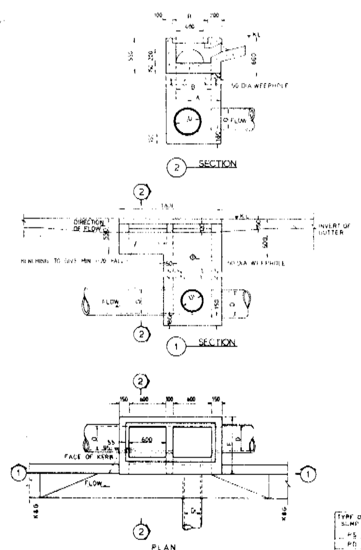
NOMINAL PIPE SIZE d	D	H	A	X	[illegible]	[illegible]	[illegible]	[illegible]	Q	AC
	SKEW 0°									
750	864	[illegible]	[illegible]	[illegible]	380	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
900	[illegible]	[illegible]	[illegible]	[illegible]	380	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1050	[illegible]	[illegible]	[illegible]	[illegible]	380	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1200	[illegible]	[illegible]	[illegible]	765	406	2205	[illegible]	[illegible]	[illegible]	[illegible]
1350	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1500	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1800	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1950	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	SKEW 15°									
	D	H	A1	X1	C	L	B	S	Q	AC
750	A	A	520	1288	A	A	A	A	2.48	0.95
900	S	S	[illegible]	1450	S	S	S	S	3.17	[illegible]
1050			650	1629					3.94	[illegible]
1200	F	F	[illegible]	[illegible]	F	F	F	F	4.79	[illegible]
1350	O	O	[illegible]	2051	O	O	O	O	[illegible]	[illegible]
1500	R	R	[illegible]	2261	R	R	R	R	6.66	2.55
1800			[illegible]	[illegible]					8.91	3.47
1950	0°	0°	[illegible]	2958	0°	0°	0°	0°	10.30	4.08

NOMINAL PIPE SIZE d	D	H	A1	X1	C	L	B	S	Q	AC	
	SKEW 30°										
750	A	A	520	1435	A	A	A	A	[illegible]	[illegible]	
900	S	S	670	1627	S	S	S	S	[illegible]	[illegible]	
1050			760	1817					4.34	[illegible]	
1200	F	F	[illegible]	2038	F	F	F	F	[illegible]	[illegible]	
1350	O	O	[illegible]	[illegible]	O	O	O	O	[illegible]	[illegible]	
1500	R	R	[illegible]	[illegible]	R	R	R	R	[illegible]	[illegible]	
1800			[illegible]	[illegible]					[illegible]	4.87	
1950	0°	0°	[illegible]	[illegible]	0°	0°	0°	0°	[illegible]	[illegible]	
	SKEW 45°										
	[illegible]	H	A2	A5	X1	C	[illegible]	B1	S1	Q	AC
750	A	A	539	686	1759	A	[illegible]	2445	[illegible]	5.36	[illegible]
900	S	S	546	803	1993	S	[illegible]	2650	[illegible]	[illegible]	1.65
1050			754	919	2226		3340	3268	1887	5.55	2.00
1200	F	F	863	1036	2496	F	[illegible]	3683	2127	6.49	2.44
1350	O	O	970	[illegible]	2801	O	[illegible]	4092	2362	7.74	2.96
1500	R	R	1078	1260	3089	R	[illegible]	4489	[illegible]	[illegible]	[illegible]
1800			1293	1494	3698		5700	5312	3067	12.05	4.81
1950	0°	0°	[illegible]	1629	[illegible]	0°	6216	5759	3327	13.48	5.64

Q - CUBIC METERS OF CONCRETE REQUIRED FOR TWO HEADWALLS FOR FIRST CELL

AC - CUBIC METERS OF CONCRETE REQUIRED FOR EACH ADDITIONAL CELL

ALL CONCRETE SHALL BE CLASS [illegible]



TYPE OF SUMP	DESCRIPTION	A	B	F			MAX DEPTH TO ℄ OF SUMP/PIPE
PS	SINGLE LOWPOINT SUMP	535	560	860			1200
PD	DOUBLE SUMP	535	560	860			1200
QS	SINGLE LOWPOINT SUMP	600	830	1130			1800
QD	DOUBLE SUMP	600	830	1130			1800
R	DOUBLE (FULL DEPTH) SUMP	AS SHOWN					2750

DOUBLE SUMP - TYPES PD AND QD ON KERB AND GUTTER

24 of 29 P331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS

74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

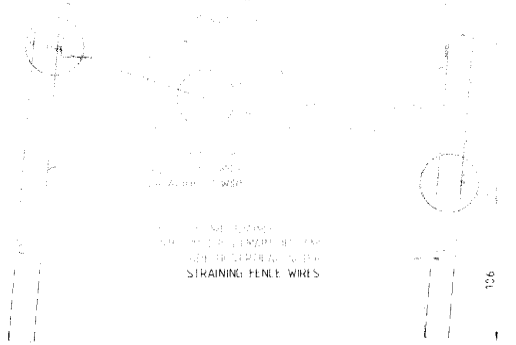
SCOTT & FURPHY CONSULTING GROUP

SCALES
PROJECT MANAGER S. HOLLIS
DESIGN
DRAWN
APPROVED [signature] DATE 2.4.84

WOLLONGONG CITY COUNCIL

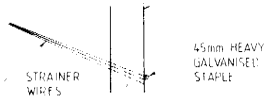
WHYTES GULLY LANDFILL SITE
STANDARD DETAILS

DRAWING No. 2798-01-22

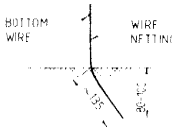


FENCE END / STRAINER ASSEMBLY ALTERNATIVE N°1

N.B. REFER ELSEWHERE FOR ALTERNATIVES OF WIRE ASSEMBLY

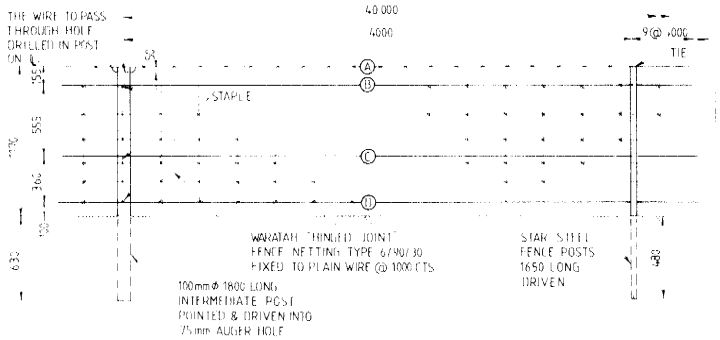


DETAIL B
N.T.S.

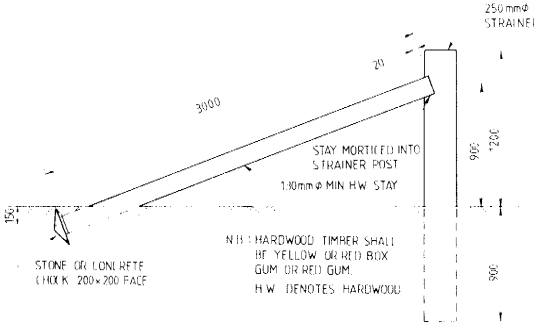


DETAIL D
N.T.S.

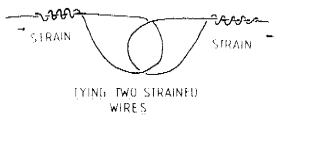
STOCK & VERMIN PROOF FENCE



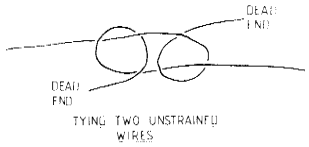
RINGLOCK / HINGE JOINT FENCE
SCALE 1:20



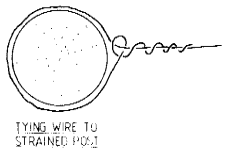
FENCE END / STRAINER ASSEMBLY — ALTERNATIVE N°2
SCALE 1:20



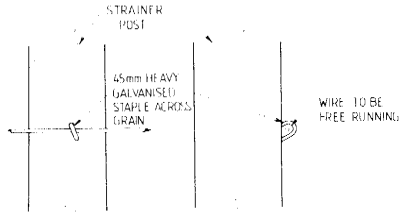
TYING TWO STRAINED WIRES



TYING TWO UNSTRAINED WIRES



WIRE TYING DETAILS
N.T.S.



STAPLE DETAIL
N.T.S.

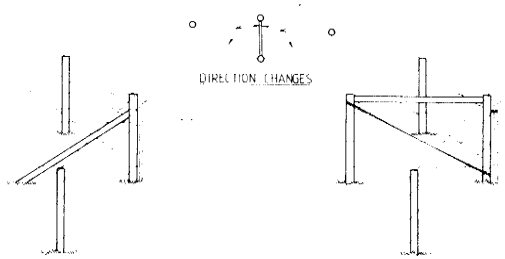
WIRE TYPES

- (A) 1·6mm HT GALV BARBED WIRE
- (B) 2·8mm HT GALV FENCE WIRE (SELVAGE OR CARRY WIRE)
- (C) 2·5mm HT GALV "TYEASY" FENCE WIRE (BELLY WIRE)
- (D) 2·5mm HT GALV "TYEASY" FENCE WIRE (BOTTOM WIRE)

HT : DENOTES HIGH TENSION

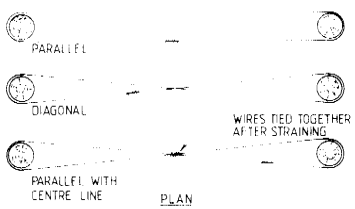
NOTES

1. EXCEPT WHERE INDICATED OTHERWISE ALL TIMBER POSTS TO BE PINUS RADIATA IMPREGNATED BY THE TANALITH PROCESS.
2. POST DIAMETERS ARE MINIMUM & SMALLER END SHALL BE PLACED IN GROUND.
3. PLAIN WIRES TO RUN THROUGH HOLES IN 'STAR' STEEL POSTS.
4. 'STAR' STEEL POSTS TO BE BLACK VARNISHED.
5. WIRE TENSIONS
   - 4mm SOFT FENCE WIRE = 2·75kN
   - 2·8mm HT FENCE WIRE = 3·0kN
   - 2·5mm TYEASY HT FENCE WIRE = 2·0kN
   - 1·6mm HT BARBED WIRE = 1·5kN
6. WIRE NETTING & HINGED FENCING TO BE FIXED BY TWITCHER WIRE "GERRARD" RING FASTENERS NOT PERMITTED.
7. GATEWAYS. FOR DETAILS REFER SHEET 2.

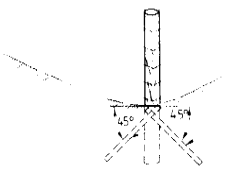


STRAINER ASSEMBLY ALTERNATIVES NTS

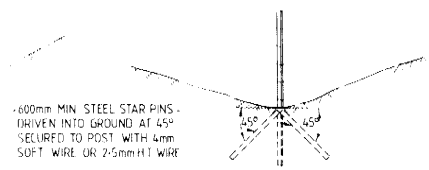
LOCATION 200m MAX ON STRAIGHTS
AT CHANGES IN DIRECTION
AT CREEK CROSSINGS ETC
AT FENCE ENDS : AT GATEWAYS



STRAINER WIRE ASSEMBLY ALTERNATIVES



SECURING OF TIMBER POSTS IN HOLLOWS
N.T.S.



SECURING 'STAR' STEEL FENCE POSTS IN HOLLOWS
N.T.S.

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE SYDNEY, PERTH, HOBART AND LAUNCESTON

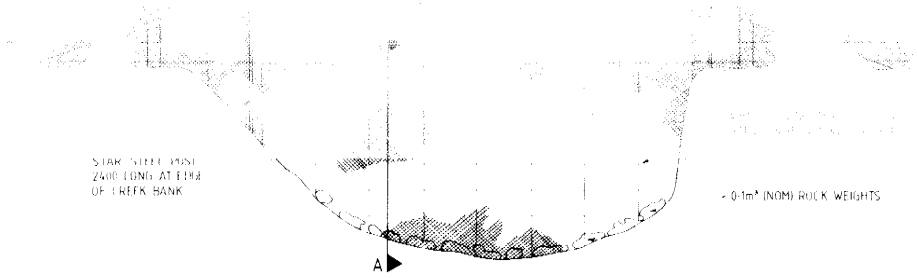
SCOTT & FURPHY CONSULTING GROUP

SCALE	AS SHOWN
TECH. MANAGER	
DESIGN	
DRAWN	J. McP.
APPROVED	DATE 2.4.86

WOLLONGONG CITY COUNCIL

STANDARD FENCING DETAILS
SHEET 1

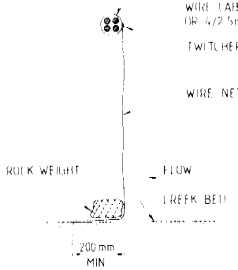
DRAWING NO. 2798-01-23



FLOODGATE FOR STOCK & VERMIN PROOF FENCE

(DEEP CREEK - 750mm DEEP
IF > 750mm DEEP USE SHALLOW
CREEK STANDARD)

SCALE 1:50



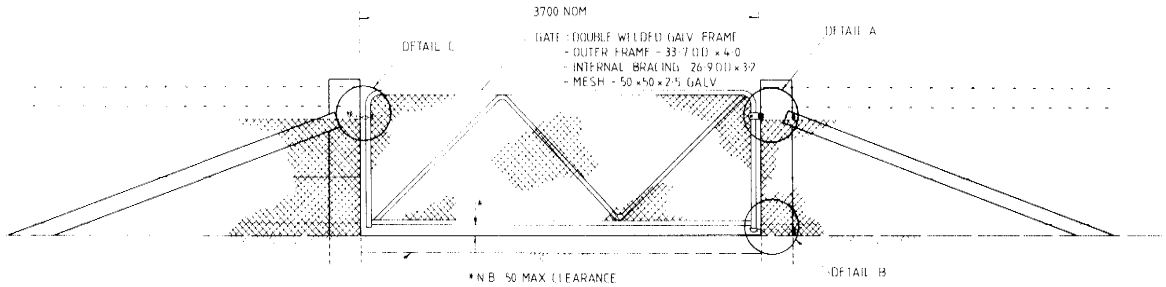
SECTION A-A

NTS

FLOODGATE FOR RINGLOCK/HINGEJOINT FENCE

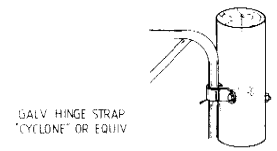
(SHALLOW CREEK - < 750mm DEEP
IF > 750mm DEEP USE DEEP
CREEK STANDARD.

SCALE 1:50



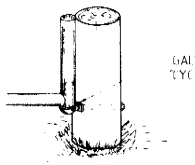
ELEVATION

SCALE 1:20



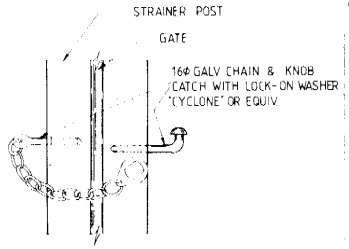
DETAIL A

NTS



DETAIL B

NTS



DETAIL C

NTS

FIELD GATE ASSEMBLY

NOTES

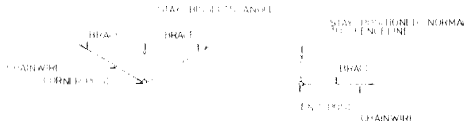
1. REFER SHEET Nº1 FOR GENERAL NOTES.
2. GATE ERECTION DETAILS TO MANUFACTURERS SPECIFICATIONS

SCOTT & FURPHY ENGINEERS PTY. LTD. CONSULTING ENGINEERS & PLANNERS. 74 EMU BANK, BELCONNEN TOWN CENTRE, CANBERRA A.C.T. 2617. TELEPHONE (062) 512077. AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON	SCOTT & FURPHY CONSULTING GROUP	SCALES: AS SHOWN; PROJECT MANAGER; DESIGN; DRAWN: D.B; APPROVED; DATE	WOLLONGONG CITY COUNCIL STANDARD FENCING DETAILS SHEET 2

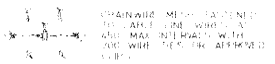
DRAWING No.: 2798-01-24

TYPES 3A & 3B

DETAIL OF CONNECTION OF WIRE MESH TO TERMINAL POSTS

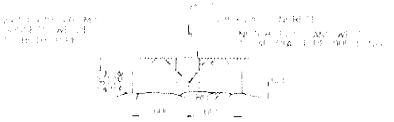


STAY AND BRACE POSITIONS



DETAIL AT BARBED SELVAGE

TYPE 3A TYPE 3B



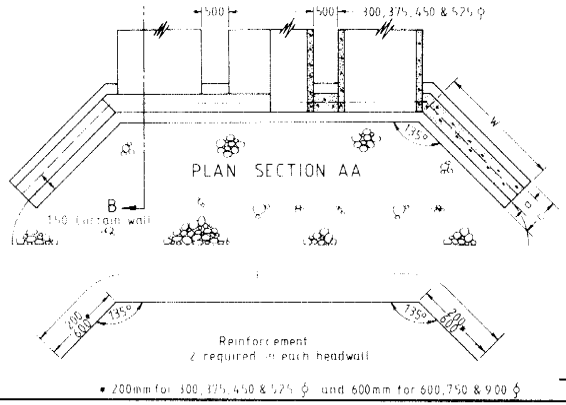
ALTERNATIVE POST HOLE WHEN ROCK NEAR SURFACE

NOTE :

1. ALL POST DIAMETERS SHOWN ARE NOMINAL SIZES.
2. ALL POSTS AND BRACES ARE MEDIUM DUTY GALVANISED IRON AS SPECIFIED.
3. ALL POSTS SHALL BE FITTED WITH APPROVED CAPS.
4. ALL WELDED JOINTS SHALL HAVE SMOOTH CONTINUOUS HEAT WELDS AND AFTER FABRICATION SHALL BE PAINTED WITH TWO COATS OF APPROVED GALVANISED ZINC PRIMER.
5. GATES TO BE ERECTED AS PER MANUFACTURER'S SPECIFICATION.
6. [illegible] 3 STRAND BARBED WIRE STRAINED TO [illegible] CHAINWIRE MESH AS SPECIFIED.

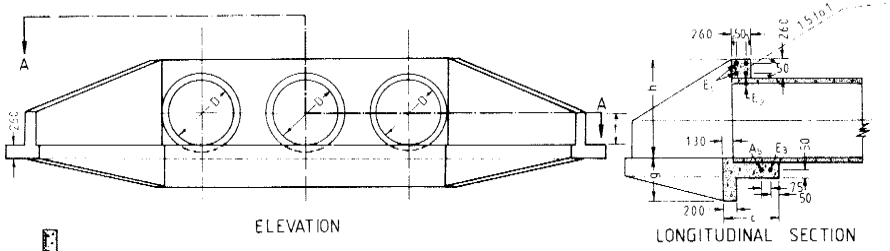
27 of 29 P 331/17

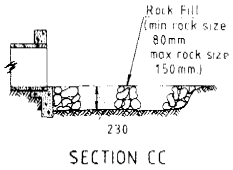
	SCOTT & FURPHY ENGINEERS PTY. LTD. CONSULTING ENGINEERS & PLANNERS 74 EMU BANK, BELCONNEN TOWN CENTRE CANBERRA A.C.T. 2617 TELEPHONE (062) 512077 AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON	SCOTT & FURPHY CONSULTING GROUP		WOLLONGONG CITY COUNCIL	
				MANPROOF FENCING DETAILS	2798 01-25

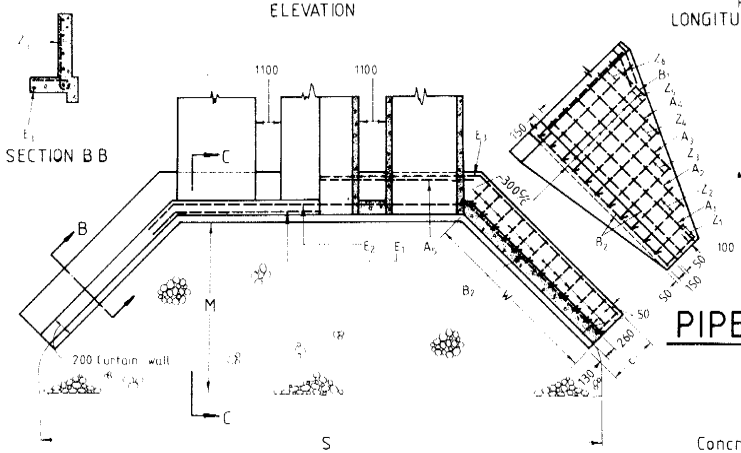


D	Pipe diameter (mm)	300	375	450	525	600	750	900
a	Footing and Kerb (mm)	150	150	150	150	180	205	230
b	Curtain wall (mm)	75	75	75	75	110	110	110
c	Curtain wall width (mm)	300	300	300	300	450	450	450
d	Kerb height (mm)	230	230	230	230	300	300	300
e	Kerb cover (mm)	40	40	40	40	50	50	50
f	Headwall height (mm)	300	300	300	300	380	380	380
g	Curtain wall depth (mm)	380	380	380	380	530	530	530
W	Headwall length (mm)	500	690	840	990	1120	1450	1780
L	Reinforcement length (mm)	2500	2750	3000	3250	4500	5000	5500
Reinforcement dia (mm)		10	10	10	10	12	12	12
Reinforcement in two headwalls	Length (mm)	10	11	12	13	18	20	22
	Mass (kg)	6.2	6.8	7.4	8.0	16.0	17.8	19.6
Conc in two headwalls (m³)		0.95	1.04	1.25	1.45	2.61	3.64	4.88
M	Outlet protection (m)	1.2	1.6	2.4	3.1	3.6	4.3	4.8
S	Outlet protection (m)	2.2	2.7	3.2	3.6	4.0	4.9	5.9

PIPE DIAMETERS 300 TO 900







D	Pipe diameter (mm)	1050	1200	1350	1500	1800
h	Headwall height (mm)	1350	1550	1700	1900	2210
g	Curtain wall depth (mm)	600	600	700	700	750
c	Curtain wall width (mm)	700	700	700	900	900
f	Headwall height (mm)	450	450	530	530	600
W	Headwall length (mm)	1930	2300	2490	2850	3400
Conc in two headwalls (m³)		7.3	8.7	10.3	13.3	16.9
M	Outlet protection (m)	5.5	6.1	6.7	7.3	8.5
S	Outlet protection (m)	8.8	9.8	10.5	11.6	13.3

PIPE DIAMETERS 1050 TO 1800

Concrete Grade 15 MPa
All dimensions are in millimetres

			1500	1700	1700	4	6.80	6.04
			1800	2350	2350	4	9.40	8.35
	A_4	12	1800	1750	1750	4	7.00	6.22
	A_5	12	1350			2		
			1500					
			1800					
	B_1	12	1050	650	950	4	3.80	3.37
			1200	1000	1300	4	5.20	4.62
			1350	700	1000	4	4.00	3.55
			1500	1100	1400	4	5.60	4.97
			1800	1100	1400	4	5.60	4.97
	B_2	12	1050	1950	2250	8	18.00	15.98
			1200	2350	2650	8	21.20	18.83
			1350	2525	2825	8	22.80	20.25
			1500	2850	3150	8	25.20	22.38
			1800	3450	3750	8	30.00	26.64
	E_1	12	1050	5800	7300	4	29.20	25.93
			1200	6250	7750	4	31.00	27.28
			1350	6770	8270	4	33.08	29.38
			1500	7230	8730	4	34.92	31.01
			1800	8210	9720	4	38.88	34.53
	E_2	12	1050	6000	7500	4	30.00	26.64
			1200	6450	7950	4	31.80	28.24
			1350	6970	8470	4	33.88	30.09
			1500	7430	8930	4	35.72	31.72
			1800	8420	9920	4	39.68	34.24
*	E_3	12	1050	6210	10410	2	20.82	18.49
			1200	6690	11490	2	22.98	20.41
			1350	7200	12600	2	25.20	22.38
			1500	7810	13810	2	27.62	24.53
			1800	8800	16000	2	32.00	28.42
	Z_1	12	1050	580	1340	4	5.36	4.76
			1200	600	1360	8	10.88	9.66
			1350	700	1450	8	11.60	10.30
			1500	650	1650	8	13.20	11.72
			1800	650	650	8	13.20	11.72
	Z_2	12	1050	740	1520	8	12.16	10.80
			1200	900	1650	8	13.20	11.72
			1350	1000	1750	8	14.00	12.43
			1500	950	1950	8	15.60	13.85
			1800	1000	2000	8	16.00	14.21
	Z_3	12	1050	1010	1790	8	14.32	12.72
			1200	1200	1950	8	15.60	13.85
			1350	1300	2050	8	16.40	14.56
			1500	1200	2200	8	17.60	15.63
			1800	1250	2250	8	18.00	15.98
	Z_4	12	1050	1320	2100	8	16.80	14.92
			1200	1500	2250	8	18.00	15.98
			1350	1575	2325	8	18.60	16.52
			1500	1500	2500	8	20.00	17.76
			1800	1600	2600	8	20.80	18.47
	Z_5	12	1500	1800	2800	8	22.40	19.89
			1800	1850	2850	8	22.80	20.25
	Z_6	12	1800	2150	3150	8	25.20	22.38

* 1500 diameter and 1800 diameter only

28 of 29 P331/17

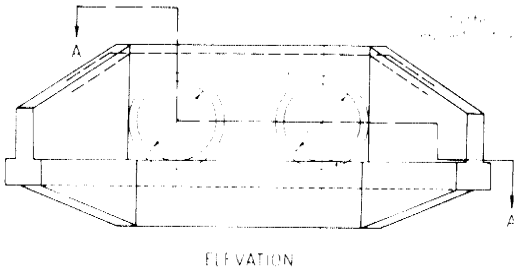
WOLLONGONG CITY COUNCIL

CONCRETE HEADWALLS FOR TRIPLE PIPE CULVERTS

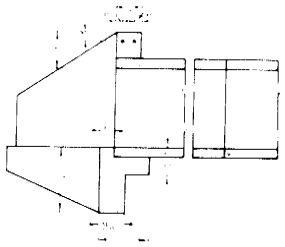
FILE No	No. OF SHEETS	SHEET No

Reg.No. 2798-01-26

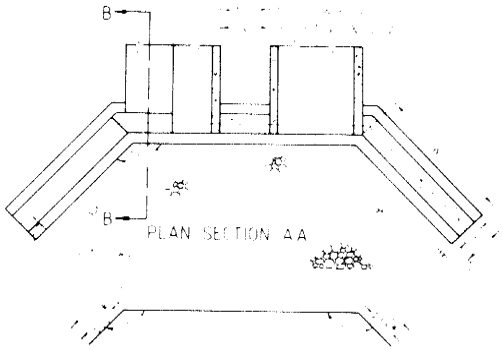
S.D. 1128



ELEVATION



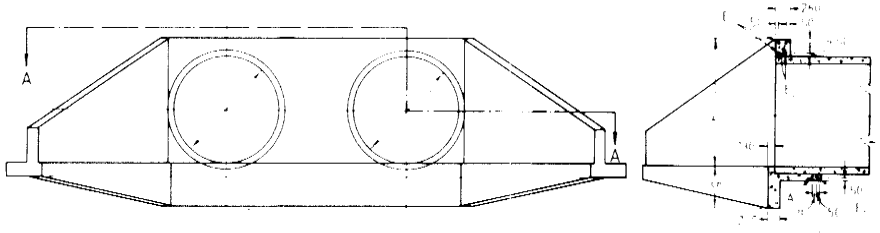
LONGITUDINAL SECTION BB



PLAN SECTION AA

Pipe diameter	mm	300	375	450	525	600	750	900
Footing and Key	mm							
Curtain wall	mm							
Curtain wall width	mm							
Kerb height	mm							
Kerb								
Headwall height	mm							
Headwall height	mm							
Reinforcement height	mm							
Reinforcement leg	mm							
Reinforcement number								
Reinforcement								

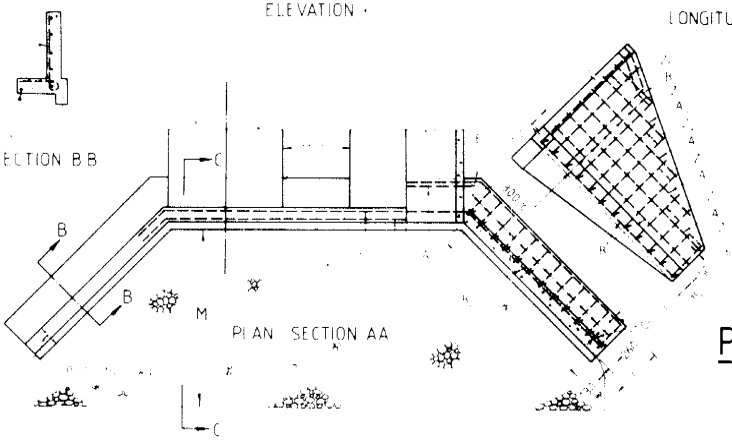
PIPE DIAMETERS 300 TO 900



ELEVATION

LONGITUDINAL SECTION

SECTION CC

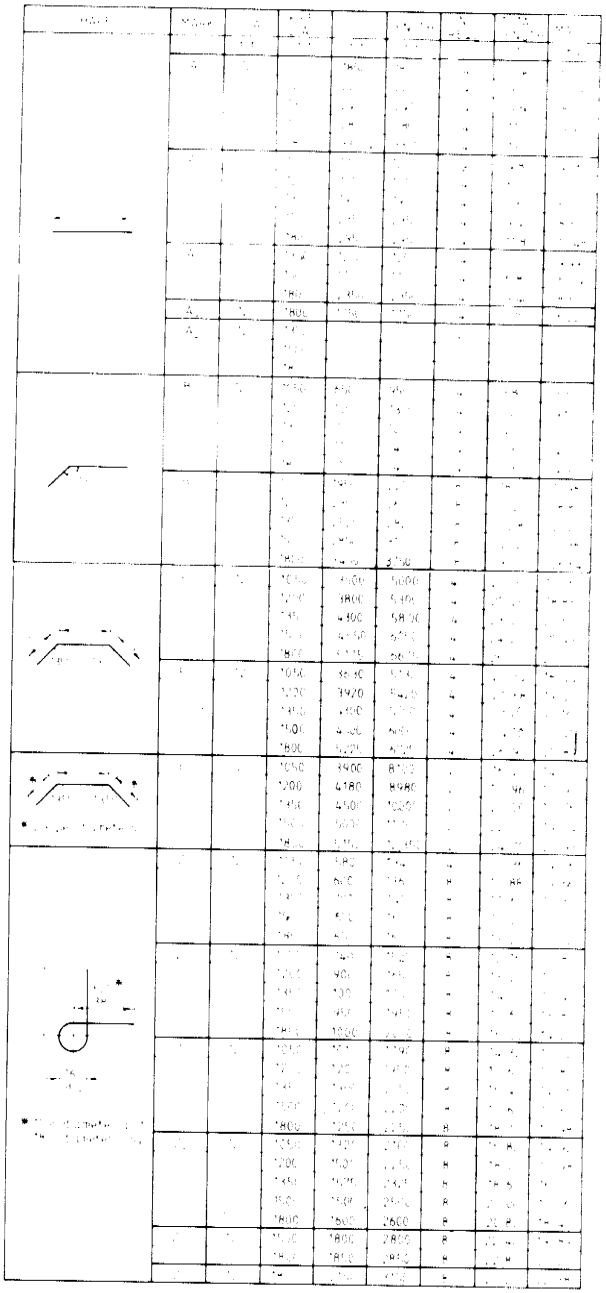


CONCRETE GRADE 15MPa
ALL DIMENSIONS ARE IN MILLIMETERS

D	Pipe diameter	mm	1050	1200	1350	1500	1800
h	Headwall height	(mm)	545	1050	1200	1350	1650
g	Curtain wall depth	(mm)	600	600	700	700	750
t	Curtain wall width	(mm)	300	300	375	900	900
f	Headwall height	(mm)	450	450	540	540	600
w	Headwall length	(mm)	1930	2300	2690	3050	3800
	Concrete two headwalls	(m)	6.0	8.2	9.3	11.8	14.9
M	Outlet protection	(m)	5.5	6.7	6.7	8	8
	Outlet protection	(m)	8.7	9.5	9.8	11	11

PIPE DIAMETERS 1050 TO 1800

REINFORCEMENT FOR HEADWALLS



P 331/17

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
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CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON

SCOTT & FURPHY CONSULTING GROUP

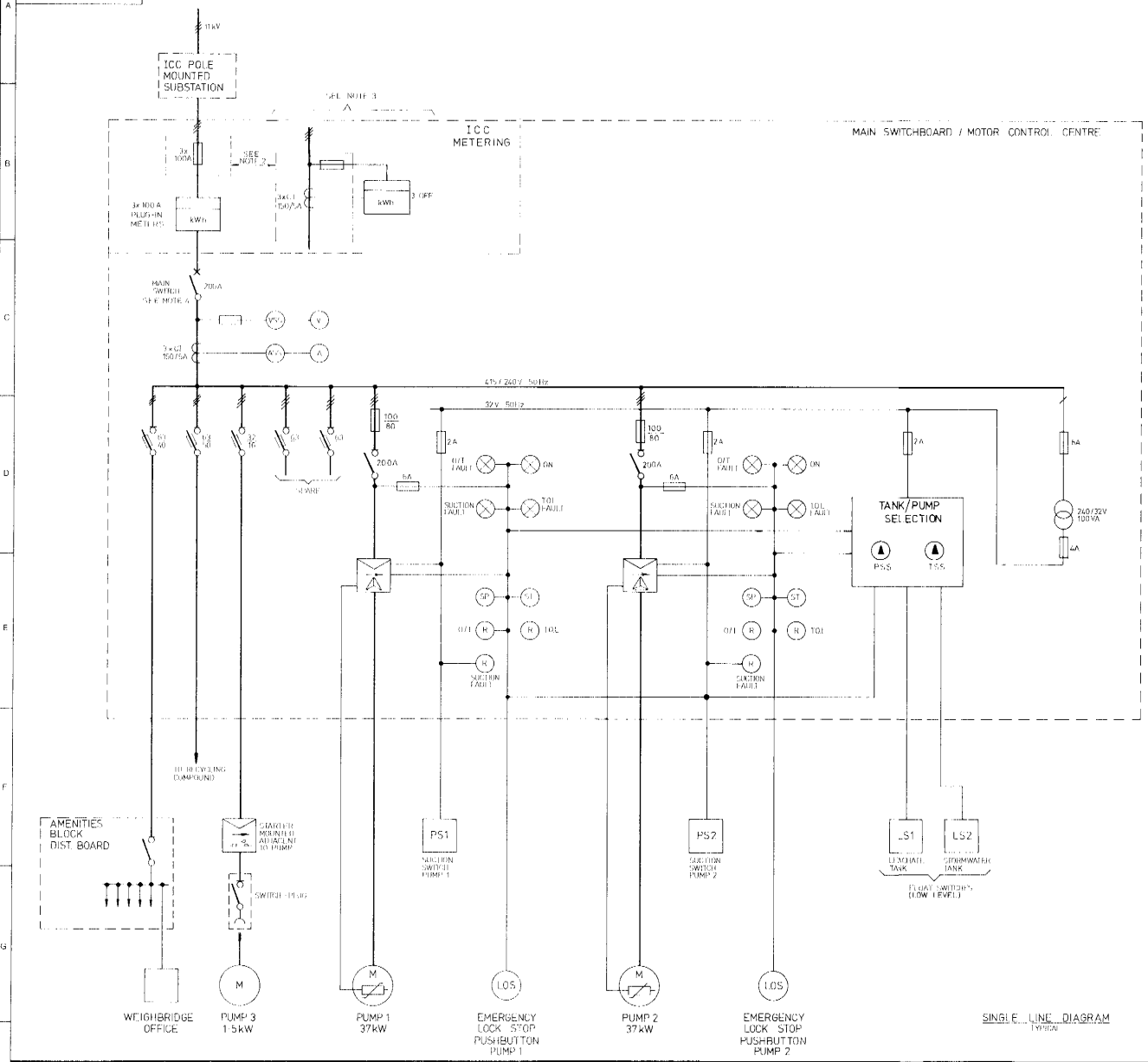
SCALE: N.T.S.
PROJECT MANAGER: S HOLLIS
DESIGN: S.H.
DRAWN: D.G.
APPROVED: DATE

WOLLONGONG CITY COUNCIL

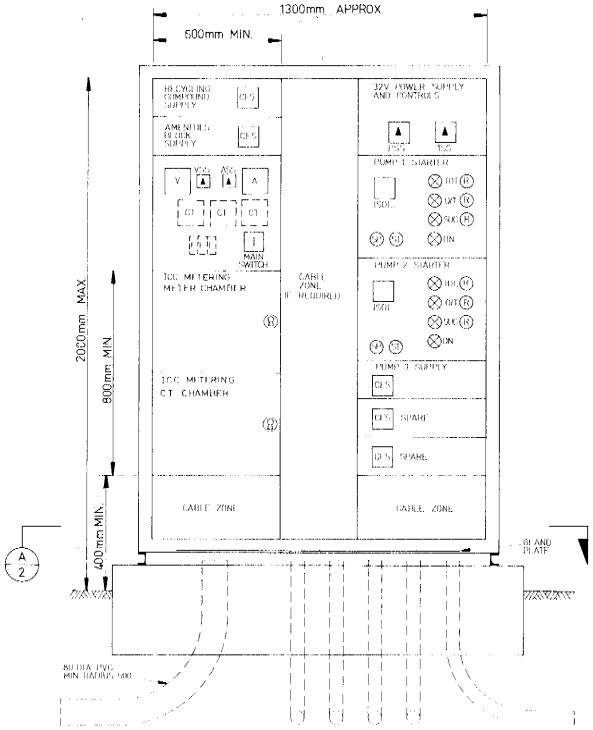
WHYTES GULLY LANDFILL SITE
HEADWALL DETAILS FOR 2/750 & 2/900 P.C.P.C.

DRAWING NO. 2798-01-27

DIMENSIONS IN MILLIMETRES | DO NOT SCALE



SINGLE LINE DIAGRAM
TYPICAL



GENERAL ARRANGEMENT
TYPICAL
REFER DRAWING N° 2 FOR SECTIONS
NOTE THE GA IS SHOWN WITH DOORS REMOVED

LEGEND

A -AMMETER
V -VOLTMETER
ASS-AMMETER SELECTOR SWITCH
VSS-VOLTMETER SELECTOR SWITCH
CT -CURRENT TRANSFORMER
CFS-COMBINATION FUSE SWITCH
F -FUSE
TOL-THERMAL OVERLOAD
O/T-OVER TEMPERATURE
kWh-KILOWATTHOUR METER
PSS-PUMP SELECTOR SWITCH
"PUMP 1 ON - OFF - PUMP 2 ON"
TSS-TANK SELECTOR SWITCH
"LEACHATE TANK - STORMWATER TANK"

⊗ INDICATING LIGHT
Ⓡ RESET PUSHBUTTON
Ⓢ STOP PUSHBUTTON
Ⓢ START PUSHBUTTON
Ⓘ ILLAWARRA COUNTY COUNCIL LOCK

NOTES

1. THE ICC METERING SHALL BE OF THE WHOLE CURRENT TYPE BUT PROVISIONS SHALL BE MADE FOR FUTURE CONVERSION TO CT METERING
2. EQUIPMENT IN BOXES SHALL BE INSTALLED IN THE CT CHAMBER
3. PART DIAGRAM SHOWS FUTURE CT METERING
4. MAIN SWITCH SHALL BE FAULT RATED TO 10 kA

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH REFER DWG No 2

2 of 29 P331/17

ITEM	MATERIAL	No OFF	LETTER	DETAIL OF AMENDMENT	MADE BY	DATE	APPRV BY

LETTER	DETAIL OF AMENDMENT	MADE BY	DATE	APPRV BY

CONSULTING ENGINEER
DESIGNED TJT | DRAWN TP | CHECKED CWR 17/5/84
APPROVED
ACCEPTED

WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
MAIN SWITCHBOARD / MOTOR CONTROL CENTRE
SINGLE LINE DIAGRAM AND GENERAL ARRANGEMENT

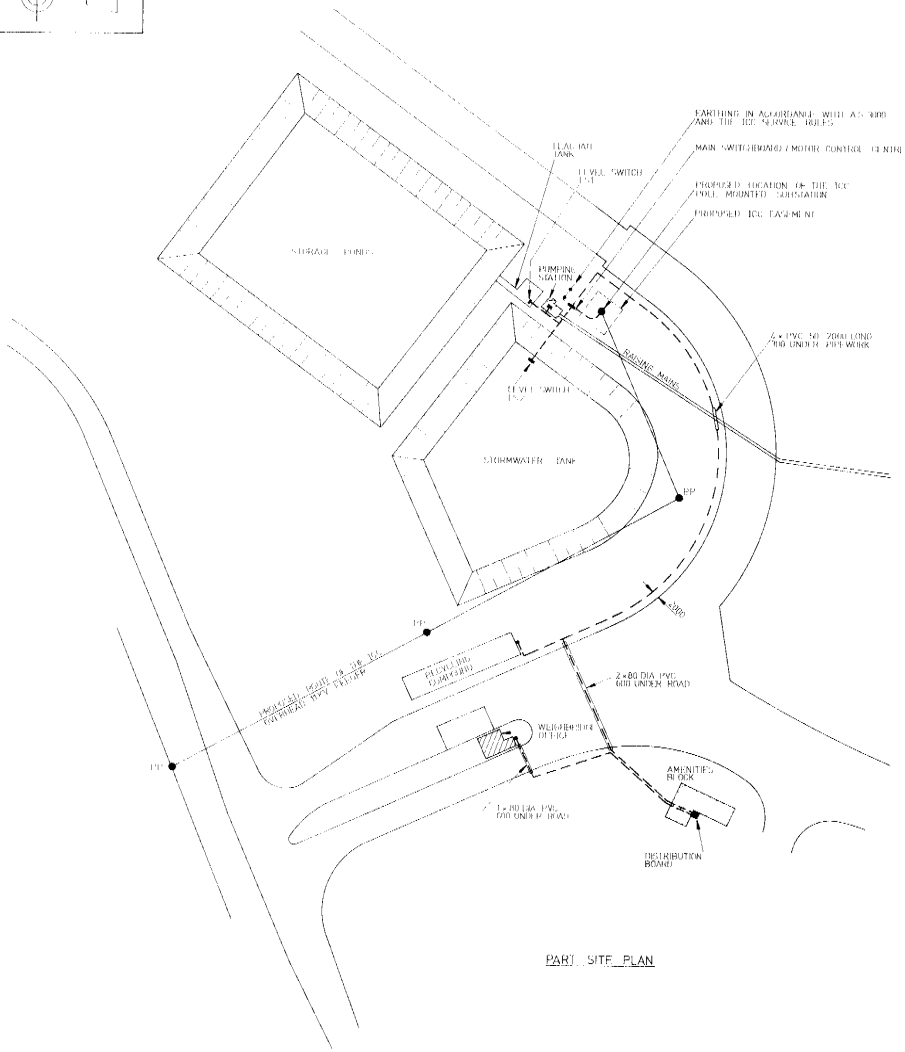
CONTRACT | FILE | SCALE A1

ISSUE | DJECT DWG No
1

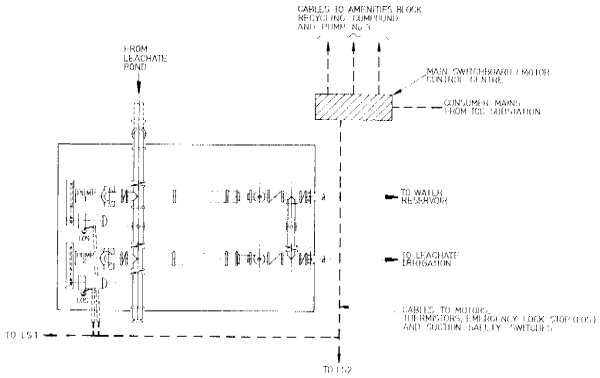
566 801

A1 : JULY 82

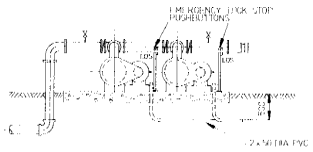
DIMENSIONS IN MILLIMETRES | DO NOT SCALE



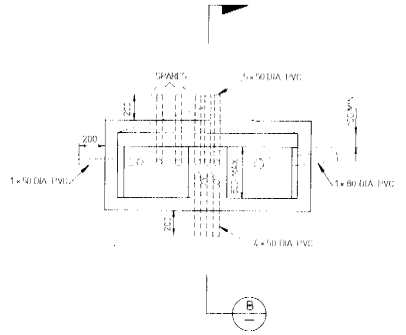
PART SITE PLAN



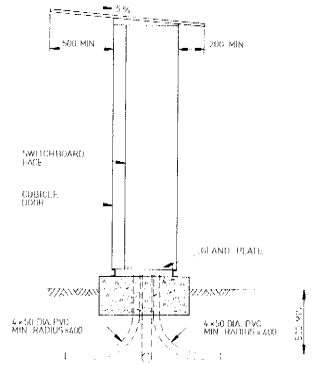
PLAN - PUMPING STATION
EQUIPMENT LAYOUT



WEST END ELEVATION
EQUIPMENT LAYOUT



SECTION A
TYPICAL



SECTION B
TYPICAL

LEGEND
- UNDERGROUND CABLE ROUTE
- CABLE CONDUIT
- LOS EMERGENCY LOCK STOP STATION

NOTES
1. CABLES TO BE LAID DIRECT IN GROUND AT A MIN. DEPTH OF 600mm UNDER ROADWAYS AND 450mm ELSEWHERE.
2. SWITCHBOARD TO BE LOCATED ON SITE.
3. CABLE TO THE RECYCLING COMPOUND TO BE TERMINATED BY OTHERS.
4. CABLE CONDUITS UNDER AMENITIES BLOCK TO BE INSTALLED BY OTHERS.
5. FLOAT SWITCHES AND THEIR CABLES AND CONDUITS TO BE DETERMINED ON SITE.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SITE DWG No 1

3 of 29 P331/17

ITEM	MATERIAL	No OFF	LETTER	DETAIL OF AMENDMENT	MADE BY	DATE	APPRV BY

LETTER	DETAIL OF AMENDMENT	MADE BY	DATE	APPRV BY

CONSULTING ENGINEER
DESIGNED TJT | DRAWN TJT | CHECKED 7/7/14
APPROVED
APPROVED 7/7/14
ACCEPTED

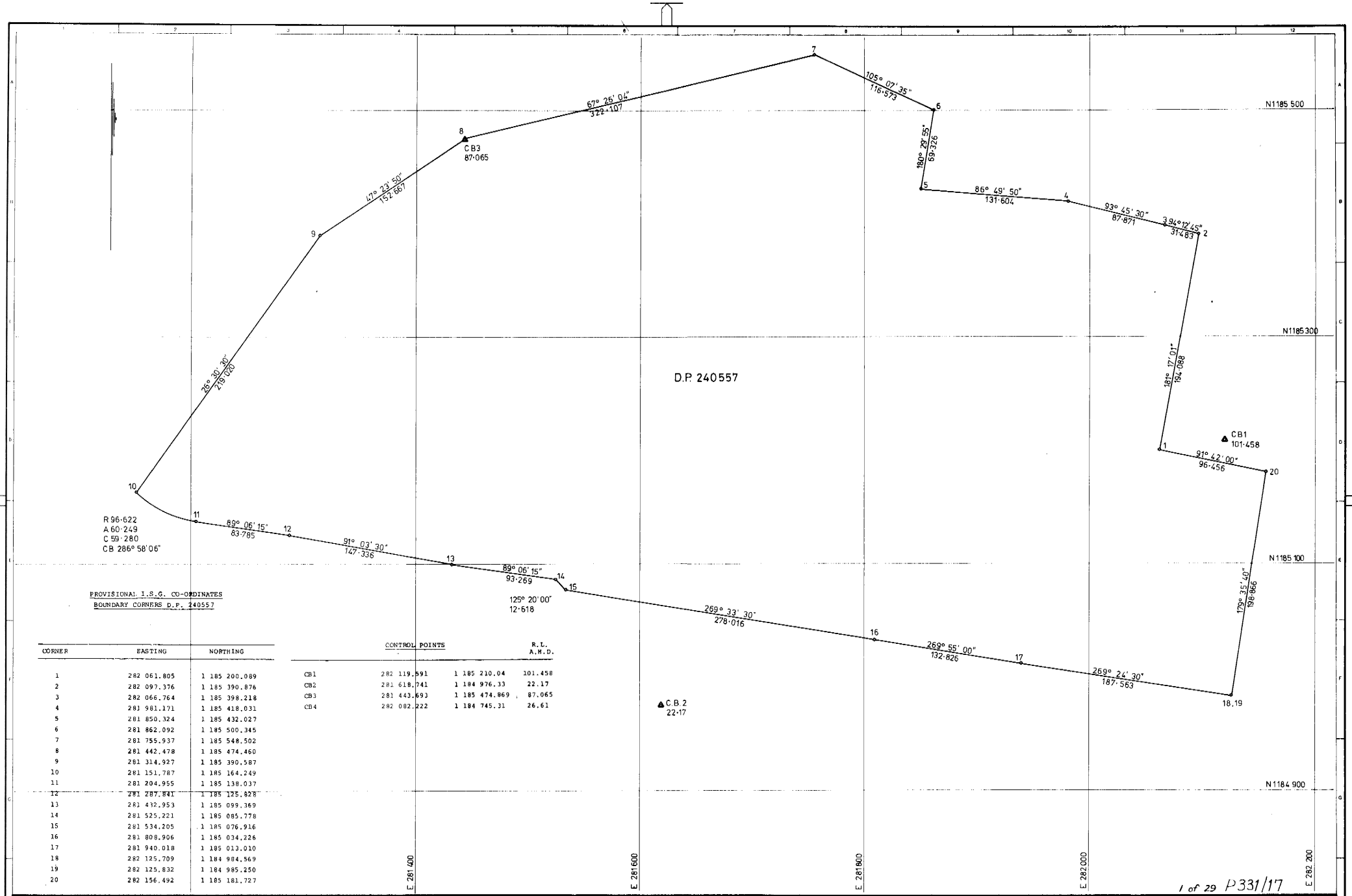
WOLLONGONG CITY COUNCIL

WHYTES GULLY LANDFILL SITE
PART SITE PLAN, EQUIPMENT LAYOUT AND SWITCHBOARD DETAILS.

CONTRACT | FILE | SCALE | A1

ISSUE | EFFECT DWG No
2

666
801



PROVISIONAL I.S.G. CO-ORDINATES
BOUNDARY CORNERS D.P. 240557

CORNER	EASTING	NORTHING
1	282 061.805	1 185 200.089
2	282 097.376	1 185 390.876
3	282 066.764	1 185 398.218
4	281 981.171	1 185 418.031
5	281 850.324	1 185 432.027
6	281 862.092	1 185 500.345
7	281 755.937	1 185 548.502
8	281 442.478	1 185 474.460
9	281 314.927	1 185 390.587
10	281 151.787	1 185 164.249
11	281 204.955	1 185 138.037
12	281 287.841	1 185 125.828
13	281 432.953	1 185 099.369
14	281 525.221	1 185 085.778
15	281 534.205	1 185 076.916
16	281 808.906	1 185 034.226
17	281 940.018	1 185 013.010
18	282 125.709	1 184 984.569
19	282 125.832	1 184 985.250
20	282 156.492	1 185 181.727

CONTROL POINTS

			R.L. A.H.D.
CB1	282 119.591	1 185 210.04	101.458
CB2	281 618.741	1 184 976.33	22.17
CB3	281 443.693	1 185 474.869	87.065
CB4	282 082.222	1 184 745.31	26.61

1 of 29 P331/17

REVISION	DESCRIPTION	DATE	REVISION	DESCRIPTION	DATE

SCOTT & FURPHY ENGINEERS PTY. LTD.
CONSULTING ENGINEERS & PLANNERS
74 EMU BANK, BELCONNEN TOWN CENTRE
CANBERRA A.C.T. 2617
TELEPHONE (062) 512077
AND AT MELBOURNE, SYDNEY, PERTH, HOBART AND LAUNCESTON
SCOTT & FURPHY CONSULTING GROUP

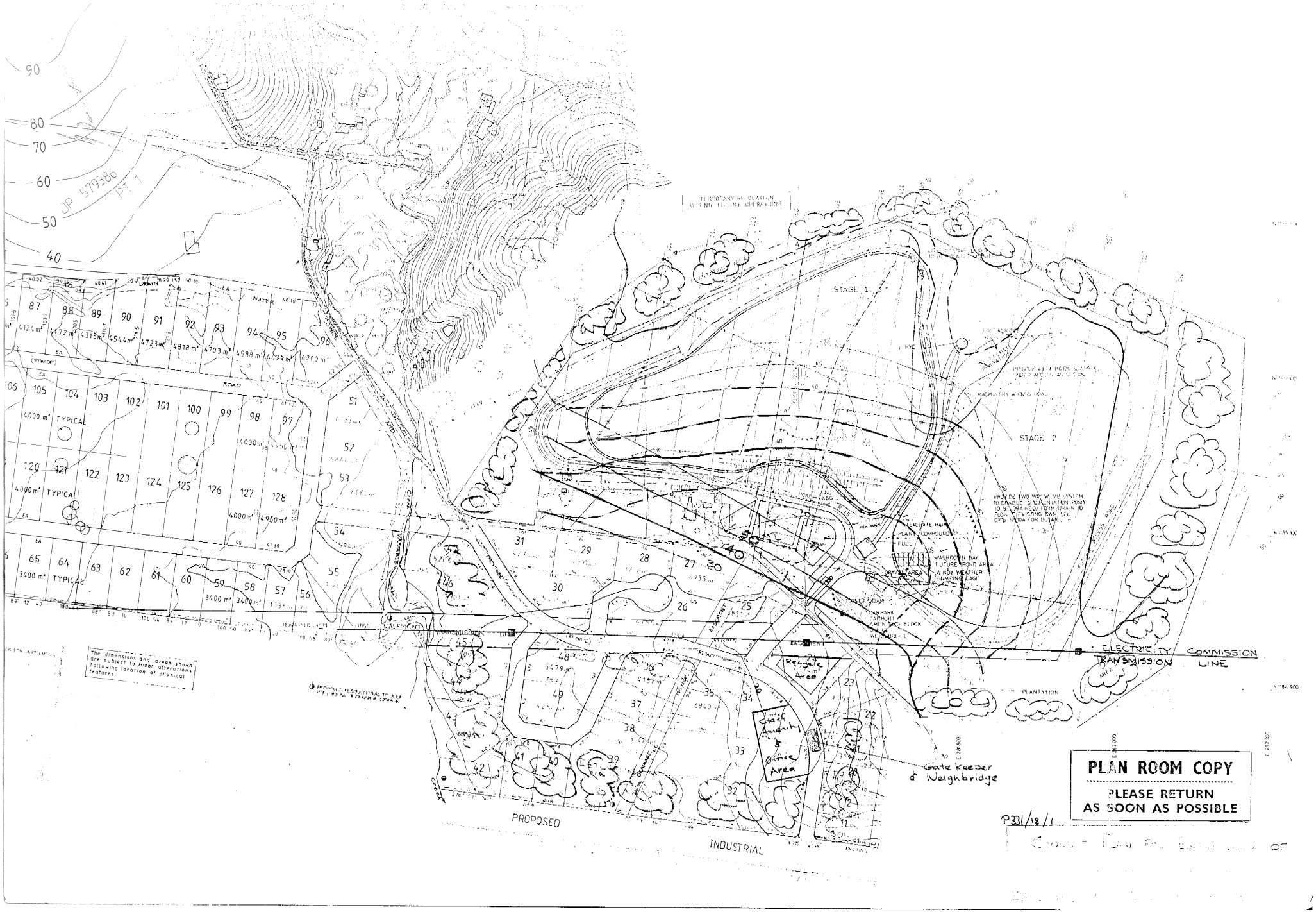
SCALES	1:1500
PROJECT MANAGER	S. HOLLIS
DESIGN	S.H.
DRAWN	D.G.
APPROVED	DATE 2.4.84

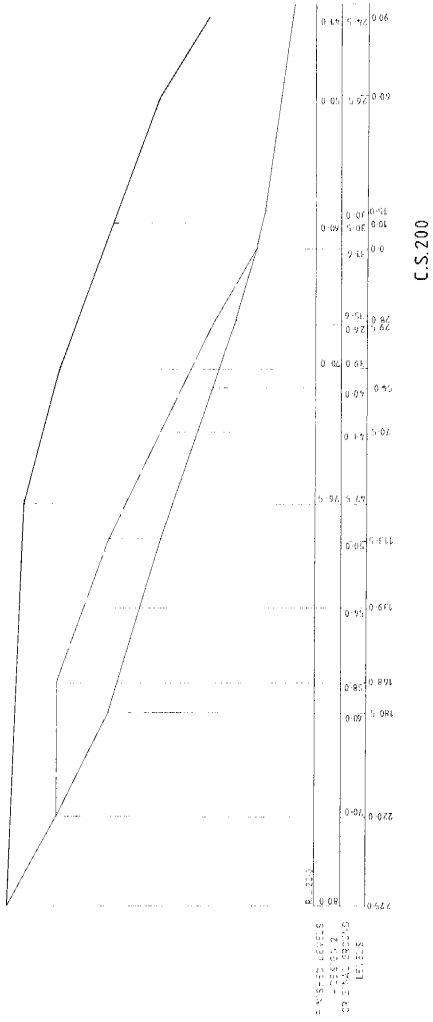
WOLLONGONG CITY COUNCIL

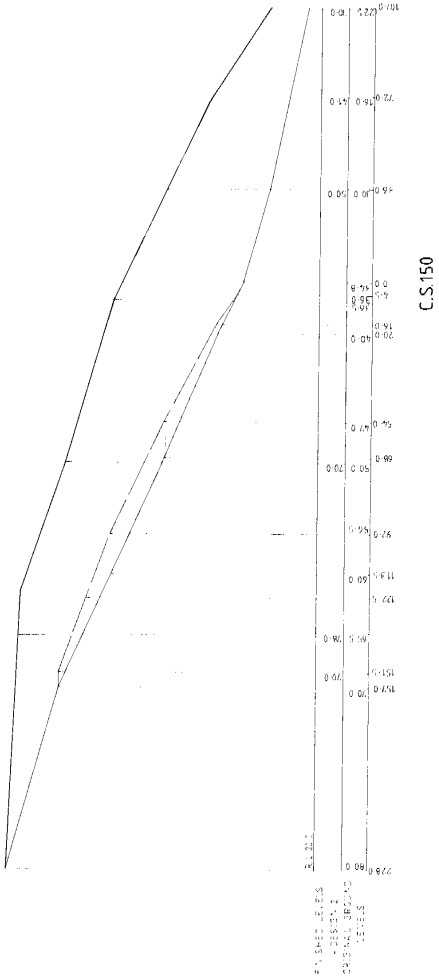
WHYTES' GULLY LANDFILL SITE
PLAN OF BOUNDARY

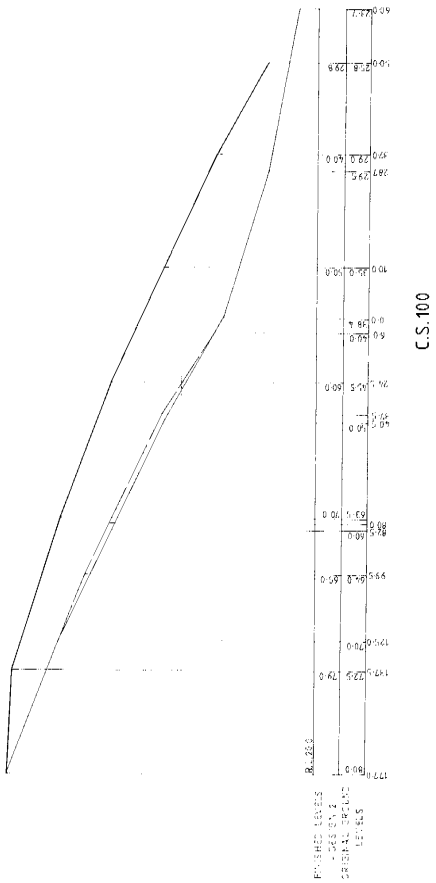
DRAWING No. 2798-01-1

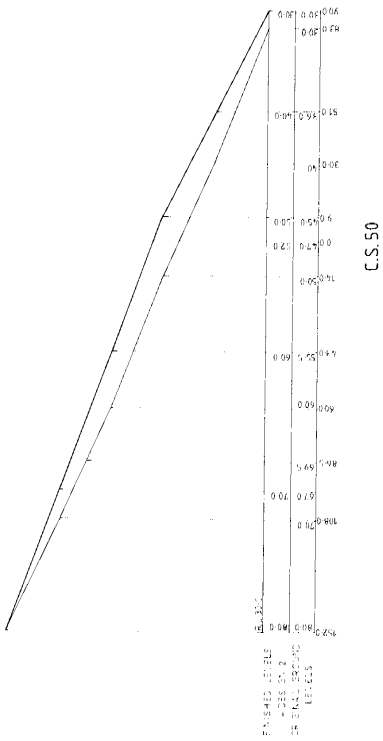
SIZE A1 841 x 594


STAGE 1
STAGE 2
PROPOSED
INDUSTRIAL
ELECTRICITY
TRANSMISSION
LINE
COMMISSION
Recycle Area
Staff Amenity & Office Area
Gate keeper & Weighbridge
PLANTATION
The dimensions and areas shown are subject to minor alterations following location of physical features.
PLAN ROOM COPY
PLEASE RETURN
AS SOON AS POSSIBLE
P331/18/1









SCALES
HORIZ 1:1000
VERT 1:500

DRAWN: J.SCHULTZ 9/11/88

CITY OF WOLLONGONG

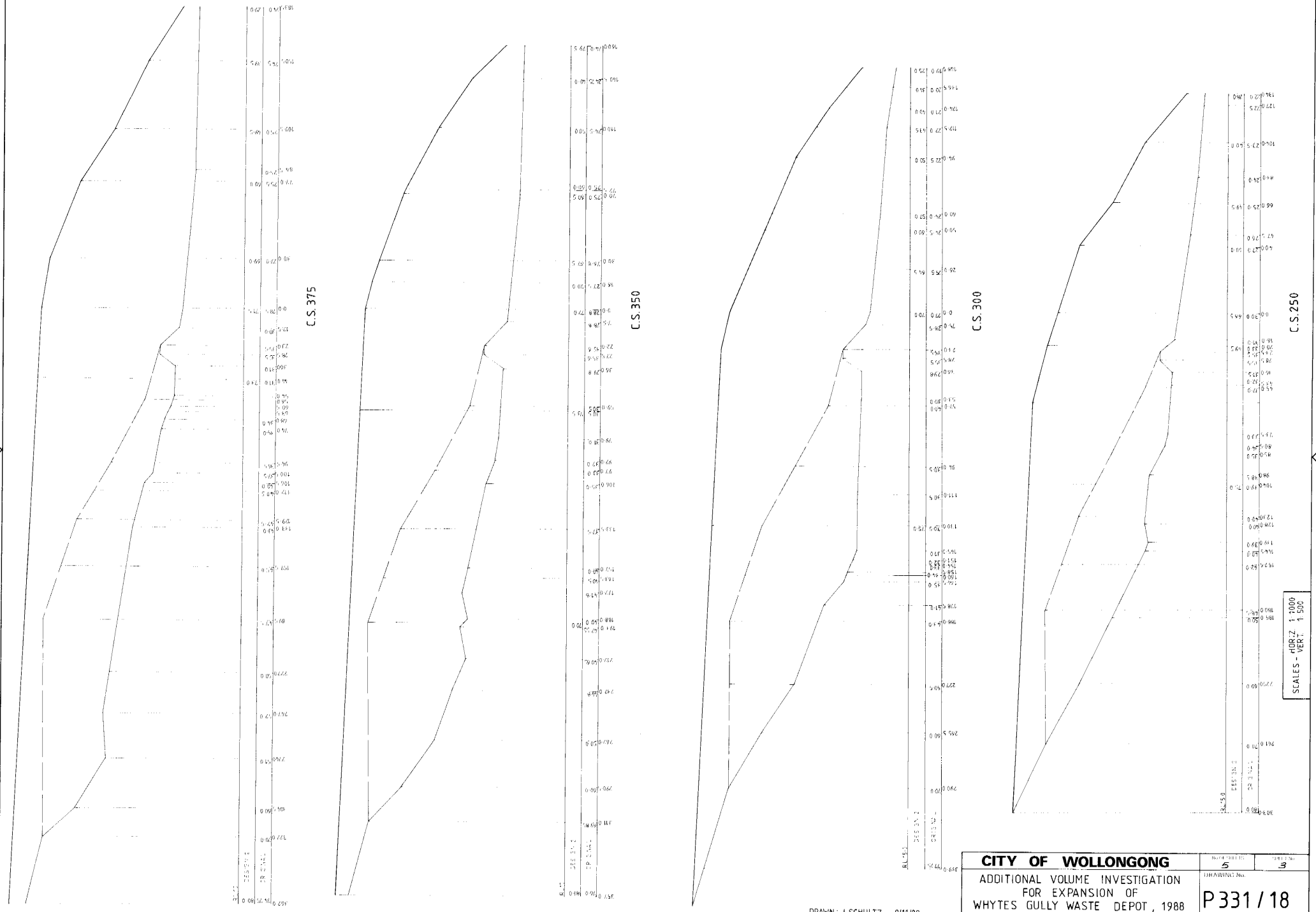
ADDITIONAL VOLUME INVESTIGATION
FOR EXPANSION OF
WHYTES GULLY WASTE DEPOT, 1988

INDEX BASE No.

SHEETS 5 SHEET No. 2

DRAWING No. P331/18

MAGX A1/2



SCALES - HORIZ 1:1000
VERT. 1:500

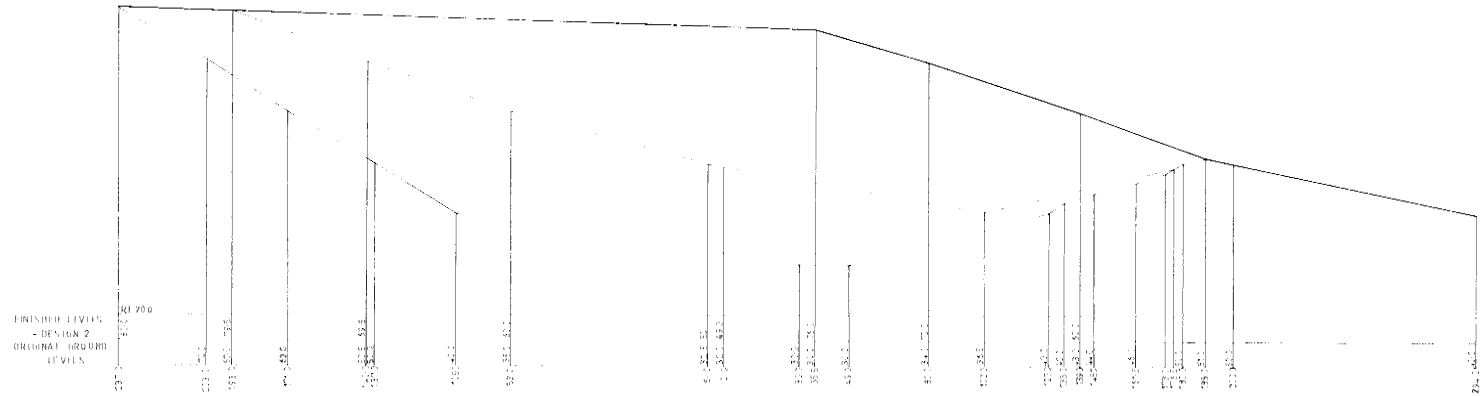
DRAWN: J SCHULTZ 9/11/88

CITY OF WOLLONGONG

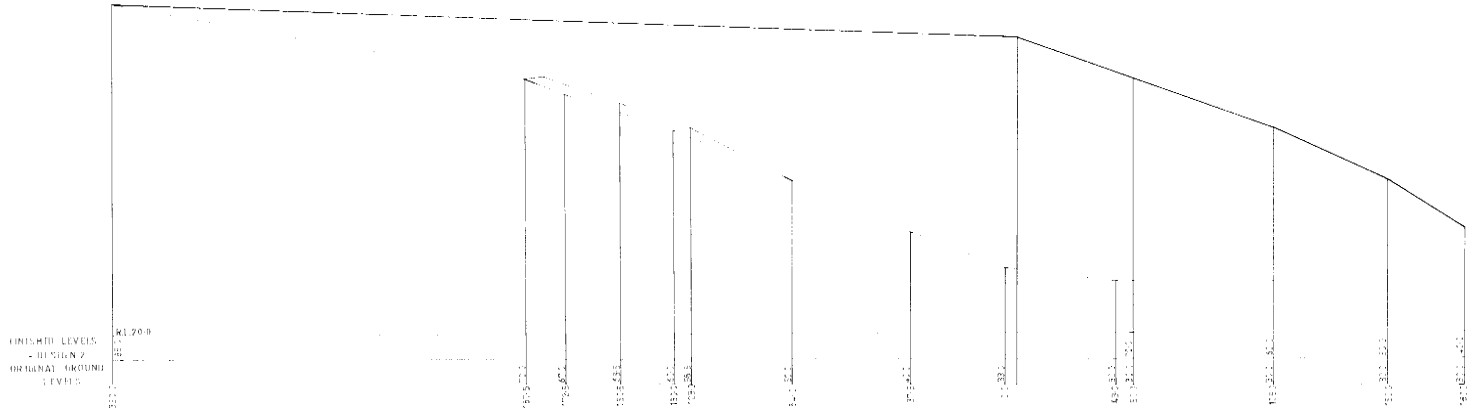
ADDITIONAL VOLUME INVESTIGATION
FOR EXPANSION OF
WHYTES GULLY WASTE DEPOT, 1988

DRAWING No.
P331/18

MAGX A1/2



C.S.550



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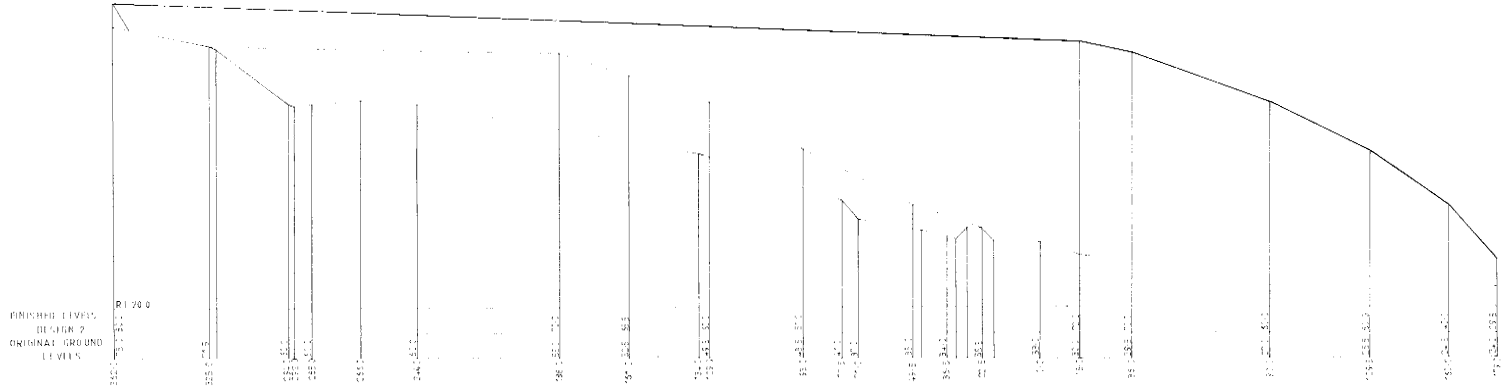


C.S.400

SCALES
HORIZ 1:1000
VERT 1:500

DRAWN: J.SCHULTZ 9/11/88

CITY OF WOLLONGONG

ADDITIONAL VOLUME INVESTIGATION
FOR EXPANSION OF
WHYTES GULLY WASTE DEPOT, 1988

INDEX BASE No.

SHEETS 5 SHEET No. 4

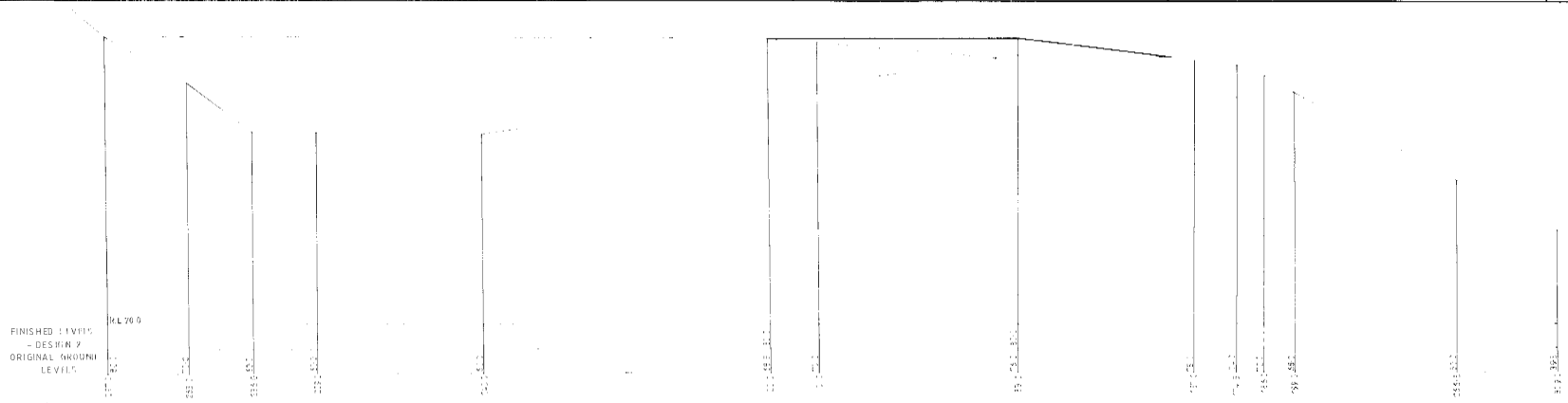
DRAWING No.

P331 / 18

MAGX A1/2

566 x 801mm

MMING EDGE



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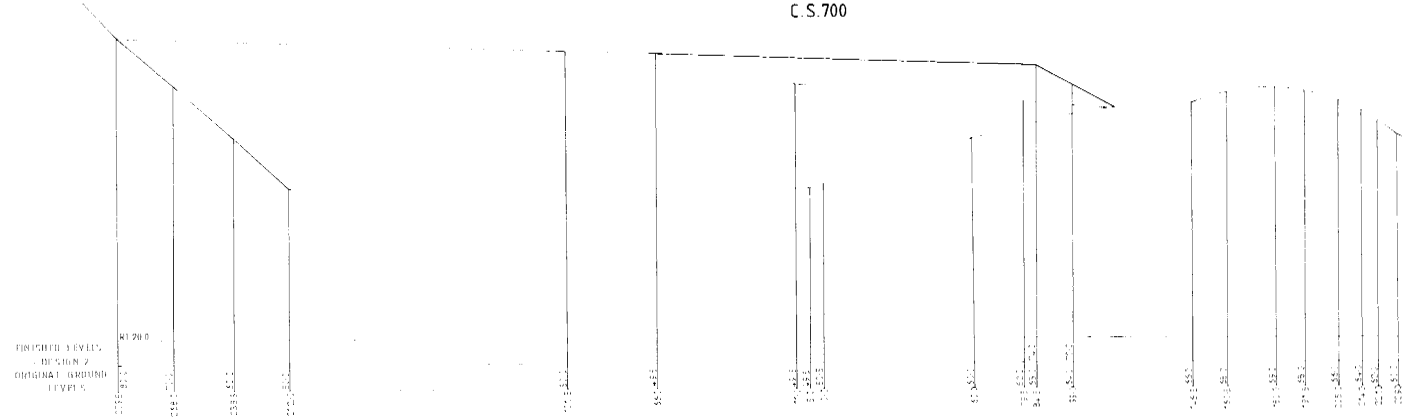
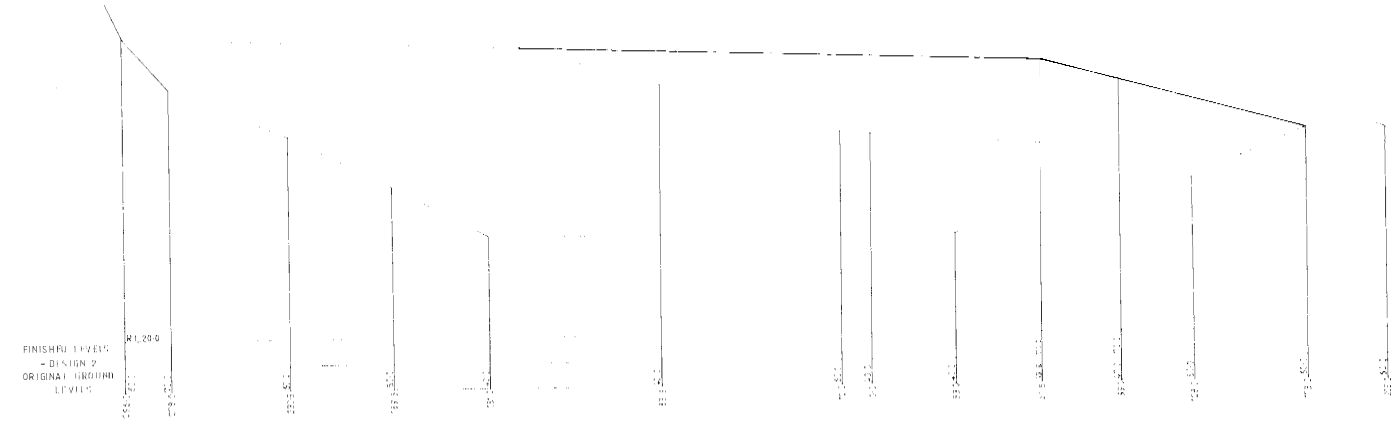


C.S.650



C.S.600

SCALES
HORIZ. 1:1000
VERT. 1:500

DRAWN: J.SCHULTZ 9/11/88

CITY OF WOLLONGONG

ADDITIONAL VOLUME INVESTIGATION
FOR EXPANSION OF
WHYTES GULLY WASTE DEPOT, 1988

INDEX BASE No.

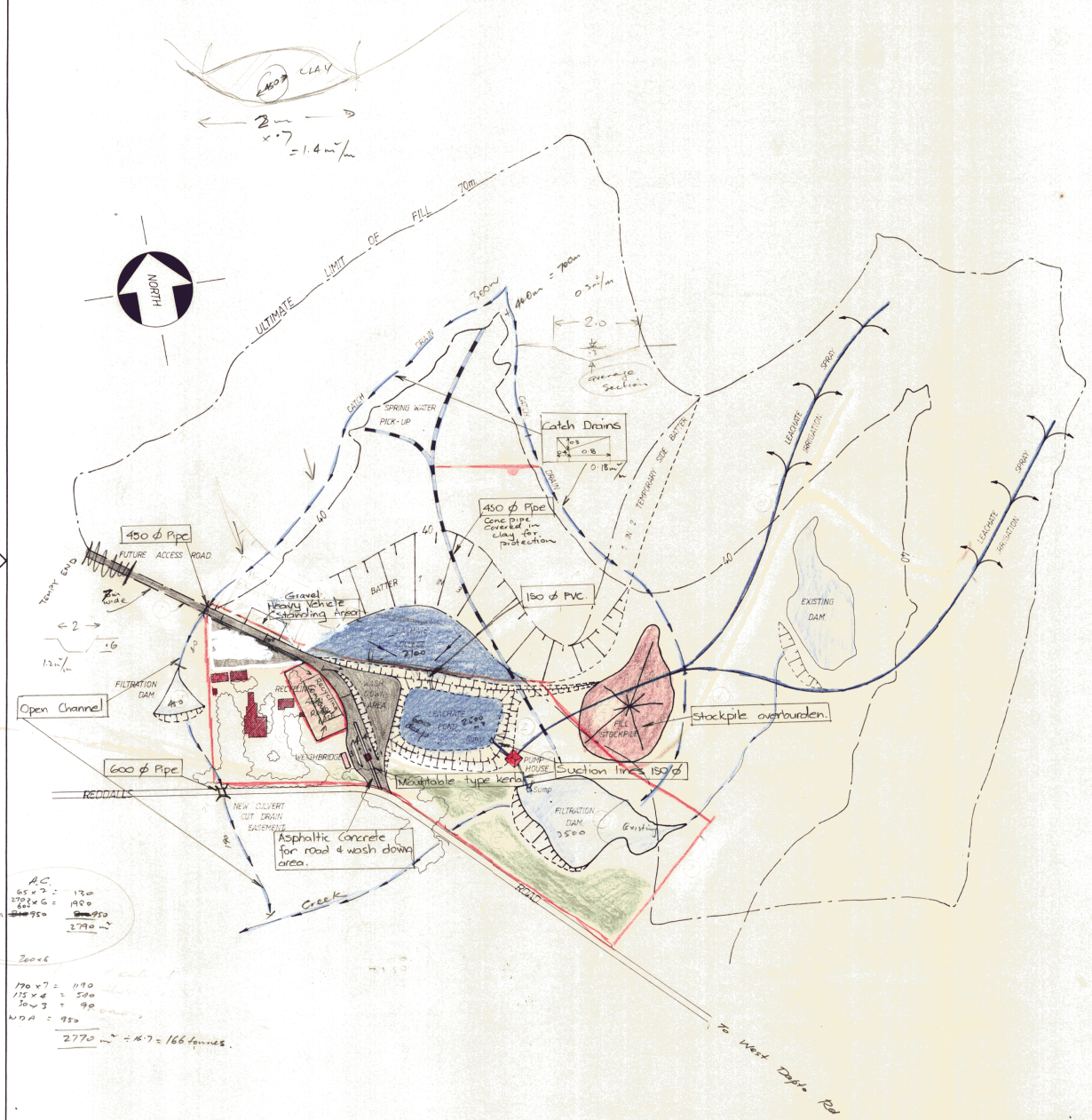
SHEET No. 5 | ISSUE No. 5

DRAWING No. P 331 / 18

MAGX A1/2

566 x 801mm

TRIMMING EDGE



A.C.
55 × 2 = 110
2700 × 6 = 1800
600 = 950
W.D. Area 950
2790 m²

200 × 6

170 × 7 = 1190
115 × 4 = 540
30 × 3 = 90
W.D.A = 950

2770 m² ÷ 16.7 = 166 tonnes.

1 S.T. LIFT TO 40m

Estimate 1137. (Prelim only)
culverts to be calculated (Sizes shown for Budget est only)

SCANNED BY PLAN ROOM

SCALES 1:1500	INDEX BASE No.	CITY OF WOLLONGONG WHYTES GULLY OPERATIONS DIAGRAM FOR WEST GULLY.	No. OF SHEETS / SHEET No. DRAWING No. P331-SK01-1

566 × 801mm

MAGX A1/2

URS

Transmittal Form

To:	Lindsay Dunstan	From:	Jacinta Mc Mahon
Organisation:	City of Wollongong Council	Date:	03 February 2006
Address:	Locked Bag 8821, South Coast Mail Centre 2521		
Transmittal No:	1	Client Ref:	
Project Name:	Whytes Gully Leachate Treatment Plant	URS Project No:	43345959

We are sending you the following:

No. of Copies	Description	Reference	Rev.
2	Whytes Gully Leachate Treatment Plant Drawings For Work As Executed	Final.	B

Delivery Method: *(Mark with X)*	Comments
☐ Courier	
☑ Mail	
☐ Express Post	
☐ Hand Deliver	
☐ Electronically	

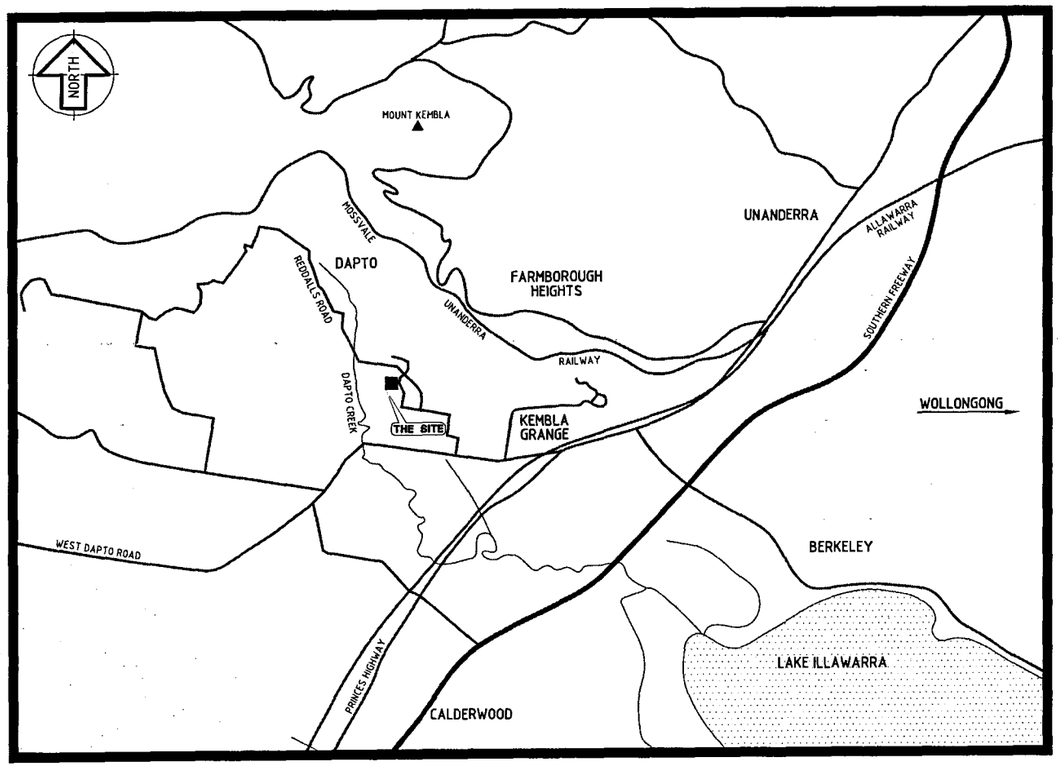
Sent By: JMcMahon Date: 3/2/06

Received: _____ Date: _____

Please acknowledge receipt by signing and either faxing or mailing a copy to the originator. Thank You

URS Australia Pty Ltd (ABN 46 000 691 690)
Level 3, 116 Miller Street
North Sydney, NSW 2060 Australia
Tel: 61 2 8925 5500
Fax: 61 2 8925 5555

WHYTES GULLY
LEACHATE TREATMENT PLANT
DRAWINGS
FOR WORK AS EXECUTED



SITE LOCATION PLAN

DRAWING SCHEDULE	
DRG. No.	TITLE
3512-00	COVER SHEET
3512-N1	GENERAL NOTES
3512-M1	PROCESS AND INSTRUMENT DIAGRAM
3512-C1	GENERAL ARRANGEMENT
3512-C2	GENERAL PLANT ELEVATIONS
3512-C3	STAGE 1 BULK EARTHWORKS
3512-C4	STAGE 2 BULK EARTHWORKS
3512-C5	STAGE 3 BULK EARTHWORKS, TANK PAD FOUNDATION & BUND WALL
3512-C6	BULK EARTHWORKS SECTIONS
3512-C7	CAUSTIC LOADING BAY
3512-C8	DRAINAGE PLAN AND PIT DETAILS
3512-S1	SEQUENCING BATCH REACTOR FABRICATION DETAILS
3512-S2	EFFLUENT BALANCE TANK FABRICATION DETAILS
3512-S3	FOOTING DETAILS
3512-S4	SBR ACCESS PLATFORM DETAILS SHEET 1 OF 2
3512-S5	SBR ACCESS PLATFORM DETAILS SHEET 2 OF 2
3512-S6	DECANT PIPEWORK DETAILS
3512-E1	WASTE TREATMENT SYSTEM SINGLE LINE DIAGRAM
3512-E2	WASTE TREATMENT SYSTEM POWER AND DISTRIBUTION (1 OF 2)
3512-E3	WASTE TREATMENT SYSTEM POWER AND DISTRIBUTION (2 OF 2)
3512-E4	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E5	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E6	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E7	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E8	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E9	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E10	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM
3512-E11	WASTE TREATMENT SYSTEM DIGITAL I/O SHEET 1
3512-E13	WASTE TREATMENT SYSTEM DIGITAL I/O SHEET 2
3512-E14	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM SHEET 1
3512-E17	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM SHEET 2
3512-E18	WASTE TREATMENT SYSTEM STARTER CIRCUIT DIAGRAM SHEET 3
3512-E21	WASTE TREATMENT SYSTEM INSTRUMENTATION SHEET 1
3512-E22	WASTE TREATMENT SYSTEM INSTRUMENTATION SHEET 2
3512-E23	WASTE TREATMENT SYSTEM INSTRUMENTATION SHEET 3
3512-E31	WASTE TREATMENT SYSTEM SCADA COMMUNICATIONS DIAGRAM
3512-E33	WASTE TREATMENT SYSTEM SCADA EQUIPMENT MONITORING PAGE
3512-E34	WASTE TREATMENT SYSTEM SCADA PROCESS SETPOINT PAGE
3512-E38	WASTE TREATMENT SYSTEM DIGITAL I/O SHEET 1

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work-As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

URS
Level 3, 116 MILLER STREET,
NORTH SYDNEY, N.S.W. 2060.
Telephone: (02) 89255500
Facsimile: (02) 89255555

PET PROCESS ENGINEERING TECHNOLOGIES
CNR McCAULEY ST & AUSTRALIA AVE
MATRAVILLE, NSW 2036
Telephone: (02) 93167466
Facsimile: (02) 96664336

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN	DATE
		J.McI.	19/09/03
AZIMUTH	FIELD BOOK	CHECKED	DATE
		RR	19/09/03
RELATED PLANS		DESIGNED	DATE
		JN	19/09/03
		CHECKED	DATE
		AE	19/09/03

APPROVED (FOR COUNCIL USE ONLY)	
SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES	NORTH POINT
AS SHOWN	

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
COVER SHEET

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.		A1
FILE NUMBER		ORIGINAL
SHEET 1 OF 1 SHEETS		
DRAWING No.	SHEET No.	ISSUE
3512	00	B

GENERAL

1. DO NOT SCALE DRAWINGS. NO RESPONSIBILITY WILL BE TAKEN BY URS FOR DIMENSIONS OBTAINED BY SCALING THE STRUCTURAL DRAWINGS.
2. ALL DIMENSIONS SHALL BE VERIFIED ON SITE BY THE CONTRACTOR WHO SHALL BE RESPONSIBLE FOR THEIR CORRECTNESS.
3. ALL DIMENSIONS ARE IN MILLIMETRES U.N.O..
4. ALL REDUCED LEVELS ARE IN METRES U.N.O..

STRUCTURAL CONCRETE

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF AS3600.
2. THE CONCRETE SHALL BE COMPACTED USING HIGH FREQUENCY VIBRATORS.
3. CURING OF ALL CONCRETE SURFACE SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
4. ALL FORMWORK SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF AS3610.
5. THE FOLLOWING ABBREVIATIONS ARE USED.
   - T TOP
   - B BOTTOM
   - LV LENGTH VARIES
   - EF EACH FACE
   - EW EACH WAY

CONCRETE

1. ADMIXTURES SHALL NOT BE USED WITHOUT THE WRITTEN APPROVAL OF THE URS ENGINEER.
2. ALL CEMENT SHALL BE TYPE SR SPECIFICATION, SULPHATE RESISTING CEMENT. U.N.O.
3. MAXIMUM SIZE OF COARSE AGGREGATE SHALL BE 20mm.
4. CONCRETE SHALL HAVE THE FOLLOWING SLUMP DURING PLACING (U.N.O.):
   - BEAMS, SLABS AND FOOTINGS 40mm TO 60mm
   - COLUMNS AND WALLS 50mm TO 80mm
5. UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL ELEMENTS SHALL HAVE AS A MINIMUM THE FOLLOWING 28 DAYS COMPRESSIVE CONCRETE STRENGTH:

ELEMENTS	f'c AT 28 DAYS (MPa)	56 DAY DRYING SHRINKAGE
SLAB/BEAMS	32	650 MICROSTRAIN
WALLS	32	650 MICROSTRAIN

STRENGTH SHALL BE VERIFIED BY PROJECT CONTROL TESTING REFER SPECIFICATION.

PILING

1. ALL PILING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 2159: PILING CODE - 1995.
2. ALL GROUT INJECTED BORED PILES SHALL BE INSTALLED IN ACCORDANCE WITH CLAUSE 7.5 OF AS 2159: PILING CODE - 1995.
3. ALL PILES SHALL BE INSTALLED TO A MINIMUM OF 200mm ABOVE CUT OF LEVEL.

TANK BITUMEN SAND MIX

THE BITUMEN SAND MIX SHALL BE MADE FROM THE FOLLOWING COMPONENTS:

BINDER
THE BINDER SHALL BE CLASS 320 RESIDUAL BITUMEN COMPLYING WITH AS 2008.

CUTTING OIL
THE CUTTING OIL SHALL BE A SUITABLE COMPATIBLE PRODUCT SUCH AS DIESEL OIL OR POWER KEROSENE.

SAND
SHALL BE NATURAL SAND COMPLYING WITH AS2758.5.

FILLER
FILLER IN THE FORM OF HYDRATED LIME WILL ALSO BE ADDED TO THE MIX AT MINIMUH QUANTITY OF 1% BY WEIGHT.

THE SAND FILLER SHALL BE WELL GRADED WITHIN THE FOLLOWING RANGE:

AS SIEVE SIZE (mm)	% PASSING (BY WEIGHT)
9.5	100
0.075	5-15

MIX DESIGN TO BE AS FOLLOWS BY WEIGHT:

SAND	89%	THESE PROPORTIONS ARE GIVEN
BINDER	8%	AS A GUIDE AND ACTUAL
CUTTING OIL	2%	PROPORTIONS TO BE
FILLER	1%	DETERMINED BY TRIAL MIXES.

THE MIX WILL BE UNDERTAKEN AT A TEMPERATURE OF APPROX. 95°C.

REINFORCEMENT

1. CLEAR CONCRETE COVER TO REINFORCEMENT INCLUDING TIES AND STIRRUPS, SHALL BE AS NOTED ON THE DRAWINGS BUT NOT LESS THAN AS FOLLOWS:

ELEMENTS	COVER (mm)
SLAB	50 TOP 60 BTM
BEAM	50
WALLS	50
PILE CAPS	50 GENERAL
PILES	50

2. COVER TO REINFORCEMENT SHALL BE OBTAINED BY THE USE OF CONCRETE BLOCKS OR PLASTIC BAR CHAIRS FOR BOTTOM REINFORCEMENT AND PLASTIC TIPPED WIRE BAR CHAIRS FOR TOP REINFORCEMENT. ALL CHAIRS TO BE SPACED 750m CRS. MAXIMUM.
3. REINFORCEMENT SYMBOLS
   - N - DENOTES GRADE 500N HOT ROLLED DEFORMED BAR TO AS 4671
   - R - DENOTES GRADE 230R HOT ROLLED PLAIN BAR TO AS4671

   NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
   17N20-250 — SPACING IN mm
   NOMINAL BAR SIZE IN mm
4. THE NUMBER AND DISTRIBUTION OF BARS ARE INDICATED AS FOLLOWS (BY EXAMPLE):
   - 20N32 INDICATES 20 GRADE 500N 32mm DIAMETER BARS.
   - N20-200 INDICATES GRADE 500N 20mm DIAMETER AT 200mm SPACING FOR THE EXTENT INDICATED.
   - 10N24-200 INDICATES 10 GRADE 500M 24mm DIAMETER BARS AT 200mm SPACING.
5. REINFORCEMENT IS REPRESENTED DIAGRAMATICALLY AND IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.
6. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITION SHOWN. THE WRITTEN APPROVAL OF THE URS ENGINEER SHALL BE OBTAINED FOR ANY OTHER SPLICES. WHERE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL-STRENGTH OF THE REINFORCEMENT.
7. WELDING OF THE REINFORCEMENT WILL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.
8. ALL BAR SUPPORTS SHALL BE GALVANISED OR EPOXY COATED. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACE SHALL ALSO HAVE PLASTIC TIPS.

CONSTRUCTION JOINT

1. CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE URS ENGINEER
2. ALL CONSTRUCTION JOINTS SHALL BE WIRE BRUSHED, CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.

STRUCTURAL STEELWORK

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS4100 AND AS 1554 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. UNLESS SHOWN OTHERWISE ALL STEEL SHALL BE IN ACCORDANCE WITH AS 3678 AND AS3679 GRADE 300 FOR ROLLED AND WELDED SECTIONS. FLAT AND ROUND BAR, AS1163 GRADE 350 FOR RHS SECTIONS. AS1163 GRADE 350 FOR CHS SECTIONS. - ALL STEEL PLATE FOR LIQUID STORAGE TANKS SHALL BE TO AS 3678 GRADE 350 L15.
3. SHOP DRAWINGS SHALL BE SUBMITTED IN TRIPLICATE TO THE URS ENGINEER FOR APPROVAL. FABRICATION SHALL NOT COMMENCE UNTIL APPROVAL HAS BEEN GIVEN.
4. ALL WELDS SHALL BE 6mm CONTINUOUS FILLET-SPECIAL PURPOSE. ALL BOLTS TO BE 20mm DIAMETER 8.8/S 2 PER CONNECTION (U.N.O.). ALL GUSSET PLATES TO BE 10mm THICK (U.N.O.) ON THE DRAWINGS.

BOLTS DESIGNATION
5. 4.6/S REFERS TO COMMERCIAL BOLTS OF STRENGTH GRADE 4.6 TO AS1111 TIGHTENED TO A SNUG TIGHT CONDITION.
   - 8.8/S REFERS TO HIGH STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS1252 TIGHTENED TO A SNUG TIGHT CONDITION.
   - 8.8/TB REFERS TO TIGHT STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS1252 FULLY TENSIONED TO AS1511 AS A BEARING JOINT.
   - 8.8/TF REFERS TO HIGH STRENGTH STRUCTURAL BOLTS OF GRADE 8.8 TO AS1252 FULLY TENSIONED TO AS4100 AS A FRICTION JOINT.
6. HIGH STRENGTH BOLTED JOINTS SHALL BE IN ACCORDANCE WITH AS4100. THE SPECIFIED BOLT TENSION SHALL BE OBTAINED BY THE USE OF APPROVED LOAD INDICATING WASHER.

EXAMINATION OF WELDS SHALL BE: -
7. ALL WELDS - 100% VISUAL
   - 10% MAG. PARTICLE (SHOP WELDS)
   - 20% MAG. PARTICLE (SITE WELDS)

   BUTT WELDS - 100% VISUAL
   - 10% ULTRASONIC AT LOCATIONS NOMINATED IN SPECIFICATION

   FILLET WELDS - 100% VISUAL

8. SUBSTITUTIONS FOR STEEL SECTIONS SHOWN ON DRAWINGS SHALL NOT BE MADE WITHOUT THE APPROVAL OF THE URS ENGINEER.
9. THE CONTRACTOR SHALL PROVIDE ALL CLEATS AND DRILL ALL HOLES NECESSARY FOR FIXING STEEL, TIMBER AND OTHER ELEMENTS TO STEEL WHETHER OR NOT DETAILED ON THE DRAWINGS.
10. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEELWORK SHALL BE SUPERVISED BY A QUALIFIED ENGINEER EXPERIENCED TO SUCH SUPERVISION TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
11. STEELWORK SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE RELEVANT ASSOCIATION OF CONSULTING STRUCTURAL ENGINEERS OF NSW STANDARD SPECIFICATIONS EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
12. ALL CONCRETE ENCASED STEELWORK SHALL BE THOROUGHLY CLEANED DOWN PRIOR TO ENCASING AND WRAPPED WITH WIRE AT 150 CENTRES, AND SHALL HAVE A MINIMUM OF 50 CONCRETE COVER UNLESS NOTED OTHERWISE.
13. ALL STEELWORK NOT ENCASED IN CONCRETE SHALL BE SURFACE CLEANED AND PAINTED AND/OR GALVANISED AS SPECIFIED.

EARTHWORKS

1. PRIOR TO COMMENCING BACKFILL ALL AREAS SHALL BE STRIPPED OF LOOSE AND UNSUITABLE MATERIAL, TO A MINIMUM DEPTH OF 300mm U.N.O. OR AS DIRECTED BY THE ENGINEER. THE EXCAVATED SURFACE SHALL BE INSPECTED BY URS GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING. REPLACE WITH CLASS A MATERIAL AND COMPACT IN ACCORDANCE WITH NOTE 4 TO THE SPECIFIED SURFACE LEVELS.
2. THE CONTRACTOR SHALL BACKFILL AREAS WITH APPROVED MATERIAL TYPES AS SHOWN ON THE DRAWINGS.

(a.) CLASS A MATERIAL SHALL COMPRISE A WELL GRADED GRANULAR MATERIAL, WITH 90% OF PARTICLES (BY MASS) < 75mm AND 10% OF PARTICLES (BY MASS) < 0.6mm AND HAVE A 4 DAY SOAKED CALIFORNIA BEARING RATIO OF GREATER THAN 30% AT 98% SMDD.

(b.) CLASS B MATERIAL SHALL CONFORM TO RTA 3051 DGB 20 OR APPROVED EQUIVALENT.

3. ALL BACKFILL MATERIALS SHALL BE FREE OF CONTAMINANTS SUCH AS PEAT, VEGETABLE MATTER, TIMBER, ORGANIC, SOLUBLE, PERISHABLE MATERIALS OR CONSTRUCTION DEBRIS.
4. BACKFILL MATERIALS SHALL BE PLACED IN UNIFORM COMPACTED LAYERS NOT EXCEEDING 200mm LOOSE THICKNESS AND SHALL BE COMPACTED TO AT LEAST 98% OF THE SMDD AT +/- 2% OF OPTIMUM MOISTURE CONTENT (OR TO A MINIMUM DENSITY INDEX OF 75%) TO AUSTRALIAN STANDARD AS 1289-5-1-1. COMPACTION IS TO BE CARRIED OUT USING A MINIMUM 5 TONNE/m WIDTH OF DRUM COMPACTOR. VIBRATING MODE OF THE COMPACTOR SHALL NOT BE USED UNLESS INSTRUCTED BY THE URS GEOTECHNICAL ENGINEER.
5. FOR SLOPING AREAS OF FILL, THE SLOPE SHALL BE PREPARED BY OVERFILLING AND CUTTING BACK AFTER COMPACTING. OVERFILLING SHALL EXTEND BEYOND THE DESIGN FINISHED SURFACE BY A HORIZONTAL DISTANCE OF AT LEAST 1.0m.
6. ALL REQUIREMENTS FOR QUALITY CONTROL AND TESTING FOR THE WORKS, INCLUDING MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES, SHALL BE AS FOR TYPE 4 EARTHWORKS AS STATED IN AS3798-1996.
7. IN AREAS WITH ACCESS CONSTRAINTS SUCH AS CLOSE TO WALLS OR EXISTING SERVICES, COMPACTION SHALL BE CARRIED OUT USING A HAND HELD VIBRATING PLATE COMPACTOR AS INSTRUCTED BY THE URS GEOTECHNICAL ENGINEER. THE MAXIMUM LOOSE LAYER THICKNESS IN AREAS WHERE HAND HELD COMPACTING EQUIPMENT IS USED SHALL BE LIMITED TO 100mm.

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work-As-Executed.

Signed.....

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	AE	22/03/05
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

DATUM | SURVEYOR | DRAWN J.McI. DATE 19/09/03
AZIMUTH | FIELD BOOK | CHECKED RR DATE 19/09/03
RELATED PLANS | DESIGNED JN DATE 19/09/03
CHECKED AE DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN
NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
GENERAL NOTES

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 1 OF 1 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. N1
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

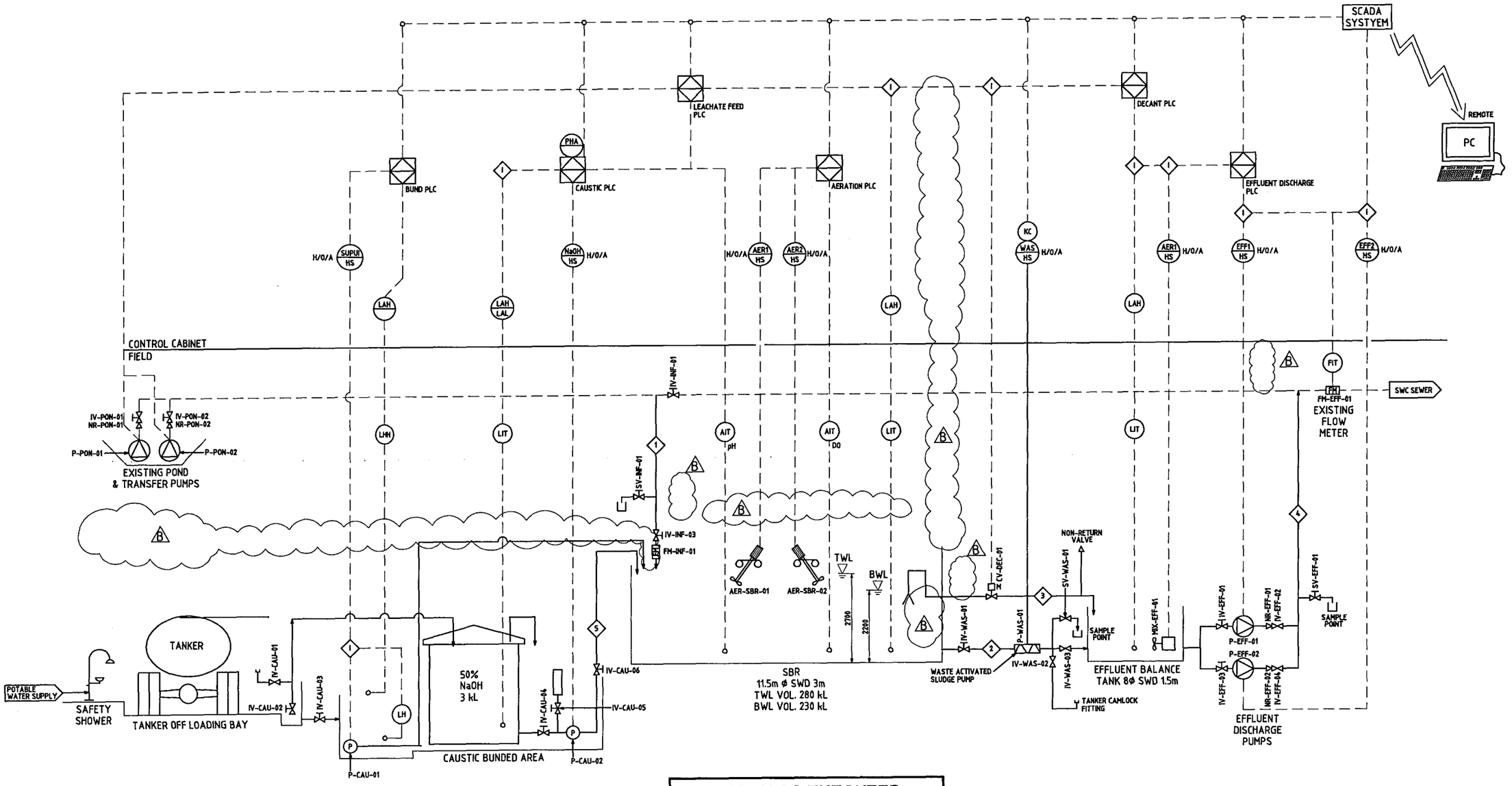
LINE No.	1	2	3	4	5
FLUID	RAW LEACHATE	WASTE ACTIVATED SLUDGE	TREATED EFFLUENT	TREATED EFFLUENT	CAUSTIC SODA 50%
MAXIMUM FLOW	12.5m³/h	36m³/h	50m³/h	10m³/h	17L/h
AVERAGE FLOW	7.5m³/h	3.6m³/h	30m³/h	6m³/h	7L/h
CONDUIT	63 UPVC CLASS 16 T.B.C.	50 UPVC CLASS 16 T.B.C.	100 UPVC CLASS 16 T.B.C.	50 UPVC CLASS 16 T.B.C.	20 UPVC CLASS 16 T.B.C.

TAG NUMBERING SYSTEM
EQUIPMENT - LOCATION - NUMBER

LEGEND:

EQUIPMENT:
P - PUMP
IV - ISOLATING VALVE
SV - SAMPLING VALVE
NR - NON-RETURN VALVE
AER - AERATOR
MIX - MIXER
CV - CONTROL VALVE

LOCATION:
CAU - CAUSTIC SODA BAY
INF - INFLUENT
EFF - EFFLUENT
WAS - WASTE ACTIVATED SLUDGE
SBR - SEQUENTIAL BATCH REACTOR
PON - POND
DEC - DECANT



WORK AS EXECUTED

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Signed.....

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	GP	22/03/05
A	FOR CONSTRUCTION	J.McI	SP	09/03

DATUM	SURVEYOR	DRAWN	DATE
AHD		J.McI.	19/09/03
AZIMUTH	FIELD BOOK	CHECKED	DATE
ISG		RR	19/09/03
RELATED PLANS		DESIGNED	DATE
		SP	19/09/03
		CHECKED	DATE
		JM	19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: NOT TO SCALE
NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
PROCESS AND INSTRUMENT DIAGRAM

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 1 OF 1 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. M1
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

NORTH

297790 E

297800 E

297810 E

297820 E

297830 E

6184190 N

6184200 N

6184210 N

6184220 N

6184230 N

6184240 N

PROPOSED ROAD

1000 1950

42000

36100

1950 1000

CONCRETE PIPE

SOP 3

SOP 4

ASPHALT SURFACE

BYPASS (UNDERGROUND)

EXISTING LEACHATE LINE (INFLUENT)

0.55m HIGH EARTH BUND WALL (1:1.5 BATTERS)

CAUSTIC DOSING POINT

3683

3000

1778

1000

FLOW METER

SAMPLING POINT

SOP 2

1500

MIXING PUMP

TANK

3000

EFFLUENT

10000

EFFLUENT BALANCE TANK

SOP 1

8000

SAMPLING POINT

WAS PUMP

SBR TANK

22.5kW FLOATING ASPIRATING AERATORS

BOUNDARY PROVIDED BY COUNCIL

19000

34100

SECURITY CHAIN LINK FENCE

SAMPLING POINT

EFFLUENT PUMPS

FLOW METER AND COMPOSITE SAMPLER

MCC

SBR ACCESS PLATFORM

UNDERGROUND DRAINAGE LINE

CAUSTIC DOSING LINE

EXISTING LEACHATE LINE (EFFLUENT TO SEWER)

1.2m DIA. CAUSTIC TANK

0.2m WIDE 0.6m HIGH RC CONCRETE BUND

ACCESS ROAD

12410

KAMLOCK

KAMLOCK

ACCESS ROAD

5300

BUND HUMP

5000

CONCRETE CAUSTIC LOADING BAY

4000

CAUSTIC DOSING PUMP

830

RAINWATER TANK AND PUMP

2690

ACCESS ROAD TO BE CONSTRUCTED BY OTHERS

150mm HIGH KERB

9000

4000

SAFETY SHOWER

29400

3735

8865

ACCESS TRACK

2000 0 2000 4000 6000 8000 10000

1:100 at A1 (DIMENSIONS IN MILLIMETRES)

PLAN VIEW

SCALE 1:100

NOTES

1. EQUIPMENT SIZES TO BE CONFIRMED.
2. EXISTING SERVICES TO BE LOCATED ON SITE PRIOR TO COMMENCING CONSTRUCTION.
3. WATER TANK LOCATION TO BE CONFIRMED ON SITE.

SETTING OUT POINTS OF TANKS

	EASTING	NORTHING
SOP 1	297815.319	6184205.471
SOP 2	297811.071	6184217.613
SOP 3	297797.355	6184190.704
SOP 4	297797.355	6184232.704

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	ISSUED FOR CONSTRUCTION	J.McL	A.E.	09/03

DATUM AHD	SURVEYOR	DRAWN J.McL	DATE 19/09/03
AZIMUTH MGA	FIELD BOOK	CHECKED RR	DATE 19/09/03
RELATED PLANS		DESIGNED JN	DATE 19/09/03
		CHECKED AE	DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
GENERAL ARRANGEMENT

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WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.

FILE NUMBER

SHEET 1 OF 8 SHEETS

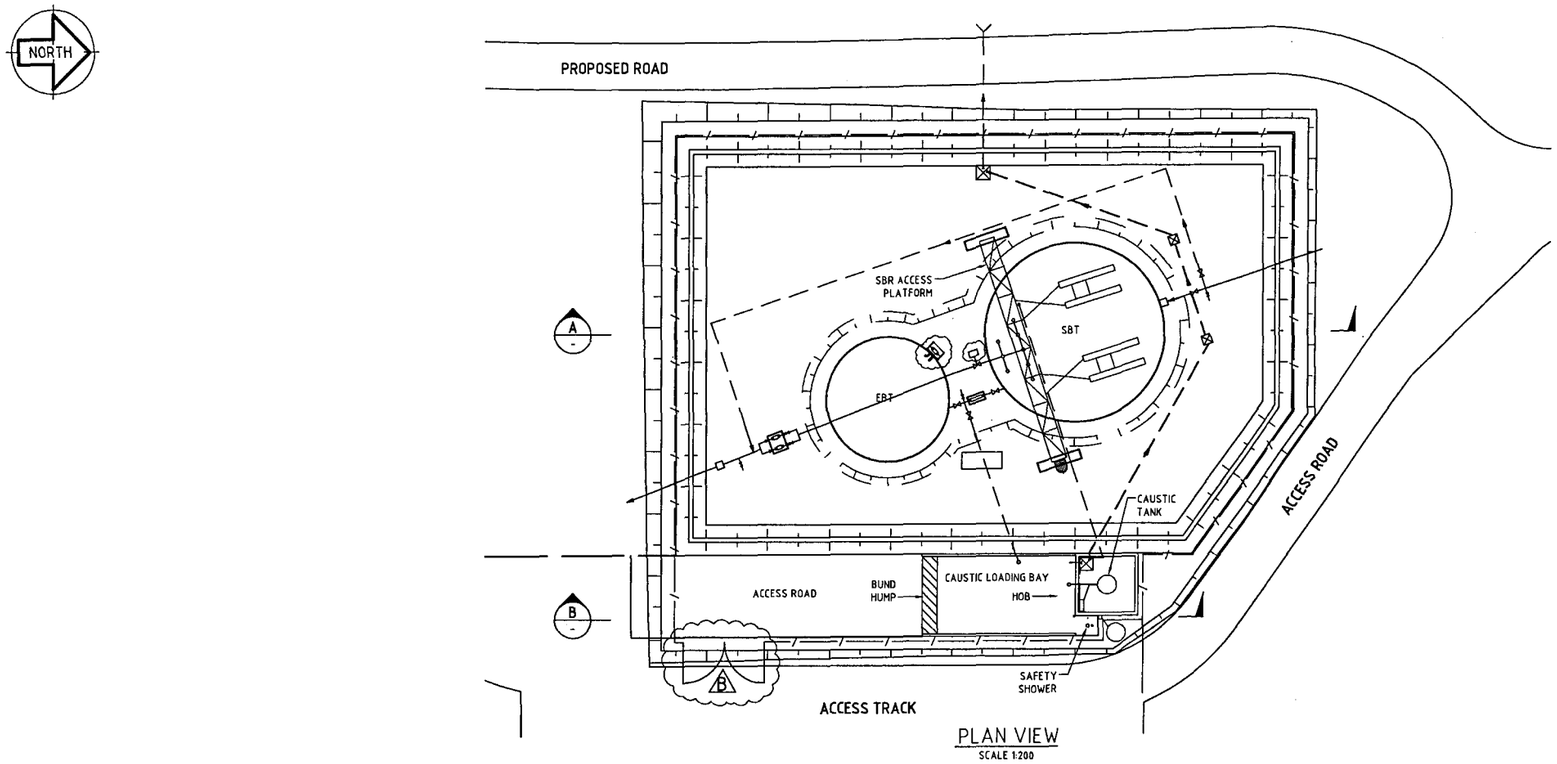
DRAWING No. 3512

SHEET No. C1

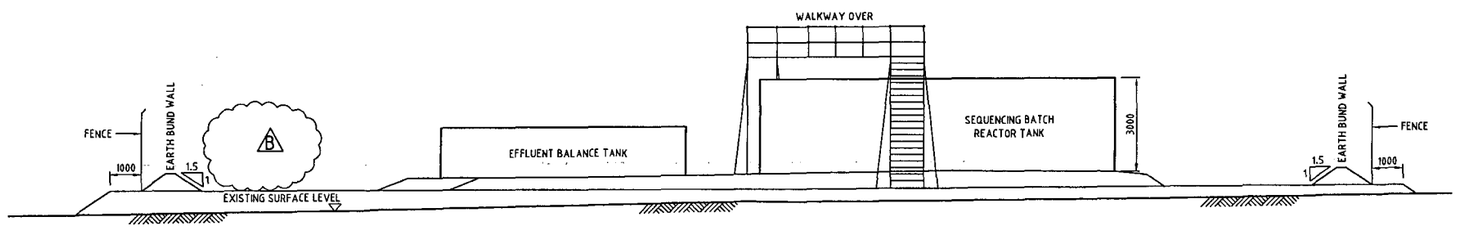
ISSUE B

A1 ORIGINAL

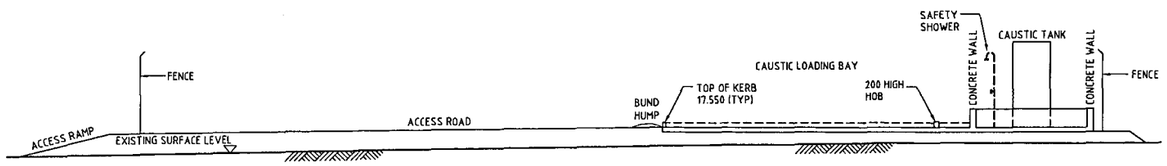
0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



PLAN VIEW
SCALE 1:200



SECTION A
SCALE: 1:100



SECTION B
SCALE: 1:100

2000 0 2000 4000 6000 8000 10000
1:100 at A1 (DIMENSIONS IN MILLIMETRES)

4000 0 4000 8000 12000 16000 20000
1:200 at A1 (DIMENSIONS IN MILLIMETRES)

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed.

Signed.....

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McI	A.E.	09/03

DATUM	SURVEYOR	DRAWN J.McI.	DATE 19/09/03	APPROVED (FOR COUNCIL USE ONLY)
AZIMUTH	FIELD BOOK	CHECKED RR	DATE 19/09/03	SENIOR DESIGN ENGINEER / DATE
RELATED PLANS		DESIGNED JN	DATE 19/09/03	MANAGER DESIGN / DATE
		CHECKED AE	DATE 19/09/03	

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

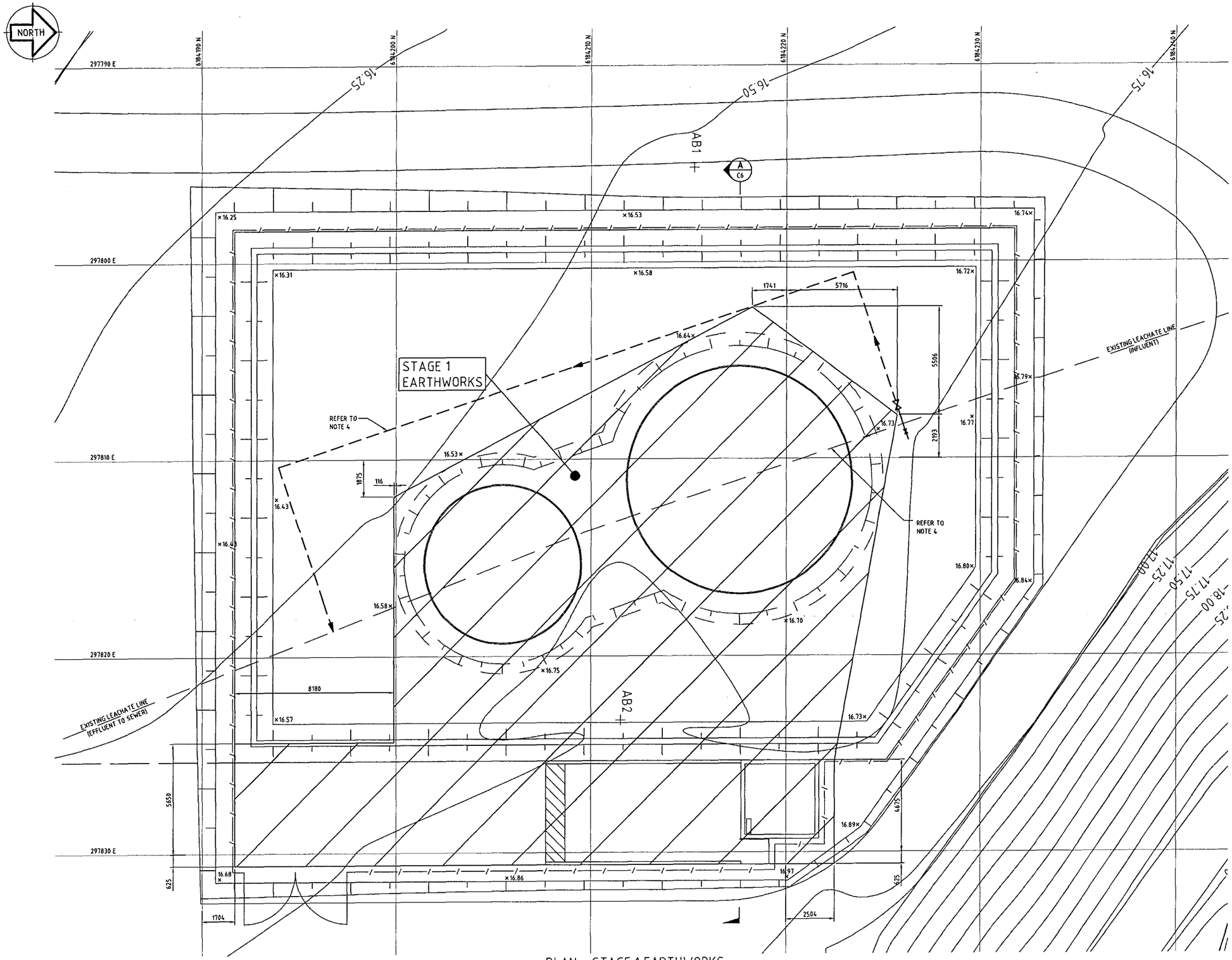
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
GENERAL PLANT ELEVATIONS

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 2 OF 8 SHEETS
DRAWING No. 3512
SHEET No. C2
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



PLAN - STAGE 1 EARTHWORKS

SCALE 1:100

2000 0 2000 4000 6000 8000 10000

1:100 at A1 (DIMENSIONS IN MILLIMETRES)

NOTES

SUBGRADE PREPARATION
STAGE 1 EARTHWORKS

1. CLEAR AREA AS INDICATED OF ALL OBSTRUCTIONS, VEGETATION, DEBRIS, SOFT OR OTHERWISE UNSUITABLE MATERIAL TO A DEPTH OF 1500mm BELOW NATURAL SURFACE LEVEL OR AS DIRECTED BY THE URS GEOTECHNICAL ENGINEER.
2. PLACE SELECTED CLASS A MATERIAL (REFER GENERAL NOTES) IN MAXIMUM 200MM LOOSE LAYERS AND COMPACT TO 98% STANDARD DENSITY. BRING COMPACTED FILL UP TO MATCH EXISTING SURFACE LEVEL UNO.
3. EXISTING LEACHATE LINE TO BE REMOVED AND REDIRECTED PRIOR TO BULK EARTHWORK EXCAVATION.

LEGEND:

× 16.64	EXISTING SURFACE LEVEL
+ 17.90	PROPOSED FINISHED SURFACE LEVEL FOR BULK EARTHWORKS
▨	PROPOSED FINISHED SURFACE LEVEL TO MATCH EXISTING AFTER PLACEMENT OF COMPACTED FILL.

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work-As-Executed.

Signed.....

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	DW	22/03/05
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

				APPROVED (FOR COUNCIL USE ONLY)	
DATUM AHD	SURVEYOR	DRAWN J.McI.	DATE 19/09/03	SENIOR DESIGN ENGINEER	MANAGER DESIGN
AZIMUTH MGA	FIELD BOOK	CHECKED RR	DATE 19/09/03		
RELATED PLANS		DESIGNED JN	DATE 19/09/03		
		CHECKED AE	DATE 19/09/03	DATE	DATE

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
STAGE 1 BULK EARTHWORKS

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 3 OF 8 SHEETS
DRAWING No. 3512
SHEET No. C3
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

NORTH

297790 E
297800 E
297810 E
297820 E
297830 E

6184190 N
6184200 N
6184210 N
6184220 N
6184230 N
6184240 N

16.25
16.50
16.75

AB1
AB2
A C6

SOP 3
SOP 4

16.22×
×16.52
×16.74
16.41×
16.68×
×16.87
16.98×
×16.91
×16.85

705
2705
2645
1455
3645
2705
6160
1234
105

+ 17.10
17.10+
+ 17.025
17.025+
17.00
+ 16.925
17.15 +
17.075+
17.075 +
+ 17.175
17.125 +
17.125+
17.20
+ 16.90
16.90+

~75mm WITHIN BUNDED AREA

REFER TO NOTE 4

STAGE 2 EARTHWORKS

EXISTING LEACHATE LINE (INFLUENT)

EXISTING LEACHATE LINE (EFFLUENT TO SEWER)

FALL

-17.00
-17.25
-17.50
-17.75
-18.00

PLAN - STAGE 2 EARTHWORKS

SCALE 1:100

2000 0 2000 4000 6000 8000 10000

1:100 at A1 (DIMENSIONS IN MILLIMETRES)

NOTES

SUBGRADE PREPARATION
STAGE 2 EARTHWORKS

1. CLEAR AREA (EXCEPT STAGE 1 AREA) OF ALL OBSTRUCTIONS, VEGETATION, DEBRIS, SOFT OR OTHERWISE UNSUITABLE MATERIAL TO A DEPTH OF AT LEAST 300mm OR AS DIRECTED BY THE ENGINEER.
2. PLACE SELECTED FILL CLASS A MATERIAL (REFER GENERAL NOTES) IN MAXIMUM 200mm LOOSE LAYER SAND COMPACTED TO 98% STANDARD DENSITY. BRING COMPACTED FILL UP TO MATCH EXISTING SURFACE LEVEL UNO.
3. IN AREA DENOTED BY ⊠ FINISHED SURFACE LEVEL (STAGE 2 EARTHWORKS) TO BE 300mm BELOW FINAL SURFACE LEVEL.
4. EXISTING LEACHATE LINE TO BE REMOVED AND REDIRECTED PRIOR TO BULK EARTHWORK EXCAVATION.
5. FOR SET OUT POINTS (SOP3 & SOP4) REFER DRG. No. 3512-C1.

LEGEND:

× 16.64 EXISTING SURFACE LEVEL

+ 17.90 PROPOSED SURFACE LEVEL FOR BULK EARTHWORKS

STAGE 2 EARTHWORKS TO SPECIFIED SURFACE LEVELS

STAGE 1 EARTHWORKS

STAGE 2 EARTHWORKS PROPOSED SURFACE LEVEL -300mm BELOW FINAL SURFACE LEVEL

WORK AS EXECUTED

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Signed.....

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WORK AS EXECUTED

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
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A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

DATUM AHD | SURVEYOR | DRAWN J.McI. DATE 19/09/03
AZIMUTH MGA | FIELD BOOK | CHECKED RR DATE 19/09/03
RELATED PLANS | DESIGNED JN DATE 19/09/03
CHECKED AE DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

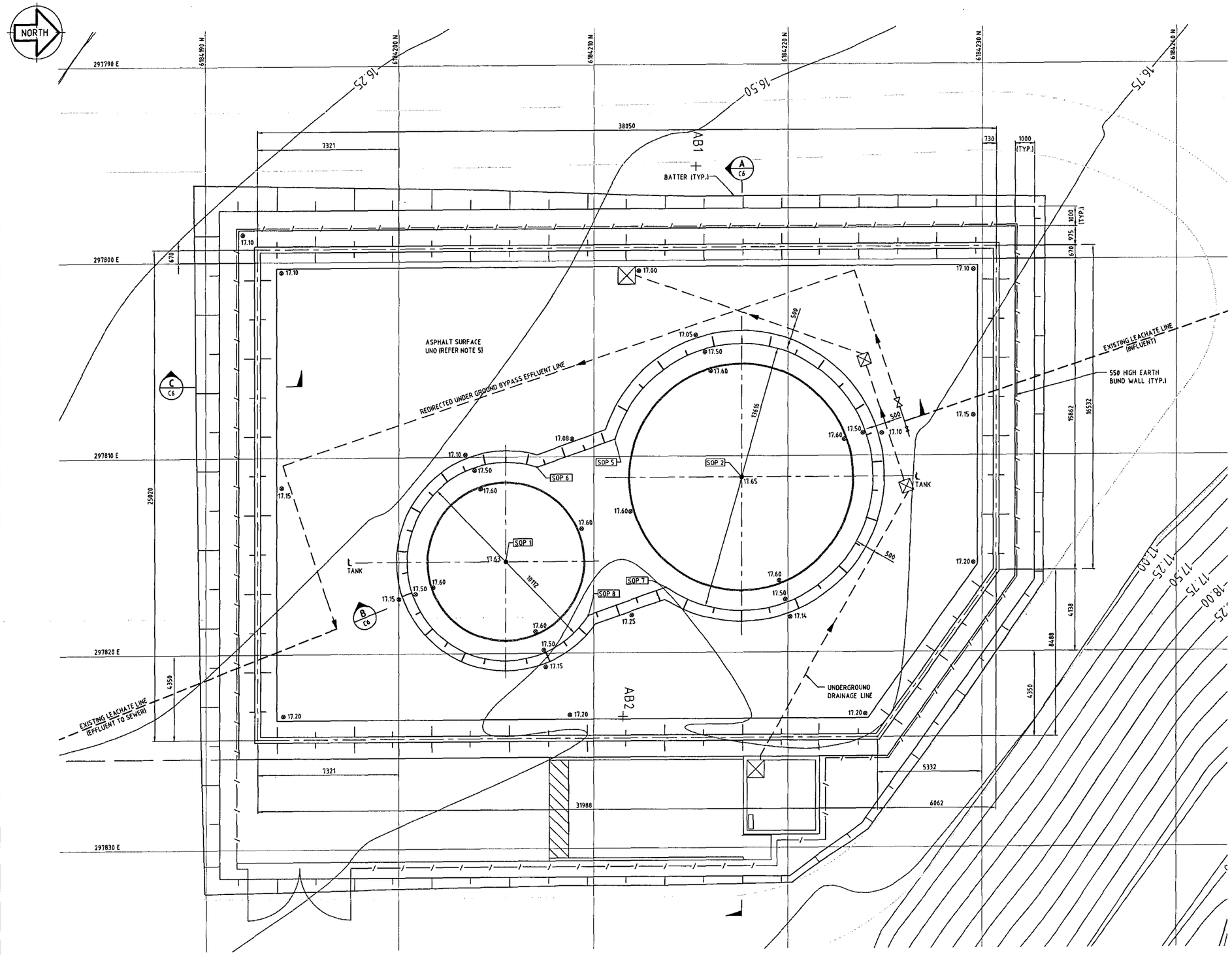
SCALES: AS SHOWN
NORTH POINT

CITY OF WOLLONGONG
WHYTES GULLY LEACHATE TREATMENT PLANT
STAGE 2 BULK EARTHWORKS

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 8 SHEETS
DRAWING No. 3512
SHEET No. C4
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



PLAN - TANK FOUNDATION PAD AND BUND WALL

SCALE 1:100

2000 0 2000 4000 6000 8000 10000

1:100 at A1 (DIMENSIONS IN MILLIMETRES)

NOTES

1. TANK PAD TOLERANCES

   THE FINISHED SURFACE LEVEL UNDER THE TANK WALL SHOULD NOT VARY BY MORE THAN ±3mm IN 3000mm OF THE CIRCUMFERENCE AND WITHIN ±6mm IN THE TOTAL CIRCUMFERENCE MEASURED FROM THE AVERAGE ELEVATION.

2. PROTECTION OF TANK PAD SHOULDER

   PROTECT SHOULDER WITH SAND/BITUMEN/CEMENT MIX (I.E. WET SAND) OR CEMENT MODIFIED SAND AFTER CONSTRUCTION OF PAD FOUNDATION AND EXCESS FILL MATERIAL HAS BEEN CUT BACK.

3. PLACEMENT OF BITUMEN/SAND MIX

   PLACE MIX IMMEDIATELY AFTER COMPLETION OF TANK PAD FOUNDATION TO SPECIFIED THICKNESS.

   BITUMEN SAND SPECIFICATION
   A LAYER OF BITUMEN SAND MIX SHALL BE APPLIED TO THE TANK FOUNDATION AS SHOWN. A SUITABLE MIX CAN BE PRODUCED BY MIXING SAND AND BITUMEN AS DESCRIBED IN THE GENERAL NOTES ON DRG No. 3512-N1.
   SOME VARIATIONS OF THESE PROPORTIONS MAY BE NECESSARY TO SUIT AMBIENT TEMPERATURE CONDITIONS, LOCALLY AVAILABLE MATERIALS, ETC., AND IT IS RECOMMENDED THAT TRIAL MIXES BE MADE IN ORDER TO ACHIEVE THE CORRECT PROPORTIONS TO SUIT THE PARTICULAR CASE.

4. TANK PAD SET OUT

   FOR SET OUT POINTS OF TANKS (SOP1 & SOP2) AND REFER DRG. No. 3512-C1.

5. ASPHALT SURFACE TO BE BITUMAN SPAY OVER 75mm COMPACTED DGB 20 (CLASS B MATERIAL). COVER SURFACE WITH STONE DUST.

LEGEND

× 16.64 EXISTING SURFACE LEVEL

⊗ 17.90 PROPOSED FINISHED SURFACE LEVEL

SETTING OUT POINTS OF TANK PAD SURFACE		
	EASTING	NORTHING
SOP 5	297809.115	6184211.092
SOP 6	297810.521	6184207.072
SOP 7	297816.666	6184213.734
SOP 8	297818.072	6184209.714

WORK AS EXECUTED

These drawings ~~are not~~ an accurate representation as at 22/03/05 of the Work As Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.Mcl.	A.E.	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM AHD | SURVEYOR | AZIMUTH MGA | FIELD BOOK | RELATED PLANS

DRAWN J.Mcl. DATE 19/09/03
CHECKED RR DATE 19/09/03
DESIGNED JN DATE 19/09/03
CHECKED AE DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
STAGE 3 BULK EARTHWORKS
TANK PAD FOUNDATION & BUND WALL

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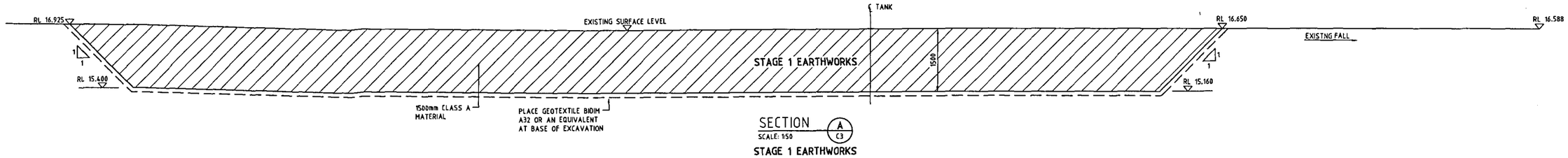
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

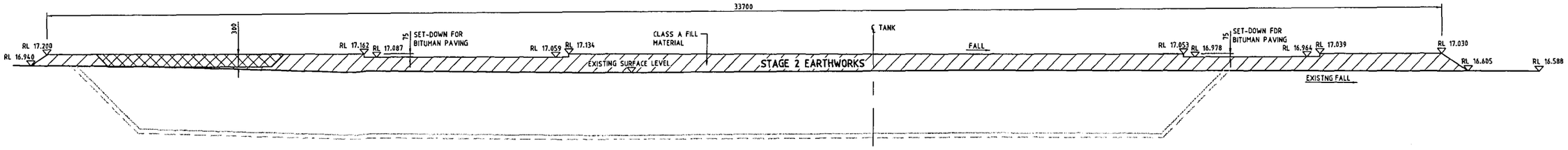
DESIGN PCS No.
FILE NUMBER
SHEET 5 OF 8 SHEETS
A1 ORIGINAL

DRAWING No. 3512 | SHEET No. C5 | ISSUE B



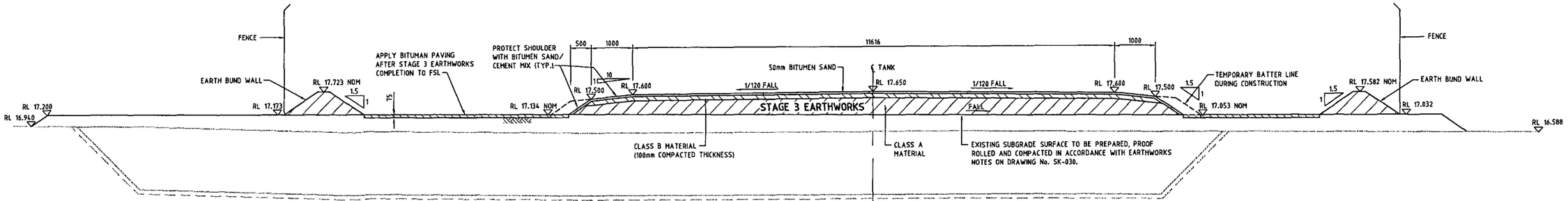
SECTION A / C3
SCALE: 1:50

STAGE 1 EARTHWORKS



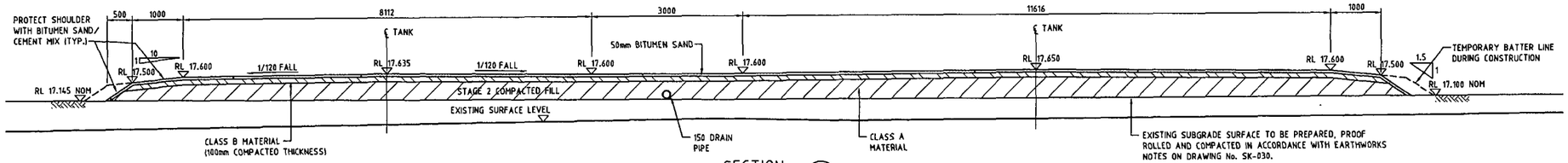
SECTION A / C4
SCALE: 1:50

STAGE 2 EARTHWORKS

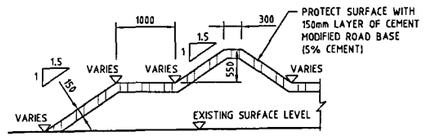


SECTION A / C5
SCALE: 1:50

STAGE 3 EARTHWORKS



SECTION B / C5
SCALE: 1:50



SECTION C / C5
SCALE: 1:50

TYPICAL SECTION THROUGH EARTH BUND WALL

1000 0 1000 2000 3000 4000 5000
1:50 at A1 (DIMENSIONS IN MILLIMETRES)

NOTES

1. CLASS A AND B MATERIAL IS DEFINED IN THE GENERAL NOTES ON DRG. NO. 3512-N1.
2. BITUMEN SAND MIX IS DEFINED IN GENERAL NOTES ON DRG No. 3512-N1.

LEGEND:

- CLASS A MATERIAL
- CLASS B MATERIAL

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McL	A.E.	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN	DATE
AHD		J.McL	19/09/03
AZIMUTH	FIELD BOOK	CHECKED RR	DATE 19/09/03
RELATED PLANS		DESIGNED JN	DATE 19/09/03
		CHECKED AE	DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

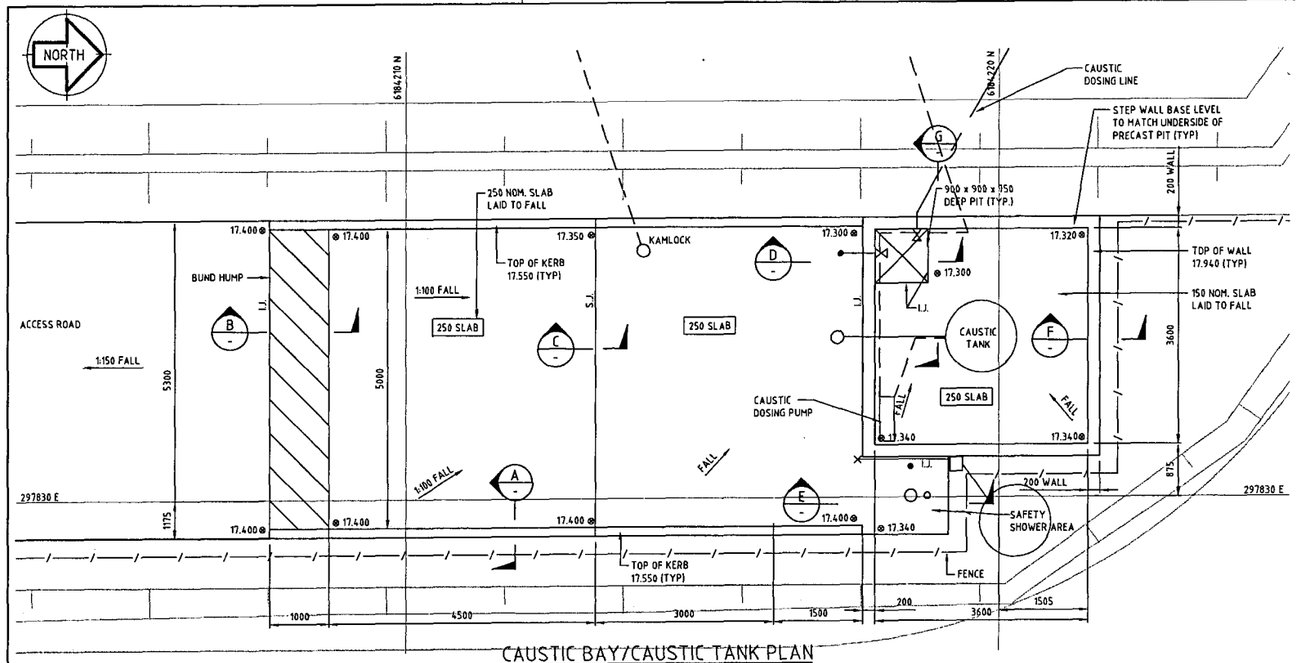
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
BULK EARTHWORKS SECTIONS

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

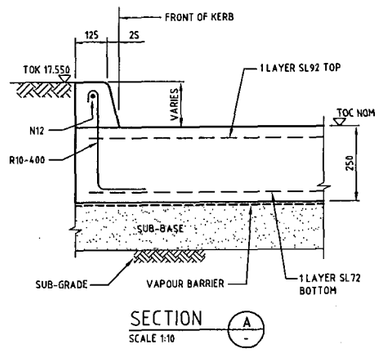
DESIGN PCS No.
FILE NUMBER
SHEET 6 OF 8 SHEETS
A1 ORIGINAL

DRAWING No. 3512
SHEET No. C6
ISSUE B



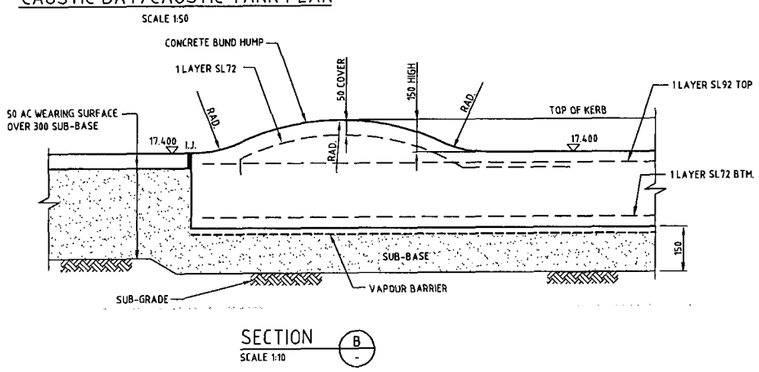
CAUSTIC BAY/CAUSTIC TANK PLAN

SCALE 1:50



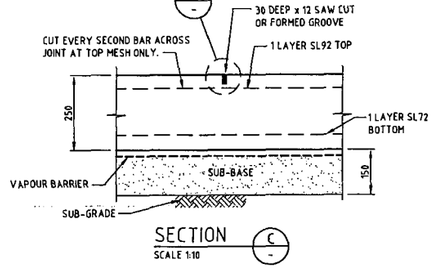
SECTION A

SCALE 1:10



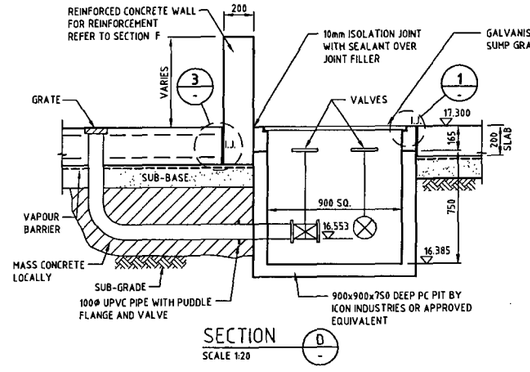
SECTION B

SCALE 1:10



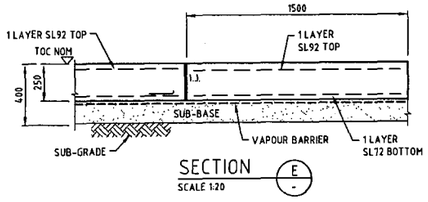
SECTION C

SCALE 1:10



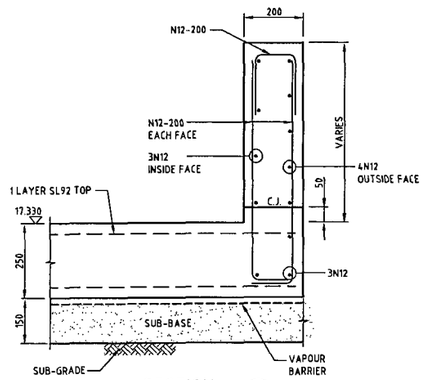
SECTION D

SCALE 1:20



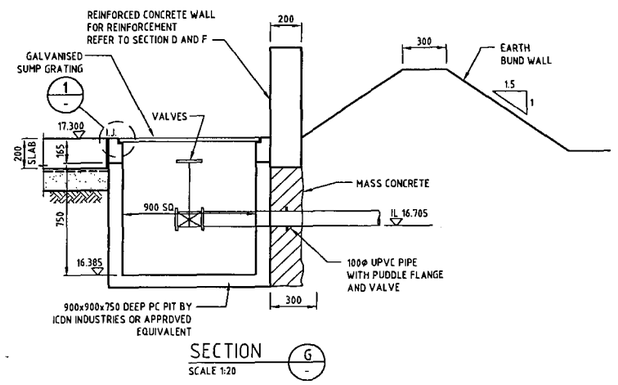
SECTION E

SCALE 1:20



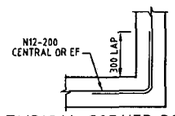
SECTION F

SCALE 1:10



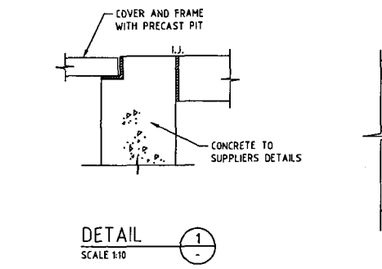
SECTION G

SCALE 1:20

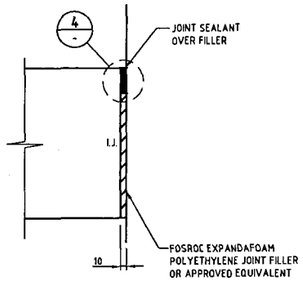


TYPICAL CORNER DETAIL OF WALL/KERB

SCALE 1:20

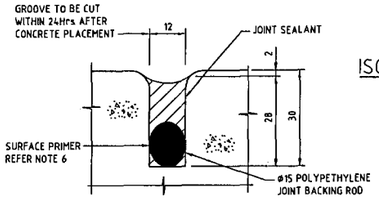


DETAIL 1 — SCALE 1:10



DETAIL 3 — SCALE 1:5

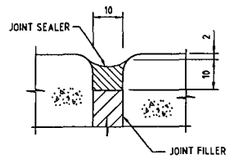
ISOLATION JOINT (I.J.) (TYPICAL)



DETAIL 2 — SCALE 1:1

JOINT SEALANT

JOINT SEALANT TO BE APPLIED A MINIMUM 28 DAYS AFTER CONCRETE PLACEMENT



DETAIL 4 — SCALE 1:1

NOTES

1. SLAB REINFORCEMENT:
   250 SLAB SL92 MESH TOP 50mm COVER
   250 SLAB SL72 MESH BOTTOM 50mm COVER
2. ALL VAPOUR BARRIERS TO BE 0.22mm FORTECON OR APPROVED EQUIVALENT.
3. ALL SLABS TO BE PLACED ON VAPOUR BARRIER OVER 150mm COMPACTED SUB-BASE.
4. ALL SUB-BASE TO BE CLASS B MATERIAL DBG20 AND COMPACTED IN ACCORDANCE WITH GENERAL NOTES.
5. ALL SUB-GRADE TO BE CLASS A MATERIAL AND COMPACTED IN ACCORDANCE WITH GENERAL NOTES ON DRG. No. SK-030.
6. ALL JOINT SEALANT TO BE PARCHEM/FOSROC CHEMPROOF OR APPROVED EQUIVALENT AND APPLIED AFTER CONCRETE HAS BEEN CURED, PREPARED AND PRIMED IN ACCORDANCE WITH MANUFACTURERS'S RECOMMENTDATIONS.

LEGEND

– – –	VAPOUR BARRIER
⊗ 17.90	PROPOSED FINISHED SURFACE LEVEL
S.J.	SHRINKAGE JOINT
I.J.	ISOLATION JOINT

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

1:50 at A1 (DIMENSIONS IN MILLIMETRES) — 1000 0 1000 2000 3000 4000 5000

1:20 at A1 (DIMENSIONS IN MILLIMETRES) — 400 0 400 800 1200 1600 2000

1:10 at A1 (DIMENSIONS IN MILLIMETRES) — 200 0 200 400 600 800 1000

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McI	A.E.	09/03

DATUM AHD	SURVEYOR	DRAWN J.McI.	DATE 19/09/03	APPROVED (FOR COUNCIL USE ONLY)
AZIMUTH ISG	FIELD BOOK	CHECKED RR	DATE 19/09/03	SENIOR DESIGN ENGINEER / MANAGER DESIGN
RELATED PLANS		DESIGNED JN	DATE 19/09/03	DATE / DATE
		CHECKED AE	DATE 19/09/03	

SCALES: AS SHOWN — NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
CAUSTIC LOADING BAY

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WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42277111

DESIGN PCS No.

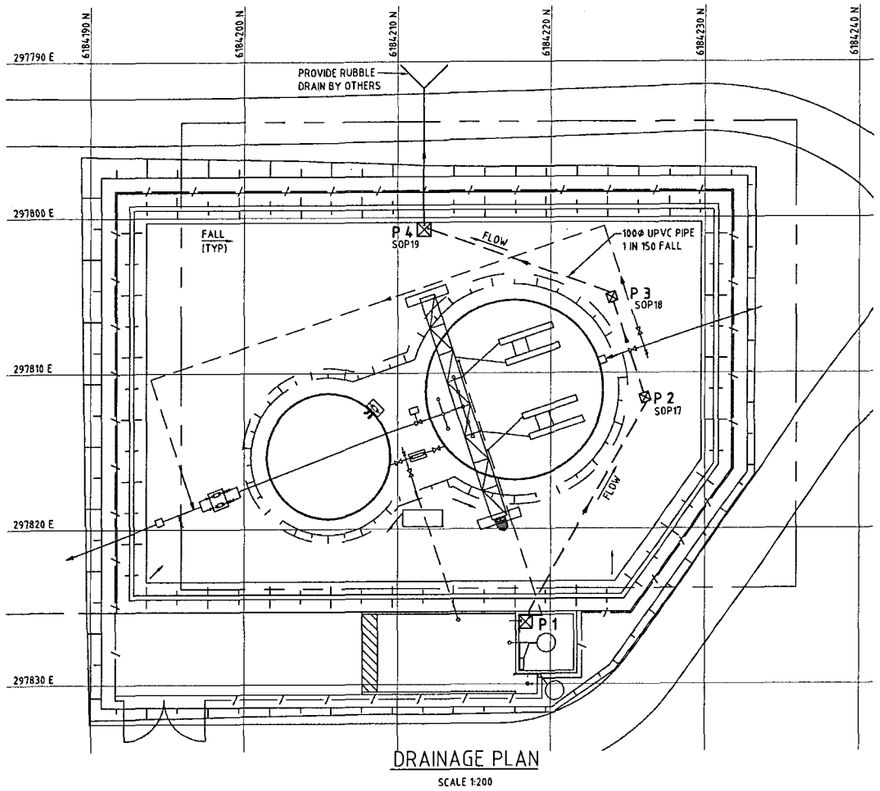
FILE NUMBER

SHEET 7 OF 8 SHEETS

DRAWING No. 3512 — SHEET No. C7 — ISSUE B

A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



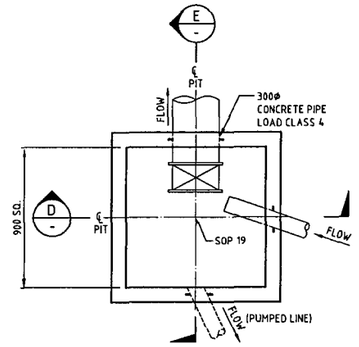
DRAINAGE PLAN
SCALE 1:200

PIT SCHEDULE					
PIT No.	SIZE	INLET IL 'A'	OUTLET IL 'B'	IL PIT IL 'C'	F.S.L. RL 'D'
P1	900x900x750 DEEP	N/A	16.705	16.385	17.300
P2	600x600x600 DEEP	16.600	16.575	16.351	17.116
P3	600x600x600 DEEP	16.533	16.508	16.317	17.082
P4	900x900x750 DEEP	16.425	16.400	16.085	17.000

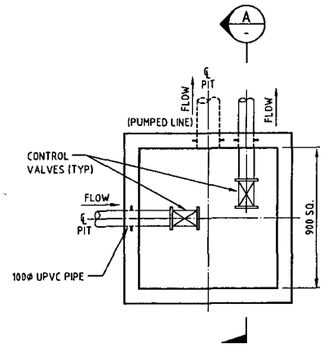
NOTE: ALL PIPES ARE 150ø UPVC U.N.O.

SETTING OUT POINTS OF PITS		
PIT No.	EASTING	NORTHING
P1	N/A	N/A
P2 (SOP17)	297811.581	6184226.109
P3 (SOP18)	297805.125	6184223.967
P4 (SOP19)	297800.755	6184211.704

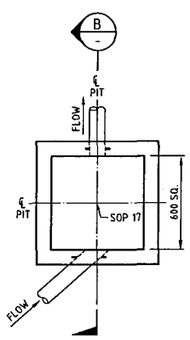
PIT COVER	
PIT No.	DESCRIPTION
P1	SUPPLY GALVANISED GRATING
P2	60mm NOM. THICK CONCRETE
P3	60mm NOM. THICK CONCRETE
P4	SUPPLY GALVANISED GRATING



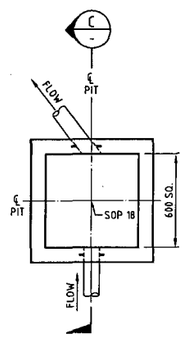
PLAN OF PIT No. P4
SCALE 1:20



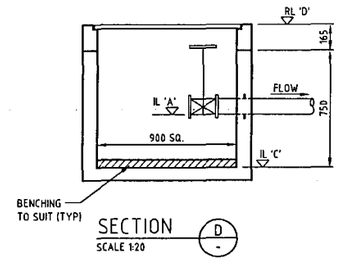
PLAN OF PIT No. P1
SCALE 1:20



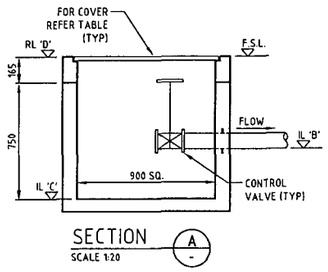
PLAN OF PIT No. P2
SCALE 1:20



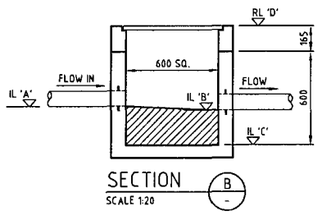
PLAN OF PIT No. P3
SCALE 1:20



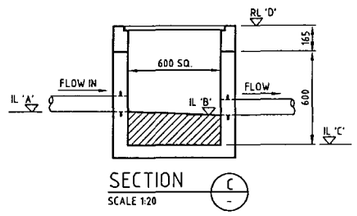
SECTION D
SCALE 1:20



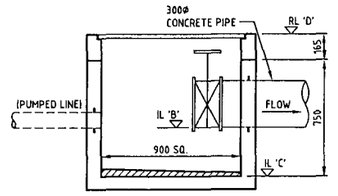
SECTION A
SCALE 1:20



SECTION B
SCALE 1:20



SECTION C
SCALE 1:20



SECTION E
SCALE 1:20

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work-As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

NOTES

1. ALL PITS PRECAST TO DIMENSIONS SHOWN.
2. ALL PIT COVERS SUPPLIED AS PRE-CAST UNITS OR GRATING AS SPECIFIED BY PIT SUPPLIER.
3. KNOCK OUT PANELS IN PIT WALLS TO BE 375x375 MAX TO TAKE 150Ø PIPE.

4000 0 4000 8000 12000 16000 20000
1:200 at A1 (DIMENSIONS IN MILLIMETRES)

400 0 400 800 1200 1600 2000
1:20 at A1 (DIMENSIONS IN MILLIMETRES)

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	JMcI	A.E.	09/03

DATUM AHD | SURVEYOR | RELATED PLANS
AZIMUTH ISG | FIELD BOOK

DRAWN JMcI — DATE 19/09/03
CHECKED RR — DATE 19/09/03
DESIGNED JN — DATE 19/09/03
CHECKED AE — DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN
NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
DRAINAGE PLAN AND PIT DETAILS

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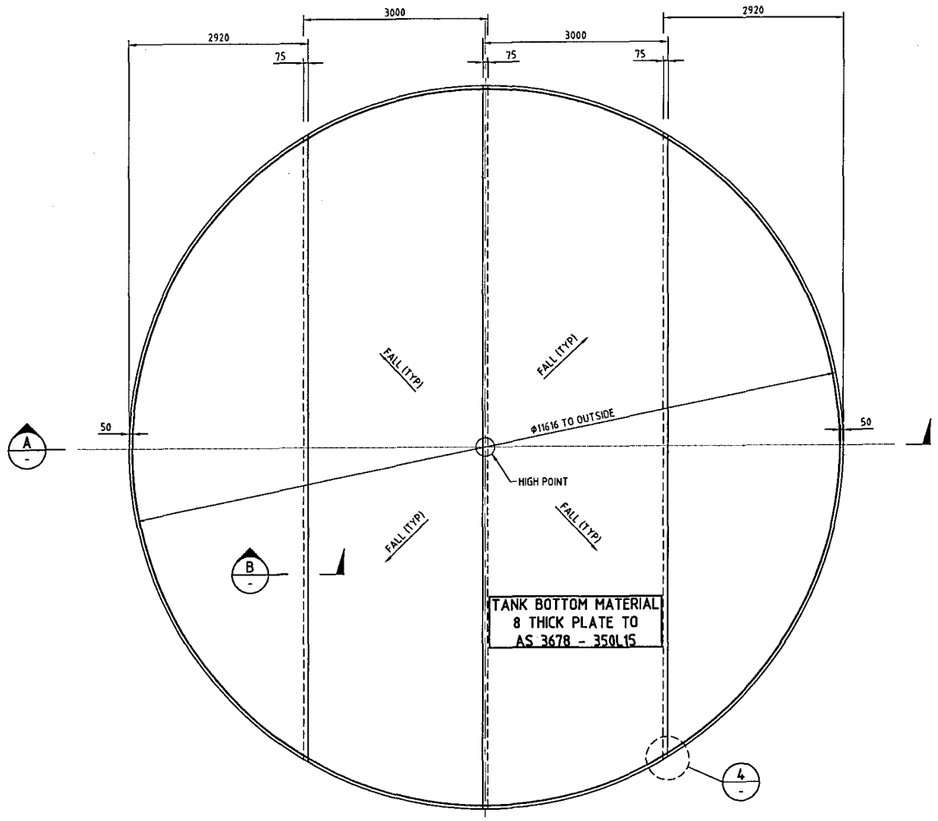
WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 8 OF 8 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. C8
ISSUE B



SEQUENCING BATCH REACTOR TANK BOTTOM PLAN VIEW

SCALE 1:50

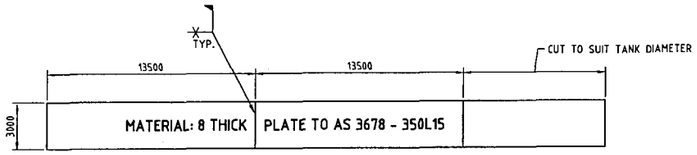
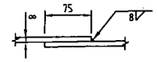


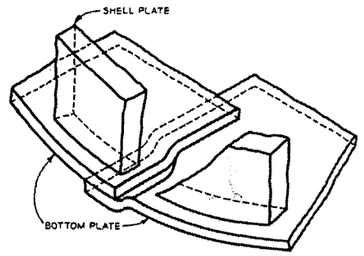
PLATE CUTTING DETAIL FOR SEQUENCING BATCH REACTOR

(PLATE WIDTHS AS PER MILL SUPPLY WITH TRIMMED AND PREPARED EDGES)

SCALE 1:200

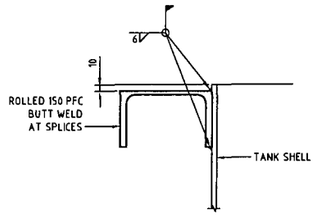


(JOINT SPLICE DETAIL)



—Method for Preparing Lap-Welded Bottom Plates Under Tank Shell.

DETAIL 4



NOTES

1. FOR GENERAL NOTES REFER TO DRG. No. 3512-N1.
2. PLATES SHALL BE GRADE 350 L15 IN ACCORDANCE WITH AS 3678.
3. ALL STEEL SHOULD BE GRADE 300 FOR ROLLED SECTIONS, FLAT AND ROUND BAR, IN ACCORDANCE WITH AS 3678 & AS 3679. (U.N.O.)
4. SITE WELDING SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS OF AS 1554, WELD CATEGORY SP. ALL VERTICAL SHELL PLATE WELDS SHALL BE FULL PENETRATION BUTT WELDS AND THE BASE WELD BOTTOM PLATE SHALL BE A SQAURE BUTT WELD.. FABRICATION, ERECTION, INSPECTION AND TESTING TO BE IN ACCORDANCE WITH API STANDARD 650.
5. PROTECTIVE COATINGS

   (BY ALTEX COATINGS LIMITED OR APPROVED EQUIVALENT)

   SURFACE PREPARATION FOR ALL SURFACES (INTERNAL, EXTERNAL AND UNDER SIDE OF BOTTOM PLATES) TO BE IN ACCORDANCE WITH ALTEX COATINGS LIMITED PRINTED INSTRUCTIONS.

   SHOP COATINGS

   UNDER SIDE OF BOTTOM PLATES

   COATING SYSTEM - FIRST COAT DEVTAR 5A - 150um DFT
   - SECOND COAT DEVTAR 5A - 150um DFT
   (REFER WELD MARGIN AT JOINT SPLICE DETAIL)

   ON SITE COATINGS
   (AFTER TANK ERECTED)

   INSIDE STEEL TANK SURFACES

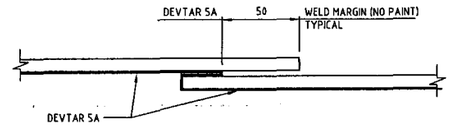
   COATING SYSTEM - FIRST COAT DEVCHEM 253 - 150um DFT
   SECOND COAT DEVCHEM 253 - 150um DFT

   EXTERNAL STEEL TANK SURFACES

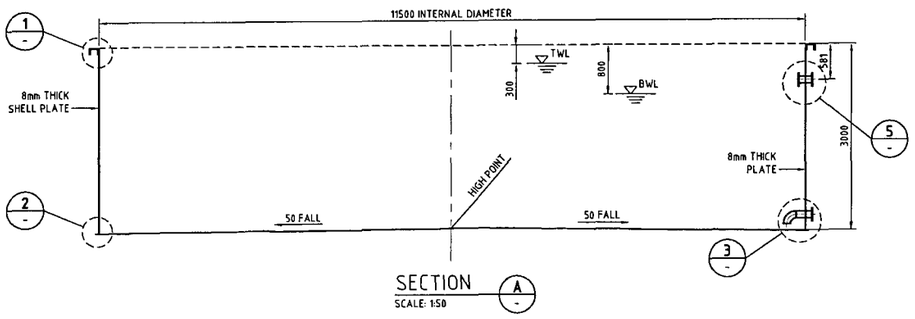
   COATING SYSTEM- FIRST COAT BAR-RUST 236 - 150um DFT
   SECOND COAT DEVTHANE 359HS - 125um DFT

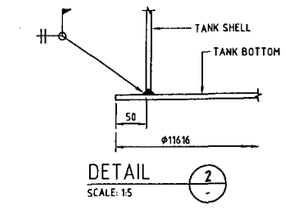
   ALL PREPARATION AND COATING APPLICATION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH ALTEX COATINGS LIMITED PRINTED INSTRUCTIONS.

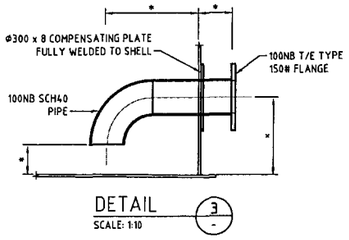
   NOTE:
   ALL PLATES SHALL BE SUPPLIED UNPAINTED TO SITE EXCEPT FOR THE UNDERSIDE OF THE BOTTOM PLATES WHICH ARE TO BE SHOP PAINTED.
   THE UNDERSIDE FLOOR PLATE SHOP COATINGS SHALL BE INSPECTED FOR DAMAGE AND PATCH REPAIRED ON SITE AS NECESSARY IN ACCORDANCE WITH THE COATING MANUFACTURERS PRINTED INSTRUCTIONS PRIOR TO INSTALLATION.
6. MANHOLES IN TANK WALLS TO BE INSTALLED IN ACCORDANCE WITH API 650. CLAUSE 3.7.



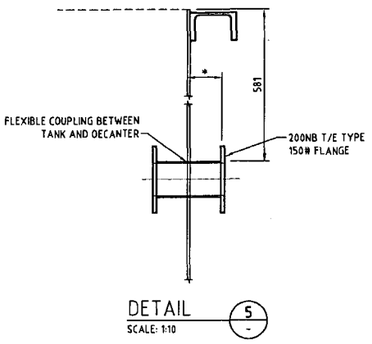
SHOP PAINTING DETAIL AT BOTTOM PLATE JOINT SPLICE







* WASTE ACTIVATED SLUDGE PUMP CONNECTION FLANGE FINAL POSITION AND DIAMETER TO BE CONFIRMED BEFORE FABRICATION



* DECANT OUTLET CONNECTION FLANGE FINAL POSITION AND DIAMETER TO BE CONFIRMED BEFORE FABRICATION

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

4000 0 4000 8000 12000 16000 20000
1: 200 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

1000 0 1000 2000 3000 4000 5000
1:50 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

100 0 100 200 300 400 500
1:5 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

WORK AS EXECUTED

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.Mcl.	A.E.	09/03

DATUM	SURVEYOR	DRAWN J.Mcl.	DATE 19/09/03
AZIMUTH	FIELD BOOK	CHECKED RR	DATE 19/09/03
RELATED PLANS		DESIGNED JN	DATE 19/09/03
		CHECKED AE	DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
SEQUENCING BATCH REACTOR
FABRICATION DETAILS

URS
Level 3, 116 MILLER STREET,
NORTH SYDNEY, N.S.W 2060.
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PET PROCESS ENGINEERING TECHNOLOGIES
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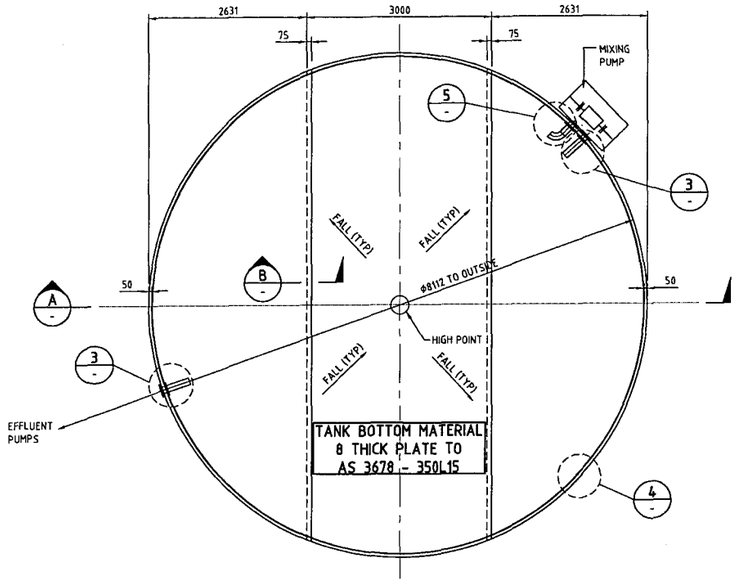
MATRAVILLE, NSW 2036
Telephone: (02) 93167466
Facsimile: (02) 96664336

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.			A1 ORIGINAL
FILE NUMBER			
SHEET 1 OF 6 SHEETS			
DRAWING No. 3512	SHEET No. S1	ISSUE B	

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



BALANCE TANK BOTTOM PLAN VIEW
SCALE 1:50

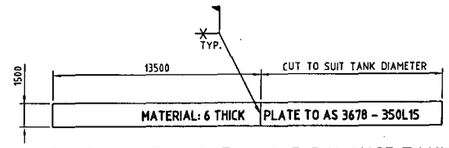
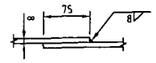
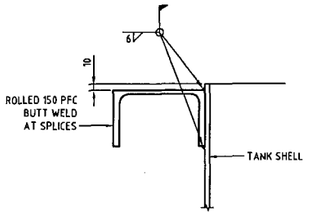


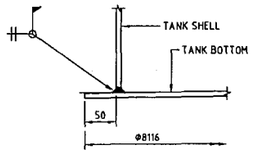
PLATE CUTTING DETAIL FOR BALANCE TANK
(PLATE WIDTHS AS PER MILL SUPPLY WITH TRIMMED AND PREPARED EDGES)
SCALE 1:200



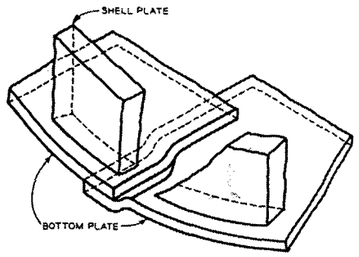
(JOINT SPLICE DETAIL)



DETAIL 1
SCALE: 1:5

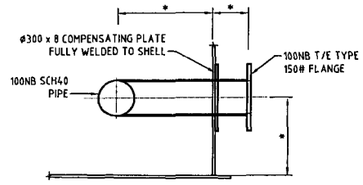


DETAIL 2
SCALE: 1:5



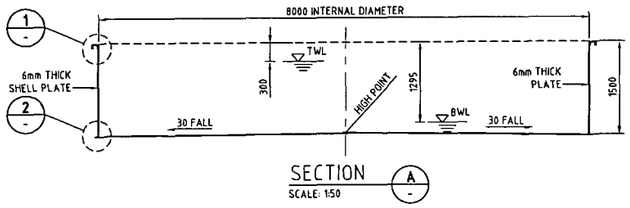
—Method for Preparing Lap-Welded Bottom Plates Under Tank Shell.

DETAIL 4

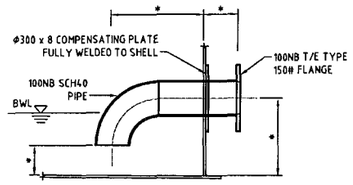


DETAIL 5
SCALE: 1:10

(HORIZONTAL BEND)

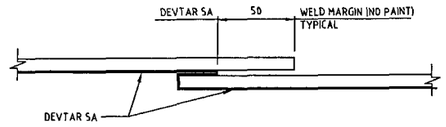


SECTION A
SCALE: 1:50



DETAIL 5
SCALE: 1:10

* EFFLUENT DISCHARGE PUMP CONNECTION FLANGE FINAL POSITION AND DIAMETER TO BE CONFIRMED BEFORE FABRICATION



SHOP PAINTING DETAIL AT BOTTOM PLATE JOINT SPLICE

NOTES

1. FOR GENERAL NOTES REFER TO DRG. No. 3512-N1.
2. PLATES SHALL BE GRADE 350 L15 IN ACCORDANCE WITH AS 3678.
3. ALL STEEL SHOULD BE GRADE 300 FOR ROLLED SECTIONS, FLAT AND ROUND BAR, IN ACCORDANCE WITH AS 3678 & AS 3679. (U.N.O.)
4. SITE WELDING SHALL COMPLY WITH THE APPLICABLE REQUIREMENTS OF AS 1554, WELD CATEGORY SP. ALL VERTICAL SHELL PLATE WELDS SHALL BE FULL PENETRATION BUTT WELDS AND THE BASE WELD BOTTOM PLATE SHALL BE A SQAURE BUTT WELD.. FABRICATION, ERECTION, INSPECTION AND TESTING TO BE IN ACCORDANCE WITH API STANDARD 650.
5. PROTECTIVE COATINGS

   (BY ALTEX COATINGS LIMITED OR APPROVED EQUIVALENT)

   SURFACE PREPARATION FOR ALL SURFACES (INTERNAL, EXTERNAL AND UNDER SIDE OF BOTTOM PLATES) TO BE IN ACCORDANCE WITH ALTEX COATINGS LIMITED PRINTED INSTRUCTIONS.

   SHOP COATINGS

   UNDER SIDE OF BOTTOM PLATES

   COATING SYSTEM - FIRST COAT DEVTAR SA - 150um DFT
   - SECOND COAT DEVTAR SA - 150um DFT
   (REFER WELD MARGIN AT JOINT SPLICE DETAIL)

   ON SITE COATINGS
   (AFTER TANK ERECTED)

   INSIDE STEEL TANK SURFACES.

COATING SYSTEM -	FIRST COAT	DEVCHEM 253	- 150um DFT
	SECOND COAT	DEVCHEM 253	- 150um DFT

   EXTERNAL STEEL TANK SURFACES.

COATING SYSTEM-	FIRST COAT	BAR-RUST 236	- 150um DFT
	SECOND COAT	DEVTHANE 359HS	- 125um DFT

   ALL PREPARATION AND COATING APPLICATION WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH ALTEX COATINGS LIMITED PRINTED INSTRUCTIONS.

   NOTE:
   ALL PLATES SHALL BE SUPPLIED UNPAINTED TO SITE EXCEPT FOR THE UNDERSIDE OF THE BOTTOM PLATES WHICH ARE TO BE SHOP PAINTED.
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6. MANHOLES IN TANK WALLS TO BE INSTALLED IN ACCORDANCE WITH API 650. CLAUSE 3.7.

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work-As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

4000 0 4000 8000 12000 16000 20000
1: 200 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

1000 0 1000 2000 3000 4000 5000
1:50 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

100 0 100 200 300 400 500
1:5 AT A1 (DIMENSIONS ARE IN MILLIMETRES)

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

DATUM | SURVEYOR | DRAWN J.McI. | DATE 19/09/03
AZIMUTH | FIELD BOOK | CHECKED RR | DATE 19/09/03
RELATED PLANS | DESIGNED JN | DATE 19/09/03
CHECKED AE | DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN
NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
EFFLUENT BALANCE TANK
FABRICATION DETAILS

URS
Level 3, 116 MILLER STREET,
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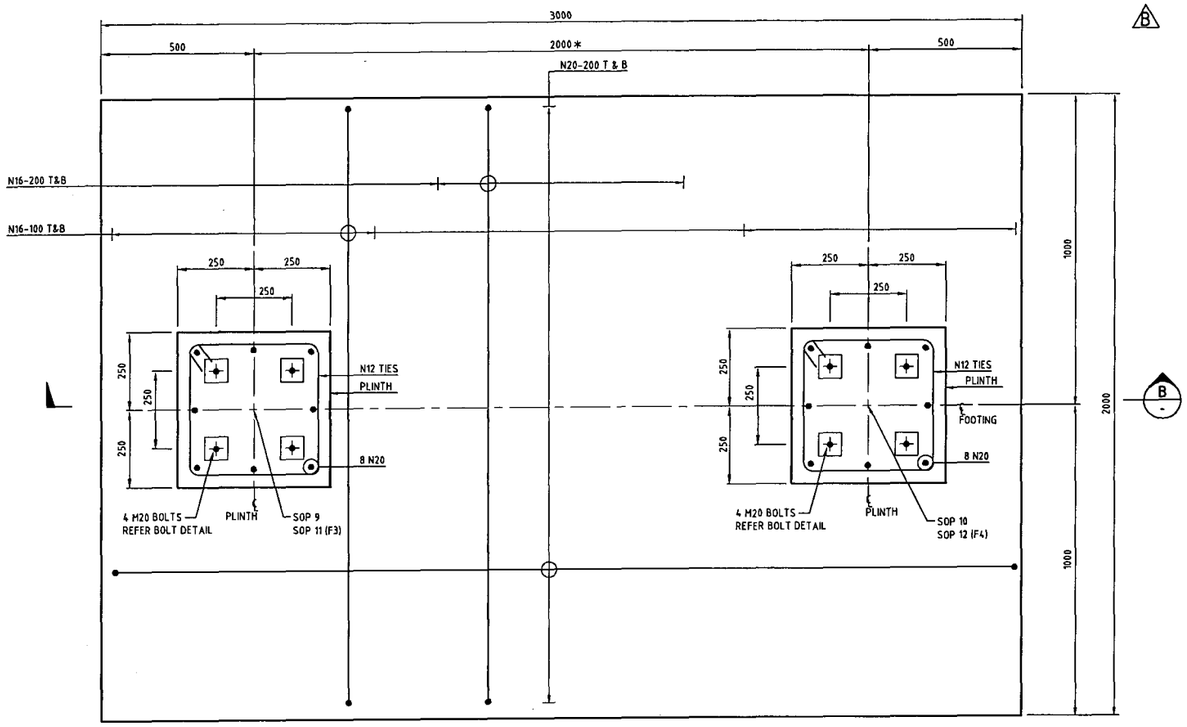
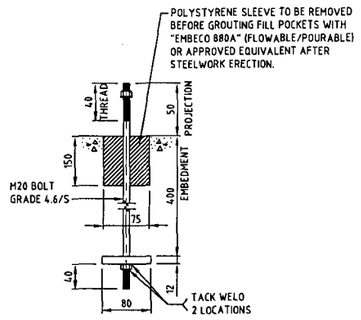
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 2 OF 6 SHEETS
DRAWING No. 3512
SHEET No. S2
A1 ORIGINAL
ISSUE B

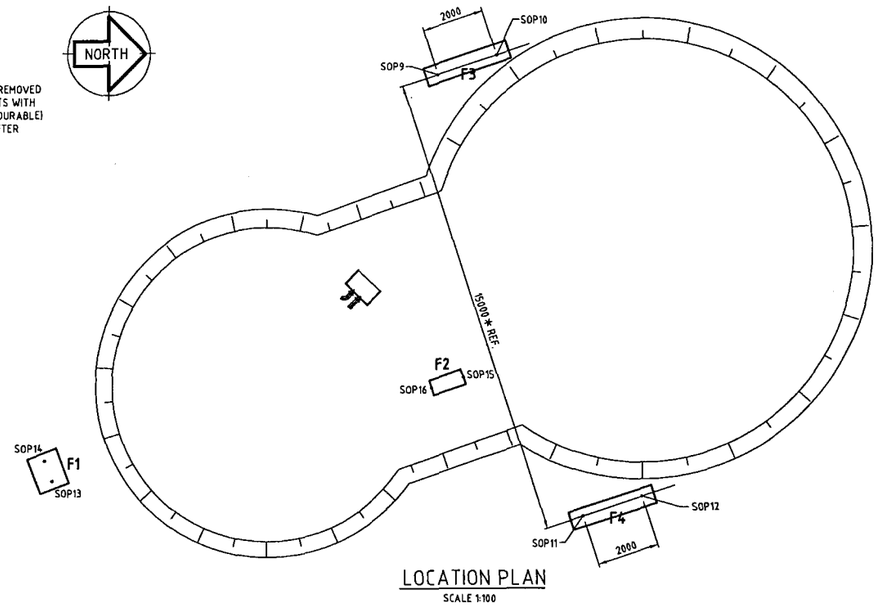


ACCESS PLATFORM FOOTING PLAN
SCALE 1:10

(2 FOOTINGS REQUIRED)
(F3 AS DRAWN F4 SIMILAR AS NOTED)



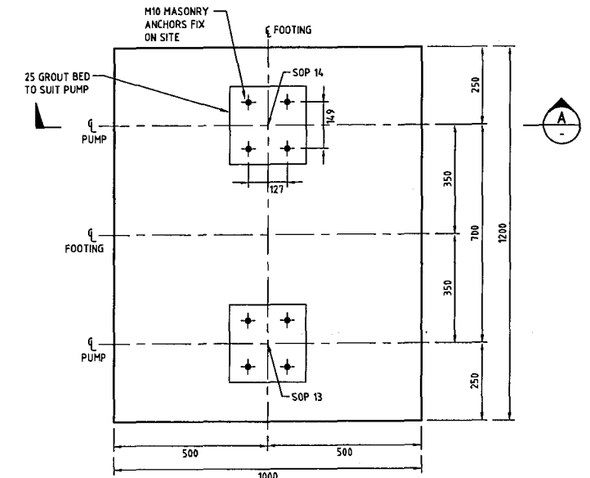
TYPICAL BOLT DETAILS
(16 REQUIRED)
SCALE 1:5



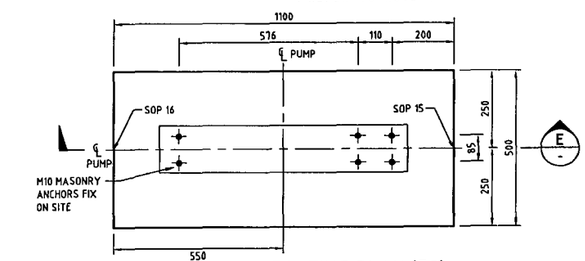
LOCATION PLAN
SCALE 1:100

SETTING OUT POINTS OF ACCESS PLATFORM AND PUMP FOOTINGS		
	EASTING	NORTHING
SOP 9	297805.370	6184210.980
SOP 10	297804.740	6184212.878
SOP 11	297819.606	6184215.703
SOP 12	297818.977	6184217.602
SOP 13	297818.394	6184198.456
SOP 14	297817.741	6184198.205
SOP 15	297815.106	6184211.829
SOP 16	297815.452	6184210.785

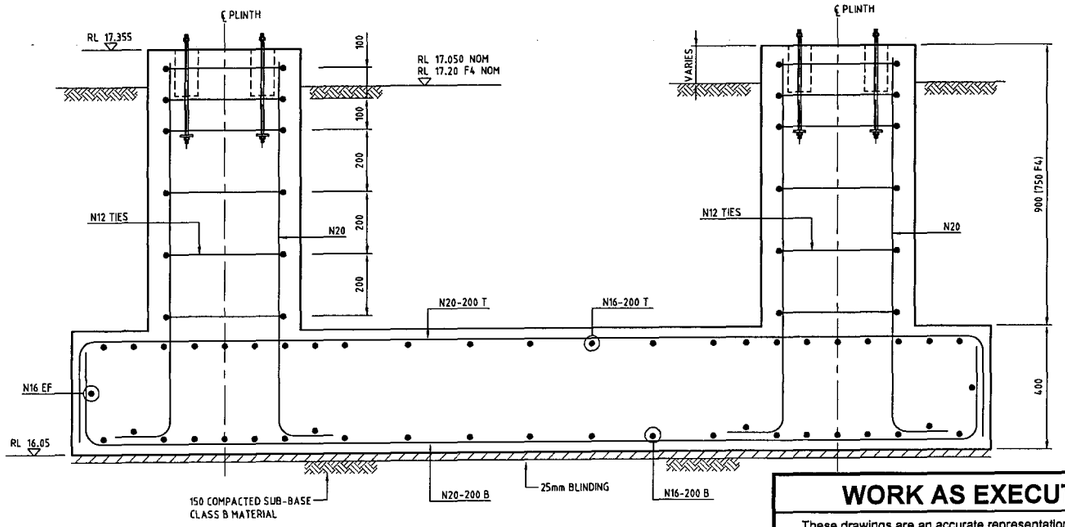
* REFER TO NOTE 4



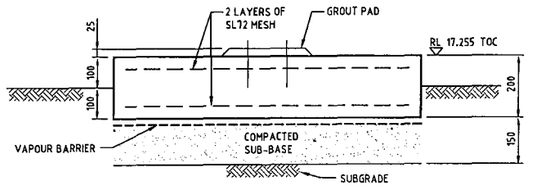
EFFLUENT PUMPS FOOTING PLAN (F1)
SL72 MESH TOP AND BOTTOM
SCALE 1:10



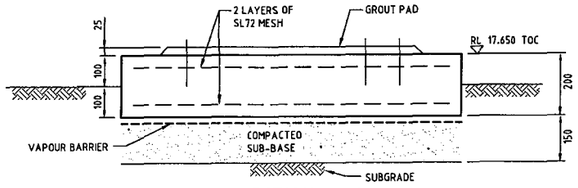
WAS PUMPS FOOTING PLAN (F2)
SL72 MESH TOP AND BOTTOM
SCALE 1:10



SECTION B
SCALE 1:10



SECTION A
SCALE 1:10



SECTION E
SCALE 1:10

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

NOTE: *
ALL DIMENSIONS SHOWN THUS-* TO BE VERIFIED ON SITE PRIOR TO STEEL FRAME FABRICATION

NOTES

1. REFER TO DRG. No. 3512-N1 FOR GENERAL NOTES.
2. SOP DENOTES SETTING OUT POINTS FOR FOOTING AS NOTED
3. F1-F4 DENOTES FOOTING NUMBER.
4. CENTRELINE OF 2 BOLT GROUPS TO BE 2000mm APART AND 15000mm APART AS PER LOCATION PLAN.

WORK AS EXECUTED

100 0 100 200 300 400 500
1:5 at A1 (DIMENSIONS IN MILLIMETRES)

200 0 200 400 600 800 1000
1:10 at A1 (DIMENSIONS IN MILLIMETRES)

2000 0 2000 4000 6000 8000 10000
1:100 at A1 (DIMENSIONS IN MILLIMETRES)

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
C	WORK AS EXECUTED	TT	A.E.	22/03/05
B	ACCESS PLATFORM FOOTINGS ALTERED	R.R.	A.E.	11/03
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

DATUM AHD | SURVEYOR | DRAWN J.McI. DATE 19/09/03
AZIMUTH ISG | FIELD BOOK | CHECKED RR DATE 19/09/03
RELATED PLANS | DESIGNED JN DATE 19/09/03
CHECKED AE DATE 19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN
NORTH POINT:

URS
Level 3, 116 MILLER STREET,
NORTH SYDNEY, N.S.W 2060.
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PET PROCESS ENGINEERING TECHNOLOGIES
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MATRAVILLE, NSW 2036
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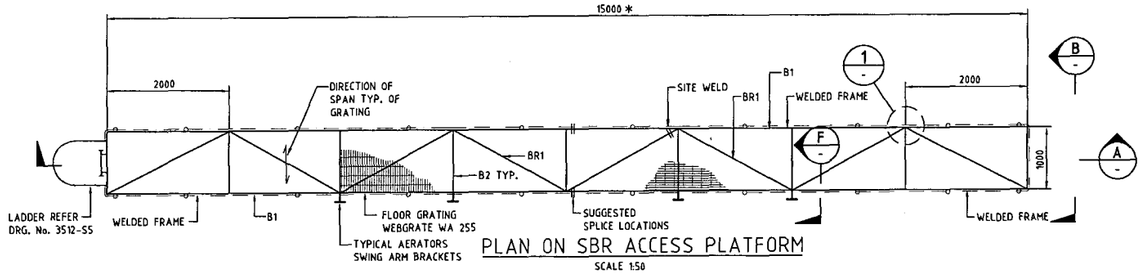
Facsimile: (02) 96664336

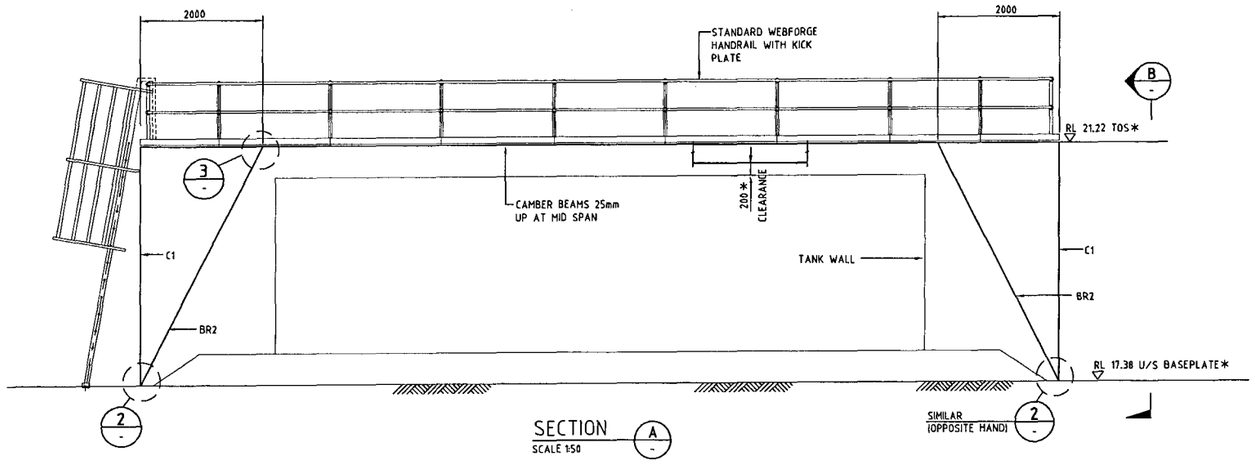
CITY OF WOLLONGONG
WHYTES GULLY LEACHATE TREATMENT PLANT
FOOTING DETAILS

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 3 OF 6 SHEETS
DRAWING No. 3512
SHEET No. S3
ISSUE C
A1 ORIGINAL



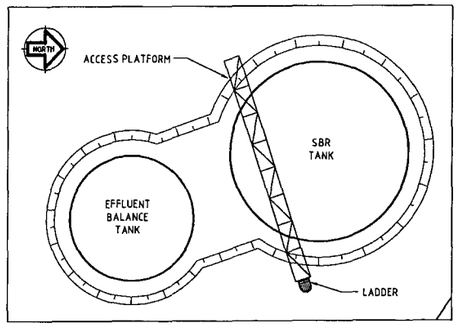
PLAN ON SBR ACCESS PLATFORM
SCALE 1:50



SECTION A
SCALE 1:50

NOTE

1. ALL DIMENSIONS AND LEVELS SHOWN THUS * TO BE VERIFIED ON SITE PRIOR TO FABRICATION.
2. ALL STEELWORK TO BE HOT DIPPED GALVANISED
3. PLATFORM, STAIRS AND LADDER TO CONFORM TO AS1657

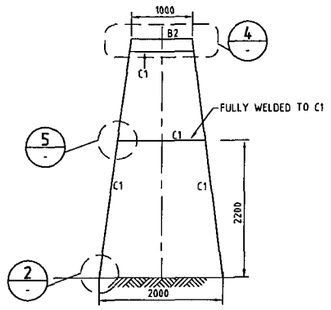


LOCATION PLAN
SCALE 1:200

NOTES

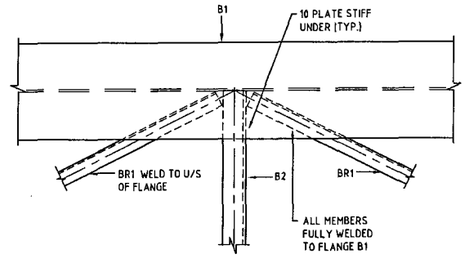
1. FOR GENERAL NOTES REFER TO DRG. No. 3512-N1.
2. ALL PLATES 10mm UNO.
3. ALL WELDS 6mm FW UNO.
4. ALL BOLTS M20 8.8/S UNO.
5. ALL SITE WELDS TO BE PATCH PAINTED WITH 2 COATS OF GALPAINT.

MEMBER SCHEDULE		
B1	310 UB 40	-
B2	150 PFC	FULLY WELDED
BR1	75 x 75 EA 6	FULLY WELDED
C1	150 UC 30	REFER DETAIL 2 & 4
BR2	100 x 100 x 6 SHS	REFER DETAIL 2 & 3



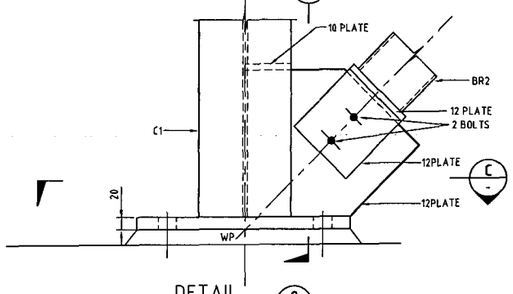
VIEW B
SCALE 1:50

FRAME DETAILS AT SUPPORT

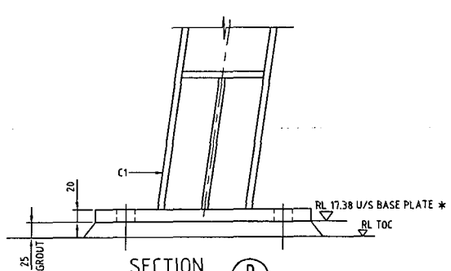


DETAIL 1
SCALE 1:10

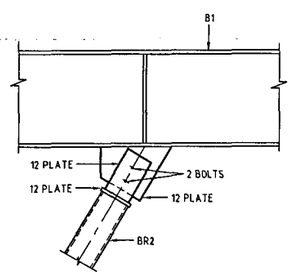
TYPICAL TRUSS CONNECTION DETAIL



DETAIL 2
SCALE 1:5

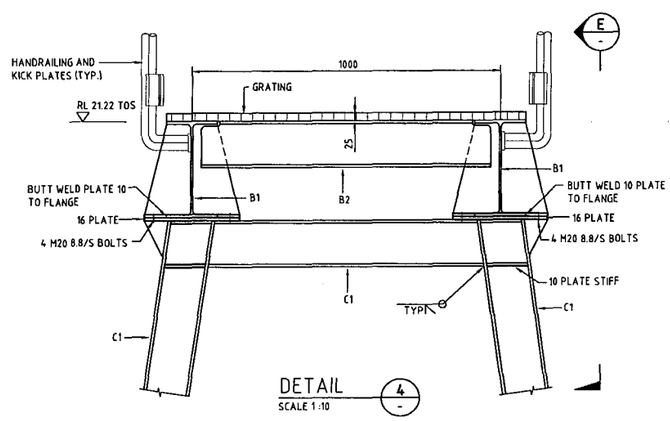


SECTION D
SCALE 1:5



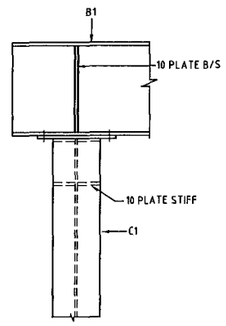
DETAIL 3
SCALE 1:10

TYPICAL TRUSS CONNECTION DETAIL

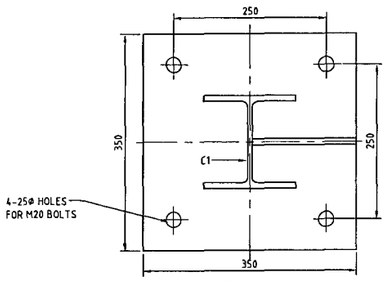


DETAIL 4
SCALE 1:10

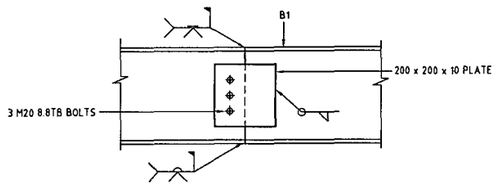
TYPICAL SUPPORT



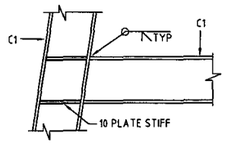
VIEW E
SCALE 1:10



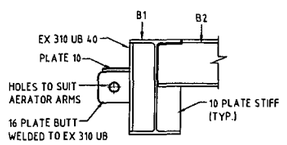
SECTION C
SCALE 1:5



TYPICAL SPLICE CONNECTION
SCALE 1:10



DETAIL 5
SCALE 1:10



SECTION F
SCALE 1:5

TYPICAL AERATOR BRACKETS

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

100 0 100 200 300 400 500
1:5 at A1 (DIMENSIONS IN MILLIMETRES)

1000 0 1000 2000 3000 4000 5000
1:50 at A1 (DIMENSIONS IN MILLIMETRES)

200 0 200 400 600 800 1000
1:10 at A1 (DIMENSIONS IN MILLIMETRES)

4000 0 4000 8000 12000 16000 20000
1:200 at A1 (DIMENSIONS IN MILLIMETRES)

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	TT	A.E.	09/03

DATUM | SURVEYOR | AZIMUTH | FIELD BOOK | RELATED PLANS

		DATE
DRAWN TT		19/09/03
CHECKED RR		19/09/03
DESIGNED JN		19/09/03
CHECKED AE		19/09/03

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER — DATE
MANAGER DESIGN — DATE

SCALES: AS SHOWN
NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
SBR ACCESS PLATFORM DETAILS
SHEET 1 OF 2

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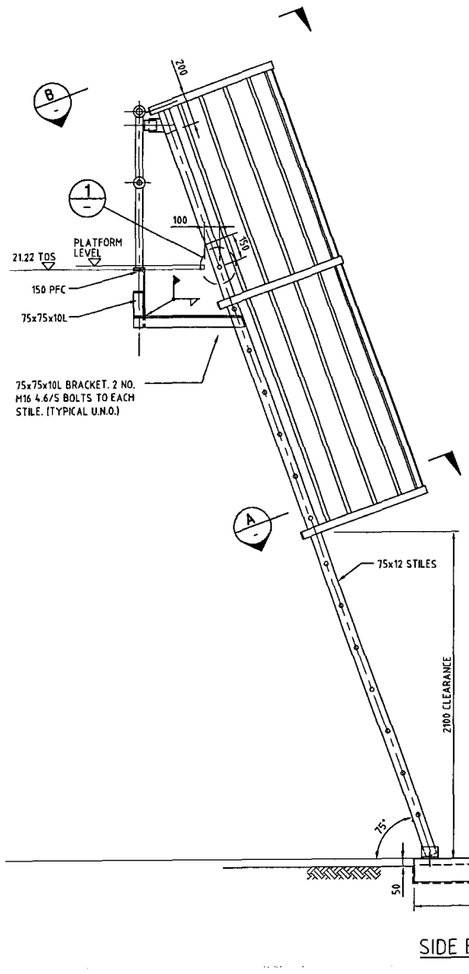
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.			A1
FILE NUMBER			ORIGINAL
SHEET 4	OF 6	SHEETS	
DRAWING No.	SHEET No.		ISSUE
3512	S4		B

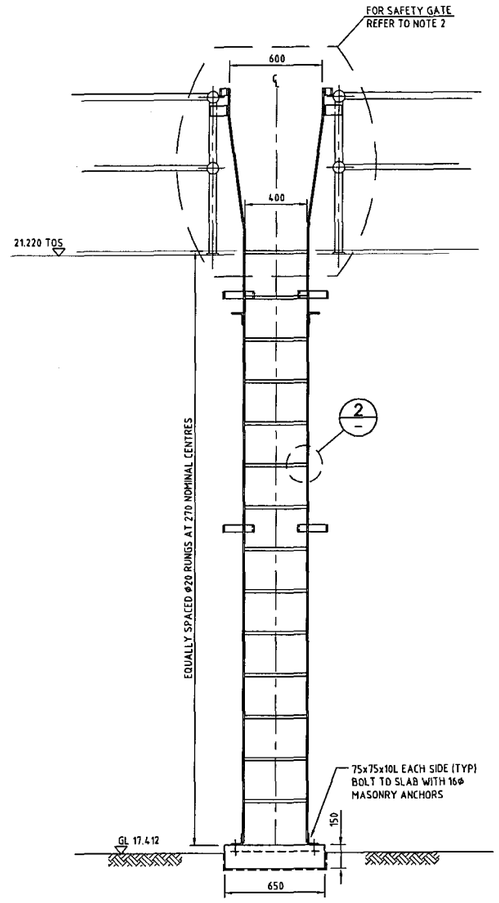
0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

NOTES

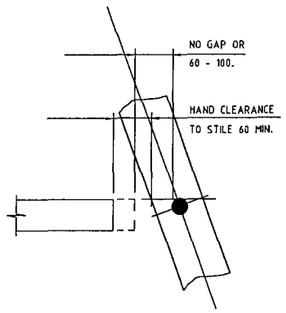
1. FOR NOTES REFER TO DRG. NO. 3512-N1.
2. FOR SAFETY GATE USE MONOWILLS SELF CLOSING GATE.



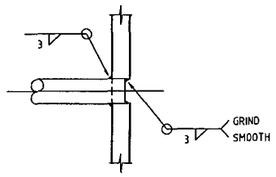
SIDE ELEVATION
SCALE 1:20



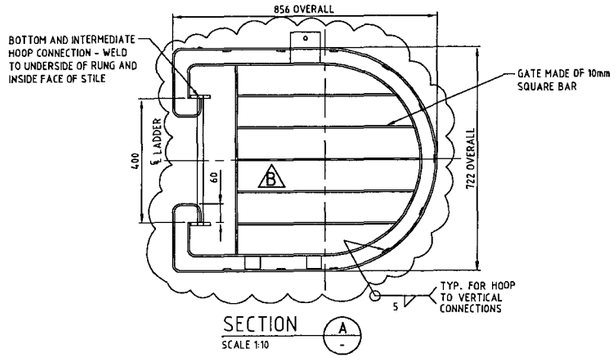
FRONT ELEVATION
SCALE 1:20



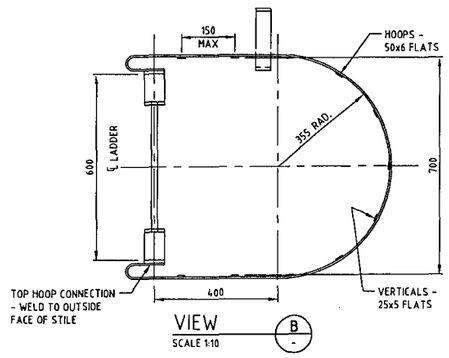
DETAIL 1
SCALE 1:5



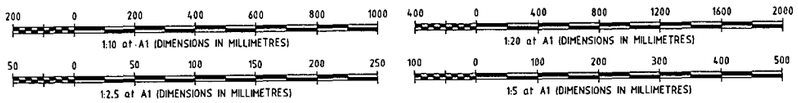
DETAIL 2
SCALE 1:2.5



SECTION A
SCALE 1:10



VIEW B
SCALE 1:10



WORK AS EXECUTED

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Signed.....

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.Mcl	A.E.	09/03

DATUM	SURVEYOR	DRAWN	DATE
		J.Mcl	19/09/03
AZIMUTH	FIELD BOOK	CHECKED RR	19/09/03
RELATED PLANS		DESIGNED JN	19/09/03
		CHECKED AE	19/09/03

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
SBR ACCESS PLATFORM DETAILS
SHEET 2 OF 2

URS
Level 3, 116 MILLER STREET, NORTH SYDNEY, N.S.W. 2060.
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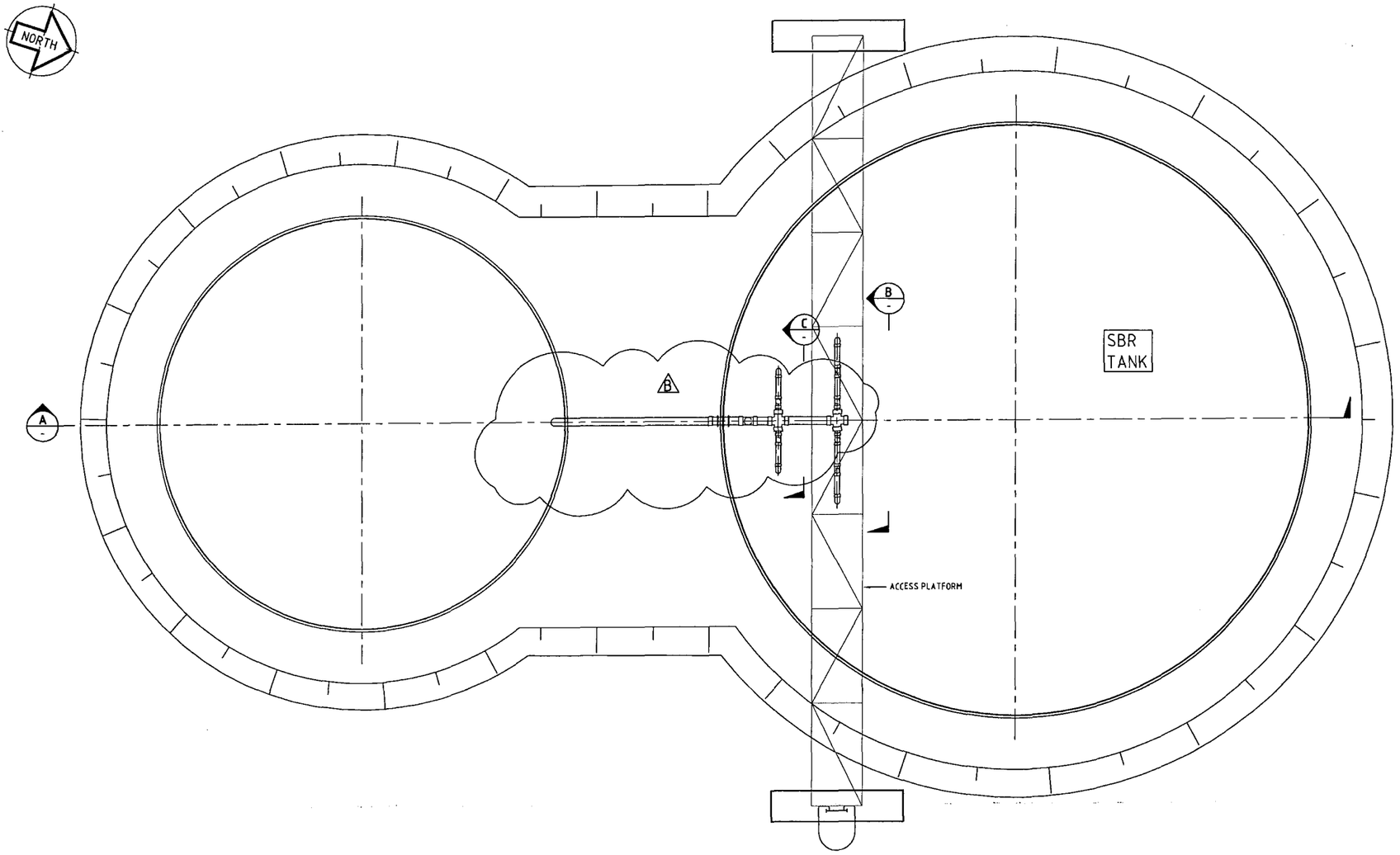
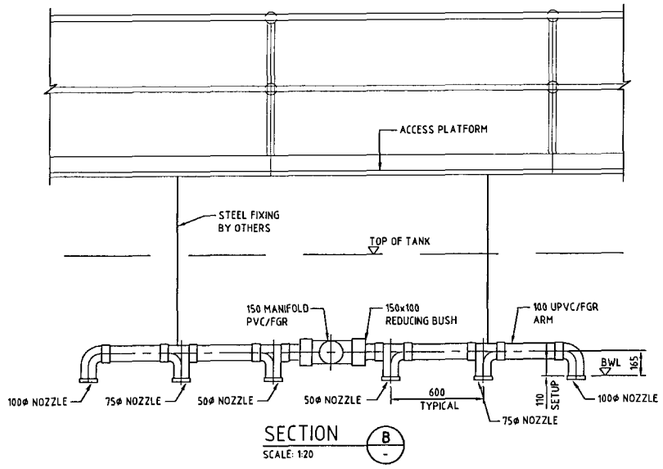
WOLLONGONG City of Innovation
DESIGN DIVISION Ph. 02 42277111

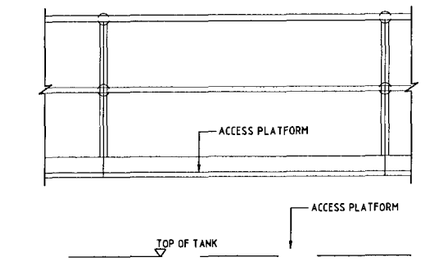
DESIGN PCS No.		A1 ORIGINAL
FILE NUMBER		
SHEET 5 OF 6 SHEETS		
DRAWING No. 3512	SHEET No. S5	ISSUE B

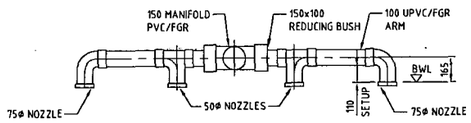


PLAN
SCALE 1:50

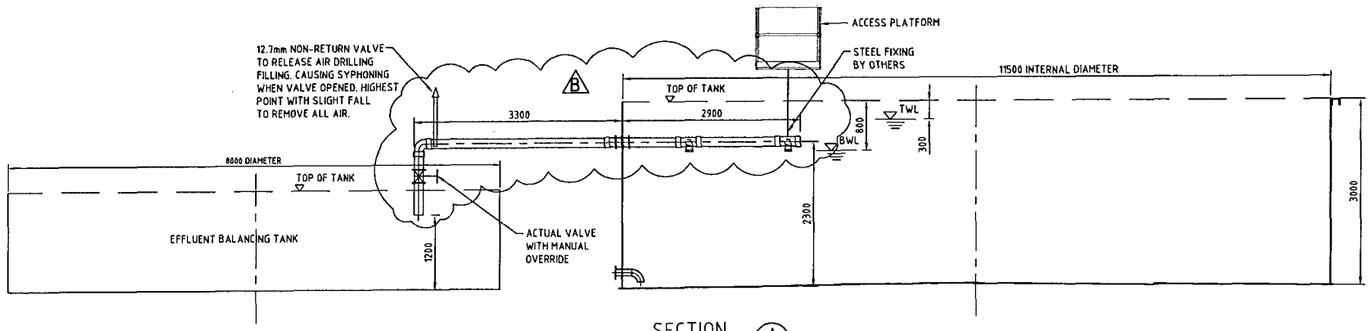


SECTION B
SCALE: 1:20





SECTION C
SCALE: 1:20



SECTION A
SCALE: 1:50

1000 0 1000 2000 3000 4000 5000
1:50 at A1 (DIMENSIONS IN MILLIMETRES)

400 0 400 800 1200 1600 2000
1:20 at A1 (DIMENSIONS IN MILLIMETRES)

WORK AS EXECUTED

These drawings are an accurate representation as at 22/03/05 of the Work As-Executed

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URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	A.E.	22/03/05
A	FOR CONSTRUCTION	J.McI.	A.E.	09/03

DATUM AHD	SURVEYOR	DRAWN J.McI.	DATE 19/09/03	APPROVED (FOR COUNCIL USE ONLY)
AZIMUTH MGA	FIELD BOOK	CHECKED RR	DATE 19/09/03	SENIOR DESIGN ENGINEER / DATE
RELATED PLANS		DESIGNED JN	DATE 19/09/03	MANAGER DESIGN / DATE
		CHECKED AE	DATE 19/09/03	

SCALES: AS SHOWN

NORTH POINT:

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
DECANT PIPEWORK DETAILS

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WOLLONGONG City of Innovation
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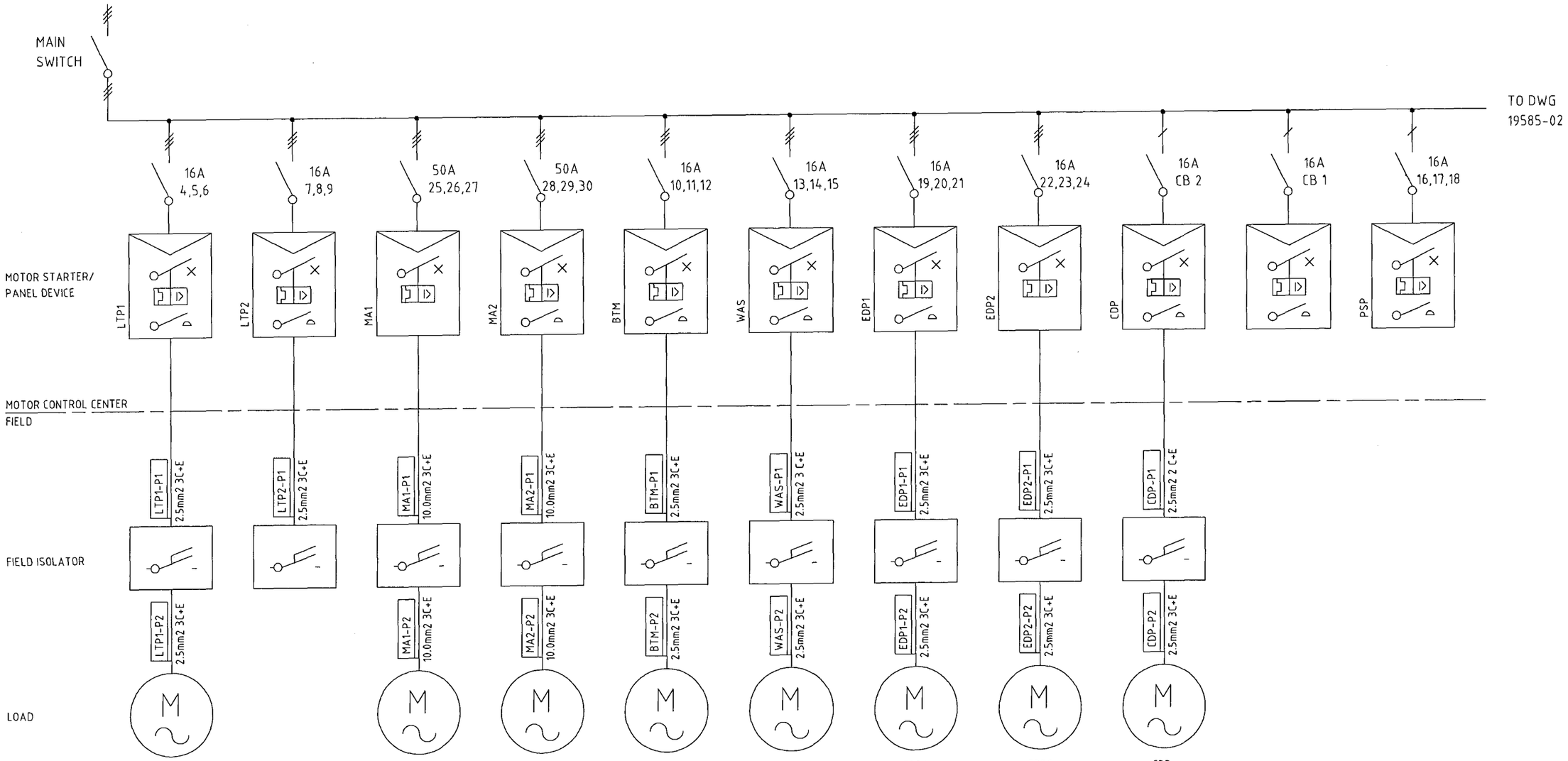
DESIGN PCS No.		A1
FILE NUMBER		ORIGINAL
SHEET 6 OF 6 SHEETS		
DRAWING No.	SHEET No.	ISSUE
3512	S6	B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



WORK AS EXECUTED

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Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL.	AE	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN	DATE
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
SINGLE LINE DIAGRAM

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DESIGN DIVISION
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DESIGN PCS No.

FILE NUMBER

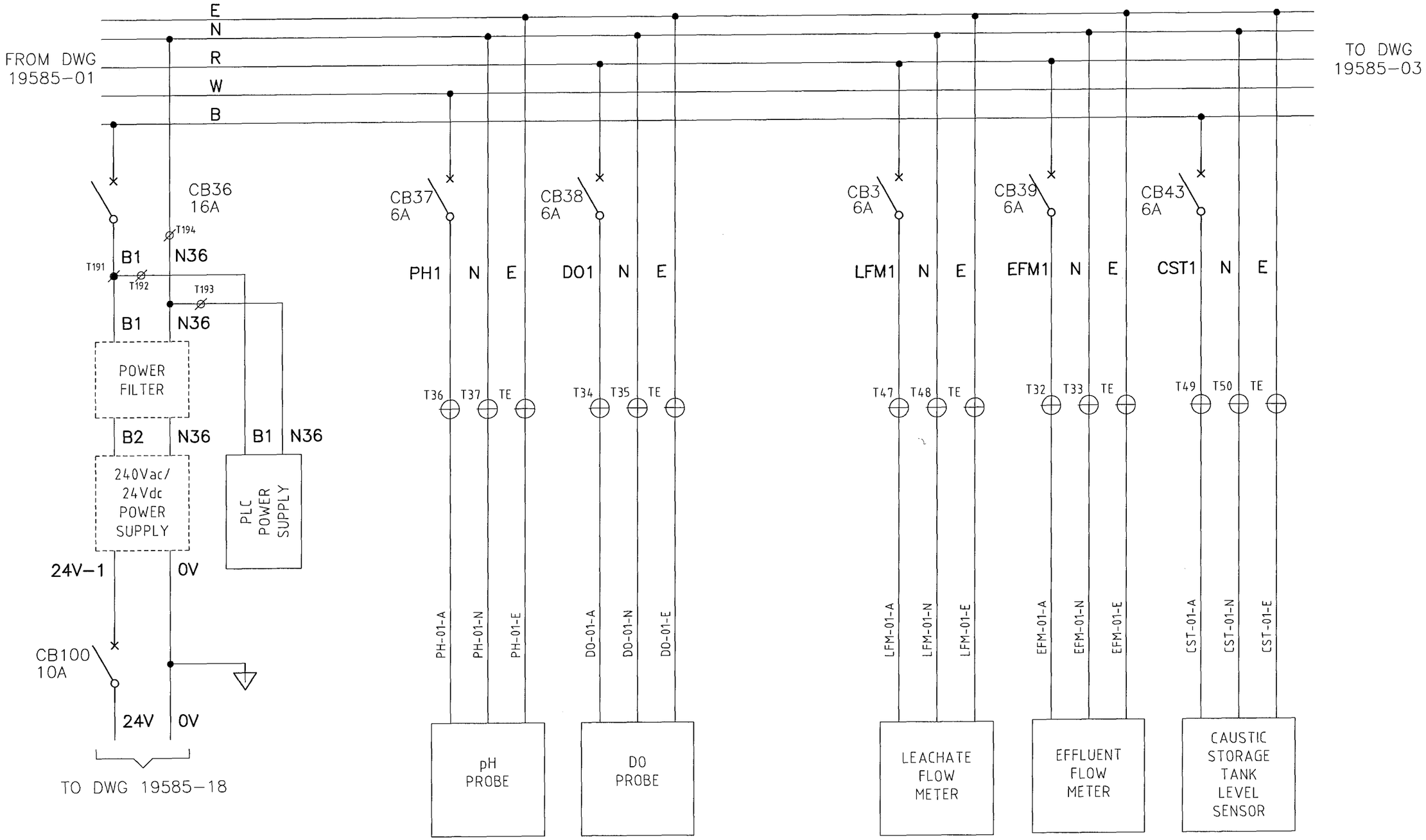
SHEET 4 OF 6 SHEETS

A1 ORIGINAL

DRAWING No. 3512

SHEET No. E1

ISSUE B



WORK AS EXECUTED

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Facsimile: (02) 96664336

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	AE	01/03/05
A	FOR CONSTRUCTION	J.McI.	AE	09/03

DATUM	SURVEYOR	DRAWN	DATE
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES

NORTH POINT

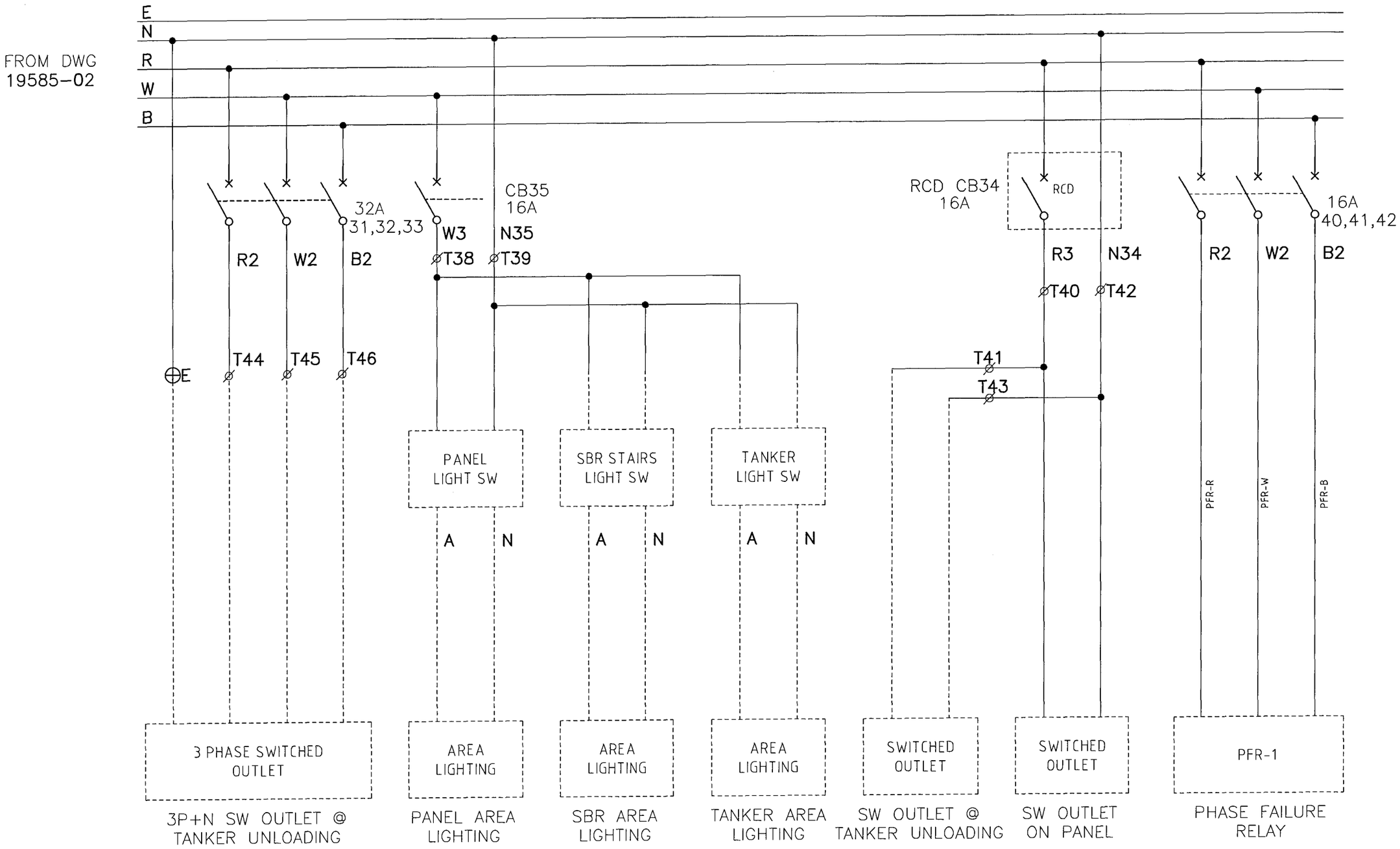
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
POWER & DISTRIBUTION (1 OF 2)

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.			A1 ORIGINAL
FILE NUMBER			
SHEET 4 OF 6 SHEETS			
DRAWING No.	SHEET No.	ISSUE
3512	E2	B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



WORK AS EXECUTED

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Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL.	AE	09/03

A 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN	DATE
		PMCP	
AZIMUTH	FIELD BOOK	CHECKED	DATE
		MR	
RELATED PLANS		DESIGNED	DATE
		PMCP	
		CHECKED	DATE
		MR	

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
POWER & DISTRIBUTION (2 OF 2)

URS
Level 3, 116 MILLER STREET,
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PET PROCESS ENGINEERING TECHNOLOGIES
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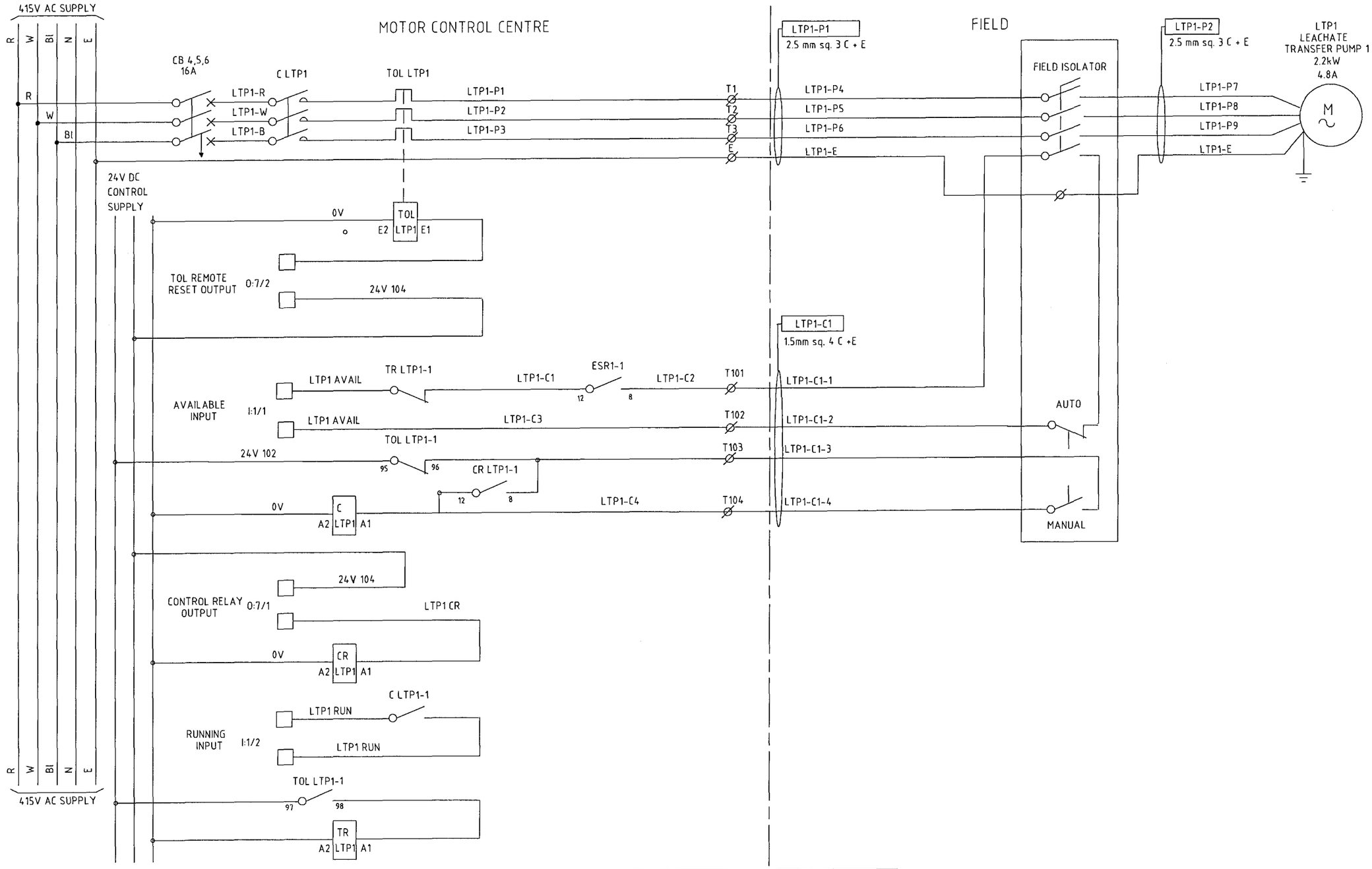
MATRAVILLE, NSW 2036
Telephone: (02) 93167466
Facsimile: (02) 96664336

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL

DRAWING No.	SHEET No.	ISSUE
3512	E3	B



WORK AS EXECUTED

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Signed: .....

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WORK AS EXECUTED

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	HR	22/03/05
A	FOR CONSTRUCTION	J.McI.	AE	09/03

DATUM	SURVEYOR	DRAWN	DATE
AZIMUTH	FIELD BOOK	PMCP	
RELATED PLANS		CHECKED MR	
		DESIGNED PMCP	
		CHECKED MR	

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

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Telephone: (02) 93167466
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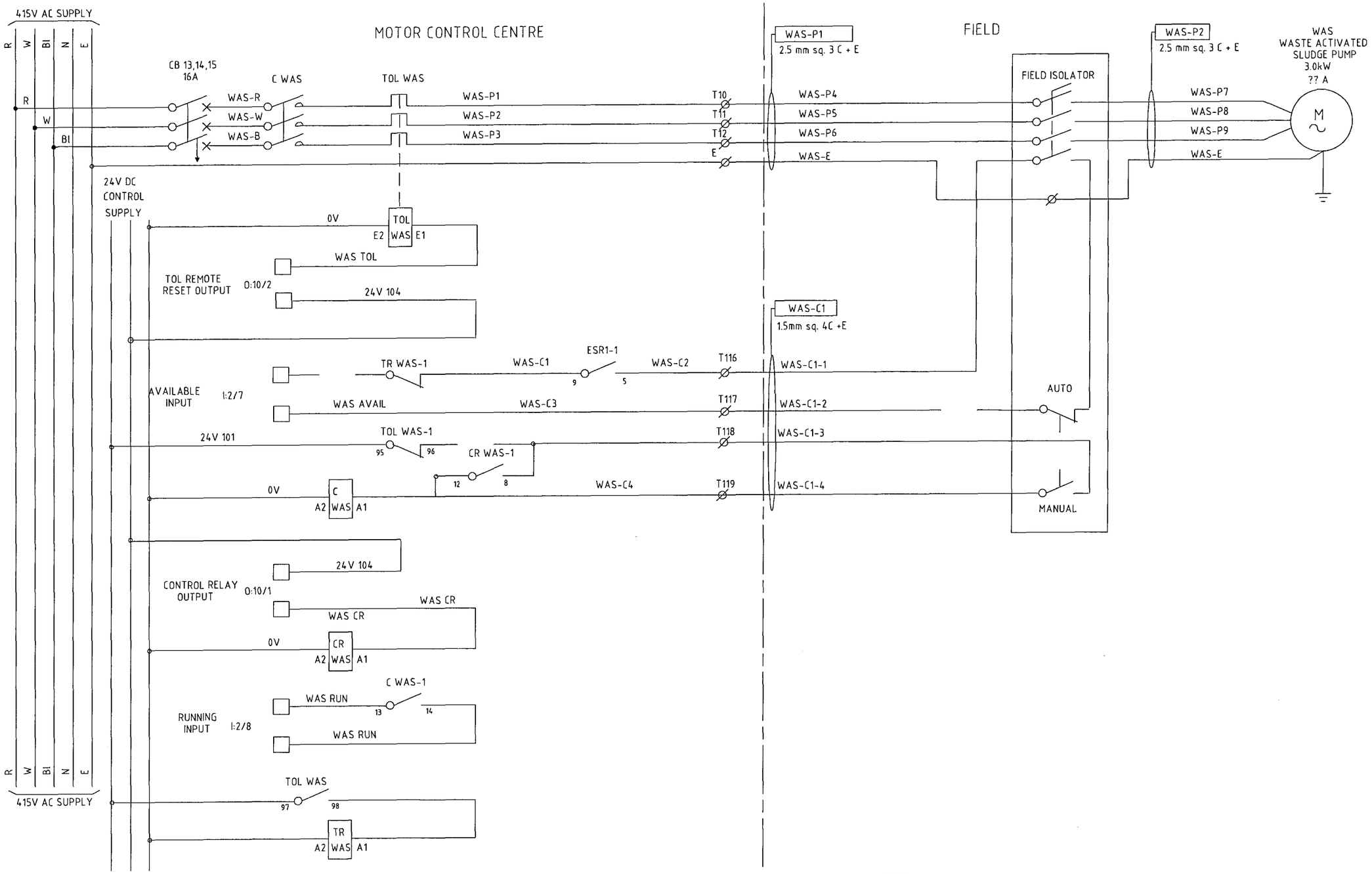
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E4
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



WORK AS EXECUTED

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McI.	AE	09/03

DATUM	SURVEYOR	DRAWN	DATE
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES

NORTH POINT

WORK AS EXECUTED

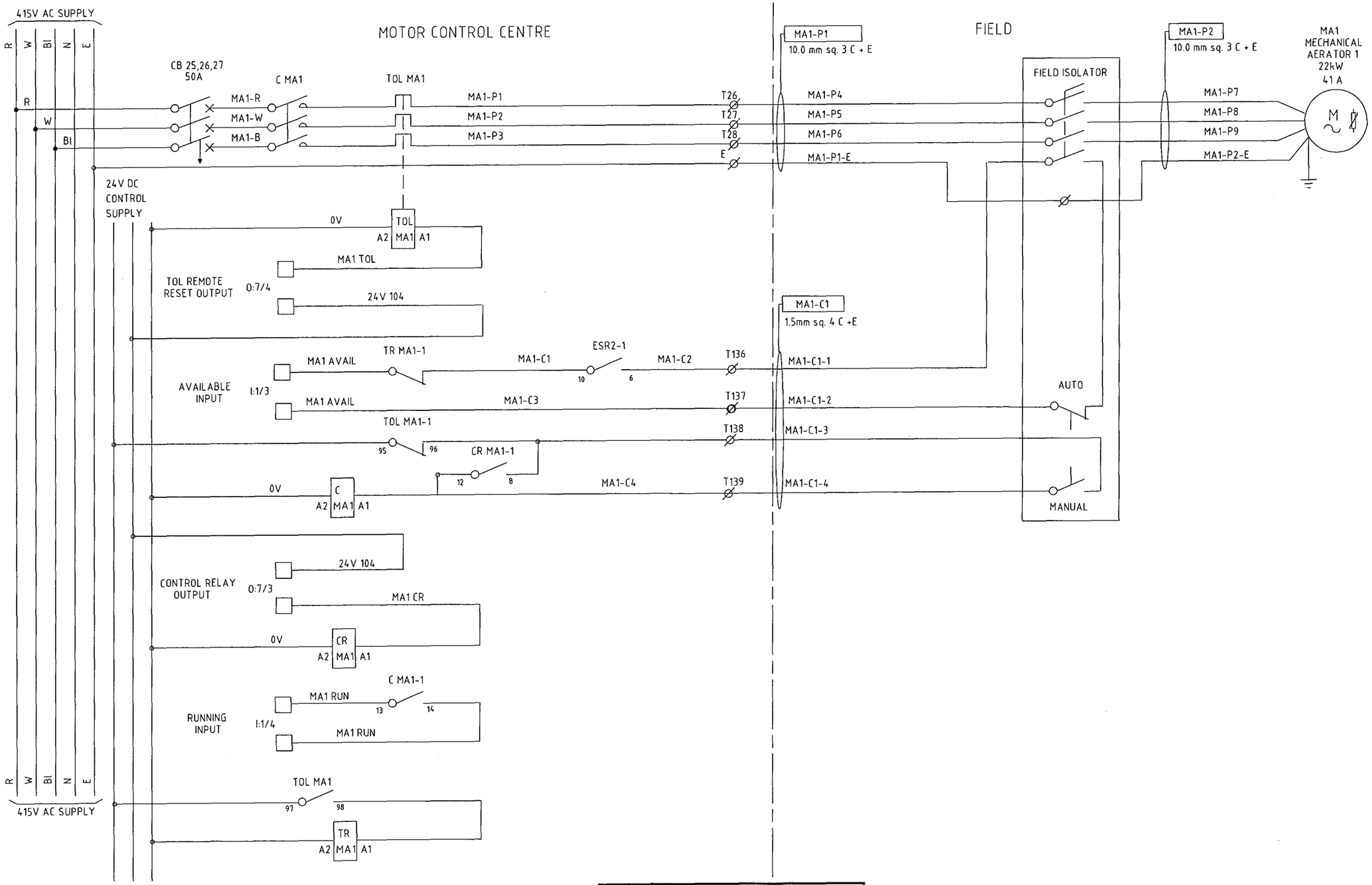
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

WOLLONGONG
City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E5
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



WORK AS EXECUTED

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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL	AE	09/03

DATUM | SURVEYOR | DRAWN PMCP | DATE
AZIMUTH | FIELD BOOK | CHECKED MR | DATE
RELATED PLANS | DESIGNED PMCP | DATE
CHECKED MR | DATE

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

WORK AS EXECUTED

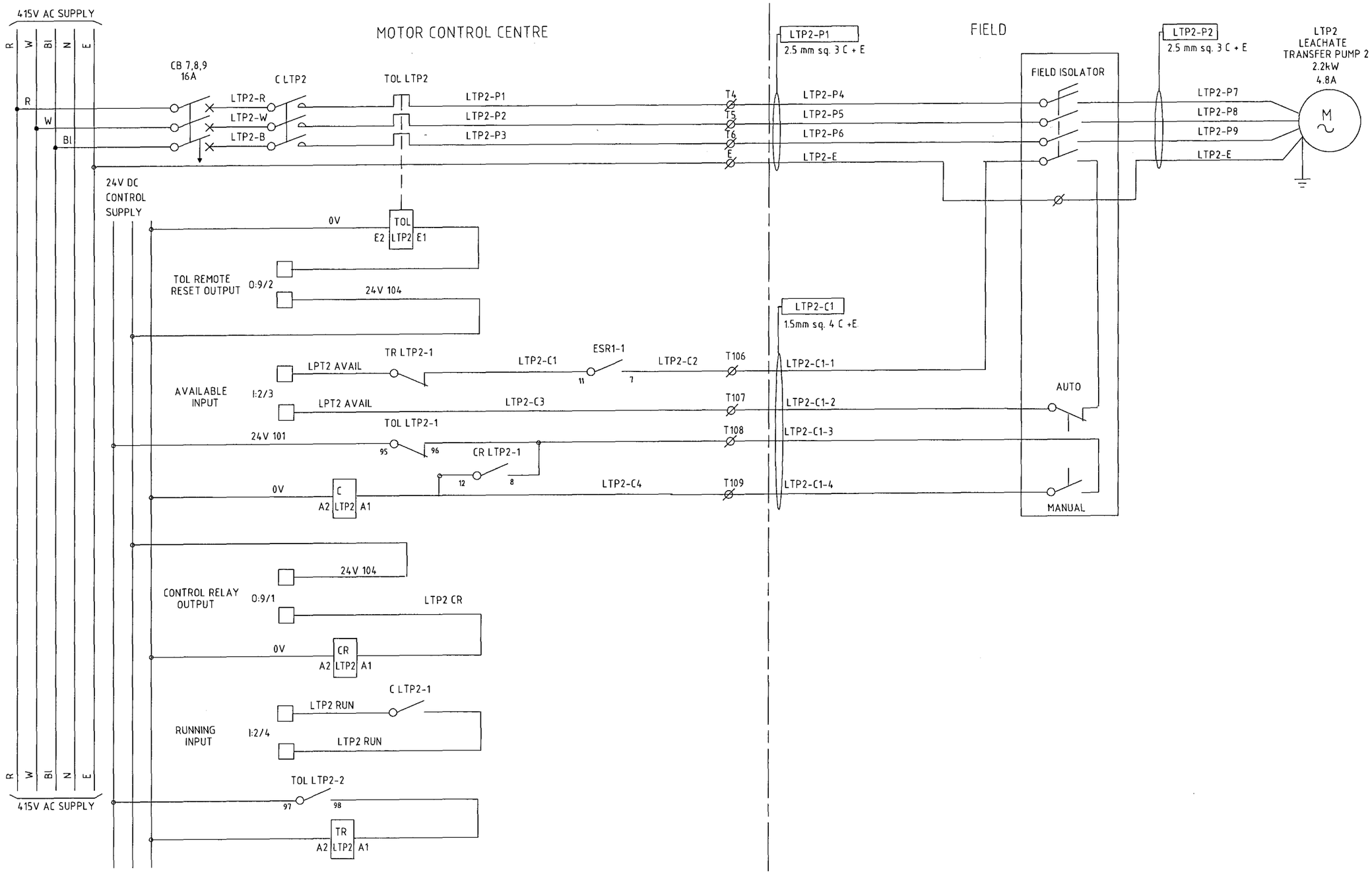
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E6
A1 ORIGINAL
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



WORK AS EXECUTED

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Telephone: (02) 93167466
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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL	AE	09/03

DATUM | SURVEYOR | DRAWN PMCP | DATE
AZIMUTH | FIELD BOOK | CHECKED MR | DATE
RELATED PLANS | DESIGNED PMCP | DATE
CHECKED MR | DATE

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

WORK AS EXECUTED

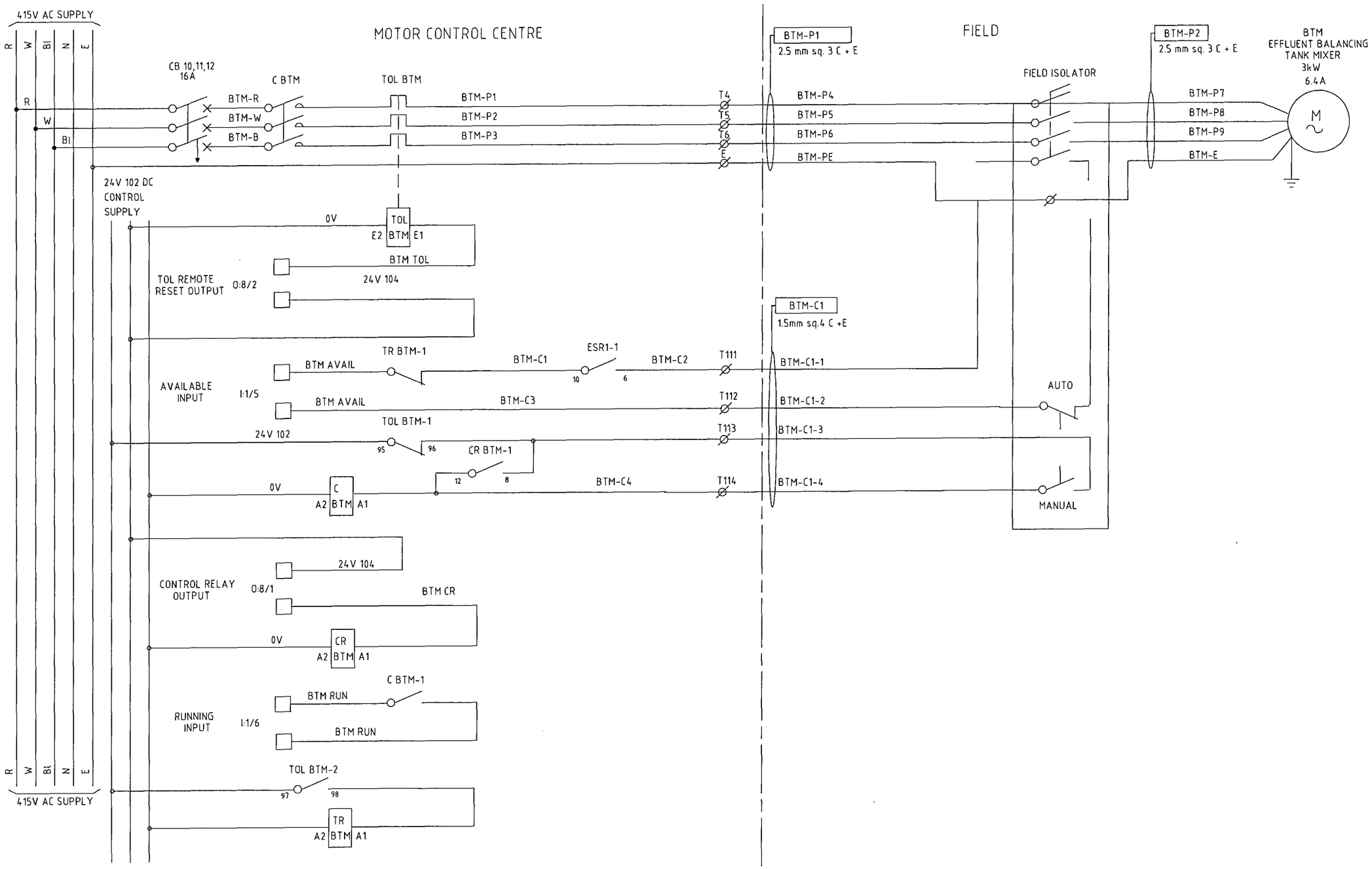
CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E7
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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RELATED PLANS | DESIGNED PMCP | DATE
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SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

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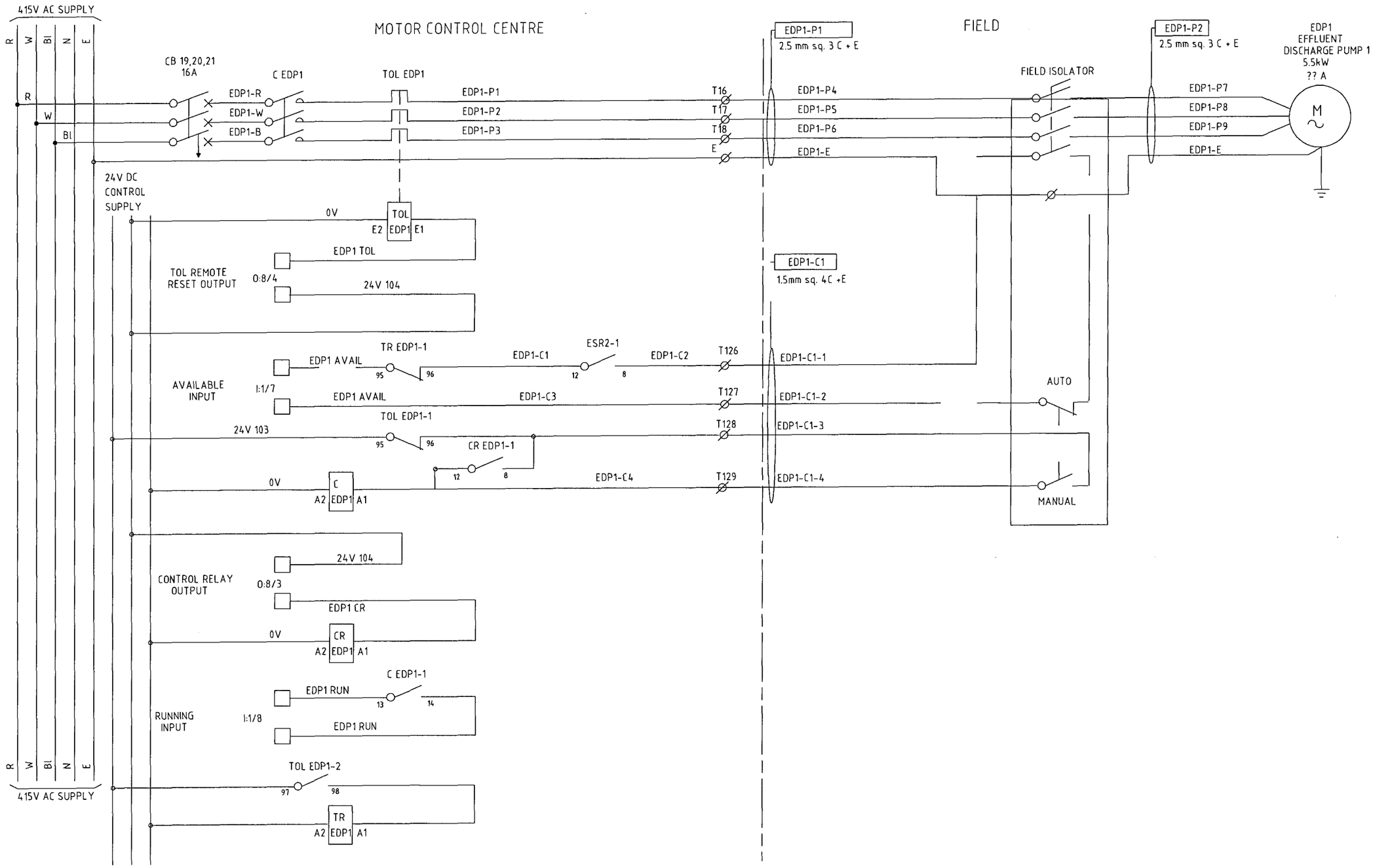
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E8
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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DATUM	SURVEYOR	DRAWN	DATE
		PMCP	
AZIMUTH	FIELD BOOK	CHECKED	DATE
		MR	
RELATED PLANS		DESIGNED	DATE
		PMCP	
		CHECKED	DATE
		MR	

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MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

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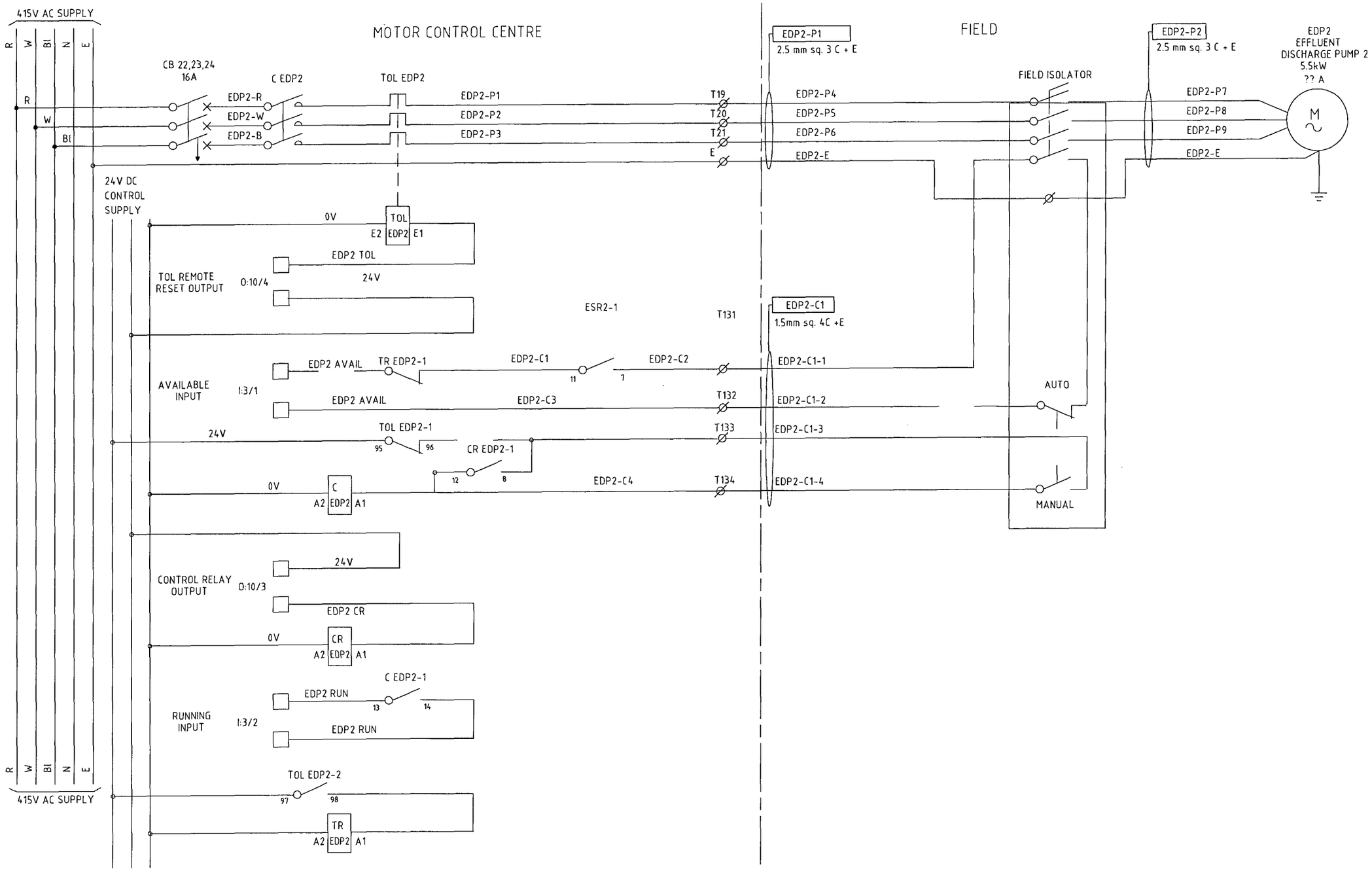
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E9
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

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SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM

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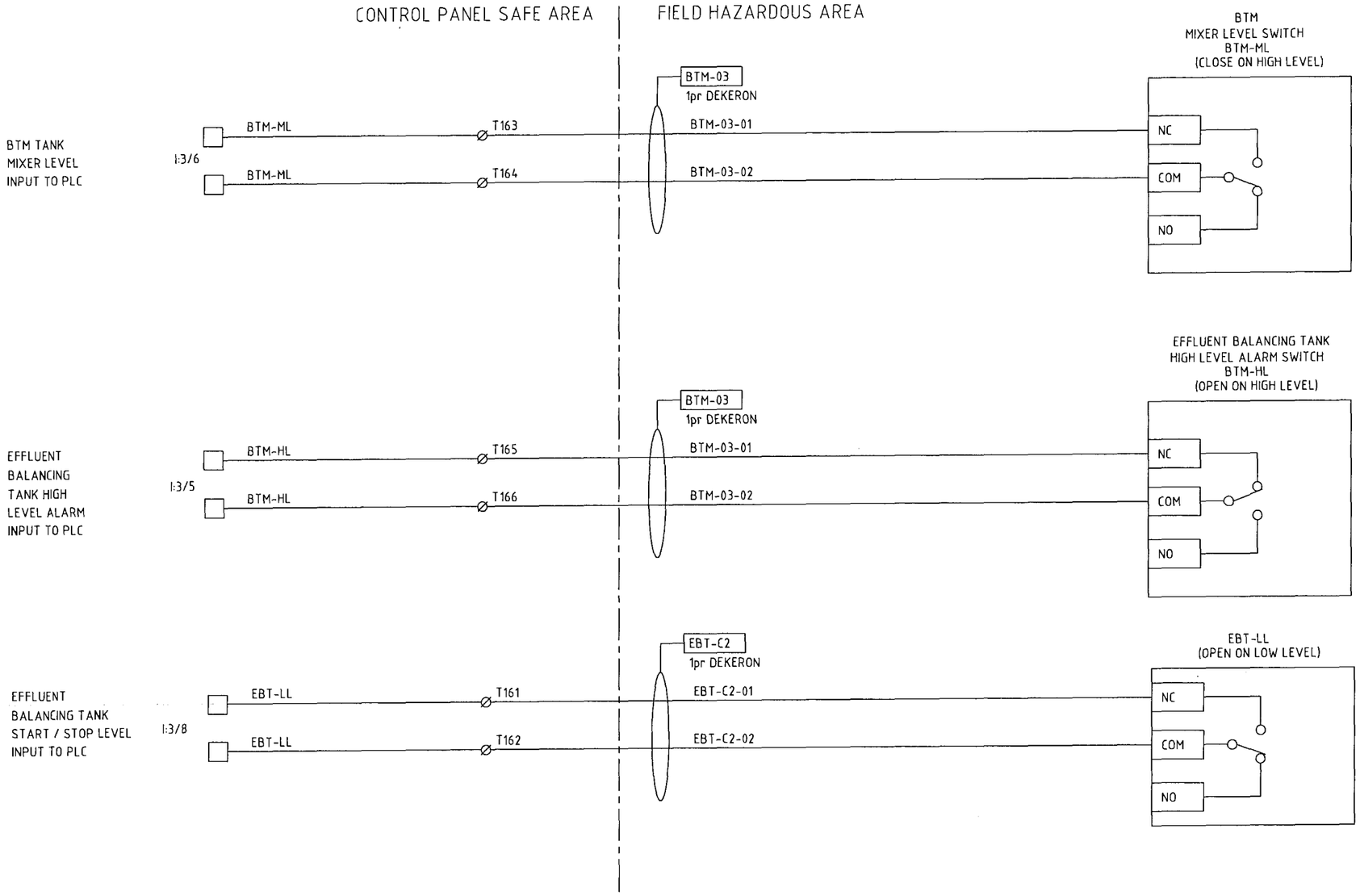
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E10
A1 ORIGINAL
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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WORK AS EXECUTED

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AZIMUTH | FIELD BOOK | CHECKED MR | DATE
RELATED PLANS | DESIGNED PMCP | DATE
CHECKED MR | DATE

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MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG
WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
DIGITAL I/O SHEET 1

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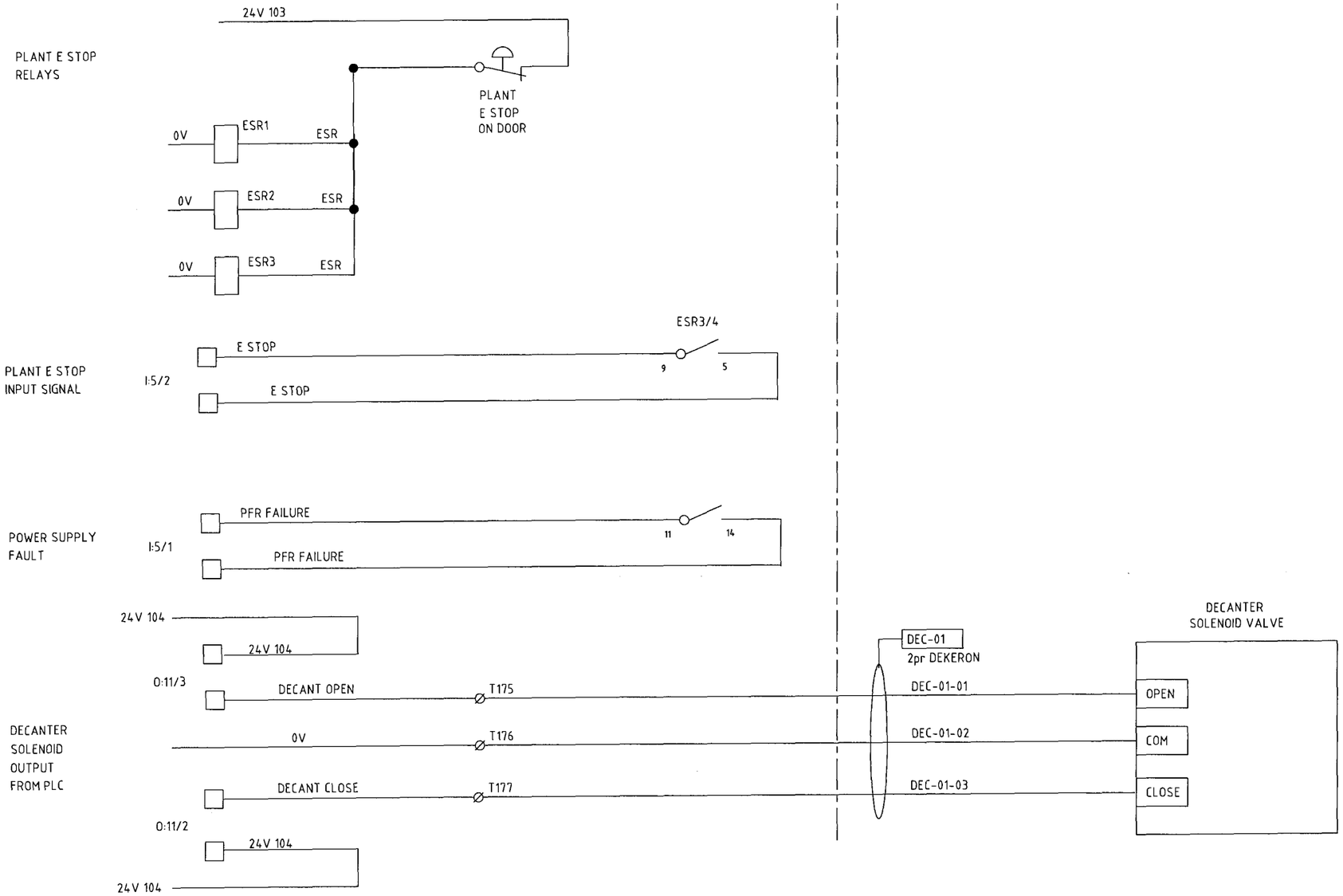
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. E11
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

CONTROL PANEL SAFE AREA

FIELD HAZARDOUS AREA



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		PMCP	
AZIMUTH	FIELD BOOK	CHECKED	DATE
		MR	
RELATED PLANS		DESIGNED	DATE
		PMCP	
		CHECKED	DATE
		MR	

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
DIGITAL I/O SHEET 2

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DESIGN PCS No.

FILE NUMBER

SHEET 4 OF 6 SHEETS

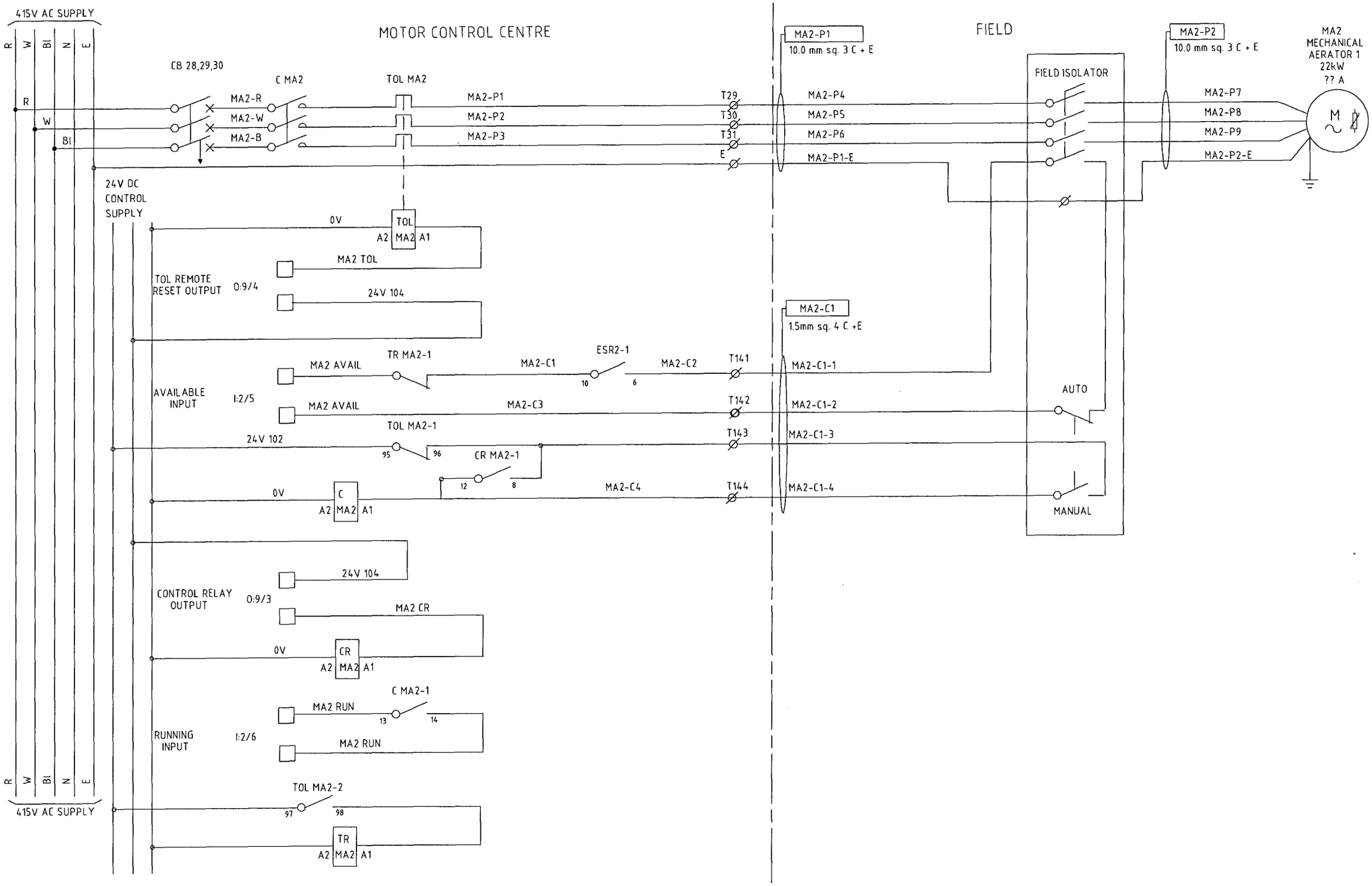
A1 ORIGINAL

DRAWING No. 3512

SHEET No. E13

ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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WORK AS EXECUTED

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DATUM | SURVEYOR | AZIMUTH | FIELD BOOK | RELATED PLANS

DRAWN PMCP DATE | CHECKED MR DATE | DESIGNED PMCP DATE | CHECKED MR DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM
SHEET 1

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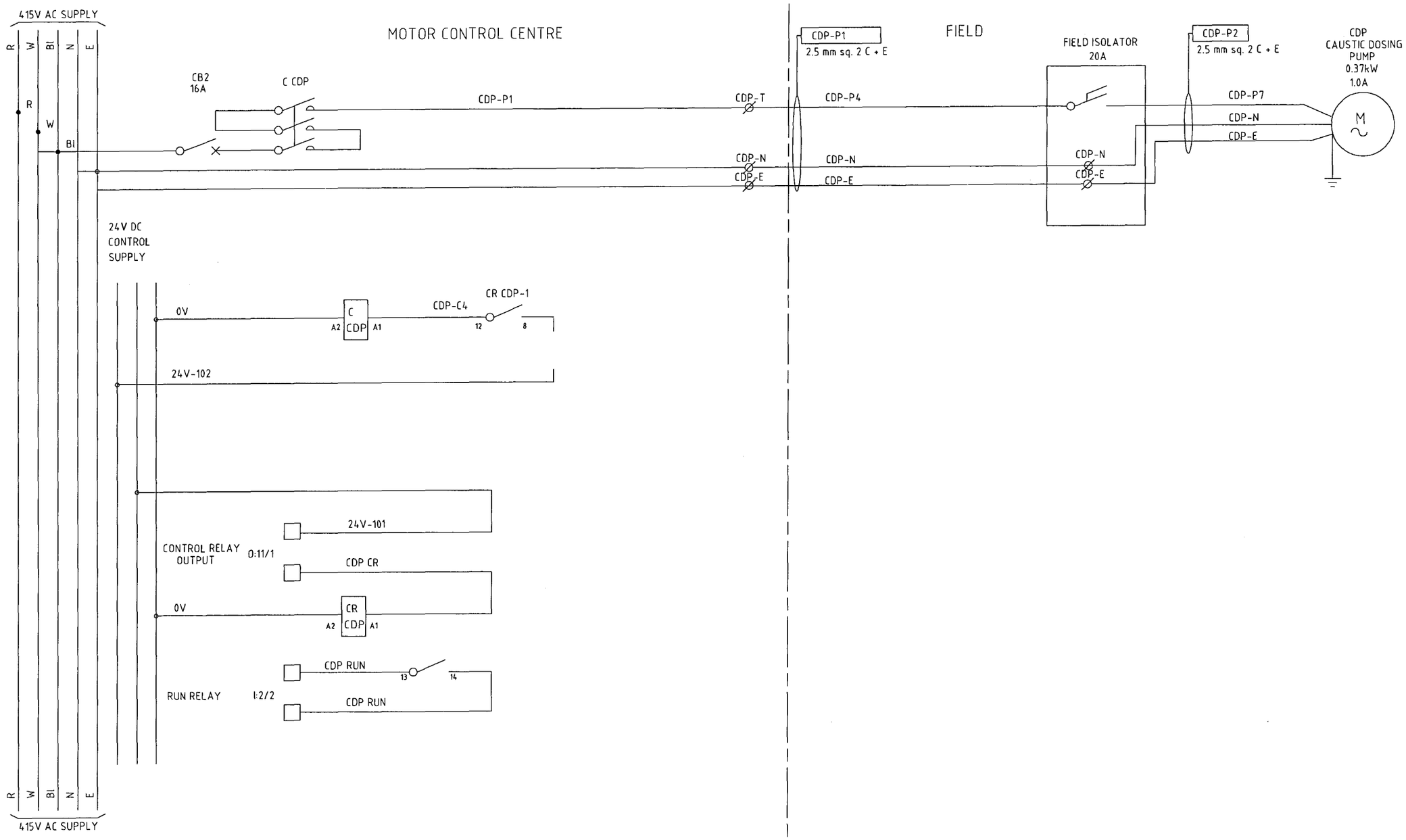
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. E14
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
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RELATED PLANS | DESIGNED PMCP | DATE
CHECKED MR | DATE

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SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM
SHEET 2

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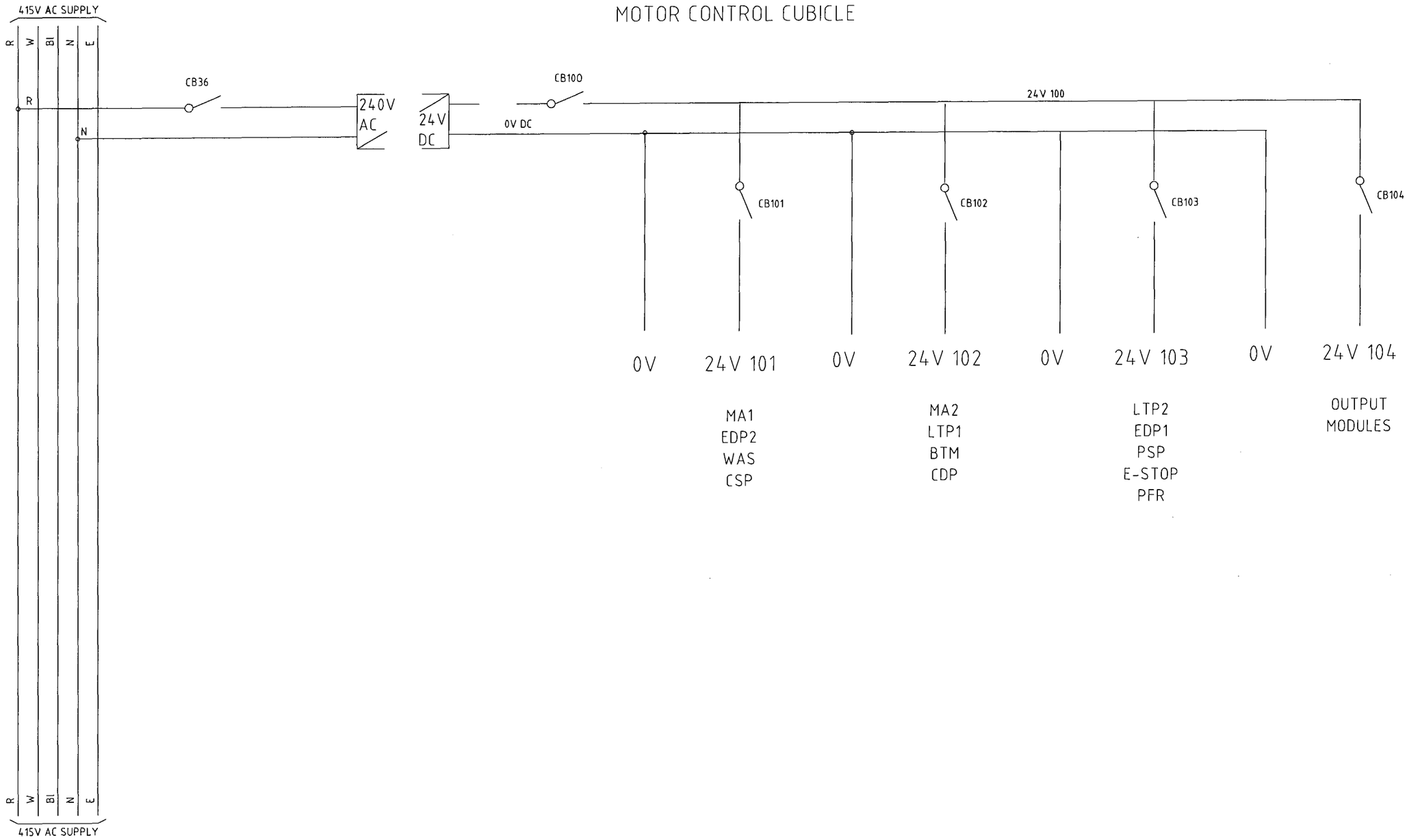
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E17
ISSUE B
A1 ORIGINAL

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

MOTOR CONTROL CUBICLE



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SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
STARTER CIRCUIT DIAGRAM
SHEET 3

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DESIGN DIVISION
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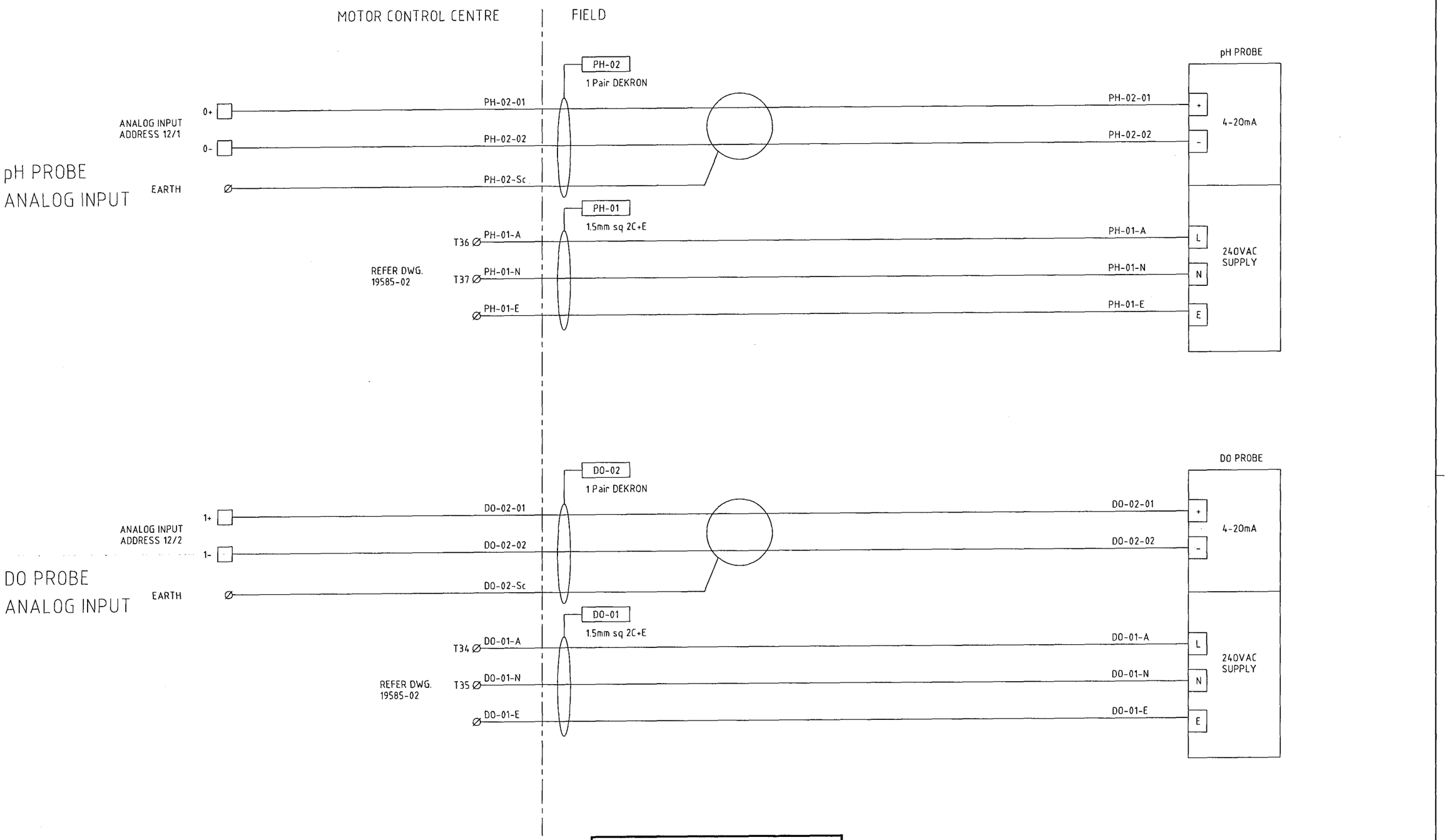
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL

DRAWING No.	SHEET No.	ISSUE
3512	E18	B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN



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		MR	
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		PMCP	
		CHECKED	DATE
		MR	

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SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES

NORTH POINT

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
INSTRUMENTATION SHEET 1

WOLLONGONG City of Innovation
DESIGN DIVISION
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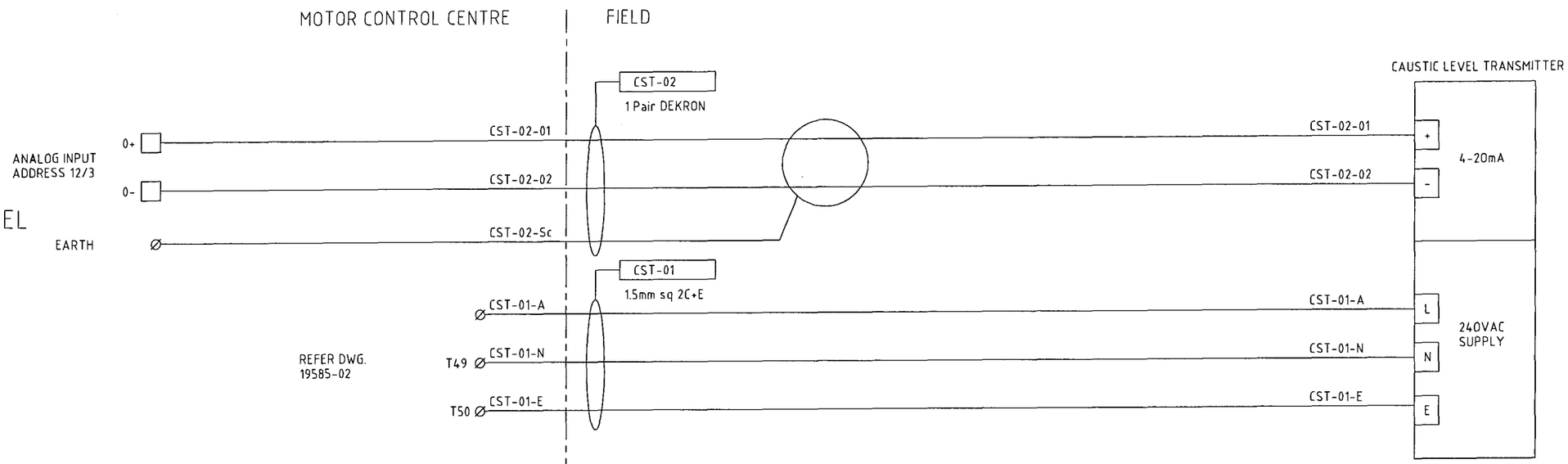
DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
DRAWING No. 3512
SHEET No. E21
A1 ORIGINAL
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

CAUSTIC TANK LEVEL ANALOG INPUT



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AZIMUTH	FIELD BOOK	CHECKED MR	DATE	SENIOR DESIGN ENGINEER / DATE	NORTH POINT
RELATED PLANS		DESIGNED PMCP	DATE	MANAGER DESIGN / DATE	
		CHECKED MR	DATE		

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
INSTRUMENTATION SHEET 2

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DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL

DRAWING No.	SHEET No.	ISSUE
3512	E22	B

MOTOR CONTROL CENTRE | FIELD

EFFLUENT DISCHARGE FLOW METER ANALOG INPUT

ANALOG INPUT ADDRESS 12/4

EFFLUENT DISCHARGE FLOW METER

EFM-02
1 Pair DEKRON

0+ — EFM-02-01 — EFM-02-01 — + — 4-20mA
0- — EFM-02-02 — EFM-02-02 — -
EARTH — EFM-02-Sc

EFM-01
1.5mm sq 2C+E

T32 — EFM-01-A — EFM-01-A — L
T33 — EFM-01-N — EFM-01-N — N — 240VAC SUPPLY
EFM-01-E — EFM-01-E — E

REFER DWG. 19585-02

LEACHATE TRANSFER FLOW METER ANALOG INPUT

ANALOG INPUT ADDRESS 13/1

LEACHATE TRANSFER FLOW METER

LFM-02
1 Pair DEKRON

0+ — LFM-02-01 — LFM-02-01 — + — 4-20mA
0- — LFM-02-02 — LFM-02-02 — -
EARTH — LFM-02-Sc

LFM-01
1.5mm sq 2C+E

T47 — LFM-01-A — LFM-01-A — L
T48 — LFM-01-N — LFM-01-N — N — 240VAC SUPPLY
LFM-01-E — LFM-01-E — E

REFER DWG. 19585-02

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A	FOR CONSTRUCTION	J.McL.	AE	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN	DATE
		PMCP	
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
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		CHECKED MR	DATE

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SENIOR DESIGN ENGINEER ..... DATE .....

MANAGER DESIGN ..... DATE .....

SCALES

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
INSTRUMENTATION SHEET 3

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Telephone: (02) 93167466
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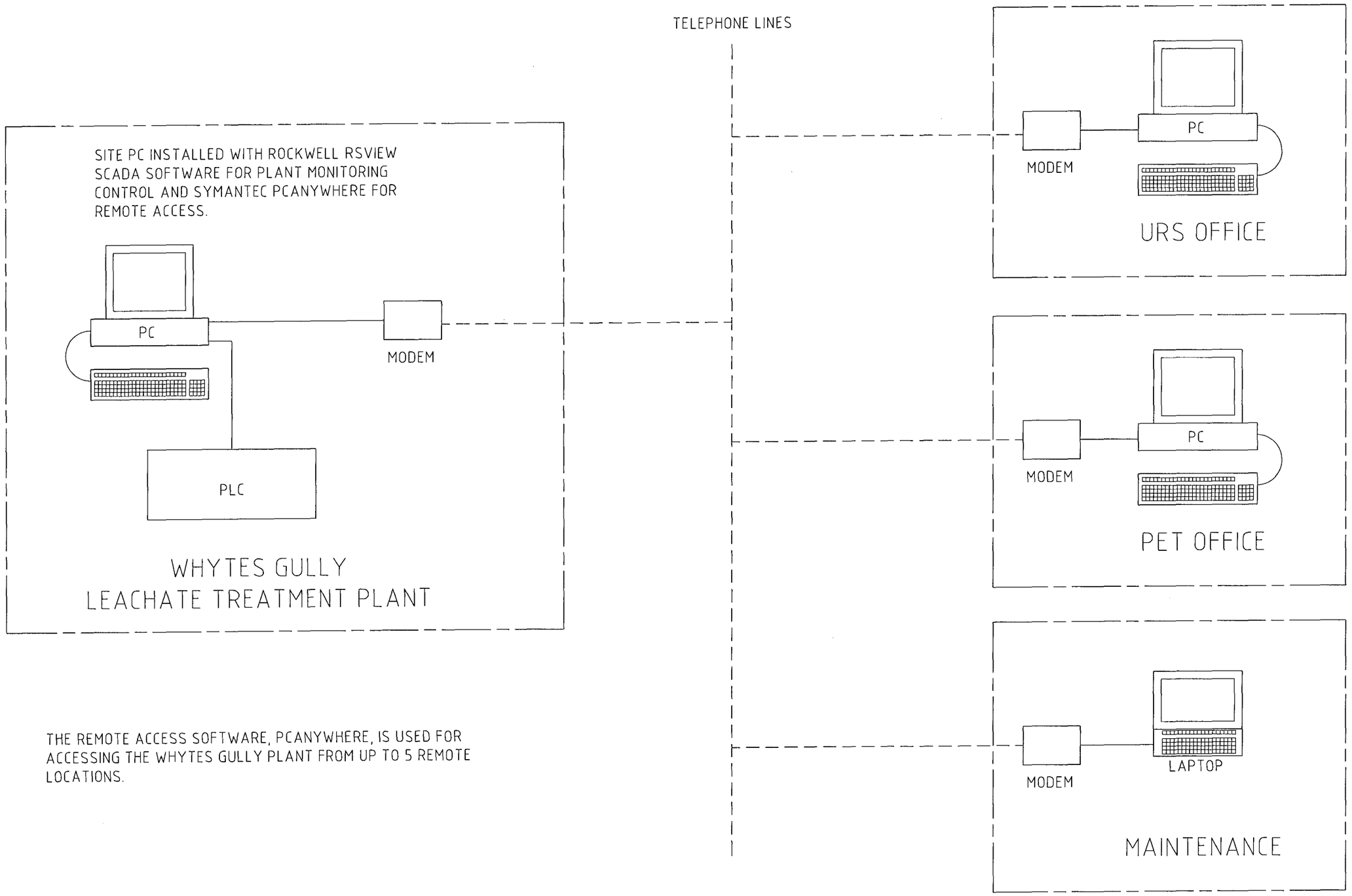
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. E23
ISSUE B



THE REMOTE ACCESS SOFTWARE, PCANYWHERE, IS USED FOR ACCESSING THE WHYTES GULLY PLANT FROM UP TO 5 REMOTE LOCATIONS.

WORK AS EXECUTED

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MATRAVILLE, NSW 2036
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Facsimile: (02) 96664336

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McI.	AE	09/03

DATUM | SURVEYOR | AZIMUTH | FIELD BOOK | RELATED PLANS

		DATE
DRAWN	PMCP	
CHECKED	MR	
DESIGNED	PMCP	
CHECKED	MR	

APPROVED (FOR COUNCIL USE ONLY)
SENIOR DESIGN ENGINEER ..... DATE .....
MANAGER DESIGN ..... DATE .....

SCALES | NORTH POINT

CITY OF WOLLONGONG
WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
SCADA COMMUNICATIONS DIAGRAM

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. E31
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

MOTOR CONTROL AND MONITORING

	LEACHATE FEED PUMPS		MECHANICAL AERATORS		EFFLUENT TRANSFER		
	PUMP 1	PUMP 2	AERATOR 1	AERATOR 2	PUMP 1	PUMP 2	
STATUS	DUTY	STANDBY	DUTY	STANDBY	DUTY	STANDBY	STATUS
	AVAILABLE	AVAILABLE	AVAILABLE	AVAILABLE	AVAILABLE	AVAILABLE	
HOURS RUN	1873 Hrs	1721 Hrs	1873 Hrs	1721 Hrs	1873 Hrs	1721 Hrs	HOURS RUN
	DUTY SELECTOR		DUTY SELECTOR		DUTY SELECTOR		
	PUMP 1	PUMP 2	AERATOR 1	AERATOR 2	PUMP 1	PUMP 2	

	EFFLUENT BALANCING TANK MIXER	WASTE ACTIVATED SLUDGE	CAUSTIC DOSING PUMP	
STATUS	RUNNING	RUNNING	RUNNING	STATUS
HOURS RUN	234 Hrs	234 Hrs	234 Hrs	HOURS RUN

PROCESS INSTRUMENTATION

pH LEVEL	1.145	mgO/l	CAUSTIC STORAGE LEVEL	2 500	Litres
DO LEVEL	7.01		EFFLUENT DISCHARGE FLOW RATE	234	Litres/sec

WEEKLY TOTALS

CAUSTIC CONSUMED	4 500	Litres
EFFLUENT DISCHARGED	10 000	Litres

WHYTES GULLY TREATMENT PLANT
EQUIPMENT MONITORING

WORK AS EXECUTED

These drawings are an accurate representation as at 19/01/04 of the Work As Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

URS
Level 3, 116 MILLER STREET,
NORTH SYDNEY, N.S.W 2060.
Telephone: (02) 89255500
Facsimile: (02) 89255555

PET PROCESS ENGINEERING TECHNOLOGIES
CNR McCAULEY ST & AUSTRALIA AVE
MATRAVILLE, NSW 2036
Telephone: (02) 93167466
Facsimile: (02) 96664336

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL	AE	09/03

DATUM | SURVEYOR | AZIMUTH | FIELD BOOK | RELATED PLANS

		DATE
DRAWN	PMCP	
CHECKED	MR	
DESIGNED	PMCP	
CHECKED	MR	

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES | NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
SCADA EQUIPMENT MONITORING PAGE

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL
DRAWING No. 3512
SHEET No. E33
ISSUE B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

	CYCLE 1		CYCLE 2		CYCLE 3	
START TIME	8:00		16:00		24:00	
LEACHATE FEED STAGE	50 000	Litres	50 000	Litres	30 000	Litres
AERATION STAGE	5.00	Hours	5.00	Hours	5.00	Hours
SETTLING STAGE	2.00	Hours	2.00	Hours	2.00	Hours
WAS PUMP RUN TIME	1.00	minutes	1.00	minutes	1.00	minutes
DO SETPOINT	1.50		1.50		1.50	
pH SETPOINT	7.10		7.10		7.10	
cycle time	6.30		6.30		6.30	

WHYTES GULLY WASTE TREATMENT PLANT
PROCESS SETPOINTS

WORK AS EXECUTED

These drawings are an accurate representation as at 19/01/04 of the Work-As-Executed.

Signed.....

URS Australia Pty Ltd / Process Engineering Technologies Pty Ltd.

ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL.	AE	09/03

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

DATUM	SURVEYOR	DRAWN PMCP	DATE
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
SCADA PROCESS SETPOINT PAGE

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PET PROCESS ENGINEERING TECHNOLOGIES
CNR McCAULEY ST & AUSTRALIA AVE
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Telephone: (02) 93167466
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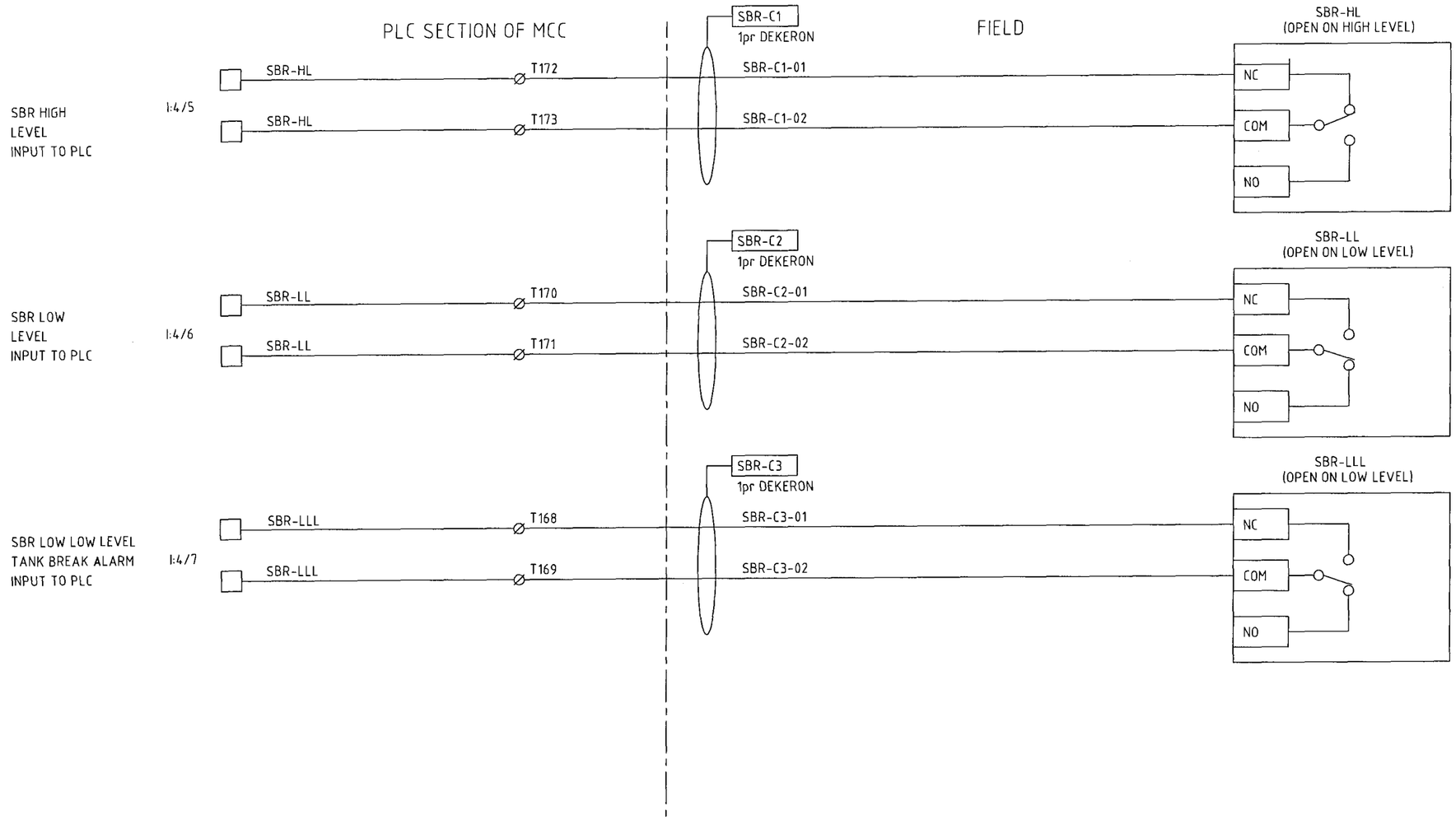
WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.			A1 ORIGINAL
FILE NUMBER			
SHEET 4 OF 6 SHEETS			
DRAWING No. 3512	SHEET No. E34	ISSUE B	



WORK AS EXECUTED

These drawings are an accurate representation as at 19/01/04 of the Work-As-Executed.

Signed.....

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Level 3, 116 MILLER STREET,
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ISSUE	DESCRIPTION	DRAWN	APPR'D	DATE
B	WORK AS EXECUTED	TT	MR	22/03/05
A	FOR CONSTRUCTION	J.McL.	AE	09/03

DATUM	SURVEYOR	DRAWN	DATE
AZIMUTH	FIELD BOOK	CHECKED MR	DATE
RELATED PLANS		DESIGNED PMCP	DATE
		CHECKED MR	DATE

APPROVED (FOR COUNCIL USE ONLY)

SENIOR DESIGN ENGINEER	MANAGER DESIGN
DATE	DATE

SCALES: AS SHOWN

NORTH POINT

WORK AS EXECUTED

CITY OF WOLLONGONG

WHYTES GULLY LEACHATE TREATMENT PLANT
WASTE TREATMENT SYSTEM
DIGITAL 1/0 SHEET1

WOLLONGONG City of Innovation
DESIGN DIVISION
Ph. 02 42277111

DESIGN PCS No.
FILE NUMBER
SHEET 4 OF 6 SHEETS
A1 ORIGINAL

DRAWING No.	SHEET No.	ISSUE
3512	E38	B

0 10 20 30 40 50 60 70 80 90 100mm ON ORIGINAL PLAN

APPENDIX C

Wind Roses

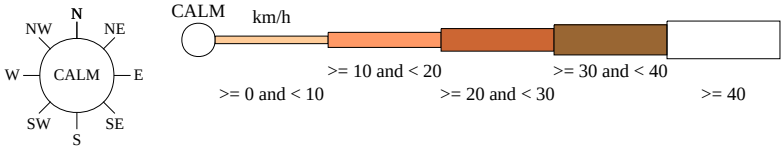
Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 27 Feb 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

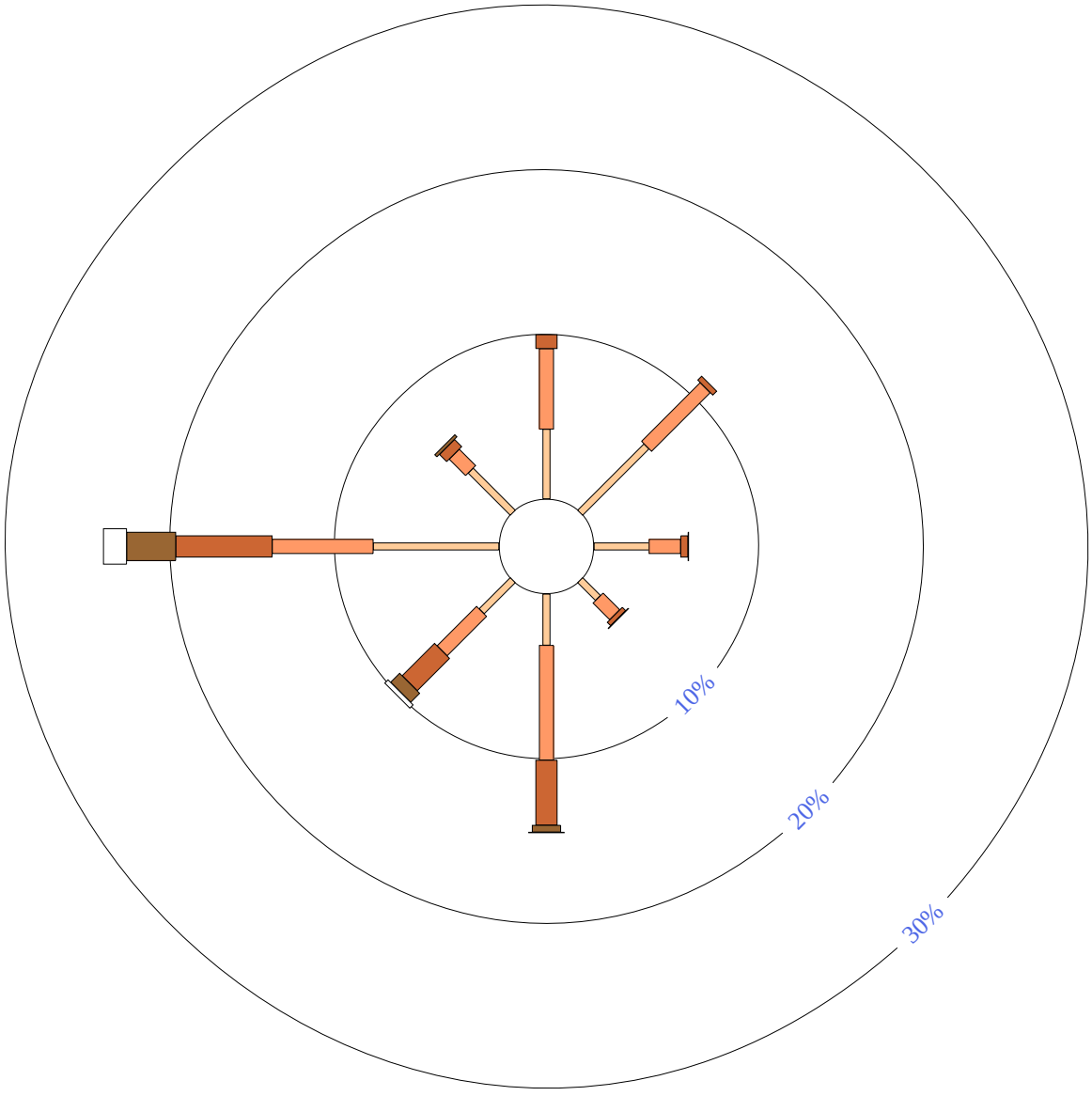
Site No: 068241 • Opened Jun 1999 • Still Open • Latitude: -34.5638° • Longitude: 150.79° • Elevation 8m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
3869 Total Observations

Calm 15%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

Site No: 068241 • Opened Jun 1999 • Still Open • Latitude: -34.5638° • Longitude: 150.79° • Elevation 8m

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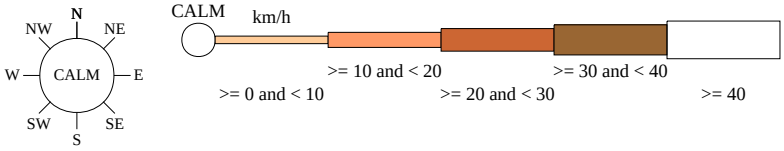
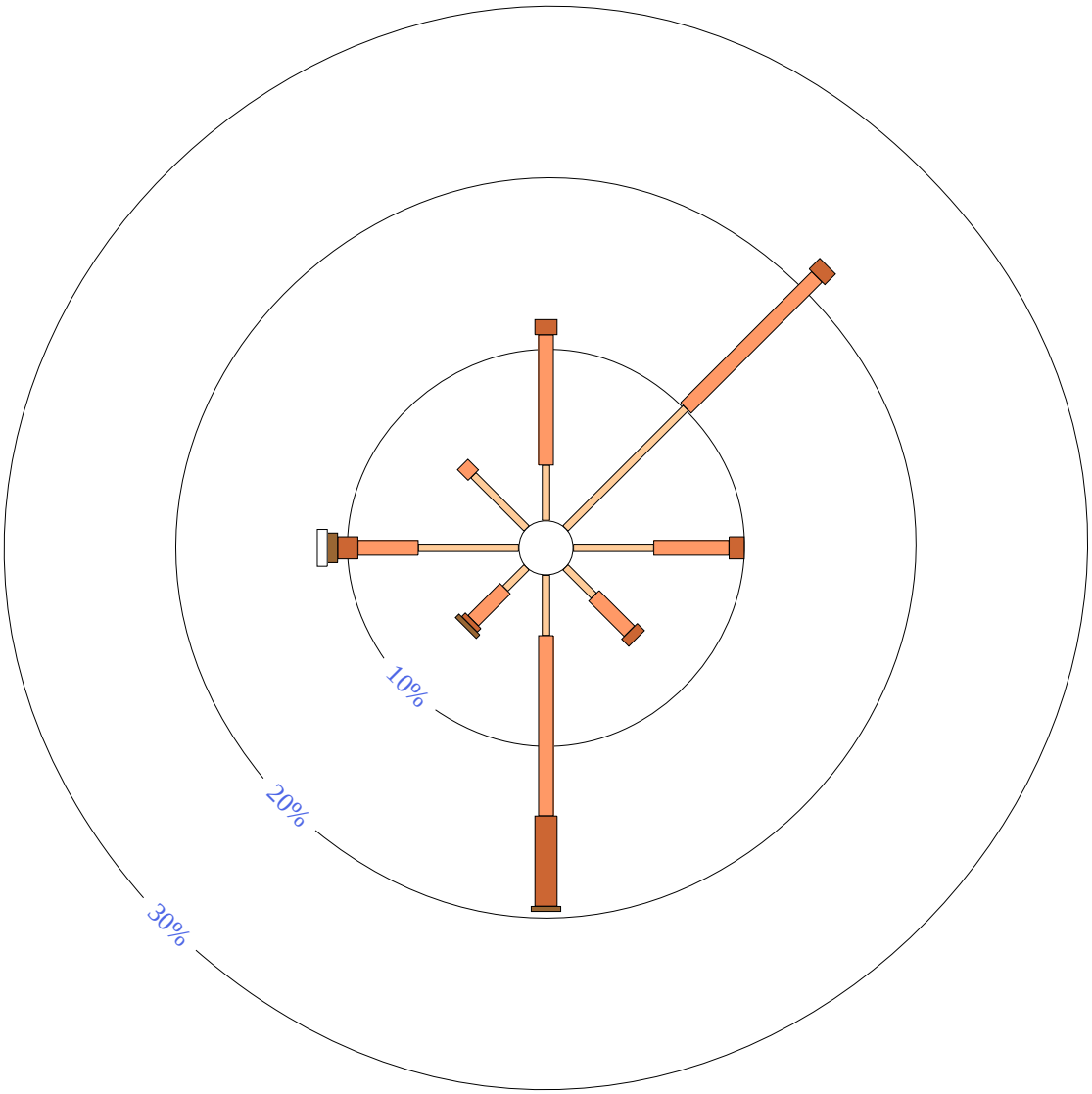


9 am Jan
337 Total Observations

Calm 8%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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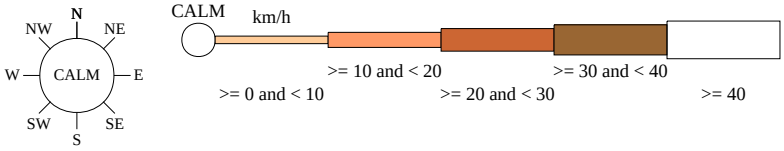
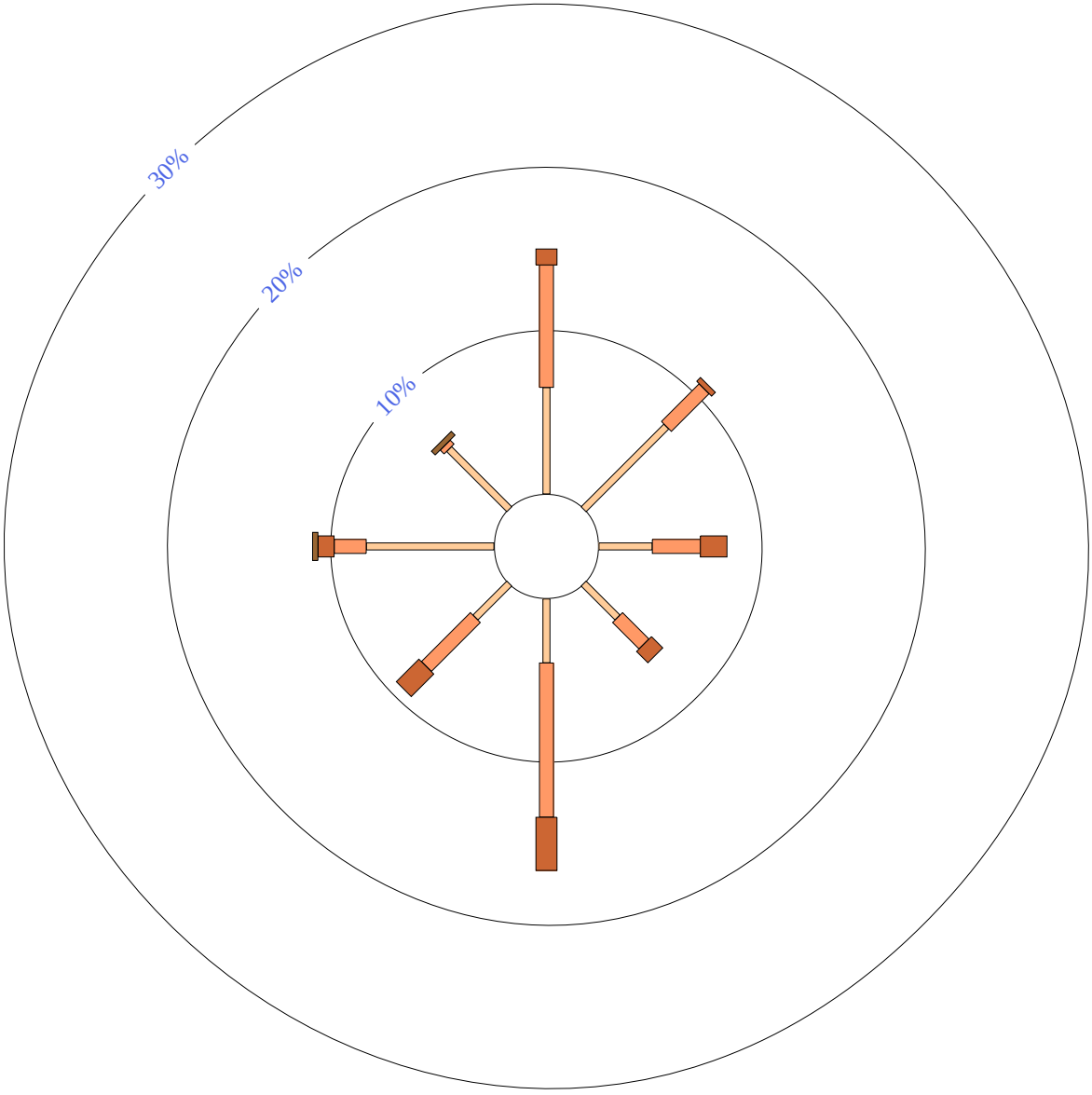


9 am Feb
302 Total Observations

Calm 16%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

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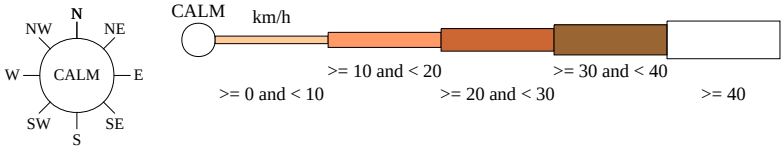
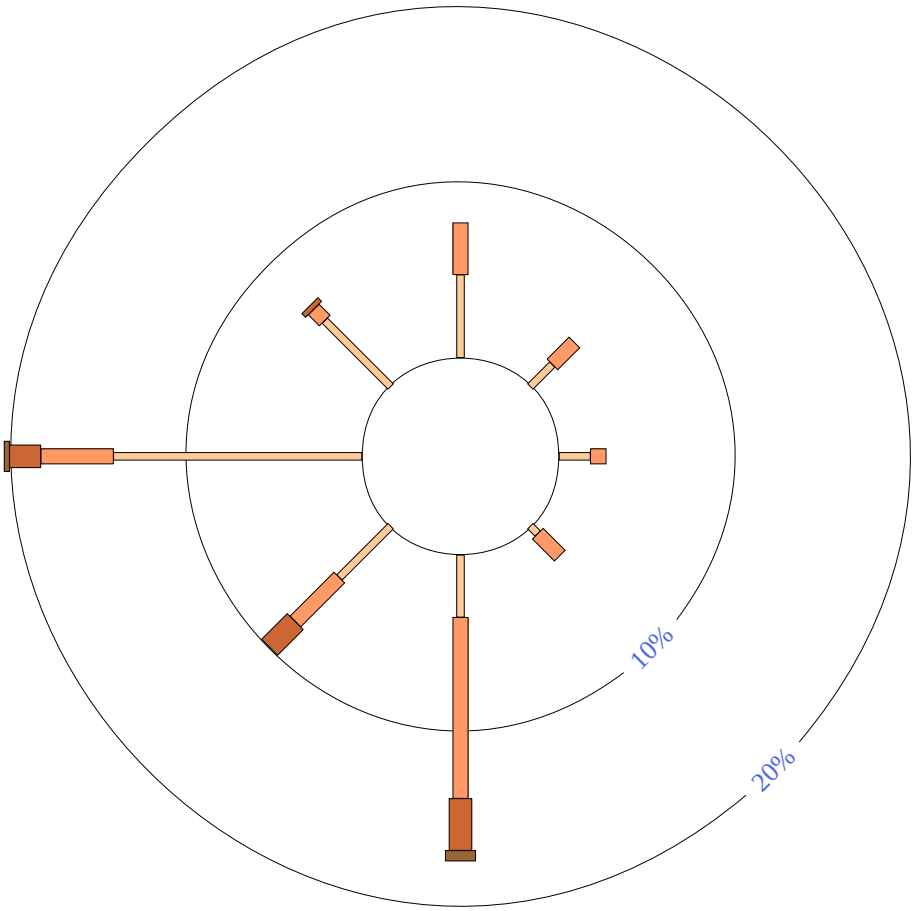


9 am Mar
333 Total Observations

Calm 29%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

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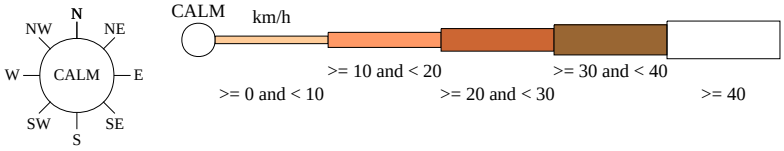
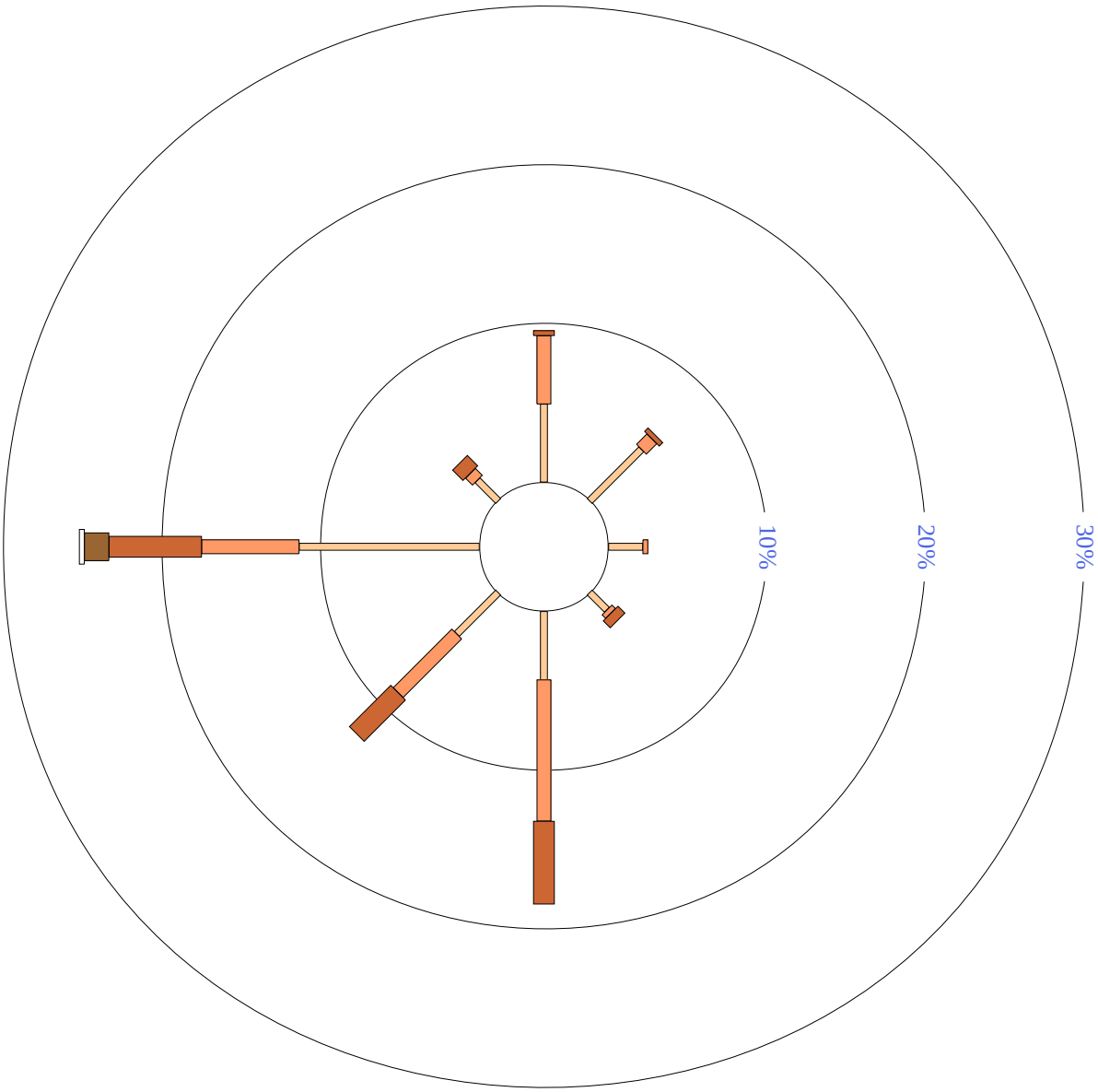


9 am Apr
326 Total Observations

Calm 20%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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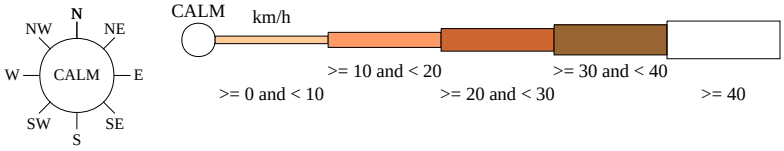
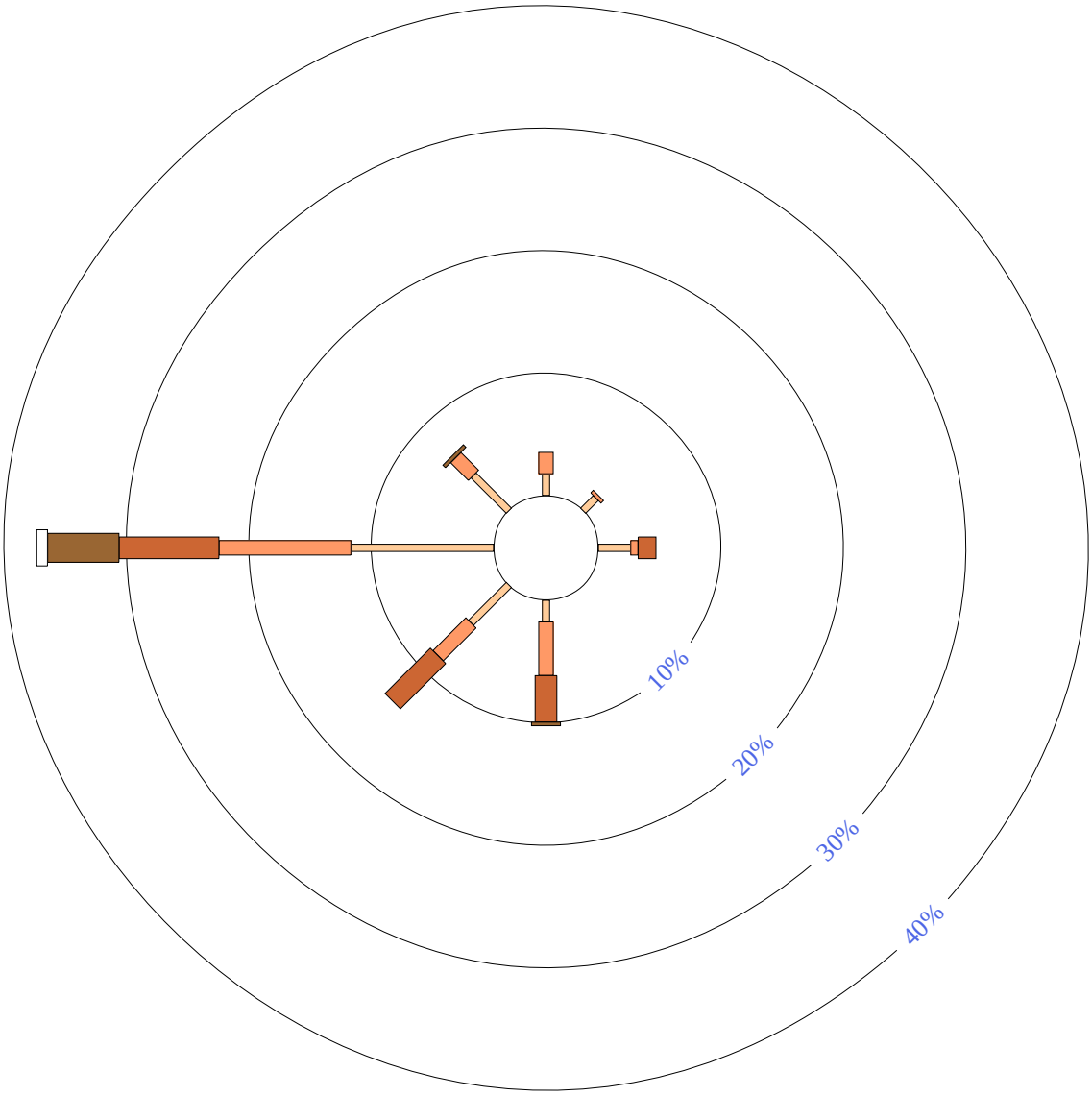


9 am May
338 Total Observations

Calm 22%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

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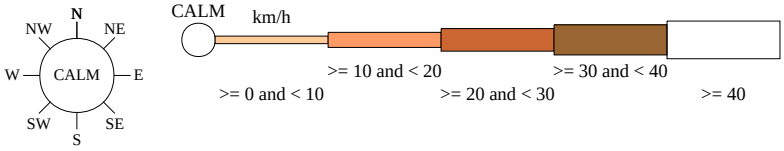
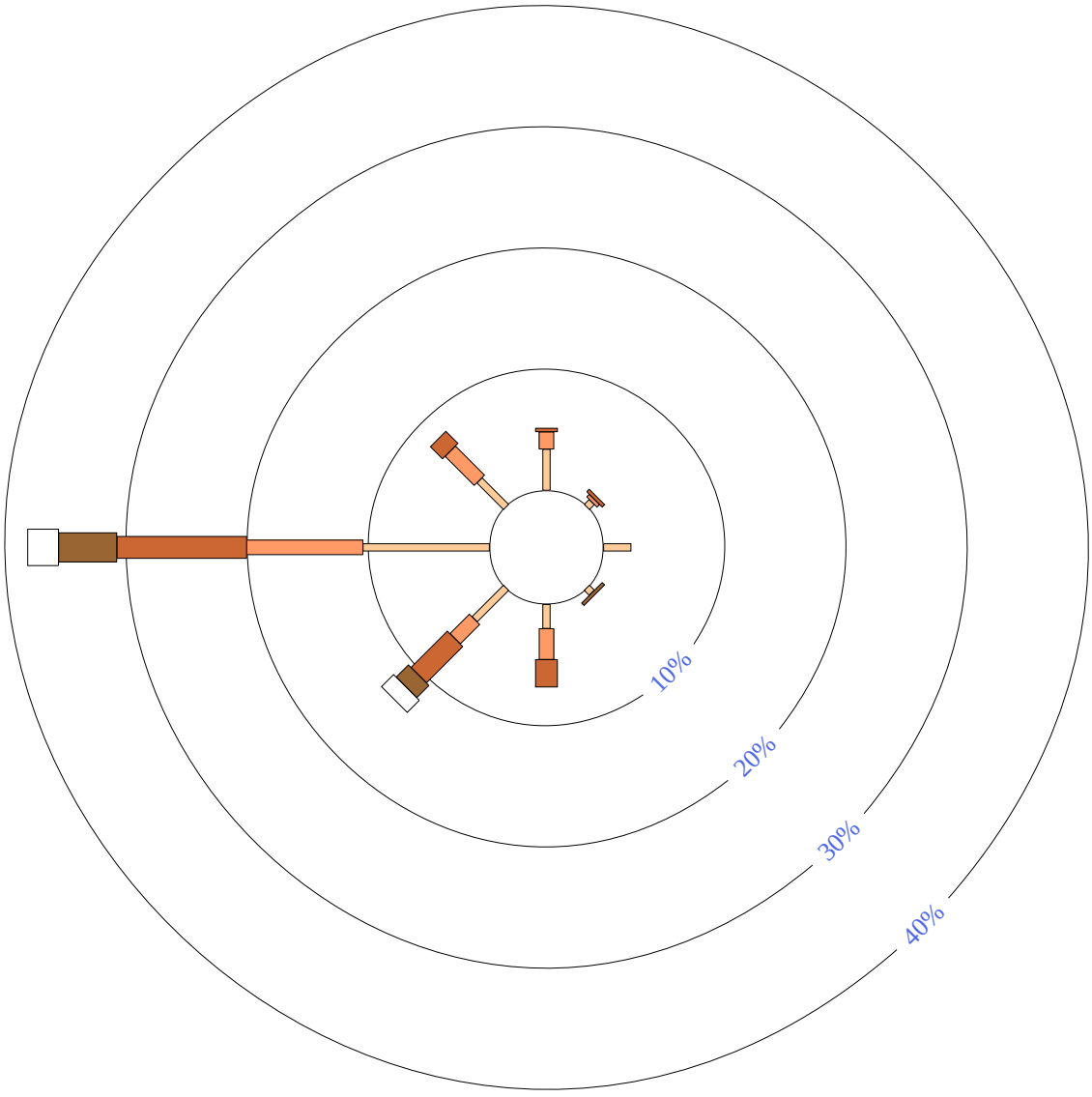


9 am Jun
349 Total Observations

Calm 24%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

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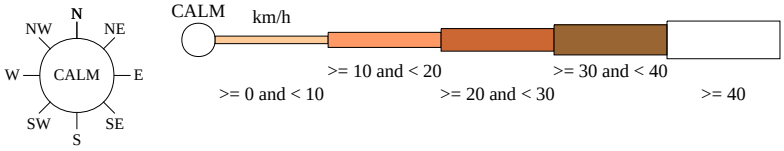
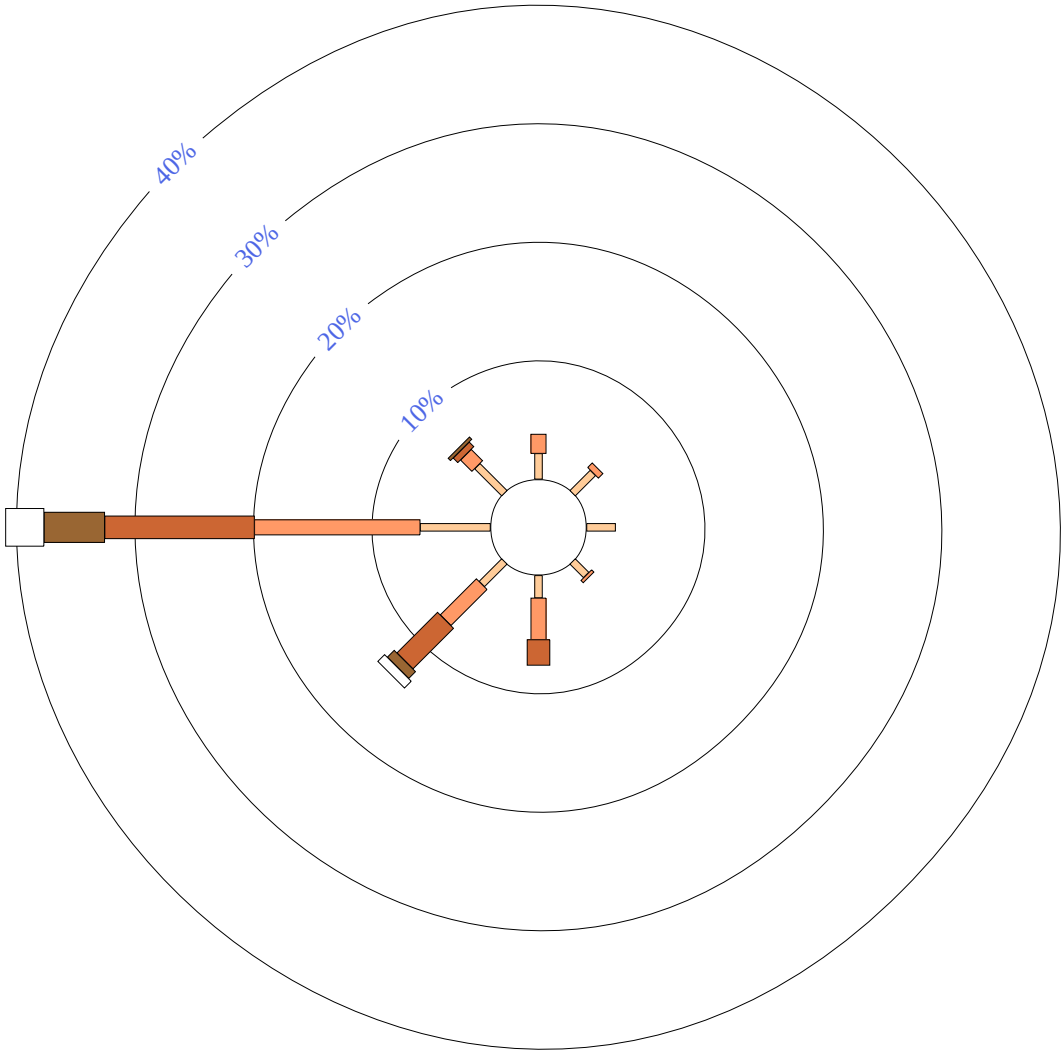


9 am Jul
366 Total Observations

Calm 20%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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ALBION PARK (WOLLONGONG AIRPORT)

Site No: 068241 • Opened Jun 1999 • Still Open • Latitude: -34.5638° • Longitude: 150.79° • Elevation 8m

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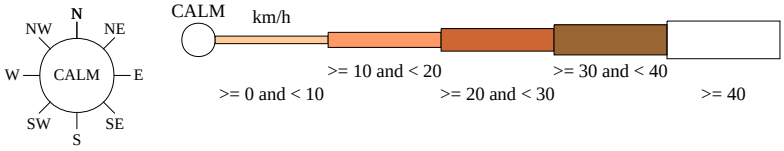
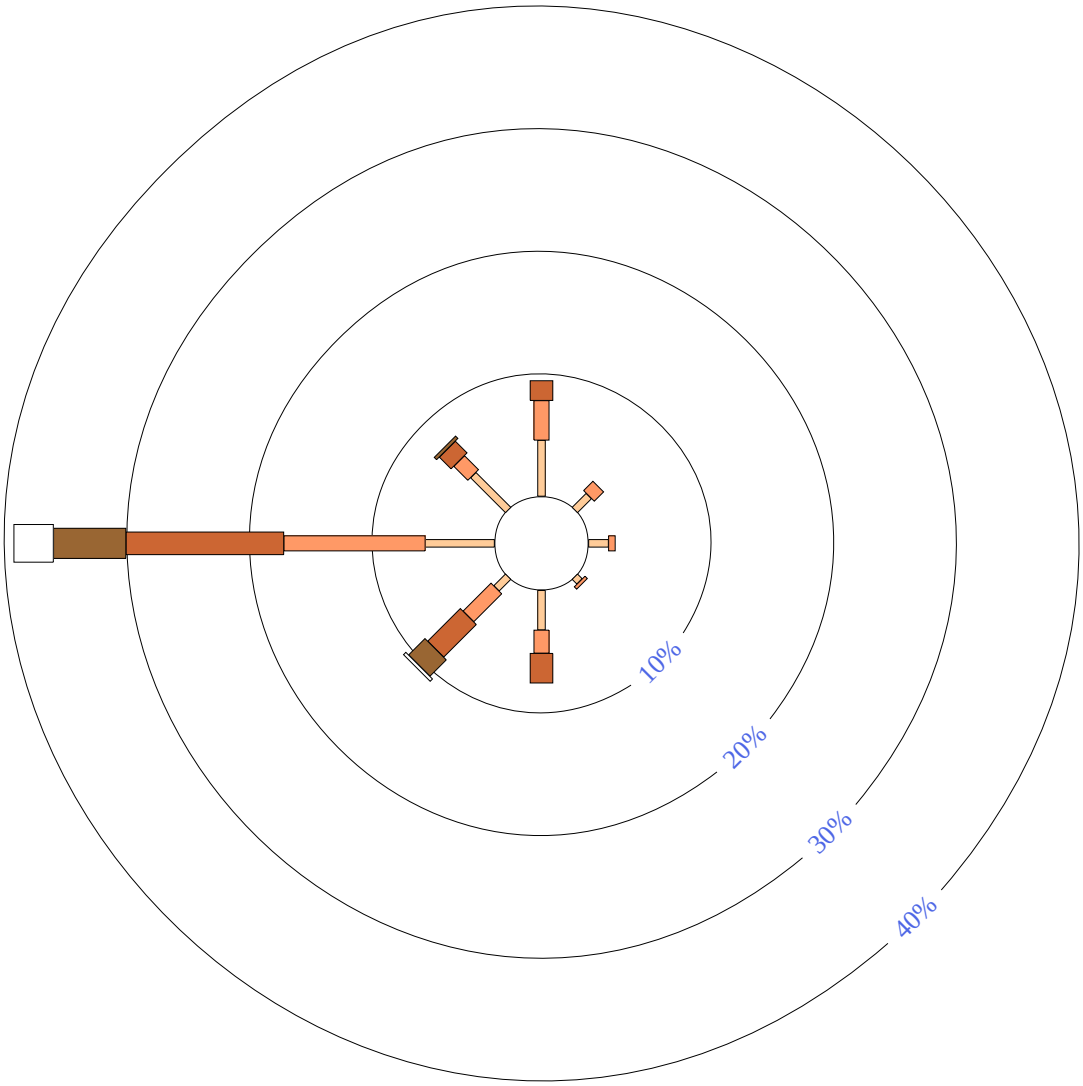


9 am Aug
367 Total Observations

Calm 19%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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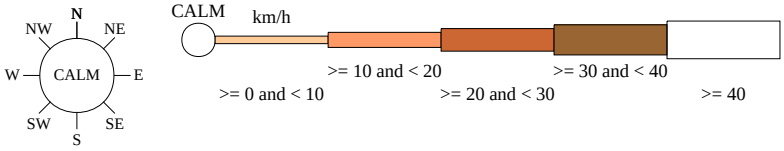
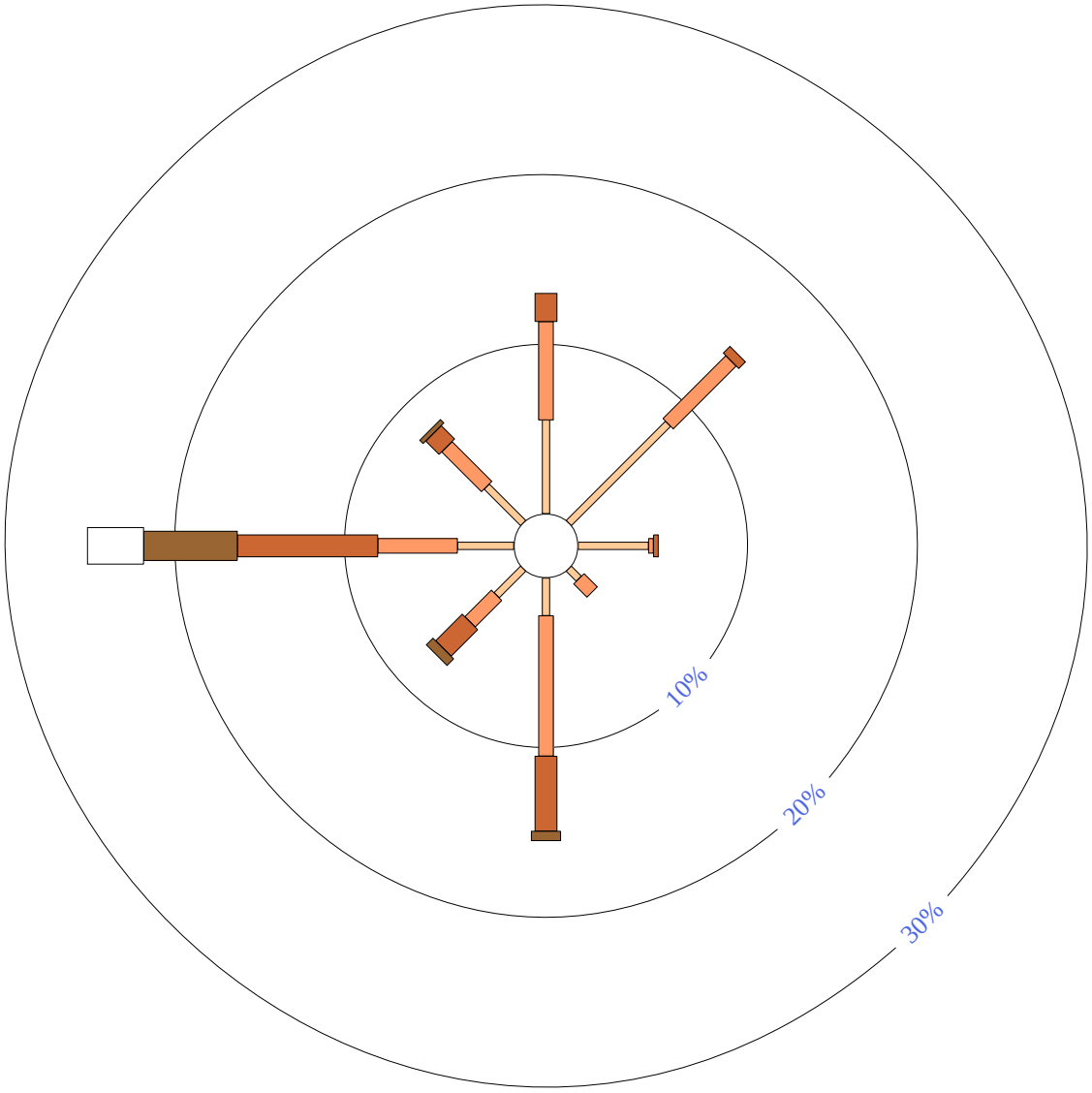


9 am Sep
357 Total Observations

Calm 10%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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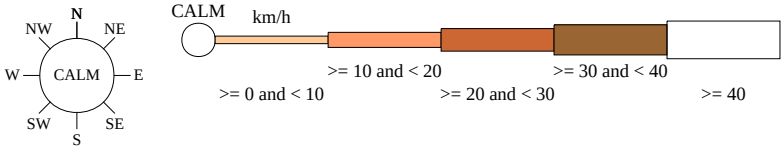
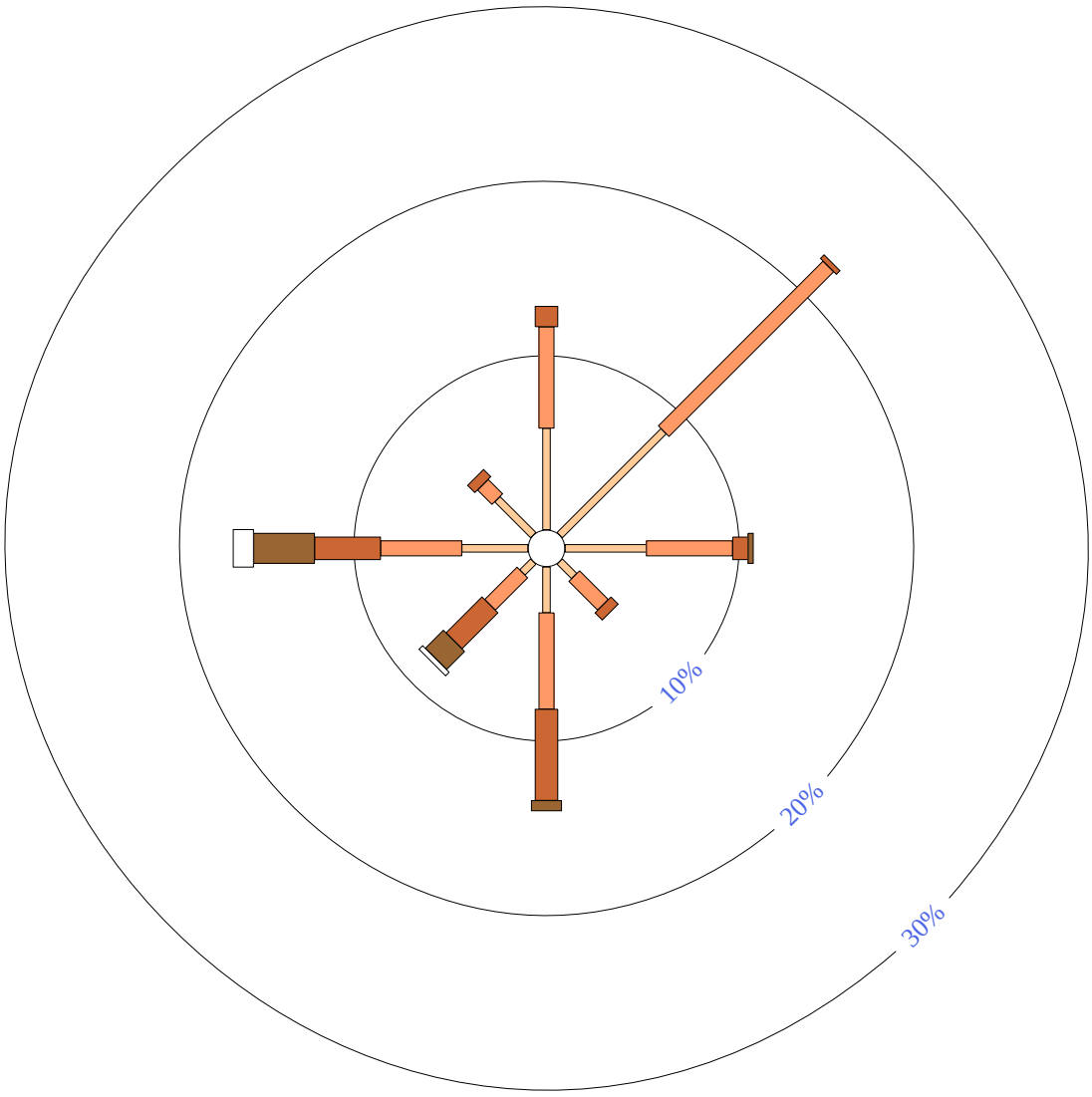


9 am Oct
339 Total Observations

Calm 5%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

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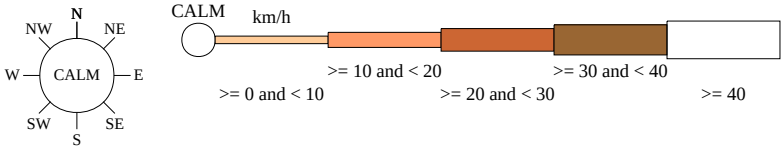
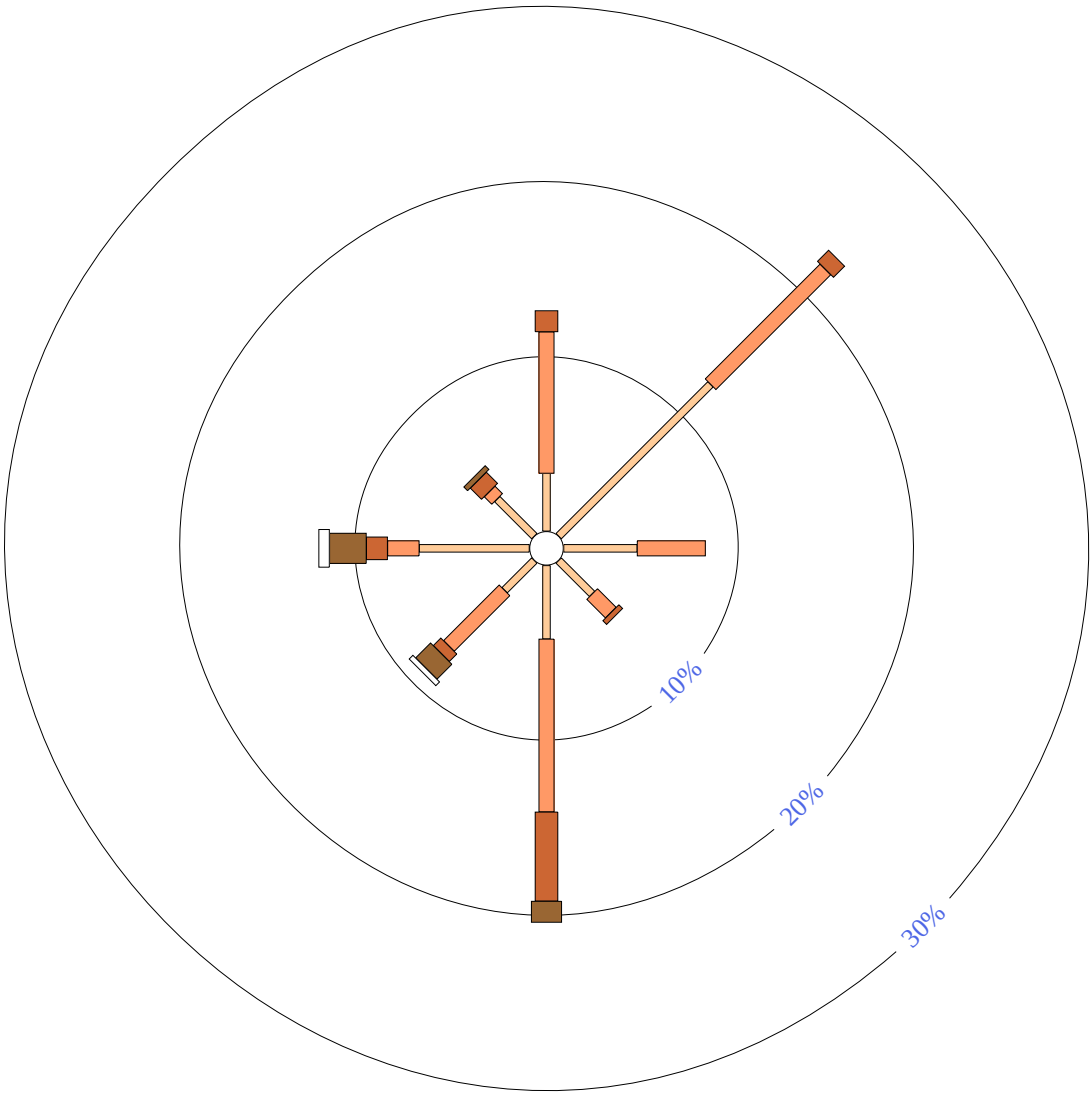


9 am Nov
329 Total Observations

Calm 5%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

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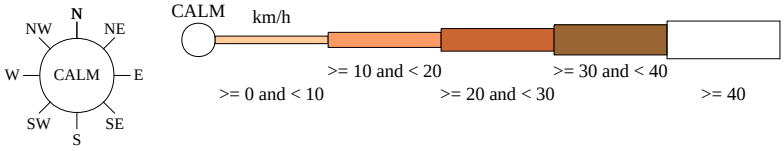
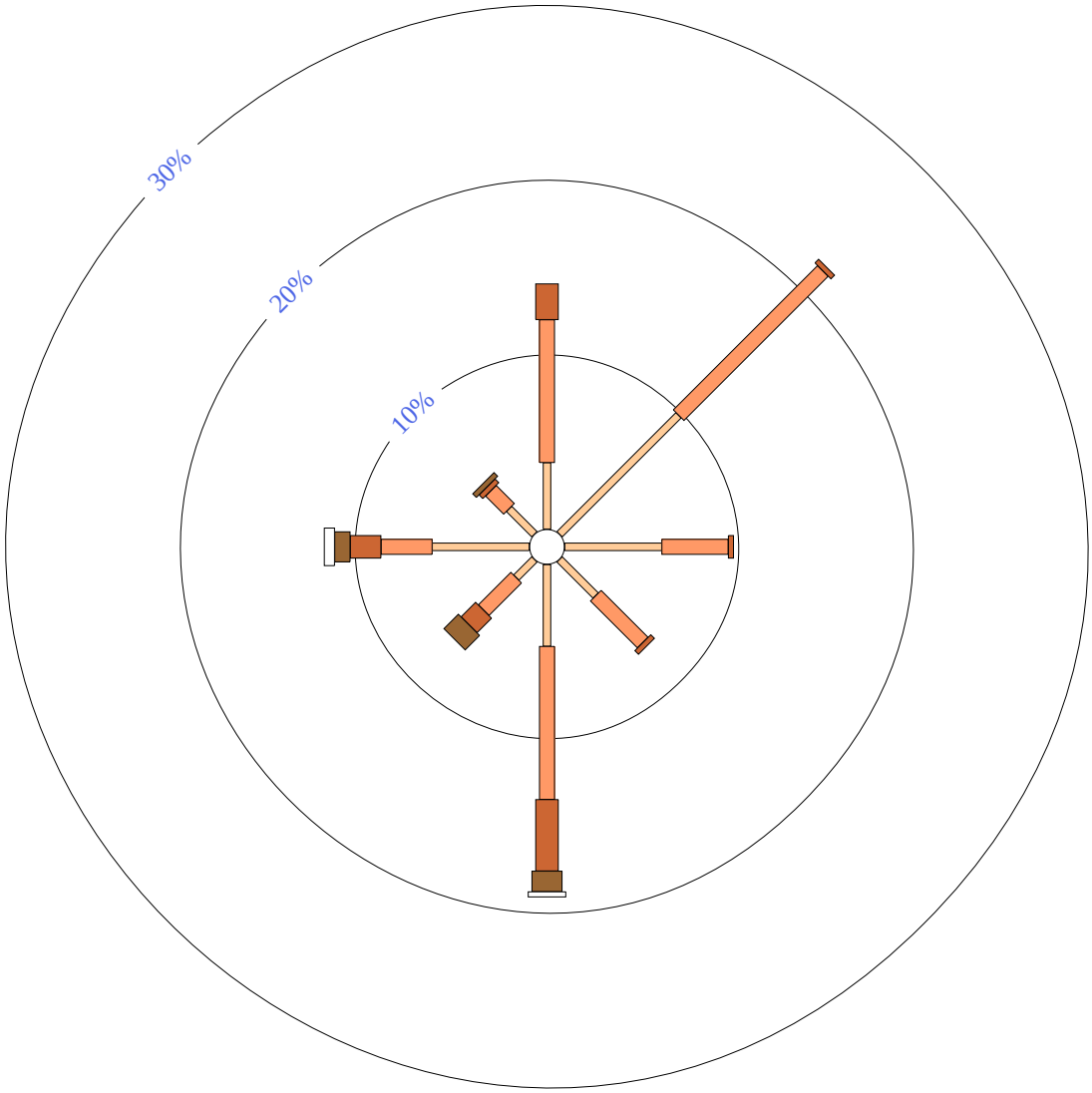


9 am Dec
337 Total Observations

Calm 5%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 27 Feb 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

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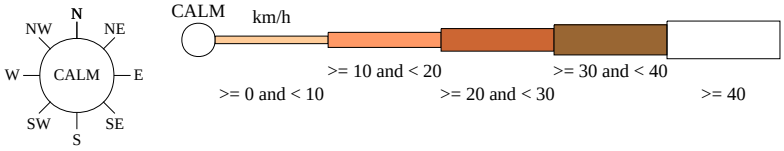
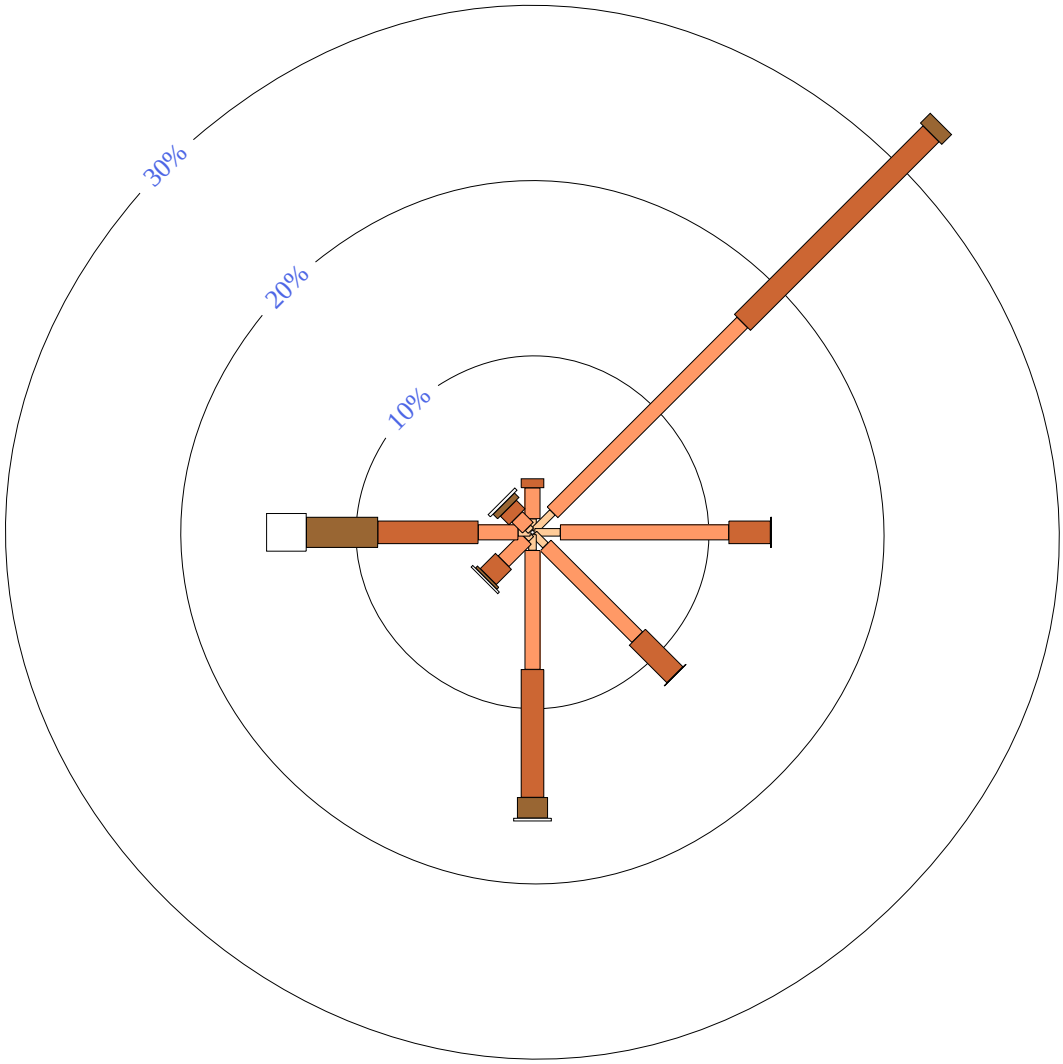


3 pm
3869 Total Observations

Calm 1%



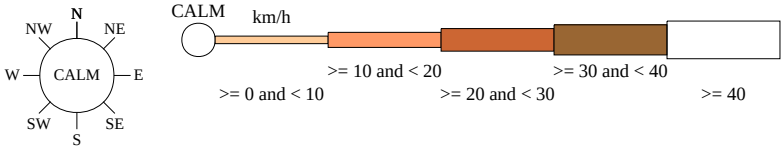
Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

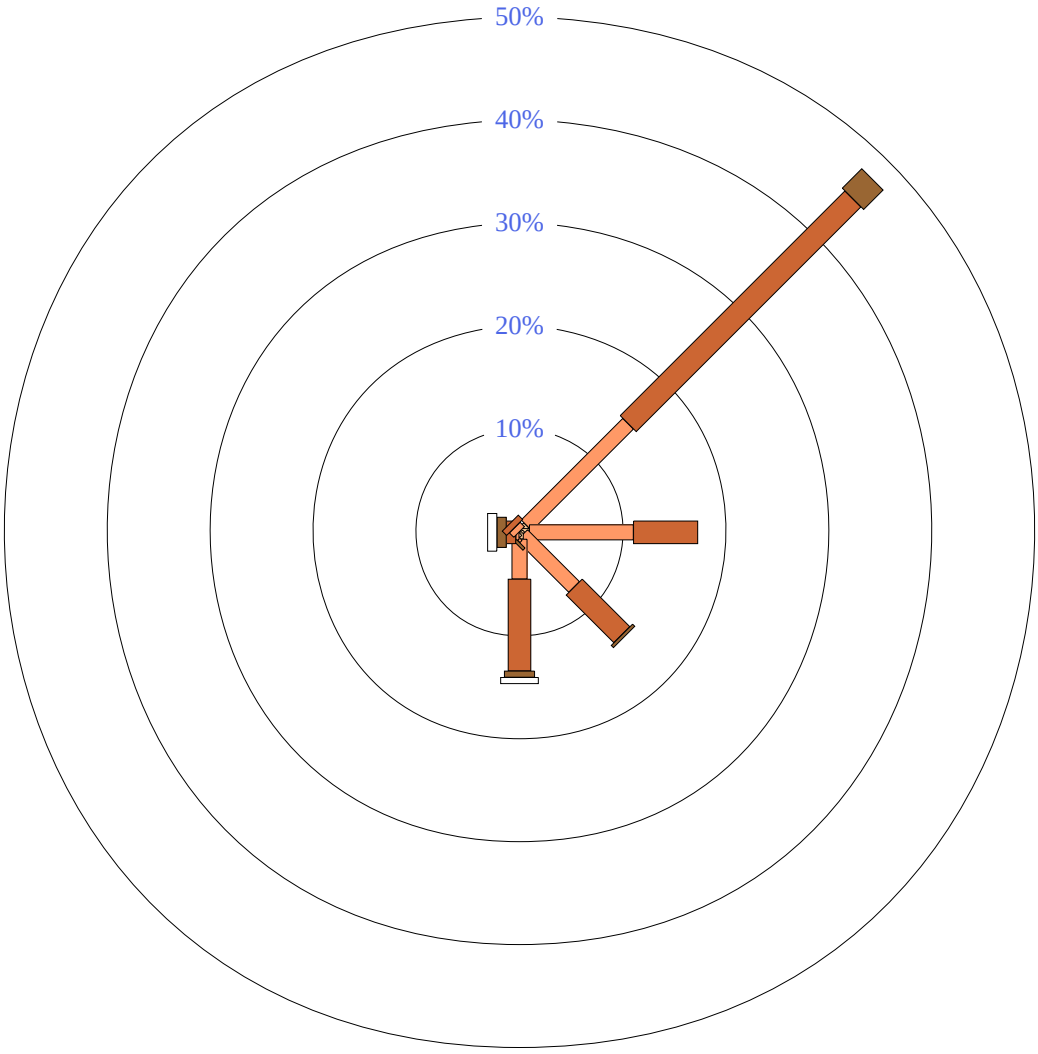
Site No: 068241 • Opened Jun 1999 • Still Open • Latitude: -34.5638° • Longitude: 150.79° • Elevation 8m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



3 pm Jan
337 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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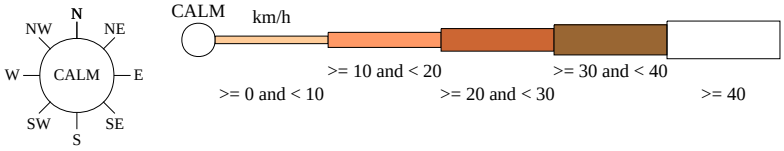
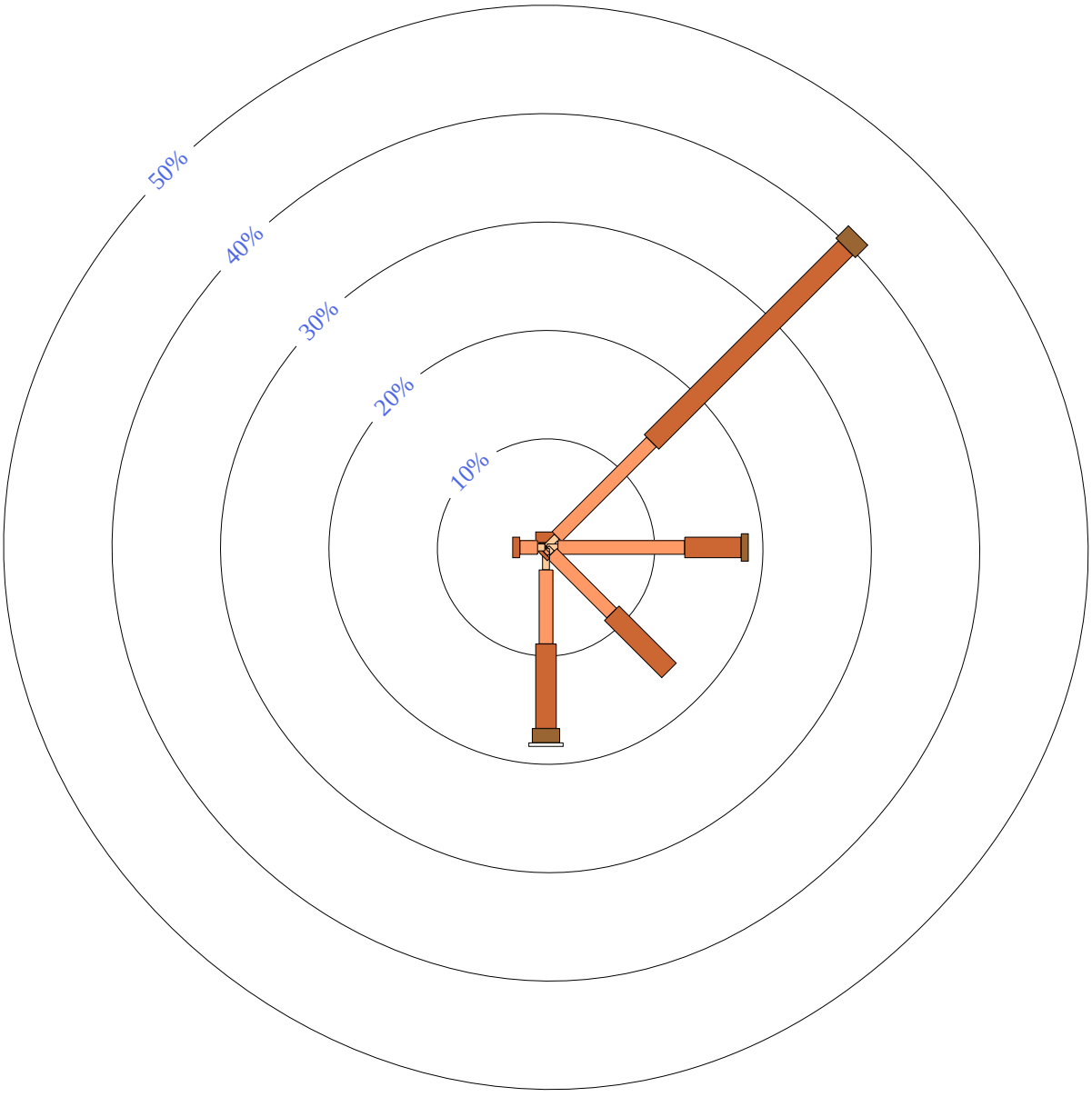


3 pm Feb
303 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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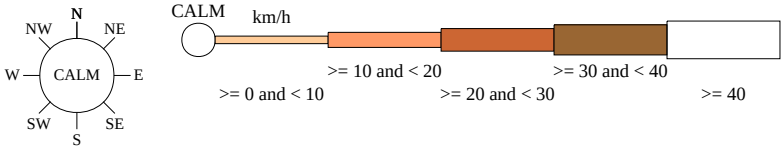
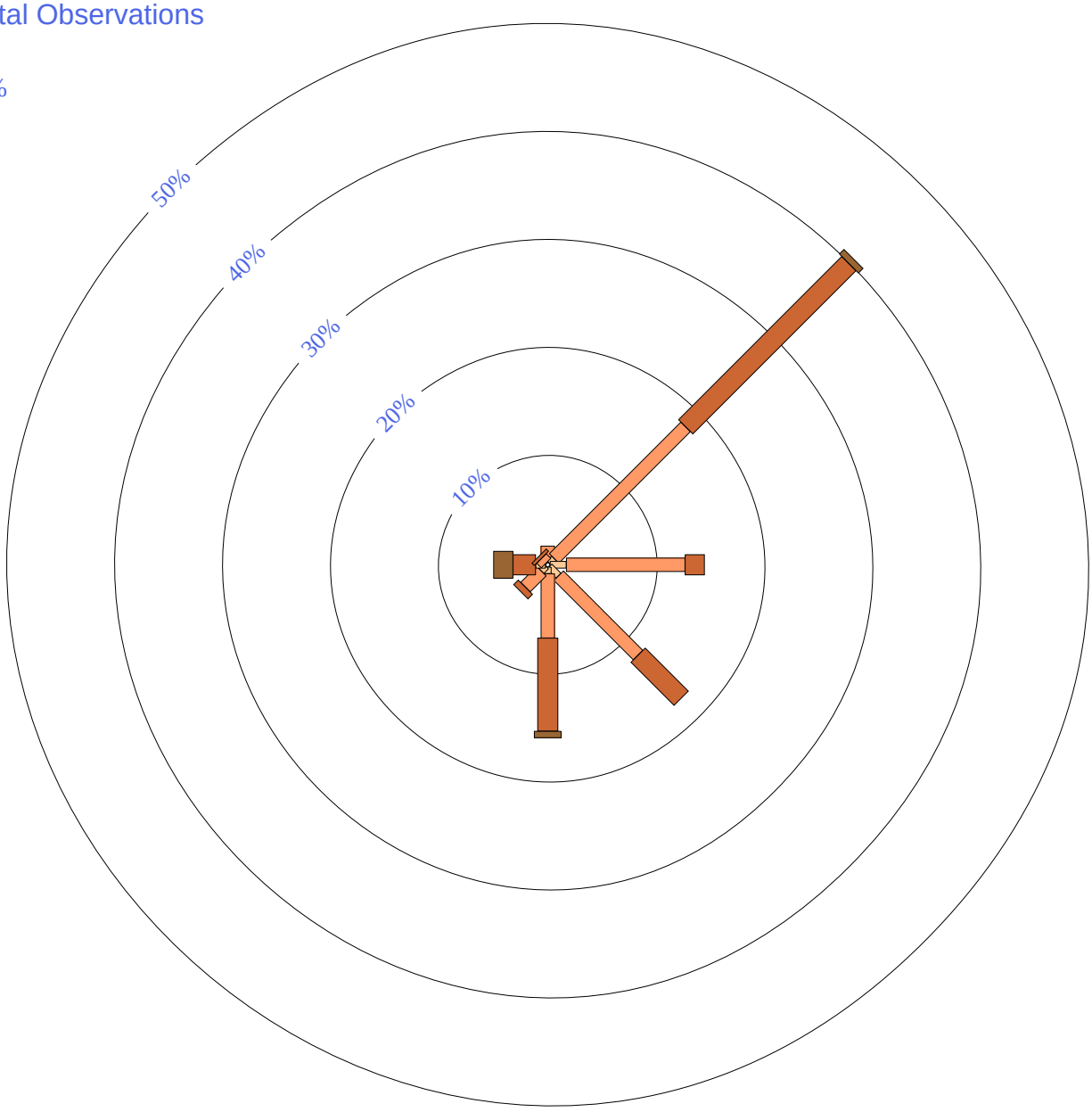


3 pm Mar
331 Total Observations

Calm 1%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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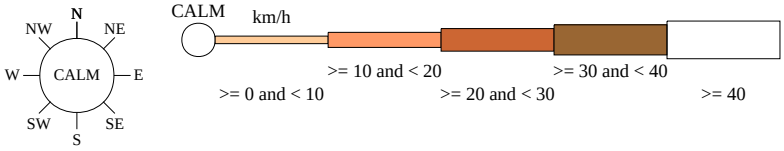
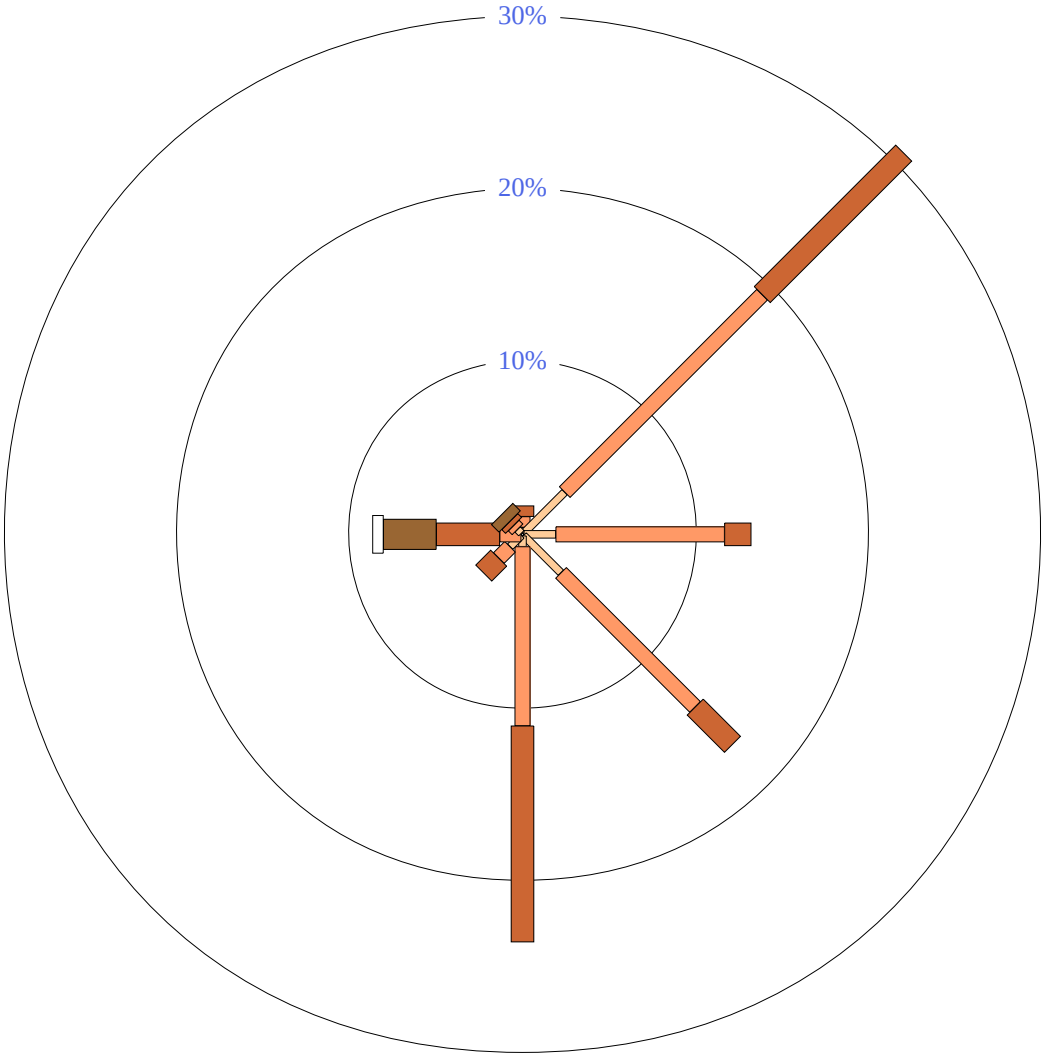


3 pm Apr
327 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

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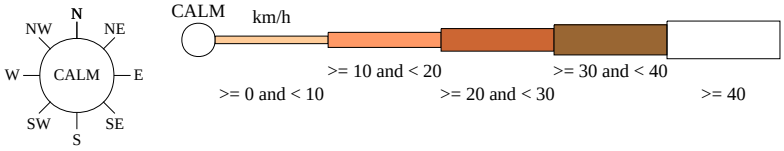
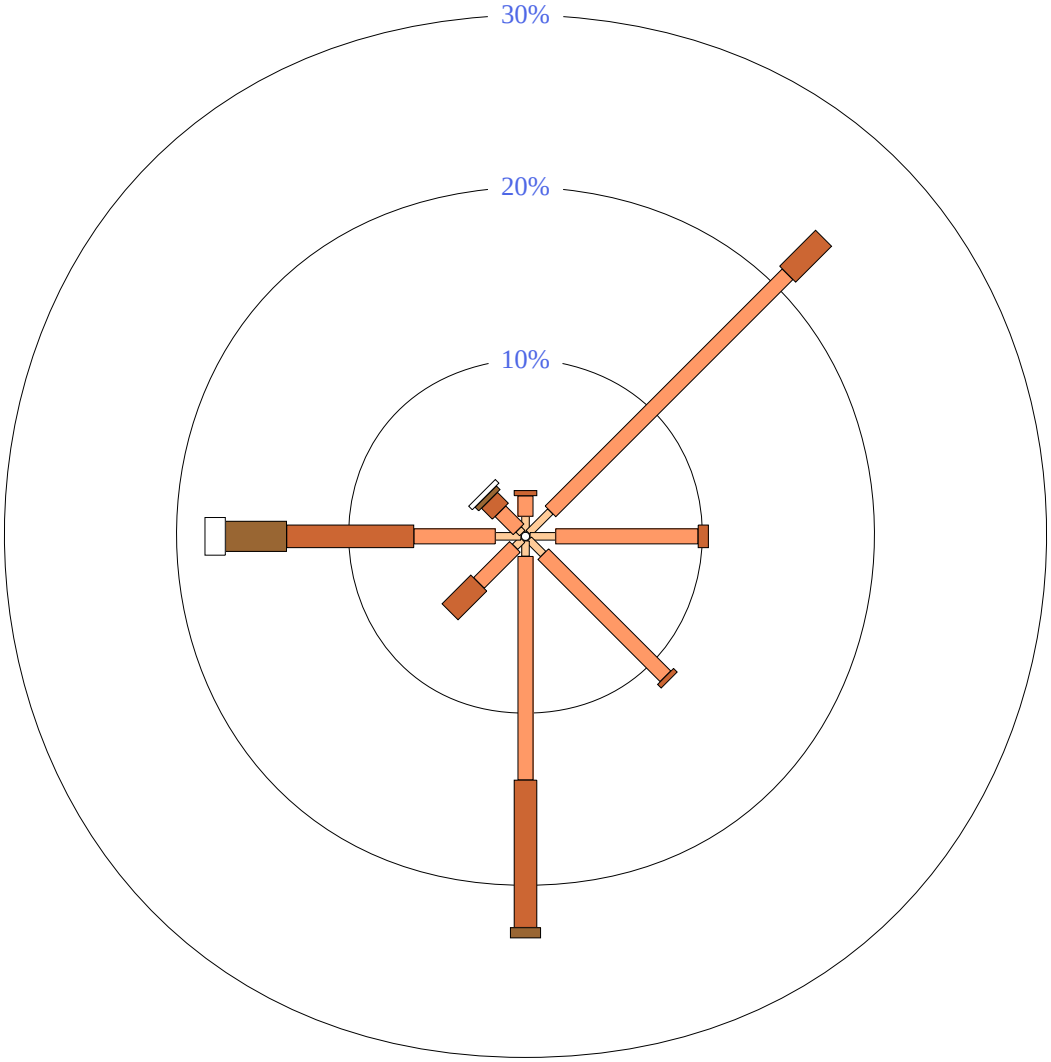


3 pm May
339 Total Observations

Calm 1%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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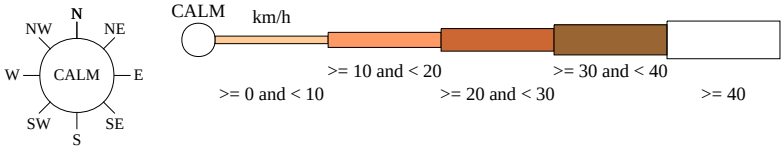
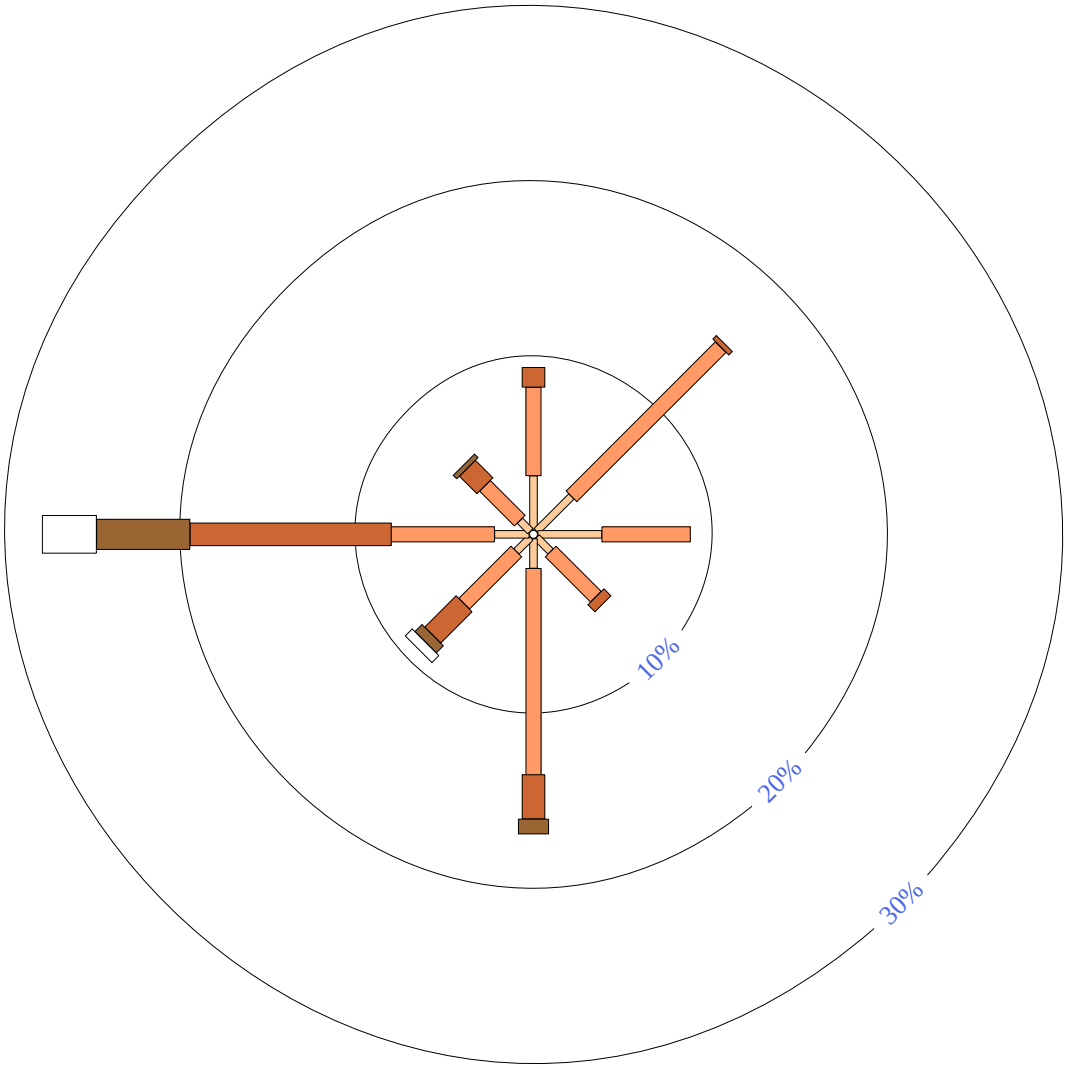


3 pm Jun
351 Total Observations

Calm 1%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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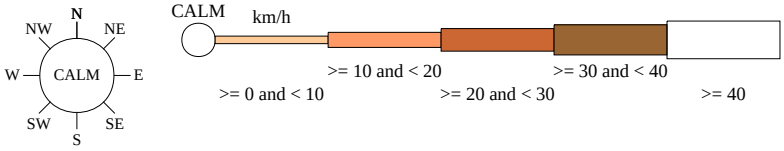
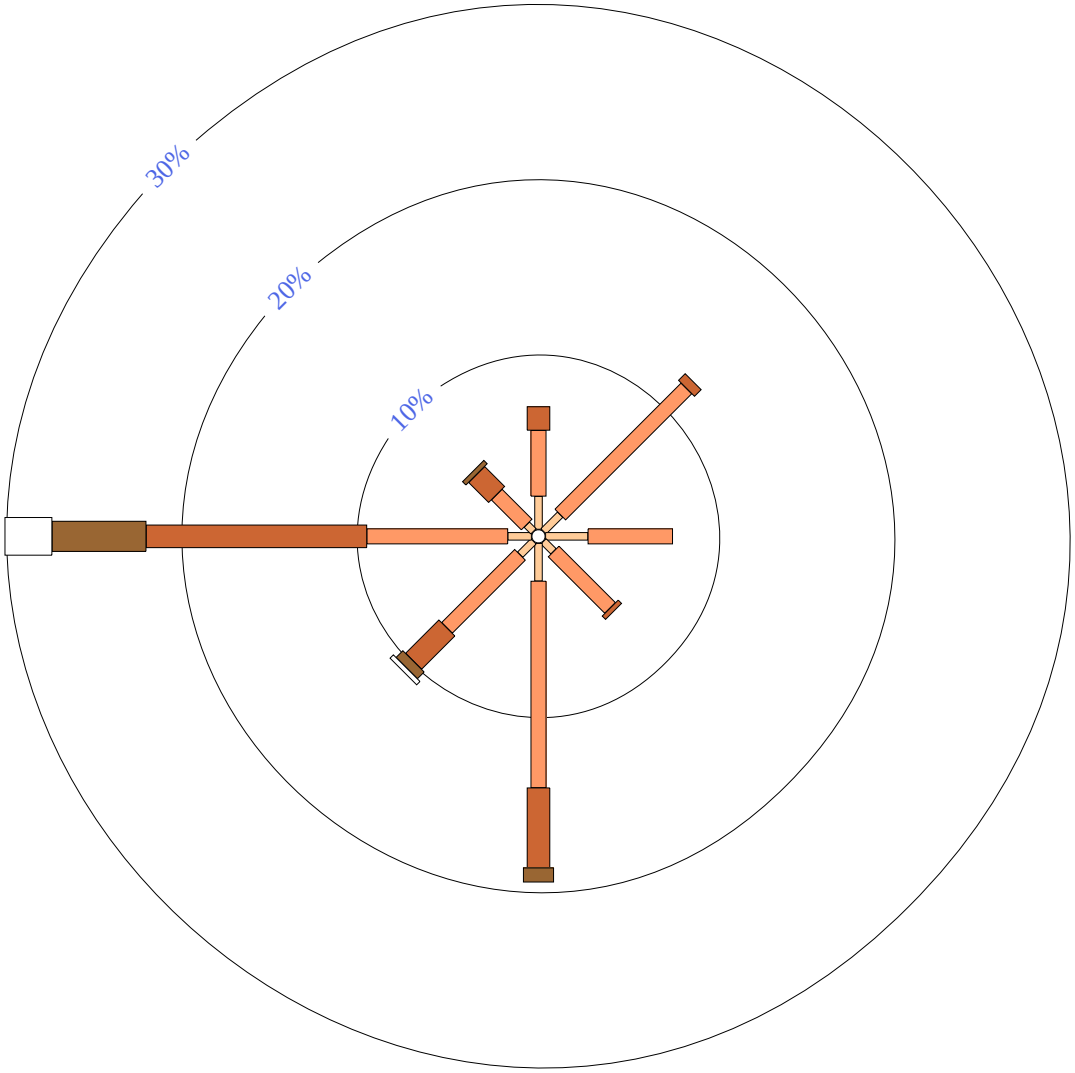


3 pm Jul
367 Total Observations

Calm 2%



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

Custom times selected, refer to attached note for details

ALBION PARK (WOLLONGONG AIRPORT)

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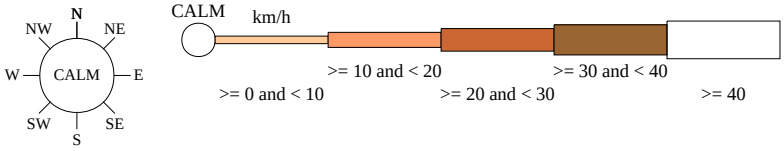
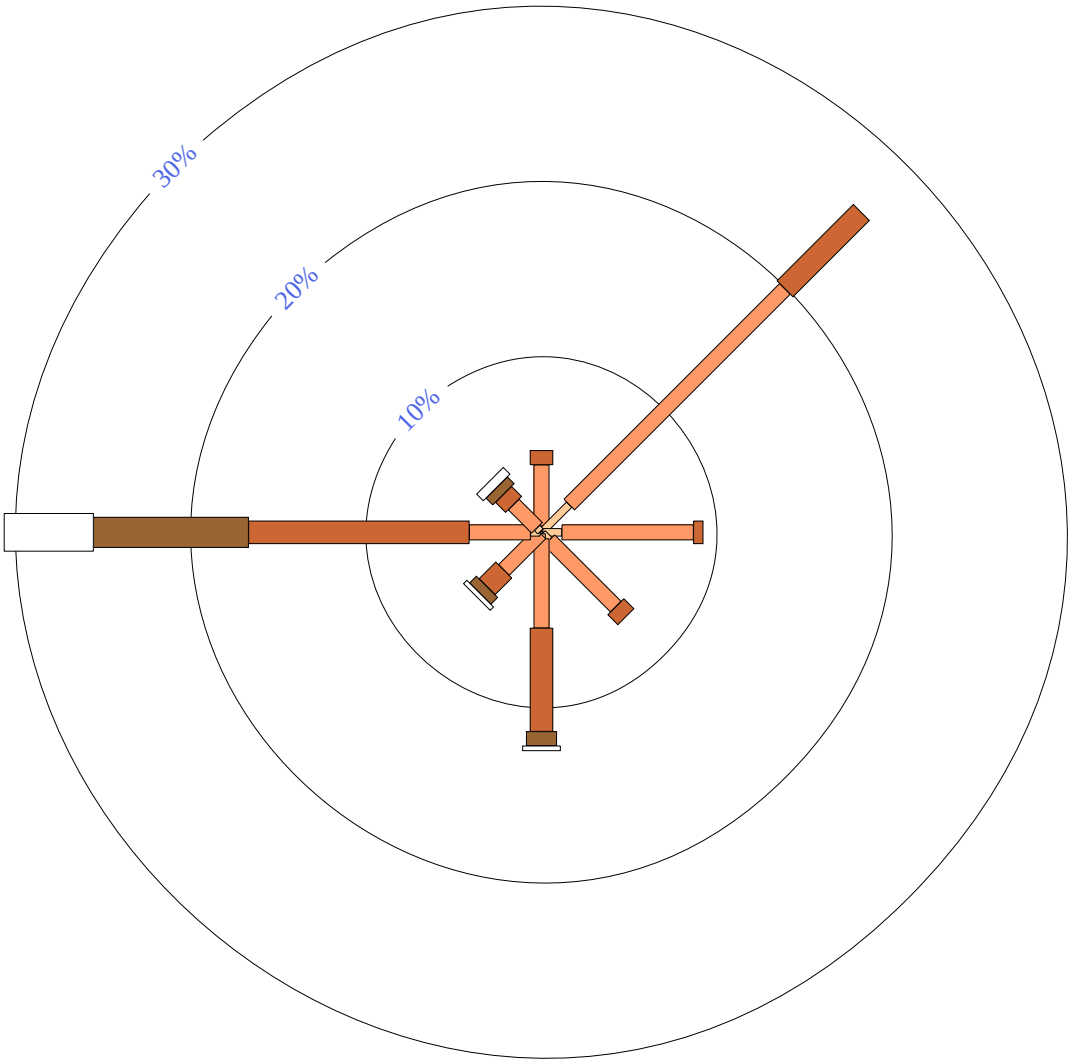


3 pm Aug
367 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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ALBION PARK (WOLLONGONG AIRPORT)

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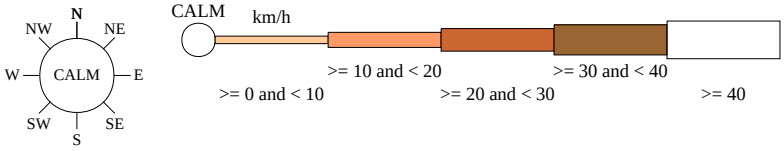
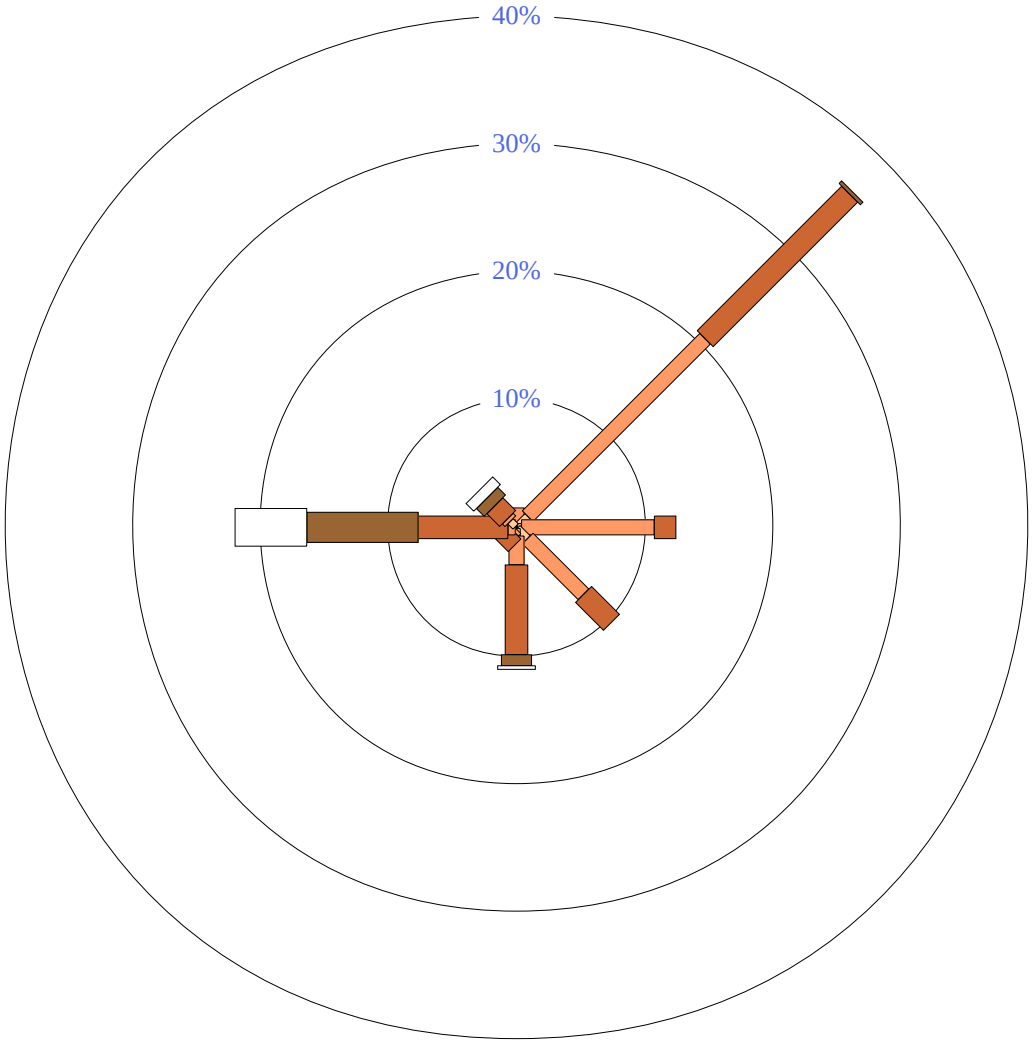


3 pm Sep
356 Total Observations

Calm *



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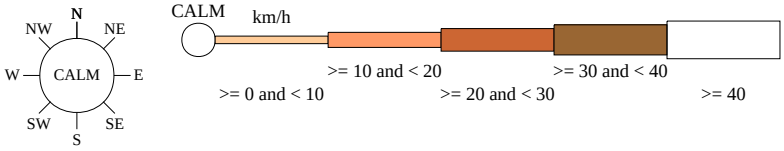
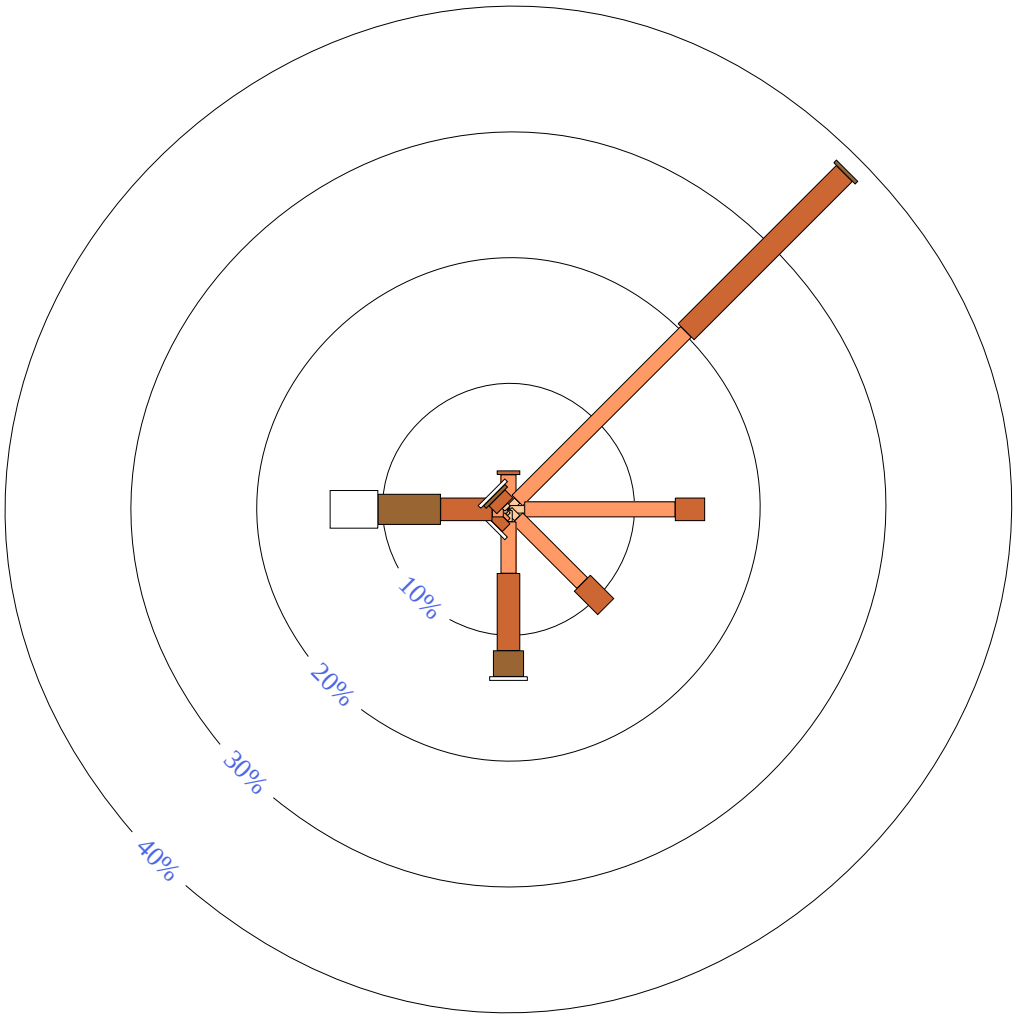


3 pm Oct
337 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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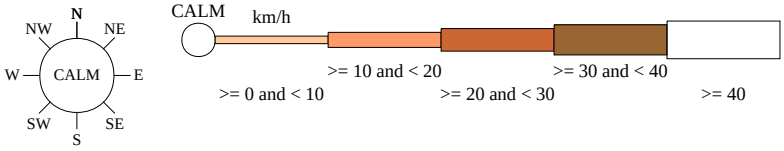
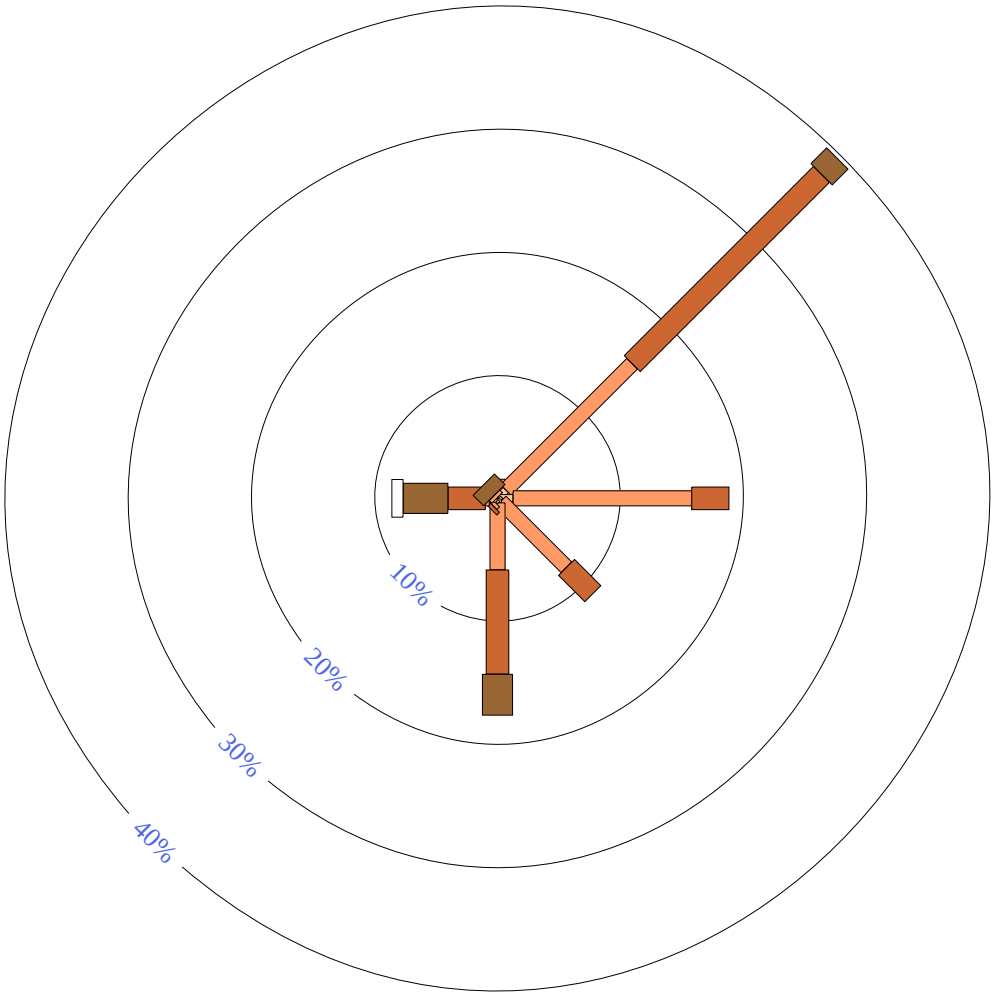


3 pm Nov
326 Total Observations

Calm *



Rose of Wind direction versus Wind speed in km/h (05 Jun 1999 to 30 Sep 2010)

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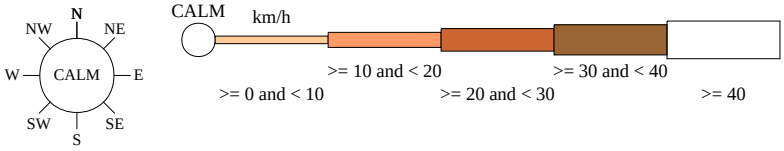

3 pm Dec
341 Total Observations

Calm *