Appendix 6

Infrastructure Servicing Report

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16 mcdonald road, baldivis

infrastructure servicing report

Project No. 15-046

pritchard francis
civil and structural engineering consultants

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Revision	Description	Author	Date
0	Due Diligence	Andrew Tucker	7 May 2015
1	For Submission with LSP	Andrew Tucker	5 January 2016
2	Modified Plan / Resubmission with LSP	Andrew Tucker	7 September 2016

1 Introduction

Pritchard Francis has been engaged by Defence Housing Australia (DHA) to undertake an Infrastructure Services Report to support the Structure Plan submission for residential development at a portion of Lot 16 McDonald Road, Baldivis.

This report outlines existing site conditions, adjacent services and likely development constraints. This report is based on the preliminary site layout contained within Appendix One.

2 Site Conditions

The site covers approximately 2.06ha in area and has frontages to McDonald Road to the east and existing rural space to the west, south and north.

This site is currently occupied by existing dwellings and structures on the western side of the lot and it is understood that the eastern half of the site was once used as a market garden.

2.1 Geology

The Perth sheet of the 1:50,000 scale Environmental Geology series maps (included in Appendix Two), indicates the site as having soil profiles as follows:

- SAND (s7) – derived from Tamala Limestone is pale yellowish brown, medium to course grained, sub-angular quartz, trace of feldspar, moderately sorted, of residual origin. Few limitations, some settlement under foundations can be expected, some ability to attenuate pollutants due to small clay content, usually considerable depth to water table due to topography.

The geological mapping shows a limestone outcrop about 100m to the north west of the site and peaty clay about 50-100m to the south west of the site.

The findings of the site from the geotechnical report, included in Appendix Three, are consistent with the geological mapping, with typically a thin layer of sand present over limestone. No peaty soils were encountered on site during the geotechnical investigation.

Limestone was present below the sand layer with rockhead varying from depths between 1.0m and more than the maximum depth of investigation (2.5m).

2.2 Topography

The current surface elevation of the site, in accordance with feature survey from Fyfe 71613/01, shows the site to vary from RL 4.0m AHD in the northwest corner, peaking in the middle of the site at about RL 7.2m and then falling to around RL 5.0m in the south east of the site. The centreline of McDonald Road ranges from RL 6.0m (south) to trapped low of RL 5.5m.

2.3 Groundwater Atlas

The Perth Groundwater Atlas indicates that the groundwater levels across the site range from 1.0m AHD to 2.0m AHD with the historical maximum approximated at 4.0m AHD. An extract from the Perth Groundwater Atlas can be found in Appendix Four.

2.4 Acid Sulphate Soils (ASS)

Mapping from the geotechnical report shown in Appendix Five shows the site having no known risk of ASS occurrence at depths less than 3m from the surface. The nearest high risk area is located approximately 50-100 m to the south west of the site.

2.5 Site Contamination

Galt Geotechnics report states that the nearest site classified as 'Remediated for Restricted Use' is located approximately 350m east of the site. Galt's geotechnical report is included in Appendix Three.

2.6 Demolition

The two most southern structures/dwellings are to be demolished and where required, the soil beneath them remediated due to historical construction techniques. The location of these can be seen in Appendix One, Preliminary Site Layout.

2.7 Earthworks

A topsoil strip of 100mm is required. We have assumed this will then be buried in the southern verge of the site and clean fill excavated will be used on site. Alternatively the topsoil will need to be removed from site.

Based on the historic market garden use for the site 500mm deep topsoil in old market garden area is assumed to be suitable for structure fill following additional compliance testing as per the Galt Geotechnics report.

Pad locations will need to be proof rolled once bulk earthworks have been completed.

It is likely that imported fill will be required across the site to make up the shortfall in material and to ensure overland flow paths and minimum grades.

3 Infrastructure

3.1 Roads

The access to the site will be from McDonald Road. Modifications will be required to the existing road reserve to allow for the construction of the proposed intersections as detailed in the concept plan in Appendix One.

3.2 Stormwater Drainage

An underground pit and pipe network is intended for the site and will be disposed of into underground tanks, most likely a modular plastic system allowing for infiltration and attenuation of the critical 1:100 year ARI event as the capacity of the basin on the east side of McDonald Road is considered to be at capacity in serving The Chimes.

3.3 Sewerage Reticulation

A 150mm diameter sewer has been allowed for to service the expected 30 lots. This can then gravity feed into the 150mm diameter sewer running along the west side of McDonald Road and then to the existing wastewater pump station adjacent to the lot. The sewerage catchment has been confirmed by the Water Corporation and the system has sufficient capacity for the 30 lot development.

Please refer to Appendix Six for Dial-Before-You-Dig information.

3.4 Water Reticulation

The site currently has a 150mm water main on the eastern side of McDonald Road. It is likely that connections into the 150mm main will be able to supply the site with water, which has been indicated by Water Corporation. Connection will need to be bored under McDonald Road. It is assumed internal water reticulation mains will be 100mm.

Please refer to Appendix Six for Dial-Before-You-Dig information.

3.5 Electrical Supply

Existing electrical infrastructure adjacent to the site includes:

- High and Low voltage cables along both sides of McDonald Road.
- Existing transformer directly opposite the site on McDonald Road.

Online mapping indicates the site will have 15-20MVA capacity in 2020 hence it is not anticipated capacity will be an issue.

Please refer to Appendix Six for dial before you dig information.

3.6 Communications

There is existing Telstra network located in McDonald Road, which is the existing service currently servicing the dwellings on site. It is expected there will be capacity to service this site.

Optic fibre currently exists along Fifty Road which is the adjoining road to the south.

Please refer to Appendix Six for dial before you dig information.

3.7 Gas

There is existing 110mm high pressure gas pipelines on the east side of McDonald Road. 40mm high pressure mains connect into this larger main to service the existing residential area to the east. It is expected this network will have capacity to service the development.

Please refer to Appendix Six for dial before you dig information.

4 Conclusion

The development of Lot 16 McDonald Road, Baldivis is not constrained by service capacities or upgrades with all services in close proximity to the site.

It is recommended further site investigations of the eastern portion of the site be undertaken to more accurately map the depth and extents of unsuitable material.

Due to the previous use of the site as a market garden it is recommended further investigations on potential impacts carried out as per the Galt Geotechnics Report.

appendices

Appendix One:	Preliminary Site Layout
Appendix Two:	Geological Mapping
Appendix Three:	Geotechnical Report
Appendix Four:	Groundwater Contours
Appendix Five:	Acid Sulphate Soils
Appendix Six:	Dial-Before-You-Dig Information
Appendix Seven:	Feature Survey

appendix one: preliminary site layout

LEGEND

- Subject Site
- **10m wide frontage single house lot** (300m² approx.)
- **12m wide frontage single house lot** (360m² approx.)
- **15m wide frontage single house lot** (450m² approx.)
- Rural / Urban zoning boundary
- Provisional bushfire setback (17m)
- Existing structure to be deleted
- Portion of road to be closed

LOT SIZES

Average	Range
408sqm*	303-490sqm*

* excluding balance lot

Subdivision Concept Plan

16 McDonald Road, Baldivis

Project Manager: AH Date: 4 August 2016
Drawn: OP Scale: 1:1,000 @ A3
Checked: AH Drawing No. 716-059 CP-1 A

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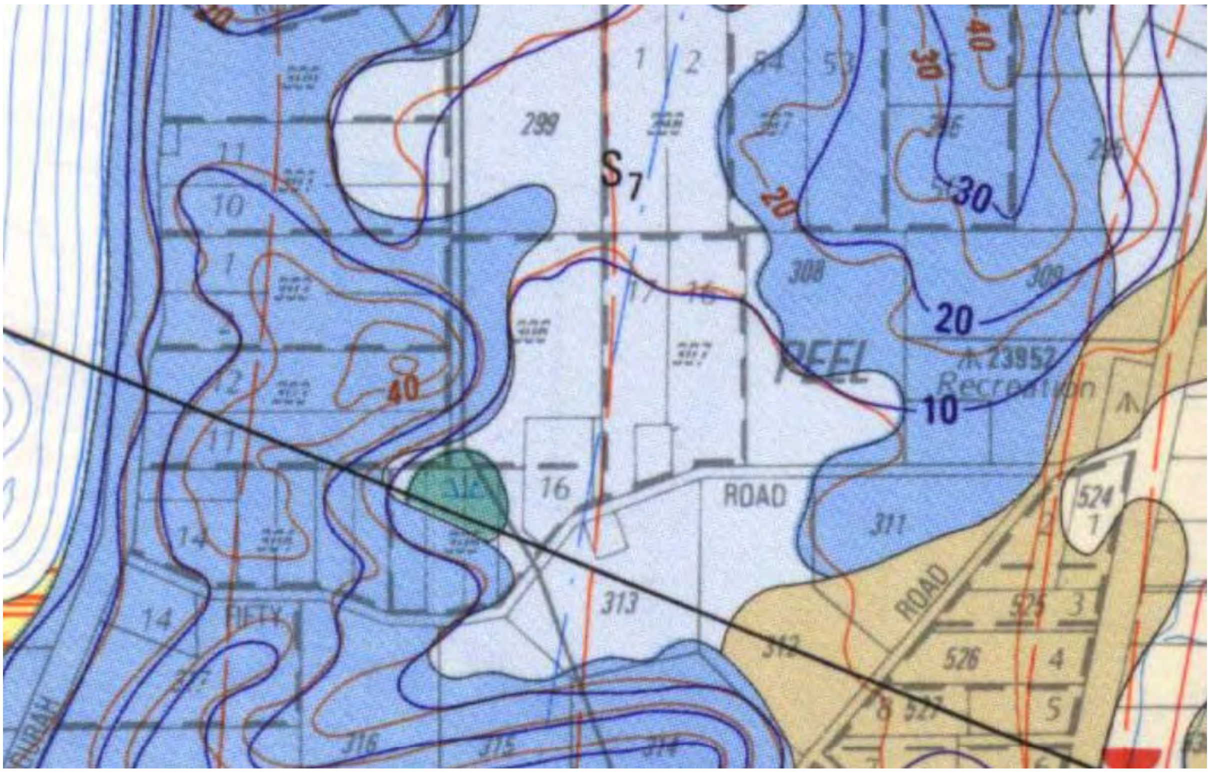
appendix two: geological mapping



S7
299
313
311
PEEL
Recreation
ROAD
ROAD
FIFTY
10
20
30
40
524
525
526

appendix three: geotechnical report

Report on

GEOTECHNICAL AND PRELIMINARY ENVIRONMENTAL STUDY PROPOSED RESIDENTIAL SUBDIVISION 16 MCDONALD ROAD, BALDIVIS

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30 April 2015

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APPENDIX C: HAND AUGER BOREHOLE REPORTS

APPENDIX D: PERTH SAND PENETROMETER RESULTS

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APPENDIX G: UNDERSTANDING YOUR REPORT

1. INTRODUCTION

This report presents the outcomes of Galt Geotechnics Pty Ltd (Galt's) geotechnical and preliminary environmental study for the proposed residential subdivision at 16 McDonald Road, Baldivis ("the site"). The location of the site relative to the surrounding area is shown on Figure 1, Site and Location Plan.

The investigation was requested by Lachlan Harris of Pritchard Francis and authorised by Jody Fisher of Defence Housing Australia in a signed client authorisation dated 13 April 2015 and email correspondence dated 14 April 2015.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

Based on the supplied information, the site is rectangular in plan and covers an area of 2.06 ha. Based on publicly available contour mapping, the current surface elevation is understood to vary from about RL 5.0 m AHD in the north west corner, peaking in the middle of the site at about RL 7.0 m AHD, and falling to around RL 6.0 m AHD in the east of the site.

The site is currently occupied by several existing residential dwellings and structures, generally on the western third of the site, with scattered large, established trees and bushes. A track runs from McDonald Road, east to west along the centre of the site to the existing structures. The balance of the site is cleared and grassed, with some areas evidently used as a laydown area. We understand that part of the eastern half of the site has been used as market gardens.

We understand that the end client, Defence Housing Australia, has concerns about possible previous uncontrolled filling of the site.

It is understood that the proposed development will comprise a residential subdivision. The latest concept plan for the proposed residential subdivision shows the development comprising 25 residential sized lots, ranging in size from 342 m^2 up to 570 m^2 and 3 roads, with the balance of the lot (5,976m^2) to consist of a rural zone, in which the existing residential dwelling will be retained.

We have not being given specific details regarding proposed structures on the site; however, we assume these will be typical single or double storey masonry structures, with shallow footings and slabs-on-ground

3. OBJECTIVES

The objectives of the study, based on the request from Pritchard Francis, were to:

Geotechnical

- assess subsurface soil and groundwater conditions across the site, including possible presence of rock / limestone and the possible presence of uncontrolled fill;
- provide recommendations on suitable footing systems for the proposed development;
- provide allowable bearing pressure and settlement estimates for shallow foundations;
- provide a site classification(s) in accordance with AS 2870-2011 "Residential Slabs and Footings";
- specify remediation work required to ensure that the site will have a site classification of "Class A", if required;
- provide recommendations and geotechnical design parameters for earth retaining structures;
- assess the appropriate site subsoil class for the site in accordance with AS 1170.4-2007;
- recommend appropriate site preparation procedures including compaction criteria, re-use of in-situ soil and specifications and preparations for filling the site;
- assess the suitability of excavated material for re-use as fill;

- assess the permeability of the soils at the site for potential on-site disposal of stormwater by infiltration, including design permeability rates;
- provide guidance on preparation of soil under pavements, roads and car parking areas, including providing a subgrade California bearing ratio (CBR) value for pavement thickness design by others.

Environmental

- conduct a desk study assessment and comment on the possible presence of acid sulfate soils (ASS) and other environmentally sensitive issues apparent from geotechnical investigation that may need further detailed investigation;
- assess the nature and extent of soil contamination in areas of the site where market gardening activities are known to have occurred (if any); and
- determine if soil contamination (if any) represents a risk to human health or the environment.

4. FIELDWORK

Fieldwork was completed on 20 April 2015 and comprised

- excavation of test pits at sixteen locations, TP01 to TP16, extending to depths of up to 2.5 m;
- testing with Perth sand penetrometer (PSP) adjacent to each test pit location and at an additional 3 locations, extending to depths of up to 2.1 m;
- drilling of hand auger boreholes at 3 locations, HA01 to HA03, extending to depths of between 0.6 m and 0.8 m below ground;
- infiltration tests using the 'inverse auger hole' method at 3 locations, P1 to P3, at depths of between 0.6 m and 0.8 m below ground;
- collection of representative samples from the former market gardening area for inspection and laboratory testing; and
- a site walkover to inspect for potential environmental issues.

General

The tests were positioned and located by a geotechnical engineer and environmental scientist from Galt using a handheld GPS accurate to within about 5 m in the horizontal plane. Our personnel observed the test pitting, excavated the hand augered boreholes, logged the materials encountered in the test pits and boreholes, conducted the penetrometer and infiltration testing, collected representative samples for inspection and laboratory testing and conducted a site walkover.

The test locations are shown on Figure 1, Site and Location Plan. Photographs of the site are presented in Appendix A, Site Photographs. Test pit and hand auger borehole details are summarised in Table 1.

Table 1: Summary of Tests

Test Name	Test Depth (m)	Fill Thickness (m)	Depth to Limestone (m)[1,2]	Reason for Termination	Stratigraphy
TP01	2.5	-	1.9	Refusal on limestone	SAND, overlying Limestone
TP02	2.2	-	1.6	Refusal on limestone	
TP03	2.2	1.0	1.5	Refusal on limestone	FILL, SAND; overlying SAND, overlying limestone
TP04	2.3	-	NE[3]	Test pit collapse	SAND
TP05	1.9	-	1.4	Refusal on limestone	SAND, overlying Limestone
TP06	1.4	-	1.3	Refusal on limestone	
TP07	2.5	0.4	NE	Test pit collapse	FILL, SAND; overlying SAND
TP08	0.6	0.4		Refusal on limestone	
TP09	2.3	-	1.0	Refusal on limestone	SAND, overlying Limestone
TP10	2.4	-	2.3	Test pit collapse	
TP11	1.8	0.6	1.8	Refusal on limestone	FILL, SAND; overlying SAND, overlying limestone
TP12	0.7	0.1		Target depth	FILL, SAND; overlying SAND
TP13	2.0	0.8		Target depth	
TP14	2.5	-		Target depth	SAND, overlying Limestone
TP15	2.4	-		Target depth	
TP16	2.3	-		Refusal on limestone	
HA01	0.8	-		Target depth	SAND
HA02	0.7	-		Target depth	
HA03	0.6	-		Target depth	

Notes:

[1] Depth at which limestone was first encountered. Limestone is typically in the form of pinnacles.

[2.] The term "limestone" as used in the report refers to a carbonate cemented rock and does not infer a specific rock strength, carbonate content, grain size, etc.

[3] NE – Not Encountered

Test Pits

Test pits were excavated using a 6 tonne John Deere 310D tractor mounted backhoe equipped with a 600 mm wide toothed bucked supplied and operated by Eddie's Backhoe Hire. Test pit reports are presented in Appendix B, Test Pit Reports along with a method of soil description and a list of explanatory notes and abbreviations used in the reports. Test pit photographs are included for selected test pits.

Hand Auger Boreholes

Hand auger borehole reports are presented in Appendix C, Hand Auger Borehole Reports. The method of soil description used in the reports is included in Appendix B.

Penetrometer Tests

Perth sand penetrometer (PSP) tests were conducted in accordance with AS 1289.6.3.3 although to a greater depth than the 0.45 m covered in the standard. The results of the penetrometer tests are presented in Appendix D, Perth Sand Penetrometer Test Results. Blow counts are reported per 150 mm increment.

Permeability Testing

The permeability testing was undertaken using the inverse auger hole method described by Cocks[1]. The results of the permeability testing are presented in Appendix E, Permeability Test Results and the results are summarised in Table 2.

Table 2: Summary of Permeability Test Results

Test Number	Test Location	Soil Description	Test Depth (m)	Minimum Unsaturated Permeability[1], k (m/day)		
				Test 1	Test 2	Test 3
P1	HA01	SAND	0.8	31	> 50	> 50
P2	HA02	SAND	0.7	17	14	17
P3	HA03	SAND	0.6	> 50	> 50	> 50

Note: 1 – The minimum unsaturated permeabilities were typically measured near the end of the test, with head typically varying between 0 m (dry) and 0.6 m.

Environmental Soil Sampling

Soil samples for the preliminary environmental assessment were collected from the former market gardening area in accordance with Australian Standard 4482.1 (2005) *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Non Volatile and Semi Volatile Compounds*.

Samples were collected at the surface and at 0.3m using dedicated nitrile gloves and placed in laboratory supplied glass jars. The samples were then placed in an ice chilled cooler until submission to the laboratory for analysis.

5. ENVIRONMENTAL LABORATORY TESTING

Soil samples collected from the surface were analysed by Eurofins in their national association of testing agencies (NATA) accredited laboratory for the following contaminants of potential concern (COPC) commonly associated with market gardening activities;

- heavy metals; and
- organochlorine and organophosphate (OC/OP) pesticides.

All laboratory analysis was undertaken using NATA-accredited methods of analysis. Laboratory test results are presented in Appendix F, Environmental Laboratory Certificates. The environmental test results are discussed in Section 8.2

[1] Cocks, G (2007), "Disposal of Stormwater Runoff by Soakage in Perth Western Australia", Journal and News of the Australian Geomechanics Society, Volume 42 No. 3, pp 101-114

6. SITE CONDITIONS

6.1 Geology

The Rockingham sheet of the 1:50,000 scale Environmental Geology series map indicates that the area is underlain by sand derived from Tamala limestone. The sand is described as *"SAND – pale yellowish brown, medium to coarse grained, sub-angular to well-rounded quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin"*.

The geological mapping shows limestone outcrop about 100 m to the north west of the site, and peaty clay about 100 m to the south west of the site.

The findings of the site investigation are consistent with the geological mapping, with typically a thin layer of sand present over limestone. No peaty soils were encountered at the test locations on the site.

6.2 Subsurface Conditions

The subsurface conditions are broadly consistent across the site. The typical soil profile from the supplied information and the current investigation can be summarised as:

- SAND (SP): medium to coarse grained, sub-angular to sub-rounded, brown becoming yellow with depth, trace limestone cobbles and gravel, typically loose to dense, present from surface to depth of between 1.0 m extending to the maximum depth investigation (2.5 m); overlying
- LIMESTONE, present below the sand layer, rockhead varying from depths between about 1.0 m and more than the maximum depth of investigation (2.5 m).

The topsoil across the site is typically about 100 mm thick, but this increases to about 500 mm thick across the former market garden area (refer to Figure 1).

The north western quarter of the site (in the location of the existing residence) has a layer of FILL overlying the natural sands. This material can be described as:

- FILL, SAND (SP): fine to coarse grained, sub-angular to sub-rounded, pale yellow/brown, trace gravel (brick and limestone fragments), trace organics, trace fines, present from surface to depth of between 0.1 m and 1.0 m.

Several test pits encountered limestone pinnacles within the excavation. Although limestone was typically encountered below 1.0 m depth, it is possible that the limestone is present at shallower depths on the site (due to the undulating nature of pinnacles). We would, however, expect any rock encountered within the top 1 m to be localised, and likely to be excavatable with the use of an excavator and rock breaker attachment.

6.3 Groundwater

The Perth Groundwater Atlas (1997) does not extend to the site, but nearby data suggests that the maximum historical groundwater level at the site would be around RL 4 m AHD. This is between about 1 m and 3 m below the current ground surface.

7. GEOTECHNICAL ASSESSMENT

7.1 Site Classification

We consider the site geotechnically capable of supporting the proposed development.

We have assessed the site in accordance with AS2870 (2011) "Residential Slabs and Footings". We consider that a site classification of "Class A" would be appropriate provided that normal site preparation as presented in Section 7.3 is undertaken prior to construction.

7.2 Site Subsoil Class

We have assessed the site subsoil class in accordance with AS1170.4-2007, "Earthquake Design Actions – Australia". We consider that a site subsoil class of 'Ce' is appropriate for the site.

7.3 Site Preparation

The site preparation measures outlined below are aimed at preparation of the site prior to construction of buildings and pavement subgrades. Landscaped areas (if any) will not require this preparation. The site preparation procedures provided below have been prepared on the basis of improving the density of the loose to medium dense zone.

The following site preparation measures must be followed:

- Remove any deleterious material from site including surficial rubbish, existing structures and buried services, soak-wells, etc.
- Strip and stockpile topsoil from across the entire site (including market garden area) for potential re-use in non-structural applications or for possible blending with clean sand (only a thin layer of topsoil was noted at the time of our investigation over the majority of the site). Topsoil strip is only necessary to remove roots. We recommend a 100 mm topsoil strip or as otherwise necessary to remove all roots from the soil. The topsoil can potentially be screened and blended with clean sand and re-used as structural fill.
- Excavate to the required level, if required.
- Rip areas of shallow limestone to at least 1.0 m below finished level (this is intended to produce a relatively excavatable soil mass within the upper 1.0 m at the site for installation of footings and buried services – if a greater depth is required, the depth of ripping may need to be increased). It may be necessary to engage us to inspect the site and conduct additional shallow test pitting to assess the presence of shallow limestone in uncertain areas.
- Remove any oversize boulders (>200 mm) not responding to ripping or compaction.
- Proof compact the exposed sandy ground to achieve the level of compaction specified in Section 7.4 to a depth of at least 0.9 m below the compacted surface – any areas of loose sand or unsuitable material must be removed and replaced with approved fill.
- Fill to the proposed design surface level using approved fill (refer Section 7.5), placed and compacted (refer Section 7.4) in layers of no greater than 300 mm loose thickness.
- Compact the footing bases to achieve the required level of compaction to a depth of at least 0.9 m below the footing base – any areas of loose sand or unsuitable material must be removed and replaced with approved fill.

Note: The topsoil layer (identifiable as the brown sand, as compared with underlying natural yellow sand) at the location of the former market gardens is up to about 500 mm thick, however rootlets were typically only present in the top 100 mm. We consider that the topsoil present below 0.1 m depth can potentially be re-used as structural fill without the need for screening or blending, however permeability testing of a trial pad of the material must be conducted prior to its use. Where permeability testing is not conducted, the full thickness of the material (0.5 m) must be stripped for re-use in non-structural areas or removed offsite.

7.4 Compaction

Approved granular fill and the *in situ* sands must be compacted using suitable compaction equipment to achieve a dry density ratio of at least 95% MMDD (maximum modified dry density) as determined in accordance with AS 1289 5.2.1.

Where sand is used as fill and the Perth sand penetrometer (PSP) is used for compaction control, the following PSP blow counts may be assumed to correlate to the required dry density ratio of 95% MMDD:

- Depth range 0.15 m to 0.45 m 8 blows
- Depth range 0.45 m to 0.75 m 10 blows
- Depth range 0.75 m to 1.05 m 12 blows (or 0.75 m to 0.9 m: 6 blows).

If difficulties are experienced in achieving the required blow count, an on-site PSP calibration should be undertaken to determine the site-specific blow count correlating to the required dry density ratio.

Over-excavation and replacement of loose materials must be done where the minimum dry density ratio cannot be achieved.

Fill must be placed in horizontal layers of not greater than 0.3 m loose thickness. Each layer must be compacted by suitable compaction equipment, and carefully controlled to ensure even compaction over the full area and depth of each layer.

Care will need to be taken when compacting in the vicinity of existing services. This is particularly important if vibratory compaction is being carried out. Tynan (1973)[2] provides assistance with the selection of compaction equipment for use adjacent to structures and services. Of particular concern are adjacent existing services.

TESTING

After compaction, verify that the required level of compaction has been achieved by testing at the base of excavation and through the full depth of any fill and to a minimum depth of 0.9 m below foundations:

- on each lift of fill at the rate of 1 test per 500 m^3;
- at each spread footing location;
- at 7.5 m centres below on-ground slabs;
- at 10 m centres along gravity retaining wall footings and strip footings (where present); and
- at 10 m centres on pavement subgrades (on the road centreline or on a grid below car parks).

7.5 Approved Fill

Imported granular fill must comply with the material requirements as stated in AS 3798-2007, "Guidelines on Earthworks for Commercial and Residential Developments".

[2] Tynan (1973) Ground Vibration and Damage Effects on Buildings, Australia Road Research Board, Special Report No. 11.

The sand (including the sand fill) present at the site will be suitable for re-use as inert structural fill. Any organic-rich sand or sand containing significant proportions of fines (material less than 0.075 mm in size) must not be used.

Organic rich material (i.e. topsoil) may be considered for re-used as structural fill provided that it is screened and blended with clean sand such that the total organic content is less than 2% and the fines content is less than 5%. Due to the lower permeability of such blends, permeability testing must be undertaken on a trial pad of the blended material to assess its design permeability prior to use as structural fill. We can provide further assistance with this if required.

Where doubt exists, a geotechnical engineer must be engaged to inspect and approve the use of potential fill materials.

7.6 Excavation

We expect that excavations on site to about 1.0 m through the sand will be readily achievable using conventional earthmoving equipment (i.e. with a 5 tonne or larger excavator). Localised areas of shallower limestone may be present. However, the depth to limestone is expected to be at greater than 1 m depth below the existing surface. Excavation of any limestone may require the use of a larger excavator (20 tonne) and rock breaker.

Excavations below 2 m depth are expected to encounter massive limestone and are likely to require the use of a larger excavator (20 tonne) and rock breaker. Ripping prior to excavation is also likely to be required, e.g. with a large (D9 or D10) bulldozer with a single tine ripper.

Excavations in sand are particularly prone to instability unless support is provided. Care must be exercised in such excavations and appropriate safety measures adopted where necessary. Where possible excavations must be battered at slopes no steeper than 1V:2H for temporary slopes and 1V:3H for permanent slopes above the groundwater table. Even at these slope angles erosion and rilling may occur.

A geotechnical engineer must be consulted where there is any doubt regarding the stability or safety of unsupported excavations.

7.7 Retaining Structures

Retaining structures may be designed in accordance with AS 4678-2002 “Earth-Retaining Structures”. For the design of retaining structures, the parameters in Table 3 are appropriate.

Table 3: Retaining Structures Design Parameters

Soil Type	Bulk Density (t/m^3)	Angle of Internal Friction (deg.)	Wall Friction = 0°		Wall Friction = 0.5Φ	
			Coefficient of Active Earth Pressure, K_a	Coefficient of Passive Earth Pressure, K_p	Coefficient of Active Earth Pressure, K_a	Coefficient of Passive Earth Pressure, K_p
Medium dense sand	17	34	0.28	3.5	0.25	5.7
Dense or well compacted sand	18	36	0.26	3.9	0.22	6.5

Notes: Earth pressure coefficients are provided in this table for conditions of zero friction between the wall and the soil and with wall friction of 0.5Φ’. The retaining wall designer should make an independent assessment of the parameters appropriate to the construction method to be used, including alternative values of wall friction. A horizontal ground surface behind the wall has been assumed.

Compaction plant can augment the lateral earth pressure acting on retaining walls. Hand operated compaction equipment is recommended within 2 m of any retaining walls to minimise compaction pressures.

It is important to note that some ground movement will occur behind any soil retaining system, including gravity retaining walls.

Retaining walls can move and rotate under imposed soil loading resulting in settlement behind the wall. This must be considered during the design and construction of the retaining walls in order that adjacent properties are not adversely affected. Particular care should be exercised when forming excavations so as not to affect neighbouring properties. Account must be taken of the effect of both temporary and permanent works on neighbouring properties. Anchoring or strutting of retaining walls may be required.

Detailed design of retaining structures should be undertaken using methods appropriate to the proposed retention system.

7.8 Shallow Footings

The structure may be founded on shallow spread footings placed within the sand which occurs from surface, provided the site preparation recommendations outlined in Section 7.3 are followed. Table 4 and Table 5 give allowable bearing pressures and estimated settlements for pad footings and strip footings at an embedment depth of at least 0.5 m.

Table 4: Pad Footing Allowable Bearing Pressures and Estimated Settlements

Min. Footing Embedment (m)	Minimum Footing Dimension (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	0.5	150	<5
	1.0	200	<5
	1.5	225	5 - 10
	2.0	250	10 - 15
1.0	0.5	200	<5
	1.0	250	<5
	1.5	250	5 - 10
	2.0	250	10 - 15

Table 5: Strip Footing Allowable Bearing Pressures and Estimated Settlements

Min. Footing Embedment (m)	Minimum Footing Dimension (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	0.5	150	< 5
	1.0	180	5 - 10
	1.5	220	15 - 20
	2.0	250	20 - 25
1.0	0.5	200	5 - 10
	1.0	250	10 - 15
	1.5	250	15 - 20
	2.0	250	20 - 25

Allowable bearing pressures for footings of intermediate plan dimensions to those tabulated can be interpolated. Footings that have a plan dimension either smaller or larger than those covered by the tables above will need to be considered individually along with other embedment depths. Footings carrying significant eccentric loading must be assessed separately.

The settlement of the proposed structure will depend upon a number of factors including the applied pressures, footing size and base preparation. The estimates of settlement provided above assume that the site preparation measures detailed in Section 7.3 have been completed. The estimated settlements are for the working bearing pressure values shown. Differential settlements of up to half of the total estimated settlement values are likely between footings of similar sizes, loads and elevations. About 70% of the settlement is expected to occur during construction.

7.9 Pavement Thickness Design

Where design of flexible pavements is undertaken, a subgrade California bearing ratio (CBR) of 12% may be assumed for pavement thickness design. This CBR assumes that the site preparation requirements outlined in Section 7.3 have been carried out in pavement subgrade areas.

7.10 Stormwater Disposal

The results of infiltration tests carried out are included in Appendix D, Permeability Test Results. The minimum measured permeability are as follows:

- P1 – 31 m/day
- P2 – 14 m/day
- P3 - >50 m/day

We consider that the natural and fill sands at the site are suitable for the disposal of stormwater by infiltration by means of soak wells. For preliminary design, we recommend a design value of permeability (k) not greater than 5 m/day for the *in situ* sand below 1 m to allow for the variability in materials and reduced permeability as a consequence of:

- densification of sand during site preparation works;
- natural variation in sands; and
- clogging of the sand around soak wells over time with fines.

Soak wells should be placed outside a line of 1V:2H extending below the edge of the nearest footing subject to local council regulations. Discharge from soak wells has been known to promote densification of loose sandy soils, leading to settlements of footings and slabs. Soak wells should be carefully wrapped with geotextile to prevent migration of sand and fines into the soak well.

The topsoil layer present at the location of the former market gardens (present from surface to 0.5 m) is likely to have a lower permeability than the design value presented above due to a higher fines content. We consider that the topsoil present below 0.1 m depth can potentially be re-used as structural fill without the need for screening or blending, however permeability testing of a trial pad (at least 1 m thick) must be conducted prior to its re-use to assess the design permeability is within the acceptable limits.

We note that limestone is present at shallow depth (locally within 1 m of the ground surface), which may hinder drainage from the site. Some moderately to well cemented limestone can be relatively impermeable. This must be taken into account when undertaking the civil design. Some suggestions are:

- raising site surface levels with sand fill where limestone is relatively shallow (but cutting from areas of the site with more sand);
- ripping the limestone to a greater depth to ensure it is broken up and more permeable (we suggest that in-situ large scale permeability testing be done if there is a reliance on this); or
- off-site disposal of stormwater (probably not necessary, but a logical extension of not relying on on-site disposal into limestone).

8. ENVIRONMENTAL ASSESSMENT

8.1 Desktop Assessment

8.1.1 Acid Sulfate Soils

The Department of Environment Regulation (DER) on-line risk-mapping database of ASS shows the site as having no known risk of ASS occurrence at depths less than 3 m. The nearest high risk area is located approximately 50 m to the south west of the site. The DER ASS risk mapping is shown in Figure 2.

8.1.2 Geomorphic Wetlands

The Department of Parks and Wildlife (DPaW) geomorphic wetlands database indicates that there are no wetlands located on the site. The nearest conservation category wetland (Opwin Swamp Dampland #6400) is located approximately 600 m to the south west of the site. The location of geomorphic wetlands are shown on Figure 2.

8.1.3 Environmentally Sensitive Areas

There are no environmental sensitive areas (ESAs) mapped as existing on the site. The nearest ESA is located approximately 200 m to the south west of the site and is associated with the Opwin Swamp Dampland. The location of ESAs are shown on Figure 2.

8.1.4 Historical Aerial Photographs

A summary of the site features visible in the available historical aerial photographs are presented in Table 6 with the historical aerial photographs presented in Figures 3a to 3d.

Table 6: Current and Historical Aerial Photographs

Year	Site Features	Surrounding Land Use
1953	The whole site is cleared.	The surrounding area is cleared
1965	Evidence of a market gardening occurring to the southern portion of the site, A building is also noted south of the site, in the middle of the site and north of the site.	No change.
1974	Vegetation to the north of the site has been cleared.	A road is noted to the east of the site. Buildings are noted to the north of the site.
1979	No change.	No change.
1981	No change.	No change.
1985	No change.	No change.

Year	Site Features	Surrounding Land Use
1995	No change.	No change.
2006	A smaller building is noted to the west of the site.	No change.
2008	An additional building is noted in the north west corner of the site.	No change.
Current	No change.	No change.

8.1.5 Contaminated Sites Database

The publicly available DER contaminated sites database was searched for known contaminated sites (sites classified as *Contaminated-restricted use*, *Remediated for restricted use* or *Contaminated-remediation required*) in proximity to the site. The site is not listed as a contaminated site. The nearest site classified as *Remediated for Restricted Use* and is located approximately 350 m east of the site.

8.1.6 Heritage

The Aboriginal Heritage Act 1972 is the Western Australian legislation in place to protect places and objects customarily used by or traditional to, the original inhabitants of Australia. Such places and objects are maintained in a register under the Act; however, all sites are protected under the Act whether or not they have been registered.

A search of the Aboriginal Heritage database shows that there are no heritage sites located within a 500 m radius of the site. Heritage sites are shown in Figure 2.

European heritage is also protected and a search of the Heritage Council of Western Australia (HCWA) database of culturally significant sites in Western Australia was undertaken for the area. No European heritage sites were found at or nearby the site (HCWA, 2015).

8.2 Detailed Site Inspection

A detailed site inspection was undertaken by a representative of Galt on 20 April 2015. The following observations were made:

- The site contains a house, three sheds, a caravan, miscellaneous building material and farm equipment.
- There was no evidence of hazardous chemical storage or spills on the site.
- No asbestos containing material (ACM) was identified within any of the building material or farm equipment.
- There was no evidence of plant stress that would indicate potential contamination.

We note that our inspection did not include a detailed assessment of the materials used in the construction of the onsite buildings. As such, no assessment can be made on the presence of hazardous material present within these buildings.

8.3 Contamination Testing Results

Soil concentrations were compared with the following criteria adopted from the National Environmental Protection Council (NEPC) (2013) *National Environmental Protection (Assessment of Site Contamination) Measure* guideline document.

- Ecological investigation levels (EIL)
- Health investigation levels – Residential (HIL-A)

In order to obtain site-specific EIL values, soil pH values were recorded for each sample. Given the preliminary nature of the assessment, the most conservative EIL for zinc, copper, lead nickel and chromium using the relevant soil pH has been adopted.

Soil analytical results are presented in Table 7 and Table 8 and are discussed below.

- Metal concentrations were below the laboratory LOR and/or conformed to the adopted criteria.
- Concentrations of all OC/OP pesticides were below the laboratory LOR and/or conformed to the adopted criteria.

Table 7: Soil Analysis Results – Metals

	Soil pH	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Assessment Criteria								
HIL-A	-	100	20	100	6000	300	400	7400
Site Specific EIL[3]	-	100	-	190	280	1100	30	230
Sample ID								
SS01/0.0	6.3	3.4	<0.4	15	14	5.6	<5	38
SS02/0.0	6.8	2.8	<0.4	15	19	6.9	<5	68
SS03/0.0	6.6	2.7	<0.4	16	19	6.8	<5	50
SS04/0.0	6.5	2.3	<0.4	16	17	6.0	<5	42
SS05/0.0	6.3	4.4	<0.4	15	16	6.4	<5	43
SS06/0.0	6.4	3.7	<0.4	15	17	6.8	<5	42
SS07/0.00	6.5	2.9	<0.4	16	19	6.3	<5	41
SS08/0.0	6.8	2.3	<0.4	17	26	6.9	<5	51
SS09/0.0	6.4	4.1	<0.4	19	32	8.2	<5	110
SS10/0.0	6.4	4.7	<0.4	19	<5	<5	<5	<5

[3] EIL value calculated in accordance with NEPM 2013 guideline using soil pH value of 6.0

Table 8: Soil Analysis Results – Pesticides

	DDT+DDE+DDD	Aldrin and Dieldrin	Chlordane	Heptachlor	Endrin	Methoxychlor	Toxaphene	Chlorpyrifos
HIL-A	240	6	50	270	10	300	20	160
Sample ID								
SS01/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS02/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS03/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS04/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS05/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS06/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS07/0.00	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS08/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS09/0.0	<0.05	0.07	<0.1	<0.05	<0.05	<0.05	<1	<0.2
SS10/0.0	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<1	<0.2

8.4 Summary

Based on the results of the desktop environmental assessment, we consider that there are unlikely to be any significant environmental aspects that will adversely impact on the proposed development. Furthermore, the contamination testing results indicate that is it unlikely that soils within the area of the site formally used for market gardening activities has been impacted by COPC at concentrations that would represent a risk to human health or the environment.

We note our preliminary contamination testing did not include an assessment of groundwater quality at the site. As such, no comment can be made on the suitability of groundwater at the site for irrigation or drinking water purposes.

9. CLOSURE

We would like to draw your attention to Appendix G of this report, "Understanding your Report". The information provided within is intended to inform you as to what your realistic expectations of this report should be. Guidance is also provided on how to minimise risks associated with groundworks for this project. This information is provided not to reduce the level of responsibility accepted by Galt, but to ensure that all parties who rely on this report are aware of the responsibilities each assumes in so doing.

GALT GEOTECHNICS PTY LTD

Owen Woodland CPEng

Geotechnical Engineer

Brad Palmer

Environmental Scientist

O:\Jobs\2015\J1501070 - PF SI McDonald Rd Baldivis\03 Correspondence\J1501070 001 R Rev0.docx

Figures

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2/39 Flynn St, WEMBLEY WA 6014

ABN: 73 292 586 155

Legend

- Site Boundary
- Former Market Garden Area
- Hand Auger Borehole / Permeability Test
- Perth Sand Penetrometer
- Soil Sample
- Test Pit

NOTES: Concept plan of subdivision from The Planning Group WA Pty Ltd, Drawing no. 715-377 CP-01A, dated 17 Feb 2015

N

0 10 20 30 40 50
Meters

SCALE	1:750	(A3)
DRAWN	DAC	
DATE DRAWN	30/04/2015	
CHECKED	PCW	
DATE CHECKED	30/04/2015	
PROJECTION	GDA 1994 MGA Zone 50	

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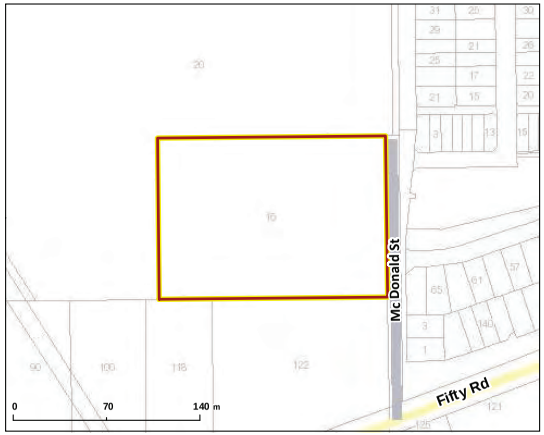
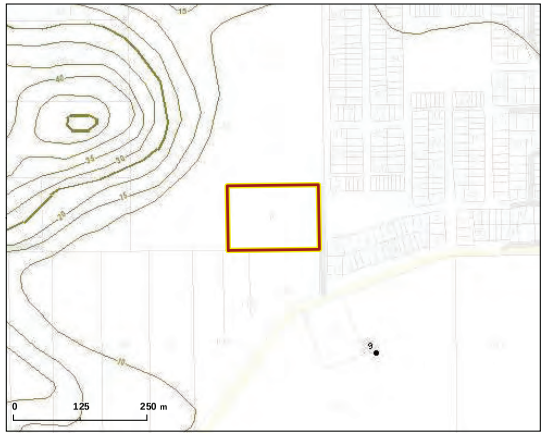
CLIENT	**PRITCHARD FRANCIS**
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	SITE & LOCATION PLAN
Job No	J1501070
Fig No	FIGURE 1
Rev	A

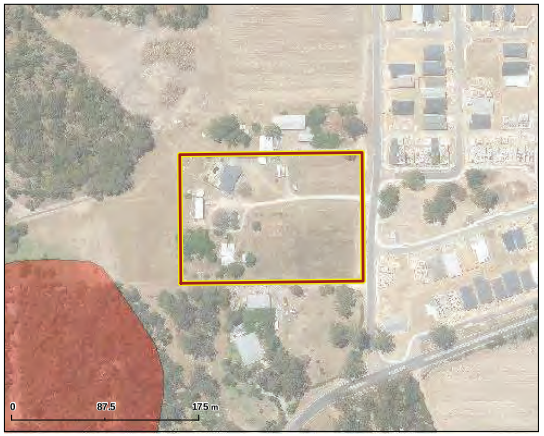
MAP 1 - AERIAL



MAP 2 - STREET



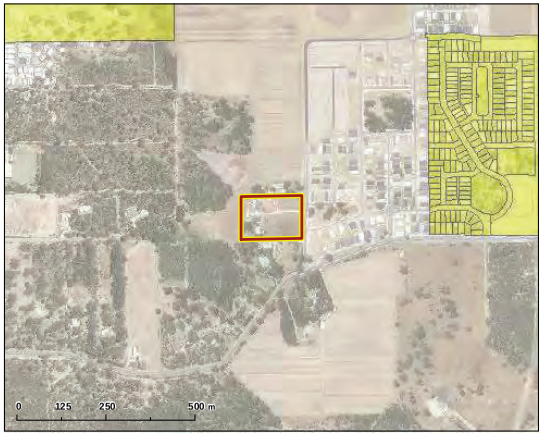
MAP 3 - CONTOURS



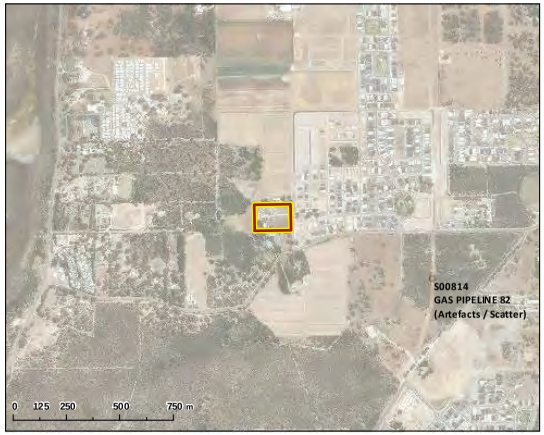
MAP 4 - ACID SULFATE SOIL RISK

MAP 5 - ENVIRONMENTALLY SENSITIVE AREAS

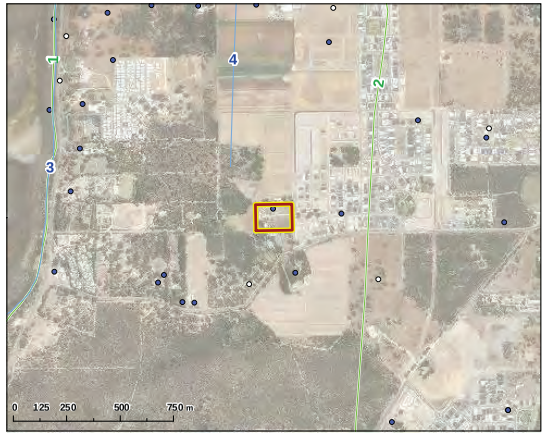
MAP 6 - GEOMORPHIC WETLANDS



MAP 7 - CONTAMINATED SITES



MAP 8 - HERITAGE SITES



MAP 9 - GROUNDWATER CONTOURS AND WINSITES

MAP 4 - ACID SULFATE SOIL RISK

High to moderate risk
Moderate to low risk

MAP 5 - ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Area

MAP 6 - GEOMORPHIC WETLANDS

Multiple Use
Conservation
Not Applicable
Resource Enhancement
Not Assessed

MAP 7 - CONTAMINATED SITES

Contaminated - remediation required
Remediated for restricted use
Contaminated - restricted use

Contaminated sites information is taken from the publicly availably Department of Environment Regulation (DER) Contaminated Sites Database. Only sites classified as 'Contaminated – remediation required', 'Contaminated – restricted use' and 'Remediated – restricted use' are shown. Sites with other classifications under the Contaminated Sites Act 2003 are identified through a basic or detailed summary of records search request though DER.

MAP 8 - HERITAGE SITES

Heritage Site

MAP 9 - GROUNDWATER CONTOURS AND WINSITES

Maximum	Minimum	WINSITES
5	5	Ground, Borehole or Well
1	1	Other

N

0 30 60 90 120 150
Meters

SCALE	1:2,000 (A3)
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DATE CHECKED	30/04/2015
PROJECTION	GDA 1994 MGA Zone 50

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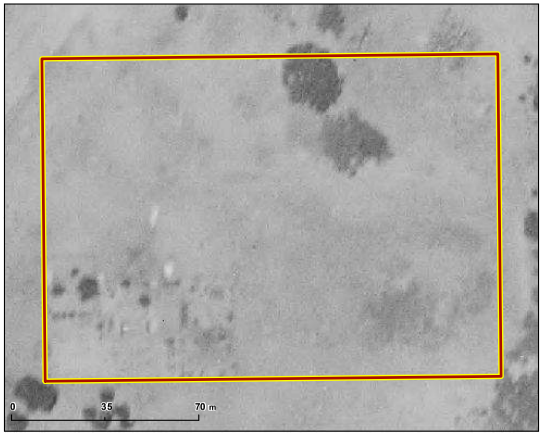
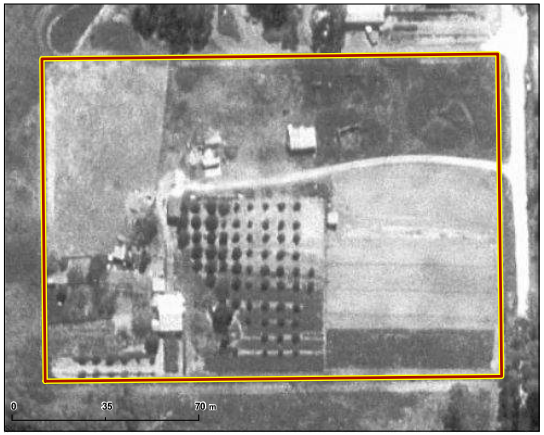
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	INDICATIVE ENVIRONMENTAL ASPECTS
Job No	J1501070
Fig No	FIGURE 2
Rev	A



MAP 1 - 1953

MAP 2 - 1965



MAP 3 - 1974

MAP 4 - 1979

MAP 5 - 1981

MAP 6 - 1985

MAP 7 - 1995

MAP 8 - 2000

MAP 9 - 2001

Legend

N

0 30 60 90 120 150

Meters

SCALE	1:2,000	(A3)
DRAWN	DAC	
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CLIENT	PRITCHARD FRANCIS
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	HISTORICAL AERIAL IMAGERY (1953 - 2001)
Job No	J1501070
Fig No	FIGURE 3A
Rev	A

MAP 10 - 2002

MAP 11 - 2003

MAP 12 - 2004

MAP 13 - 2005

MAP 14 - 2006

MAP 15 - 2007

MAP 16 - 2008

MAP 17 - 2009

MAP 18 - 2010

N

0 240 480 720 960 1200

Meters

SCALE	1:2,000	(A3)
DRAWN	DAC	
DATE DRAWN	30/04/2015	
CHECKED	SS	
DATE CHECKED	30/04/2015	
PROJECTION	GDA 1994 MGA Zone 50	

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CLIENT	PRITCHARD FRANCIS
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	HISTORICAL AERIAL IMAGERY (2002 - 2010)
Job No	J1501070
Fig No	FIGURE 3B
Rev	A

MAP 19 - 2011(March)

MAP 20 - 2011(August)

MAP 21 - 2012(February)

MAP 22 - 2012(September)

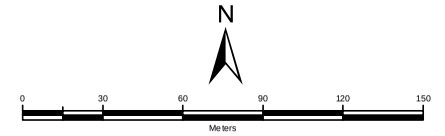
MAP 23 - 2013(January)

MAP 24 - 2013(September)

MAP 25 - 2014(February)

MAP 26 - 2014(May)

MAP 27 - 2014(August)



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DATE CHECKED	30/04/2015	
PROJECTION	GDA 1994 MGA Zone 50	

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PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	HISTORICAL AERIAL IMAGERY (2011(MARCH) - 2014(AUGUST))

Job No	Fig No	Rev
J1501070	FIGURE 3C	A

MAP 28 - 2014(November)

N

0 30 60 90 120 150

Meters

SCALE	1:2,000	(A3)
DRAWN	DAC	
DATE DRAWN	30/04/2015	
CHECKED	SS	
DATE CHECKED	30/04/2015	
PROJECTION	GDA 1994 MGA Zone 50	

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CLIENT	**PRITCHARD FRANCIS**
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	HISTORICAL AERIAL IMAGERY (2014(NOVEMBER) - ONWARDS)

Job No	Fig No	Rev
J1501070	FIGURE 3D	**A**

Appendix A: Site Photographs

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2/39 Flynn St, WEMBLEY WA 6014

ABN: 73 292 586 155

Photograph 1: At TP05 facing south, facing towards a former market garden

Photograph 2: At TP10 facing north

Photograph 3: At TP02 facing south

Photograph 4: At TP04 facing west, note the higher elevation at TP04 compared to the western land

Photograph 5: At TP08 facing west

Photograph 6: Current development located nearby the site at the corner of McDonald Road and Fifty Road. Note the presence of shallow massive limestone

Appendix B: Test Pit Reports

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ABN: 73 292 586 155

METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

GRAPHIC LOG & UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) SYMBOLS

Graphic	USCS	Soil Name
		FILL (various types)
		COBBLES
		BOULDERS
	GP	GRAVEL (poorly graded)
	GW	GRAVEL (well graded)
	GC	Clayey GRAVEL
	SP	SAND (poorly graded)
	SW	SAND (well graded)
	SC	Clayey SAND

Graphic	USCS	Soil Name
	SM	Silty SAND
	ML	SILT (low liquid limit)
	MH	SILT (high liquid limit)
	CL	CLAY (low plasticity)
	CI	CLAY (medium plasticity)
	CH	CLAY (high plasticity)
	OL	Organic SILT (low liquid limit)
	OH	Organic SILT (high liquid limit)
	Pt	PEAT

RESISTANCE TO EXCAVATION

Symbol	Term	Description
VE	Very easy	All resistances are relative to the selected method of excavation
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

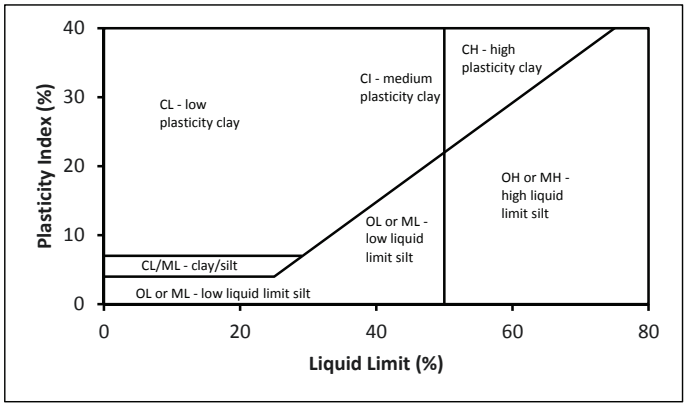
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil descriptions are based on AS1726-1993, Appendix A. Material properties are assessed in the field by visual/tactile methods in combination with field testing techniques (where used).

PARTICLE SIZE

Soil Name		Particle Size (mm)
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	20 to 63
	Medium	6 to 20
	Fine	2 to 6
SAND	Coarse	0.6 to 2.0
	Medium	0.2 to 0.6
	Fine	0.075 to 0.2
FINES	SILT	0.002 to 0.075
	CLAY	<0.002

PLASTICITY PROPERTIES



MOISTURE CONDITION

AS1726-1993

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays and silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition and may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

CONSISTENCY AND DENSITY

AS1726-1993 and HB160-2006

Symbol	Term	Undrained Shear Strength (kPa)	SPT "N"	DCP blows per 100 mm
VS	Very Soft	0 to 12	0 to 2	<1
S	Soft	12 to 25	2 to 4	<1
F	Firm	25 to 50	4 to 8	1 to 2
St	Stiff	50 to 100	8 to 15	3 to 4
VSt	Very Stiff	100 to 200	15 to 30	5 to 10
H	Hard	>200	>30	>10

Symbol	Term	Density Index (%)	SPT "N"	DCP blows per 100 mm	PSP Blows per 300 mm
VL	Very Loose	<15	0 to 4	<1	0 to 2
L	Loose	15 to 35	4 to 10	1 to 2	2 to 6
MD	Medium Dense	35 to 65	10 to 30	2 to 3	6 to 8
D	Dense	65 to 85	30 to 50	4 to 8	8 to 15
VD	Very Dense	>85	>50	>8	>15

Note: PSP correlations only valid to 450 mm depth

Consistency and density may also be inferred from excavation performance and material behaviour.

EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

METHOD OF DRILLING OR EXCAVATION

AC	Air Core	E	Excavator	PQ3	PQ3 Core Barrel
AD/T	Auger Drilling with TC-Bit	EH	Excavator with Hammer	PT	Push Tube
AD/V	Auger Drilling with V-Bit	HA	Hand Auger	R	Ripper
AT	Air Track	HMLC	HMLC Core Barrel	RR	Rock Roller
B	Bulldozer Blade	HQ3	HQ3 Core Barrel	SON	Sonic Rig
BH	Backhoe Bucket	N	Natural Exposure	SPT	Driven SPT
CT	Cable Tool	NMLC	NMLC Core Barrel	WB	Washbore
DT	Diatube	PP	Push Probe	X	Existing Excavation

SUPPORT

T	Timbering

PENETRATION EFFORT (RELATIVE TO THE EQUIPMENT USED)

VE	Very Easy	E	Easy	F	Firm
H	Hard	VH	Very Hard		

WATER

►	Water Inflow	▼	Water Level
◄	Water Loss (complete)		
◁	Water Loss (partial)		

SAMPLING AND TESTING

B	Bulk Disturbed Sample	P	Piston Sample
BLK	Block Sample	PBT	Plate Bearing Test
C	Core Sample	U	Undisturbed Push-in Sample
CBR	CBR Mould Sample		U50: 50 mm diameter
D	Small Disturbed Sample	SPT	Standard Penetration Test
ES	Environmental Soil Sample		Example: 3, 4, 5 N=9
EW	Environmental Water Sample		3,4,5: Blows per 150 mm
G	Gas Sample		N=9: Blows per 300 mm after
HP	Hand Penetrometer		150 mm seating interval
LB	Large Bulk Disturbed Sample	VS	Vane Shear; P = Peak
M	Mazier Type Sample		R = Remoulded (kPa)
MC	Moisture Content Sample	W	Water Sample

ROCK CORE RECOVERY

TCR = Total Core Recovery (%) $= \frac{CRL}{TCL} \times 100$

SCR = Solid Core Recovery (%) $= \frac{CCR}{TCL} \times 100$

RQD = Rock Quality Designation (%) $= \frac{ALC>100}{TCL} \times 100$

TCL	Length of Core Run
CRL	Recovered Length of Core
CCR	Total Length of Cylindrical Pieces of Core Recovered
ALC>100	Total Length of Axial Lengths of Core Greater than 100 mm Long

TEST PIT: TP01

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387816 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424917 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	M	L	Topsoil and rootlets in top 100 mm
			0.5										
			1.0								D	L - MD	
			1.5										
			2.0							Trace gravel and cobbles comprising limestone			Limestone outcrop at 1.9 m comprising approximately 30% of test pit face
			2.5							Hole terminated at 2.50 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB | Log GG_EXCAVATION_J1501070.GPJ <<DrawingFile>> 30/04/2015 16:06 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP02

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387784 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424920 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, ~~brown~~ Yellow	M	L	
			0.5										
			1.0								D	MD	Below 1.6 m, limestone comprising approximately 30% of test pit face
			1.5							With some gravel and cobbles comprising limestone			
			2.0										
			2.5							Hole terminated at 2.20 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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TEST PIT: TP03

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387742 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424921 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, ~~brown~~ Yellow	M	L - MD	
			0.5										
			1.0								D	MD	
			1.5							Trace gravel and cobbles comprising limestone			
			2.0							With some gravel and cobbles comprising limestone			
			2.5							Hole terminated at 2.20 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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TEST PIT: TP04

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387655 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424917 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, fine grained, sub-angular to sub-rounded, pale yellow-brown, trace gravel comprising limestone and brick fragments	M	MD	
			0.5										
			1.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	D	L	
			1.5									MD	
			2.0										
			2.5							Hole terminated at 2.30 m Terminated due to test pit collapse Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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TEST PIT: TP05

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387823 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424873 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND (TOPSOIL): medium to coarse grained, sub-rounded, brown, trace organics			
			0.5							SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	M	L	
			1.0						SP				
			1.5							With some gravel and cobbles comprising limestone	D	L - MD	
			2.0							Hole terminated at 1.90 m Refusal on limestone Groundwater not encountered			
			2.5										

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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TEST PIT: TP06

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387781 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424839 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND (TOPSOIL): medium to coarse grained, sub-rounded, brown, with some organics			
			0.5						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	M	L	
			1.0							With some gravel and cobbles comprising limestone	D	L - MD	
			1.5							Hole terminated at 1.40 m Refusal on limestone Groundwater not encountered			
			2.0										
			2.5										

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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TEST PIT: TP07

Job Number:	J1501070	**Easting:**	387752 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424867 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, medium to coarse grained, sub-rounded, brown, with some organics	M	L	
			0.5						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	D	L - MD	
			1.0										
			1.5										
			2.0										
			2.5							Hole terminated at 2.50 m Terminated due to test pit collapse Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:06 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP08

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387691 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424869 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, fine grained, sub-angular to sub-rounded, pale brown	M	MD	
			0.5						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow			
			1.0							Hole terminated at 0.60 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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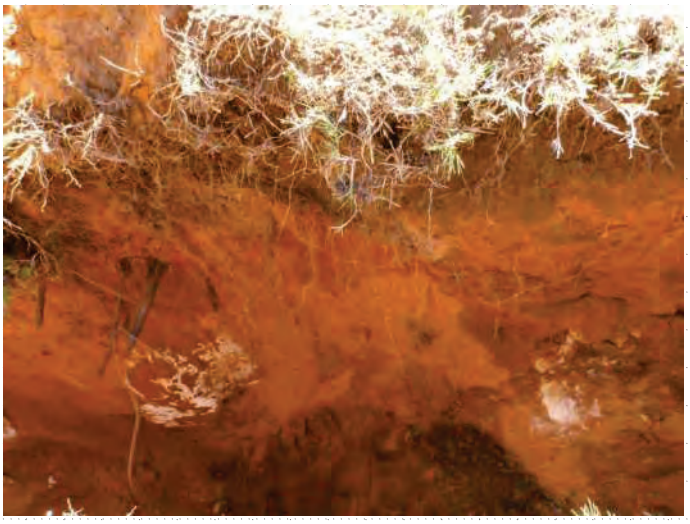
TEST PIT: TP09

Job Number:	J1501070	**Easting:**	387685 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424828 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: fine to coarse grained, sub-angular to sub-rounded, brown	M	L - MD	At 1.0 m, one limestone boulder excavated. Below 1.0 m, limestone outcrop comprising approximately 30% of test pit face.
			0.5										
			1.0							Trace gravel and cobbles comprising limestone			
			1.5										
			2.0										
			2.5							Hole terminated at 2.30 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:06 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP10

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387737 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424121 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND (TOPSOIL): medium to coarse grained, sub-rounded, brown, with some organics	M	L	
			0.5						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow			
			1.0								D	L - MD	
			1.5										
			2.0							With some gravel and cobbles comprising limestone			
			2.5							Hole terminated at 2.40 m Terminated due to test pit collapse Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:06 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP11

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387679 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424872 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, fine grained, sub-angular to sub-rounded, pale yellow-brown	M	MD	Limestone pinnacle at 1.0 m
			0.5						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	D		
			1.0										
			1.5										
			2.0							Hole terminated at 1.80 m Refusal on limestone Groundwater not encountered			
			2.5										

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP12

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387710 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424867 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, fine to coarse grained, sub-angular to sub-rounded, pale yellow, comprising limestone	M	MD	
									SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow			
			0.5										
			1.0							Hole terminated at 0.70 m Target depth Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP13

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387714 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424927 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	FILL: SAND, fine grained, sub-angular to sub-rounded, pale yellow-brown	M	L	
			0.5										
			1.0						SP	SAND: fine to coarse grained, sub-angular to sub-rounded, yellow	D	L - MD	
			1.5										
			2.0							Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5										

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP14

Job Number:	J1501070	**Easting:**	387797 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424903 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	M	L	
			0.5										
			1.0										
			1.5							With some gravel and cobbles comprising limestone	D	L - MD	At 1.5 m, limestone pinnacle
			2.0										
			2.5							Hole terminated at 2.50 m Target depth Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP15

Sheet 1 OF 1

Job Number:	J1501070	**Easting:**	387800 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424883 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, brown	M	L	
			0.5							Yellow			
			1.0							Trace gravel and cobbles comprising limestone	D	MD	At 1.0 m, limestone pinnacle At 1.7 m, limestone pinnacle
			2.0										
			2.5							Hole terminated at 2.40 m Target depth Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

TEST PIT: TP16

Job Number:	J1501070	**Easting:**	287829 m	**Contractor:**	Eddie's Backhoe	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424833 m	**Machine:**	JD 310D	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50	**Operator:**	Eddie	**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis			**Bucket:**	600 mm toothed	**Checked By:**	PCW

Excavation					Sampling			Field Material Description					
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
BH	E		0.0						SP	SAND (TOPSOIL): medium to coarse grained, sub-rounded, brown			
			0.5							SAND: medium to coarse grained, sub-angular to sub-rounded, yellow	M	L	
			1.0						SP	With some gravel and cobbles comprising limestone	D	MD	At 1.0 m, limestone pinnacle comprising approximately 30% of test pit face
			1.5										
			2.0										
			2.5							Hole terminated at 2.30 m Refusal on limestone Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 16:07 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

Appendix C: Hand Auger Borehole Reports

www.galtgeo.com.au
2/39 Flynn St, WEMBLEY WA 6014
ABN: 73 292 586 155

HAND AUGER BOREHOLE: HA01

Job Number: J1501070
Client: Pritchard Francis
Project: Proposed Residential Subdivision
Location: 16 McDonald Road, Baldivis

Easting: 387738 m
Northing: 6424898 m
Datum: MGA94 Zone 50

Operator: EY
Inclination: -90°

Date: 20/04/2015
Logged: EY
Checked Date: 30/04/2015
Checked By: PCW

Drilling					Sampling			Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, brown Yellow	M	L	
			0.5										
			1.0							Hole terminated at 0.80 m Target depth Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 13:24 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

HAND AUGER BOREHOLE: HA02

Job Number: J1501070
Client: Pritchard Francis
Project: Proposed Residential Subdivision
Location: 16 McDonald Road, Baldivis

Easting: 387806 m
Northing: 6424924 m
Datum: MGA94 Zone 50

Operator: EY
Inclination: -90°

Date: 20/04/2015
Logged: EY
Checked Date: 30/04/2015
Checked By: PCW

Drilling					Sampling			Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E		0.0						SP	SAND: medium to fine grained, sub-angular to sub-rounded, brown Yellow	M	L	
			0.5										
			1.0							Hole terminated at 0.70 m Target depth Groundwater not encountered			

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 13:24 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

HAND AUGER BOREHOLE: HA03

Job Number:	J1501070	**Easting:**	387695 m	**Operator:**	EY	**Date:**	20/04/2015
Client:	Pritchard Francis	**Northing:**	6424832 m	**Inclination:**	-90°	**Logged:**	EY
Project:	Proposed Residential Subdivision	**Datum:**	MGA94 Zone 50			**Checked Date:**	30/04/2015
Location:	16 McDonald Road, Baldivis					**Checked By:**	PCW

Drilling					Sampling			Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	ACID SULPHATE SAMPLE	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E		0.0						SP	SAND: medium to coarse grained, sub-angular to sub-rounded, brown Yellow	M	L	
			0.5										
										Hole terminated at 0.60 m Target depth Groundwater not encountered			
			1.0										

Sketch & Other Observations

Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

GALT LIB 1.01.GLB | Log GG_EXCAVATION J1501070.GPJ <<DrawingFile>> 30/04/2015 13:24 8.30.003 Datgel DGD, CPT, Photo, Monitoring Tools | Lib: GALT 1.01 2013-02-21 Prj: GALT 1.01 2013-02-21

Appendix D: Perth Sand Penetrometer Results

www.galtgeo.com.au
2/39 Flynn St, WEMBLEY WA 6014
ABN: 73 292 586 155

PERTH SAND PENETROMETER FIELD TEST DATA (Standard Depth 900mm)
(AS12896.3.3)

Client:	Pritchard Francis	**Job No:**	J1501070
Project:	Proposed Residential Subdivision	**Date:**	20/04/2015
Location:	16 McDonald Road, Baldivis	**Engineer:**	EY

Test No:	1	2	3	4	5	6	7	8
Location:	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08
Depth (mm)	**N° of Penetrometer Blows per 150 mm Depth Interval**							
0-150	Seat	Seat	Seat	Seat	Seat	Seat	Seat	Seat
150-300	2	2	5	5	3	2	2	7
300-450	2	1	5	6	3	3	2	7
450-600	3	2	4	5	3	2	1	8
600-750	2	1	5	5	4	1	2	11
750-900	2	2	5	4	3	2	1	8
900-1050	4	3	4	2	3	2	2	8
1050-1200		4	5	3				
1200-1350		5	6	6				
1350-1500		6	6	6				
1500-1650		6	5	5				
1650-1800		7	5	5				
1800-1950		8	5	4				
1950-2100		8	5	4				

Test No:	9	10	11	12	13	14	15	16
Location:	TP09	TP10	TP11	TP12	TP13	TP14	TP15	TP16
Depth (mm)	**N° of Penetrometer Blows per 150 mm Depth Interval**							
0-150	Seat	Seat	Seat	3	Seat	Seat	Seat	Seat
150-300	3	2	3	4	4	2	3	2
300-450	4	2	4	3	5	4	4	3
450-600	3	2	3	2	5	2	5	2
600-750	4	2	6	3	5	2	4	2
750-900	3	2	6	3	5	3	3	3
900-1050	3	4	4	3	5	3	4	3
1050-1200							5	
1200-1350							5	
1350-1500							6	
1500-1650							6	
1650-1800							7	
1800-1950							8	
1950-2100							8	

Test No:	17	18	19					
Location:	PSP01	PSP02	PSP03					
Depth (mm)	**N° of Penetrometer Blows per 150 mm Depth Interval**							
0-150	Seat	Seat	Seat					
150-300	3	2	2					
300-450	3	1	1					
450-600	3	2	3					
600-750	3	2	2					
750-900	3	4	2					
900-1050	4	6	4					
1050-1200	4	7	4					
1200-1350	5	6	5					
1350-1500	7	6	5					
1500-1650	7	4	4					
1650-1800	6	5	5					
1800-1950	8	6	5					
1950-2100	8	7	7					

Perth Sand Penetrometer tests done in accordance with AS 1289.6.3.3 (except blow counts are reported per 150 mm, rather than 300 mm)
HB: Hammer bounce (refusal)
0 = Penetration due to hammer weight only
R: Refusal

Appendix E: Permeability Test Results

www.galtgeo.com.au
2/39 Flynn St, WEMBLEY WA 6014
ABN: 73 292 586 155

Permeability Calculation - Inverse Auger Hole Method

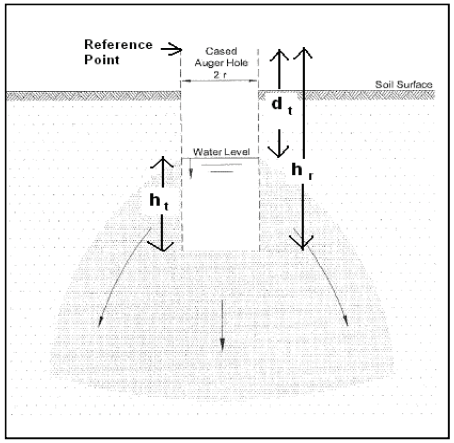
Galt Geotechnics

Spreadsheet author:	ORW	17-Oct-09

Job No:	J1501070
Client:	Pritchard Francis
Site:	16 McDonald Road
Location:	Baldivis
Calc by:	EY 22-Apr-15
BH Name:	HA01/P1
Test Depth:	0.8 m

$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114



Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	0.8	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m

Test 1

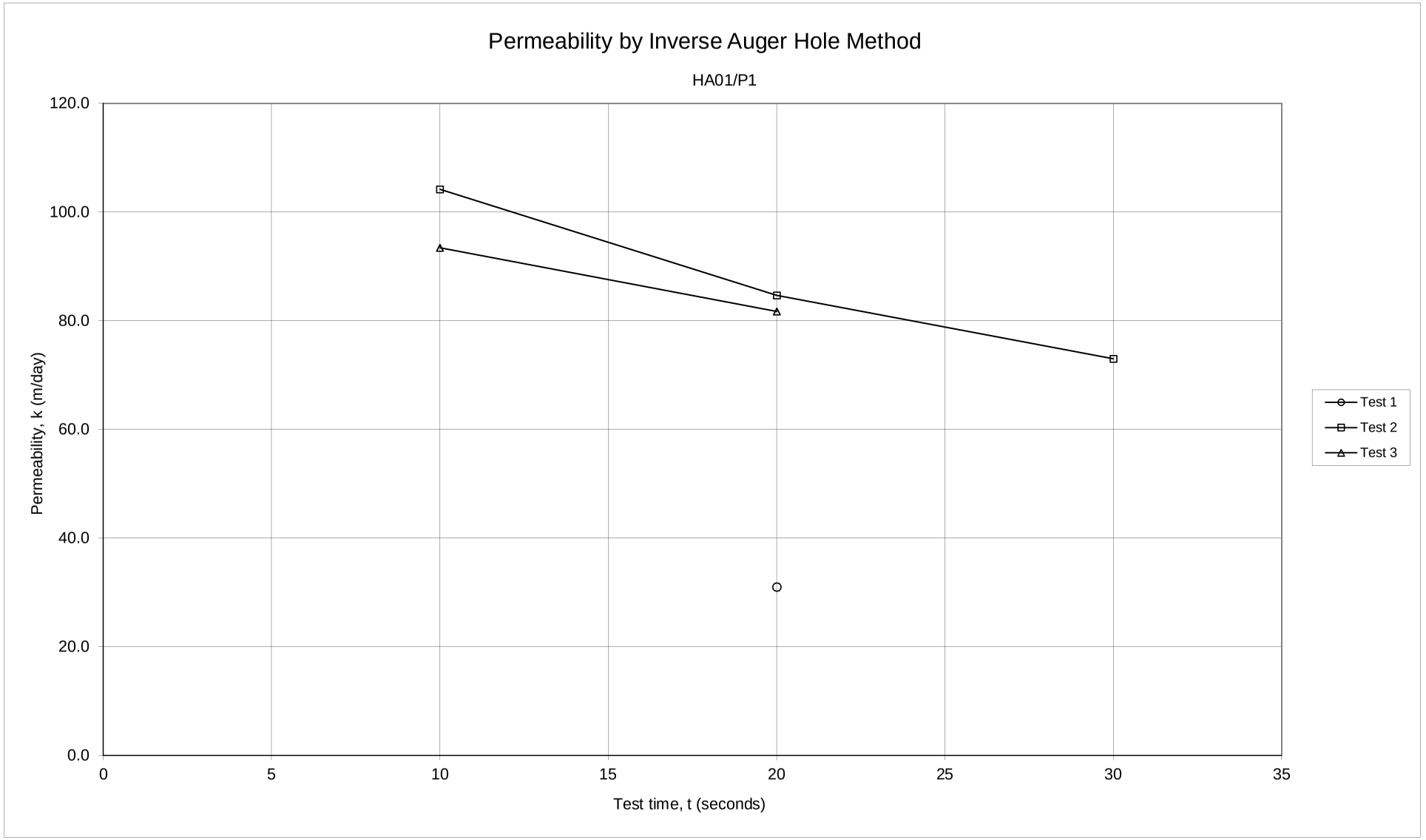
t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.19	0.61		
20	0.38	0.42	3.6E-04	31.0
		AVERAGE	3.6E-04	31.0

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.18	0.62		
10	0.47	0.33	1.2E-03	104.2
20	0.58	0.22	9.8E-04	84.6
30	0.64	0.16	8.4E-04	73.0
		AVERAGE	1.0E-03	87.3

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.15	0.65		
10	0.43	0.37	1.1E-03	93.4
20	0.56	0.24	9.5E-04	81.7
		AVERAGE	1.0E-03	87.5


Permeability by Inverse Auger Hole Method
HA01/P1
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Permeability, k (m/day)
0
5
10
15
20
25
30
35
Test time, t (seconds)
Test 1
Test 2
Test 3

Permeability Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J1501070
Client:	Pritchard Francis
Site:	16 McDonald Road
Location:	Baldivis
Calc by:	EY 22-Apr-15
BH Name:	HA02/P2
Test Depth:	0.7 m

Spreadsheet author:	ORW	17-Oct-09

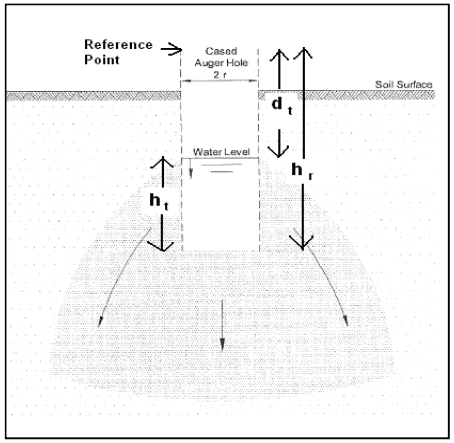
$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
X	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Permeability	X	m/s
r	radius of test hole	0.04	m
t	time since start of measurement	X	s
h_r	reference point height above base	0.7	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.08	0.62	X	X
20	0.27	0.43	3.5E-04	30.4
40	0.36	0.34	2.9E-04	24.8
60	0.43	0.27	2.6E-04	22.8
80	0.485	0.215	2.5E-04	21.6
100	0.52	0.18	2.3E-04	20.1
120	0.56	0.14	2.3E-04	19.9
140	0.57	0.13	2.1E-04	17.9
		AVERAGE	2.6E-04	22.5

Test 2

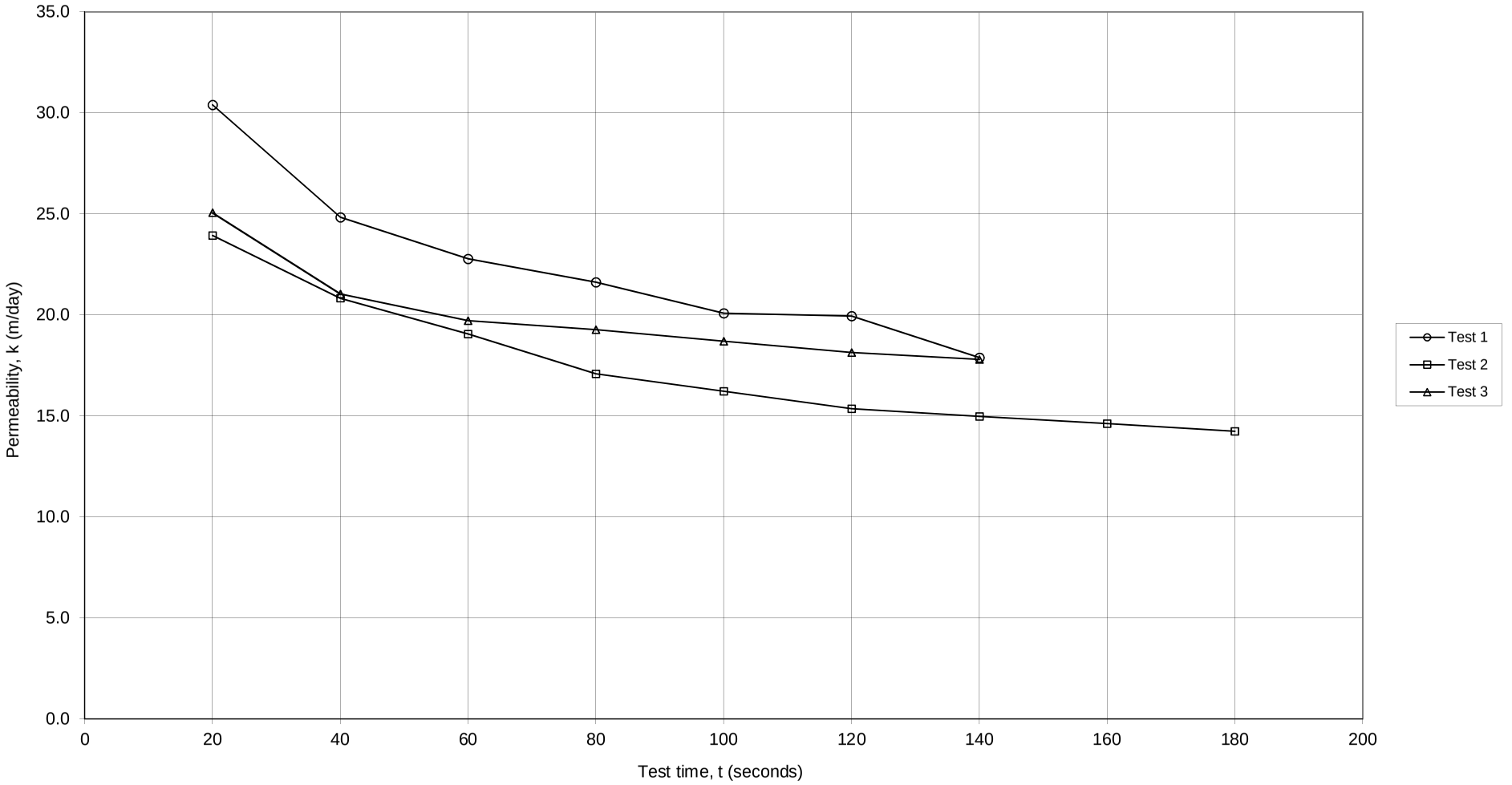
t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.08	0.62	X	X
20	0.235	0.465	2.8E-04	23.9
40	0.325	0.375	2.4E-04	20.8
60	0.39	0.31	2.2E-04	19.1
80	0.43	0.27	2.0E-04	17.1
100	0.47	0.23	1.9E-04	16.2
120	0.5	0.2	1.8E-04	15.4
140	0.53	0.17	1.7E-04	15.0
160	0.555	0.145	1.7E-04	14.6
180	0.575	0.125	1.6E-04	14.2
		AVERAGE	2.0E-04	17.4

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.085	0.615	X	X
20	0.245	0.455	2.9E-04	25.1
40	0.33	0.37	2.4E-04	21.0
60	0.4	0.3	2.3E-04	19.7
80	0.46	0.24	2.2E-04	19.3
100	0.505	0.195	2.2E-04	18.7
120	0.54	0.16	2.1E-04	18.1
140	0.57	0.13	2.1E-04	17.8
		AVERAGE	2.3E-04	20.0

Permeability by Inverse Auger Hole Method

HA02/P2



Permeability Calculation - Inverse Auger Hole Method

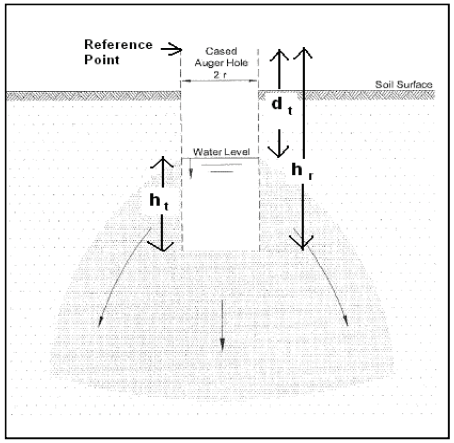
Galt Geotechnics

Spreadsheet author:	ORW	17-Oct-09

Job No:	J1501070
Client:	Pritchard Francis
Site:	16 McDonald Road
Location:	Baldivis
Calc by:	EY 22-Apr-15
BH Name:	HA03/P3
Test Depth:	0.6 m

$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114



Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	0.6	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m

Test 1

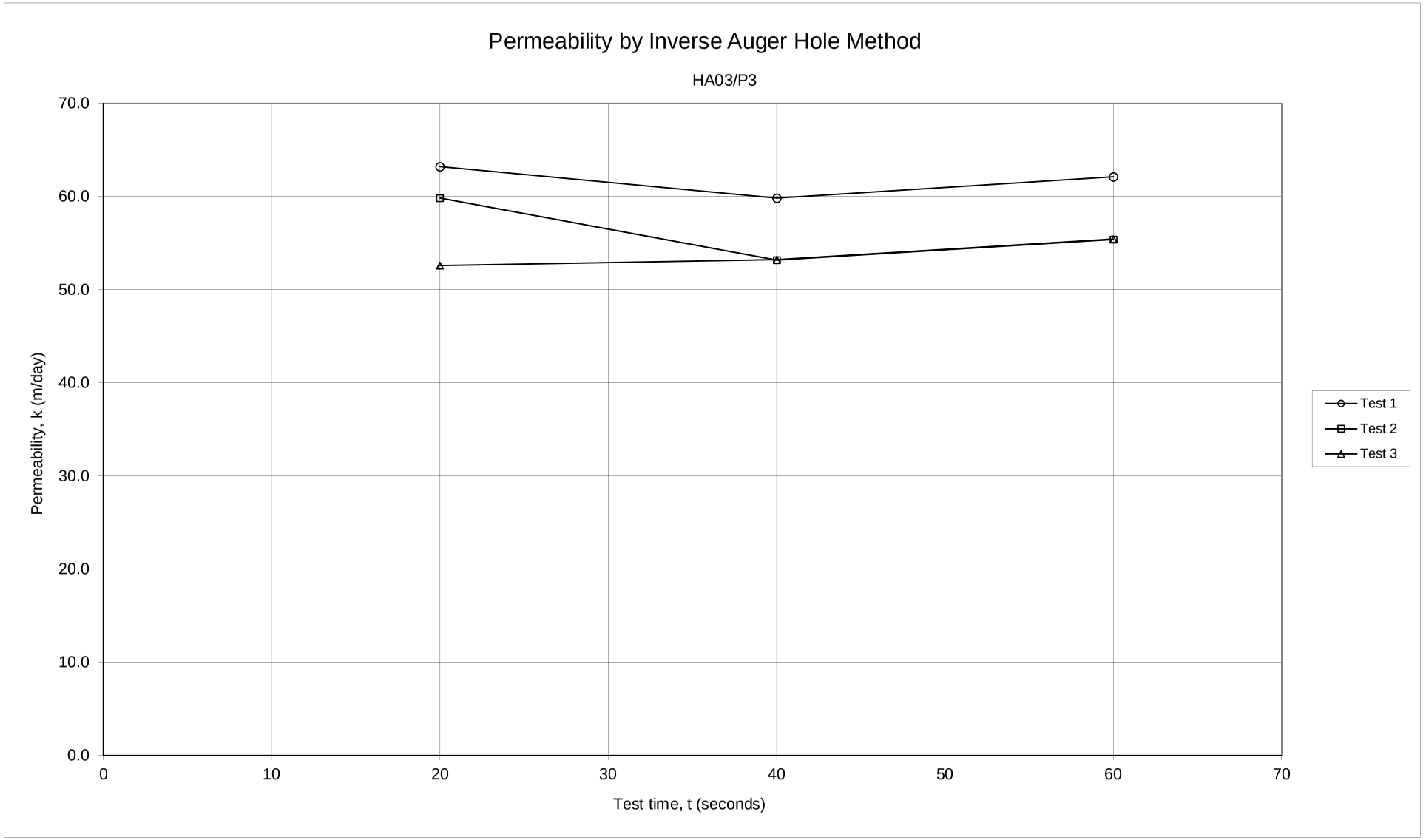
t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.1	0.5		
20	0.37	0.23	7.3E-04	63.2
40	0.49	0.11	6.9E-04	59.8
60	0.56	0.04	7.2E-04	62.1
		AVERAGE	7.1E-04	61.7

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.14	0.46		
20	0.38	0.22	6.9E-04	59.8
40	0.48	0.12	6.2E-04	53.2
60	0.55	0.05	6.4E-04	55.4
		AVERAGE	6.5E-04	56.1

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.105	0.495		
20	0.34	0.26	6.1E-04	52.6
40	0.47	0.13	6.2E-04	53.2
60	0.545	0.055	6.4E-04	55.4
		AVERAGE	6.2E-04	53.7


Permeability by Inverse Auger Hole Method
HA03/P3
Permeability, k (m/day)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
10
20
30
40
50
60
70
Test time, t (seconds)
Test 1
Test 2
Test 3

Appendix F: Environmental Laboratory Certificates

www.galtgeo.com.au
2/39 Flynn St, WEMBLEY WA 6014
ABN: 73 292 586 155

Certificate of Analysis

Galt Environment P/L
2/39 Flynn St
Wembley
WA 6014

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: **Brad Palmer**

Report **454842-S**
Project name BALDIVIS
Project ID J1501070
Received Date Apr 22, 2015

Client Sample ID			**SS01/0.0**	**SS02/0.0**	**SS03/0.0**	**SS04/0.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M15-Ap16245**	**M15-Ap16246**	**M15-Ap16247**	**M15-Ap16248**
Date Sampled			**Apr 20, 2015**	**Apr 20, 2015**	**Apr 20, 2015**	**Apr 20, 2015**
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	90	87	91	75
Tetrachloro-m-xylene (surr.)	1	%	79	79	83	73
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

Client Sample ID			SS01/0.0	SS02/0.0	SS03/0.0	SS04/0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M15-Ap16245	M15-Ap16246	M15-Ap16247	M15-Ap16248
Date Sampled			Apr 20, 2015	Apr 20, 2015	Apr 20, 2015	Apr 20, 2015
Test/Reference	LOR	Unit				
Organophosphorous Pesticides						
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	55	61	63	65
Heavy Metals						
Arsenic	2	mg/kg	3.4	2.8	2.7	2.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	15	15	16	16
Copper	5	mg/kg	14	19	19	17
Lead	5	mg/kg	5.6	6.9	6.8	6.0
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	38	68	50	42
% Moisture	0.1	%	2.6	3.6	3.1	3.1

Client Sample ID			SS05/0.0	SS06/0.0	SS07/0.0	SS08/0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M15-Ap16249	M15-Ap16250	M15-Ap16251	M15-Ap16252
Date Sampled			Apr 20, 2015	Apr 20, 2015	Apr 20, 2015	Apr 20, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			SS05/0.0	SS06/0.0	SS07/0.0	SS08/0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			M15-Ap16249	M15-Ap16250	M15-Ap16251	M15-Ap16252
Date Sampled			Apr 20, 2015	Apr 20, 2015	Apr 20, 2015	Apr 20, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	88	93	95	88
Tetrachloro-m-xylene (surr.)	1	%	82	83	83	77
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	58	62	77	77
Heavy Metals						
Arsenic	2	mg/kg	4.4	3.7	2.9	2.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	15	15	16	17
Copper	5	mg/kg	16	17	19	26
Lead	5	mg/kg	6.4	6.8	6.3	6.9
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	43	42	41	51
% Moisture	0.1	%	2.7	2.3	3.1	3.7

Client Sample ID			SS09/0.0	SS10/0.0	QC1
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M15-Ap16253	M15-Ap16254	M15-Ap16255
Date Sampled			Apr 20, 2015	Apr 20, 2015	Apr 20, 2015
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05

Client Sample ID			SS09/0.0	SS10/0.0	QC1
Sample Matrix			Soil	Soil	Soil
Eurofins | mgt Sample No.			M15-Ap16253	M15-Ap16254	M15-Ap16255
Date Sampled			Apr 20, 2015	Apr 20, 2015	Apr 20, 2015
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	0.07	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	77	85	98
Tetrachloro-m-xylene (surr.)	1	%	74	72	80
Organophosphorous Pesticides					
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Naled	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	71	75	86
Heavy Metals					
Arsenic	2	mg/kg	4.1	4.7	4.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	19	19	18
Copper	5	mg/kg	32	< 5	6.3
Lead	5	mg/kg	8.2	< 5	< 5
Mercury	0.1	mg/kg	0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5
Zinc	5	mg/kg	110	< 5	12

Client Sample ID			SS09/0.0	SS10/0.0	QC1
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M15-Ap16253**	**M15-Ap16254**	**M15-Ap16255**
Date Sampled			**Apr 20, 2015**	**Apr 20, 2015**	**Apr 20, 2015**
Test/Reference	LOR	Unit			
% Moisture	0.1	%	3.5	2.9	1.5

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite 14			
Organochlorine Pesticides	Melbourne	Apr 23, 2015	14 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorous Pesticides	Melbourne	Apr 23, 2015	14 Day
- Method: USEPA 8270 Organophosphorus Pesticides			
Metals M8	Melbourne	Apr 23, 2015	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			
% Moisture	Melbourne	Apr 22, 2015	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: Galt Environment P/L
Address: 2/39 Flynn St
Wembley
WA 6014

Project Name: BALDIVIS
Project ID: J1501070

Order No.: J1501070
Report #: 454842
Phone: 08 6272 0200
Fax: 08 9285 8444

Received: Apr 22, 2015 9:54 AM
Due: Apr 29, 2015
Priority: 5 Day
Contact Name: Brad Palmer

Eurofins | mgt Client Manager: Natalie Krasselt

Sample Detail					Metals M8	Eurofins | mgt Suite 14	Moisture Set
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
SS01/0.0	Apr 20, 2015		Soil	M15-Ap16245	X	X	X
SS02/0.0	Apr 20, 2015		Soil	M15-Ap16246	X	X	X
SS03/0.0	Apr 20, 2015		Soil	M15-Ap16247	X	X	X
SS04/0.0	Apr 20, 2015		Soil	M15-Ap16248	X	X	X
SS05/0.0	Apr 20, 2015		Soil	M15-Ap16249	X	X	X
SS06/0.0	Apr 20, 2015		Soil	M15-Ap16250	X	X	X
SS07/0.0	Apr 20, 2015		Soil	M15-Ap16251	X	X	X
SS08/0.0	Apr 20, 2015		Soil	M15-Ap16252	X	X	X
SS09/0.0	Apr 20, 2015		Soil	M15-Ap16253	X	X	X

Company Name:	Galt Environment P/L	**Order No.:**	J1501070	**Received:**	Apr 22, 2015 9:54 AM
Address:	2/39 Flynn St Wembley WA 6014	**Report #:**	454842	**Due:**	Apr 29, 2015
		Phone:	08 6272 0200	**Priority:**	5 Day
		Fax:	08 9285 8444	**Contact Name:**	Brad Palmer
Project Name:	BALDIVIS				
Project ID:	J1501070				

Eurofins | mgt Client Manager: Natalie Krasselt

Sample Detail					Metals M8	Eurofins | mgt Suite 14	Moisture Set
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
SS10/0.0	Apr 20, 2015		Soil	M15-Ap16254	X	X	X
QC1	Apr 20, 2015		Soil	M15-Ap16255	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

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

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

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

Results <10 times the LOR : No Limit

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

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

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

QC DATA GENERAL COMMENTS

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorous Pesticides							
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl azinphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Naled	mg/kg	< 0.5			0.5	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	98			70-130	Pass	
4.4'-DDE	%	95			70-130	Pass	
4.4'-DDT	%	88			70-130	Pass	
a-BHC	%	126			70-130	Pass	
Aldrin	%	95			70-130	Pass	
b-BHC	%	111			70-130	Pass	
d-BHC	%	97			70-130	Pass	
Dieldrin	%	96			70-130	Pass	
Endosulfan I	%	94			70-130	Pass	
Endosulfan II	%	98			70-130	Pass	
Endosulfan sulphate	%	104			70-130	Pass	
Endrin	%	90			70-130	Pass	
Endrin aldehyde	%	99			70-130	Pass	
Endrin ketone	%	105			70-130	Pass	
g-BHC (Lindane)	%	87			70-130	Pass	
Heptachlor	%	96			70-130	Pass	
Heptachlor epoxide	%	94			70-130	Pass	
Hexachlorobenzene	%	91			70-130	Pass	
Methoxychlor	%	82			70-130	Pass	
LCS - % Recovery							
Organophosphorous Pesticides							
Diazinon	%	83			70-130	Pass	
Ethion	%	102			70-130	Pass	
Fenitrothion	%	81			70-130	Pass	
Methyl parathion	%	82			70-130	Pass	
Mevinphos	%	92			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	80			80-120	Pass	
Cadmium	%	95			80-120	Pass	
Chromium	%	96			80-120	Pass	
Copper	%	98			80-120	Pass	
Lead	%	98			80-120	Pass	
Mercury	%	101			75-125	Pass	
Nickel	%	100			80-120	Pass	
Zinc	%	98			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M15-Ap16246	CP	%	88			70-130	Pass	
4.4'-DDE	M15-Ap16246	CP	%	89			70-130	Pass	
4.4'-DDT	M15-Ap16246	CP	%	82			70-130	Pass	
a-BHC	M15-Ap16246	CP	%	95			70-130	Pass	
Aldrin	M15-Ap16246	CP	%	81			70-130	Pass	
b-BHC	M15-Ap16246	CP	%	96			70-130	Pass	
d-BHC	M15-Ap16246	CP	%	84			70-130	Pass	
Dieldrin	M15-Ap16246	CP	%	87			70-130	Pass	
Endosulfan I	M15-Ap16246	CP	%	81			70-130	Pass	
Endosulfan II	M15-Ap16246	CP	%	85			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	M15-Ap16246	CP	%	94			70-130	Pass	
Endrin	M15-Ap16246	CP	%	83			70-130	Pass	
Endrin aldehyde	M15-Ap16246	CP	%	86			70-130	Pass	
Endrin ketone	M15-Ap16246	CP	%	95			70-130	Pass	
g-BHC (Lindane)	M15-Ap16246	CP	%	74			70-130	Pass	
Heptachlor	M15-Ap16246	CP	%	84			70-130	Pass	
Heptachlor epoxide	M15-Ap16246	CP	%	87			70-130	Pass	
Hexachlorobenzene	M15-Ap16246	CP	%	78			70-130	Pass	
Methoxychlor	M15-Ap16246	CP	%	85			70-130	Pass	
Spike - % Recovery									
Organophosphorous Pesticides				Result 1					
Diazinon	M15-Ap16250	CP	%	90			70-130	Pass	
Ethion	M15-Ap16250	CP	%	73			70-130	Pass	
Fenitrothion	M15-Ap16250	CP	%	71			70-130	Pass	
Methyl parathion	M15-Ap16250	CP	%	72			70-130	Pass	
Mevinphos	M15-Ap16250	CP	%	90			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M15-Ap16251	CP	%	78			75-125	Pass	
Cadmium	M15-Ap16251	CP	%	97			75-125	Pass	
Chromium	M15-Ap16251	CP	%	97			75-125	Pass	
Copper	M15-Ap16251	CP	%	103			75-125	Pass	
Lead	M15-Ap16251	CP	%	98			75-125	Pass	
Mercury	M15-Ap16251	CP	%	85			70-130	Pass	
Nickel	M15-Ap16251	CP	%	99			75-125	Pass	
Zinc	M15-Ap16251	CP	%	85			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M15-Ap16245	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M15-Ap16245	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M15-Ap16245	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Bolstar	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl azinphos	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Naled	M15-Ap16249	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phorate	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M15-Ap16249	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M15-Ap16250	CP	mg/kg	3.7	3.2	17	30%	Pass	
Cadmium	M15-Ap16250	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M15-Ap16250	CP	mg/kg	15	15	2.0	30%	Pass	
Copper	M15-Ap16250	CP	mg/kg	17	17	1.0	30%	Pass	
Lead	M15-Ap16250	CP	mg/kg	6.8	6.2	10	30%	Pass	
Mercury	M15-Ap16250	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M15-Ap16250	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M15-Ap16250	CP	mg/kg	42	46	7.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M15-Ap16251	CP	mg/kg	2.9	2.6	10	30%	Pass	
Cadmium	M15-Ap16251	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M15-Ap16251	CP	mg/kg	16	16	1.0	30%	Pass	
Copper	M15-Ap16251	CP	mg/kg	19	19	<1	30%	Pass	
Lead	M15-Ap16251	CP	mg/kg	6.3	6.7	6.0	30%	Pass	
Mercury	M15-Ap16251	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M15-Ap16251	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	M15-Ap16251	CP	mg/kg	41	45	9.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M15-Ap16252	CP	%	3.7	3.2	12	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M15-Ap16255	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endosulfan I	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M15-Ap16255	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M15-Ap16255	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

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

Authorised By

Natalie Krasselt	Analytical Services Manager
Carroll Lee	Senior Analyst-Organic (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson
National Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

Uncertainty data is available on request

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Appendix G: Understanding Your Report

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UNDERSTANDING YOUR GEOTECHNICAL ENGINEERING REPORT

GALT FORM PMP11 Rev1

1. EXPECTATIONS OF A GEOTECHNICAL ENGINEERING REPORT

This document has been prepared to clarify what is and is not provided in your geotechnical report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with geotechnical conditions.

Geotechnical engineering is a less exact science than other engineering disciplines. We include this information to help you understand where our responsibilities as geotechnical engineers begin and end, to help the client recognise his responsibilities and risks. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of geotechnical problems and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following :

- The project objectives as we understood them and as described in this report;
- the specific site mentioned in this report; and
- the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this geotechnical report if any of the following conditions apply:

- the report was not written for you;
- the report was not written for the site specific to your development;
- the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your geotechnical engineering report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the design process by being engaged for consultation with other members of the design team and by being able to review work produced by other members of the design team which relies on geotechnical information provided in our report.

3. GEOTECHNICAL ENGINEERING LOGS

Our reports often include logs of intrusive and non-intrusive geotechnical investigation techniques. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

4. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party as a consequence of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

5. CHANGE IN SUBSURFACE CONDITIONS

The geotechnical recommendations in this report are based on the ground conditions that existed at the time when the study was undertaken. Changes in ground conditions can occur in numerous ways including as a result of anthropogenic events (such as construction on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where ground conditions have changed, additional sampling, testing or analysis may be required to fully assess the changed conditions.

6. SUBSURFACE CONDITIONS DURING CONSTRUCTION

Practical constraints mean that we cannot know every minute detail about the subsurface conditions at a particular site. We use engineering judgement to form an opinion about the subsurface conditions at the site. Some variation to our evaluated conditions is likely and significant variation is possible. Accordingly, our report should not be considered as final as it is developed from engineering judgement and opinion.

The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot observe construction.

7. ENVIRONMENTAL ISSUES

Unless specifically mentioned otherwise in our report, environmental considerations are not included. The investigation techniques used by us in developing our report differ from those for an environmental investigation. Our report was not prepared with environmental considerations in mind and it is the client's responsibility to satisfy himself that environmental considerations have been taken into account for the site. If you require guidance on how to proceed on evaluating environmental risk at the site, we can provide further information and contacts.

UNDERSTANDING YOUR ENVIRONMENTAL REPORT

GALT FORM PMP29 Rev1

1. EXPECTATIONS OF AN ENVIRONMENTAL REPORT

This document has been prepared to clarify what is and is not provided in your environmental report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with environmental conditions. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of environmental problems and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following:

- The project objectives as we understood them and as described in this report;
- the specific site mentioned in this report; and
- the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this report if any of the following conditions apply:

- the report was not written for you;
- the report was not written for the site specific to your development;
- the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your environmental report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the project planning process by being engaged for consultation with members of the project team and by being able to review work produced by other members of the project team which relies on environmental information provided in our report.

3. ENVIRONMENTAL LOGS

Our reports often include logs of intrusive and non-intrusive environmental investigation techniques. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

4. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party as a consequence of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

5. CHANGE IN SITE CONDITIONS

The environmental recommendations in this report are based on the site conditions that existed at the time when the study was undertaken. Changes in site conditions can occur in numerous ways including as a result of anthropogenic events (such as potentially contaminating activities or action on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where site conditions have changed, additional sampling, testing or analysis may be required to fully characterise the changed conditions.

O:\Administration\Standard Forms and Documents\PMP29 Understanding your Environmental Report.docx

appendix four: groundwater contours

Perth Groundwater Atlas - Groundwater contours

appendix five: acid sulphate soils

MAP 1 - AERIAL

MAP 2 - STREET

MAP 3 - CONTOURS

MAP 4 - ACID SULFATE SOIL RISK

MAP 5 - ENVIRONMENTALLY SENSITIVE AREAS

MAP 6 - GEOMORPHIC WETLANDS

MAP 7 - CONTAMINATED SITES

MAP 8 - HERITAGE SITES

MAP 9 - GROUNDWATER CONTOURS AND WINSITES

MAP 4 - ACID SULFATE SOIL RISK

High to moderate risk | Moderate to low risk

MAP 5 - ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Area

MAP 6 - GEOMORPHIC WETLANDS

Multiple Use | Conservation | Not Applicable
Resource Enhancement | Not Assessed

MAP 7 - CONTAMINATED SITES

Contaminated - remediation required | Remediated for restricted use
Contaminated - restricted use

Contaminated sites information is taken from the publicly available Department of Environment Regulation (DER) Contaminated Sites Database. Only sites classified as 'Contaminated – remediation required', 'Contaminated – restricted use' and 'Remediated – restricted use' are shown. Sites with other classifications under the Contaminated Sites Act 2003 are identified through a basic or detailed summary of records search request through DER.

MAP 8 - HERITAGE SITES

Heritage Site

MAP 9 - GROUNDWATER CONTOURS AND WINSITES

Maximum | Minimum | WINSITES
5 | 5 | Ground, Borehole or Well
1 | 1 | Other

N

Metres

SCALE	1:2,000 (A3)
DRAWN	DAC
DATE DRAWN	30/04/2015
CHECKED	SS
DATE CHECKED	30/04/2015
PROJECTION	GDA 1994 MGA Zone 50

Galt Environmental Pty Ltd
ACN : 161 709 998
Tel : +61 (0)8 6272-0200
Fax : +61 (0)8 9285 8444
Address : U2, 39 Flynn Street, Wembley, WA, 6014

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CLIENT	PRITCHARD FRANCIS
PROJECT	PROPOSED RESIDENTIAL SUBDIVISION
LOCATION	16 MCDONALD ROAD BALDIVIS
TITLE	INDICATIVE ENVIRONMENTAL ASPECTS
Job No.	J1501070
Fig No.	FIGURE 2
Rev.	A

appendix six: dial-before-you-dig information

DBYD Enquiry Response

For your immediate information **'THERE IS AN APA HIGH PRESSURE NATURAL GAS TRANSMISSION PIPELINE'** in the area of your proposed works. Please **do not** proceed until the next steps below are completed.

Date:	19/02/2015
From:	Land Officer, APA group

Phone:	1800 103 452
Email:	HELM@apa.com.au

To:	Mr Lachlan Harris
Company:	Pritchard Francis
Phone:	0891928015
Email:	lachlan.h@pfeng.com.au
Fax:	0891928038

RE:

DBYD Seq No:	44003106
Utility ID:	70850

Scale: 1: 50000

Address:	Mcdonald Road Baldivis	
Map:	Streetsmart	:611E1

Next step:

Please contact an APA Group Lands Officer immediately on **1800 103 452** to discuss the exact nature and extent of your works.

There is to be **NO ATTEMPT TO PHYSICALLY LOCATE THE PIPELINE**. Although the route of the pipeline is marked out by warning signs it shall not be inferred that the pipe is buried under and in a straight line between signs. No depths on the pipeline should be assumed. Only an **APA representative** can locate the pipeline and is required to be scheduled for locations. APA Group advises that information supplied in this response is only valid for 30 days.

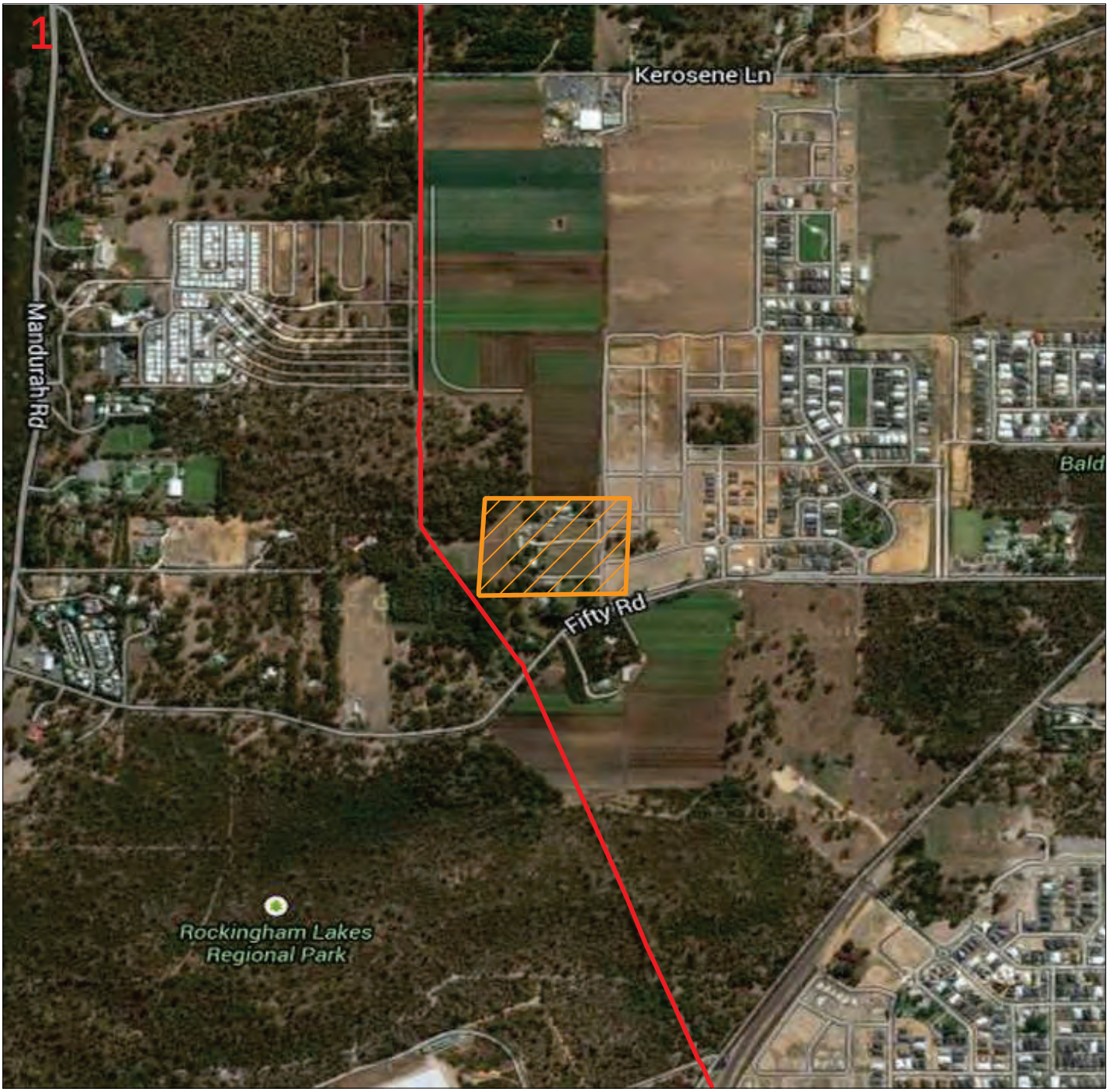
Damage to a high pressure natural gas transmission pipeline could result in:-

- possible explosion and fire;
- possible injury or loss of life;
- substantial repair and gas restoration liability damage costs;
- gas escaping at pressures of up to 15,000 kPa;
- loss of gas to thousands of customers.

Thank you for your interest in maintaining a safe and secure gas pipeline network.

Please note that this is **not** an approval to carry out work within APA Group's pipeline easement.

APA Group Transmission does not guarantee the accuracy or completeness of the map and does not make any warranty about the data. APA Group Transmission is not under any liability to the user for any loss or damage (including consequential loss or damage) which the user may suffer resulting from the use of this map.



Legend

N DBYD Requests

N APA Transmission Pipelines

Scale: 1: **10000**

0 0.1km

N
W E
S

APA DBYD Transmissions Project

Dial Before You Dig Enquiry

DATE: **19/02/2015**

SEQUENCE NO: **44003106**

DATA SOURCE:

Pipeline Data Copyright APA Group and NT Gas Distribution Pty. Ltd., Property Parcels Copyright respective State Governments, mapping data Copyright OpenStreetMap contributors and Google ©2014, DBYD Dig Location provided by DBYD.

APA Group

This map is confidential and the information and details contained in it are and remain the property of APA Group.

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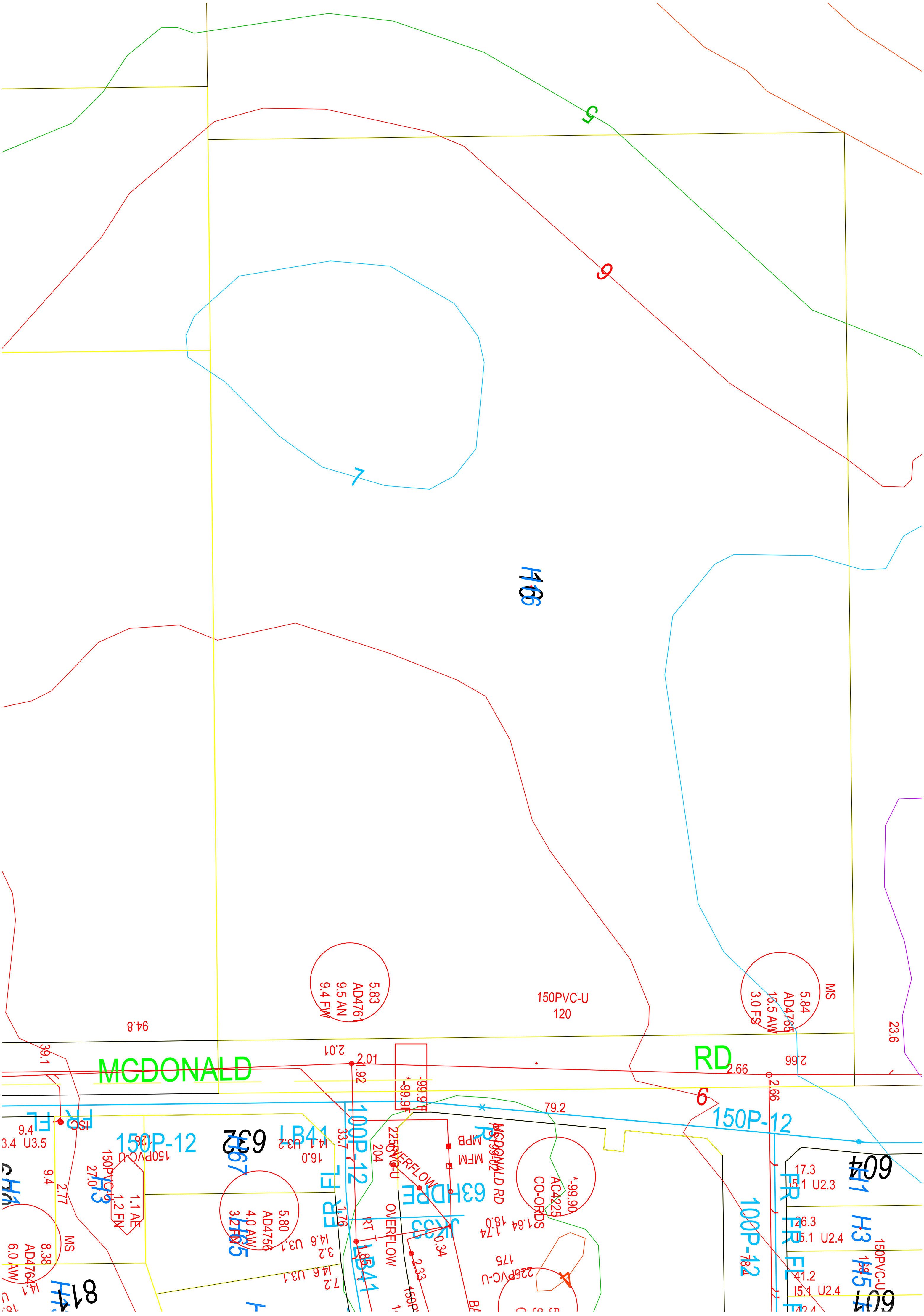
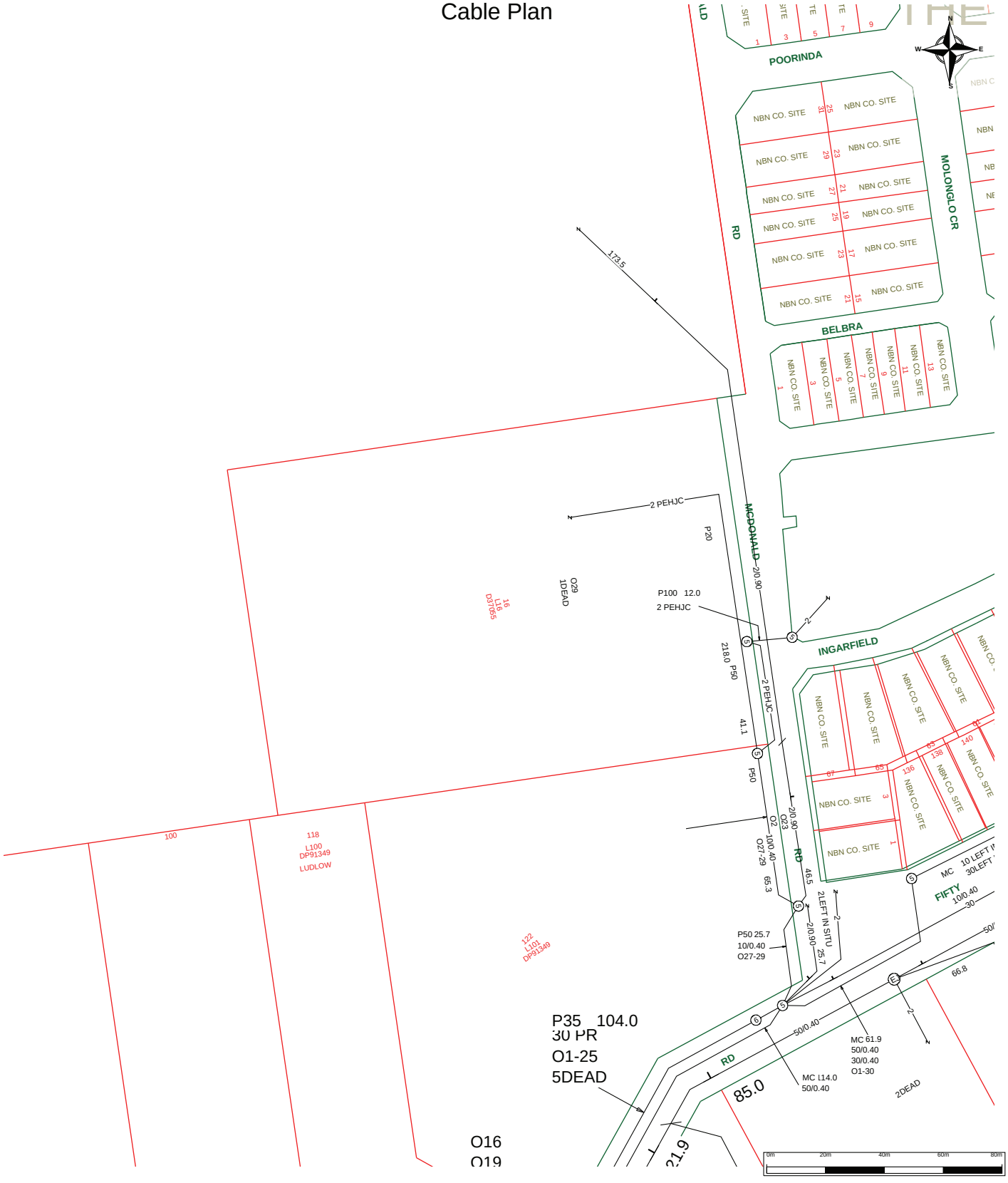
Please note that this is **not** an approval to carry out work within APA Group's pipeline easement. For further information please call APA on 1800 103 452.

APA Group Transmission does not guarantee the accuracy or completeness of the map and does not make any warranty about the data. APA Group Transmission is not under any liability to the user for any loss or damage (including consequential loss or damage) which the user may suffer resulting from the use of this map.



MCDONALD
RD
150PVC-U
120
150P-12
100P-12
632
604
LB41
OVERFLOW
63HDPE
79.2
2.01
2.66
23.6
9.4
U3.5
17.3
I5.1 U2.3
26.3
I5.1 U2.4
41.2
MS

Cable Plan



For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 19/02/2015 16:16:12

Sequence Number: 44003105

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

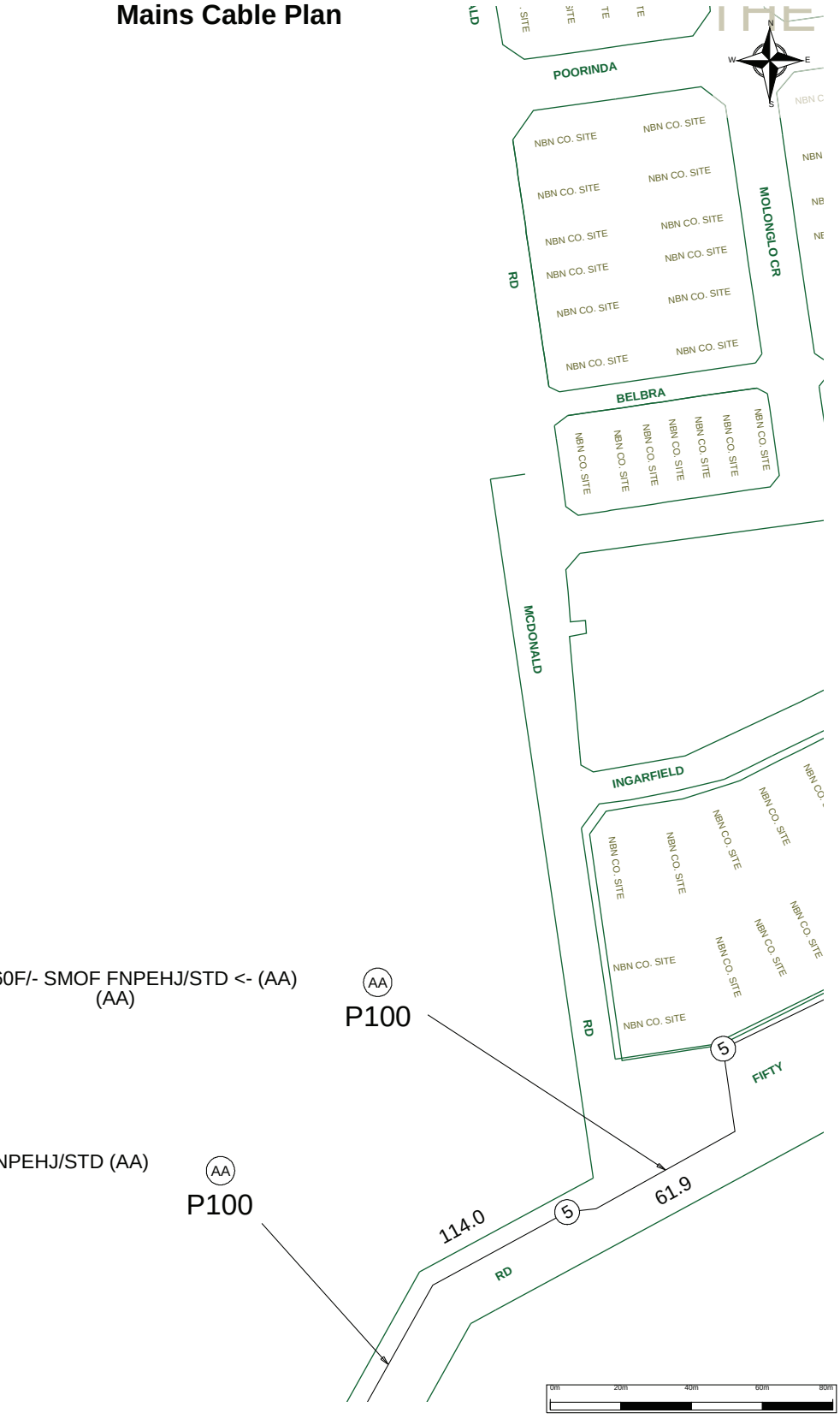
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Mains Cable Plan



For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 19/02/2015 16:16:14

Sequence Number: 44003105

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

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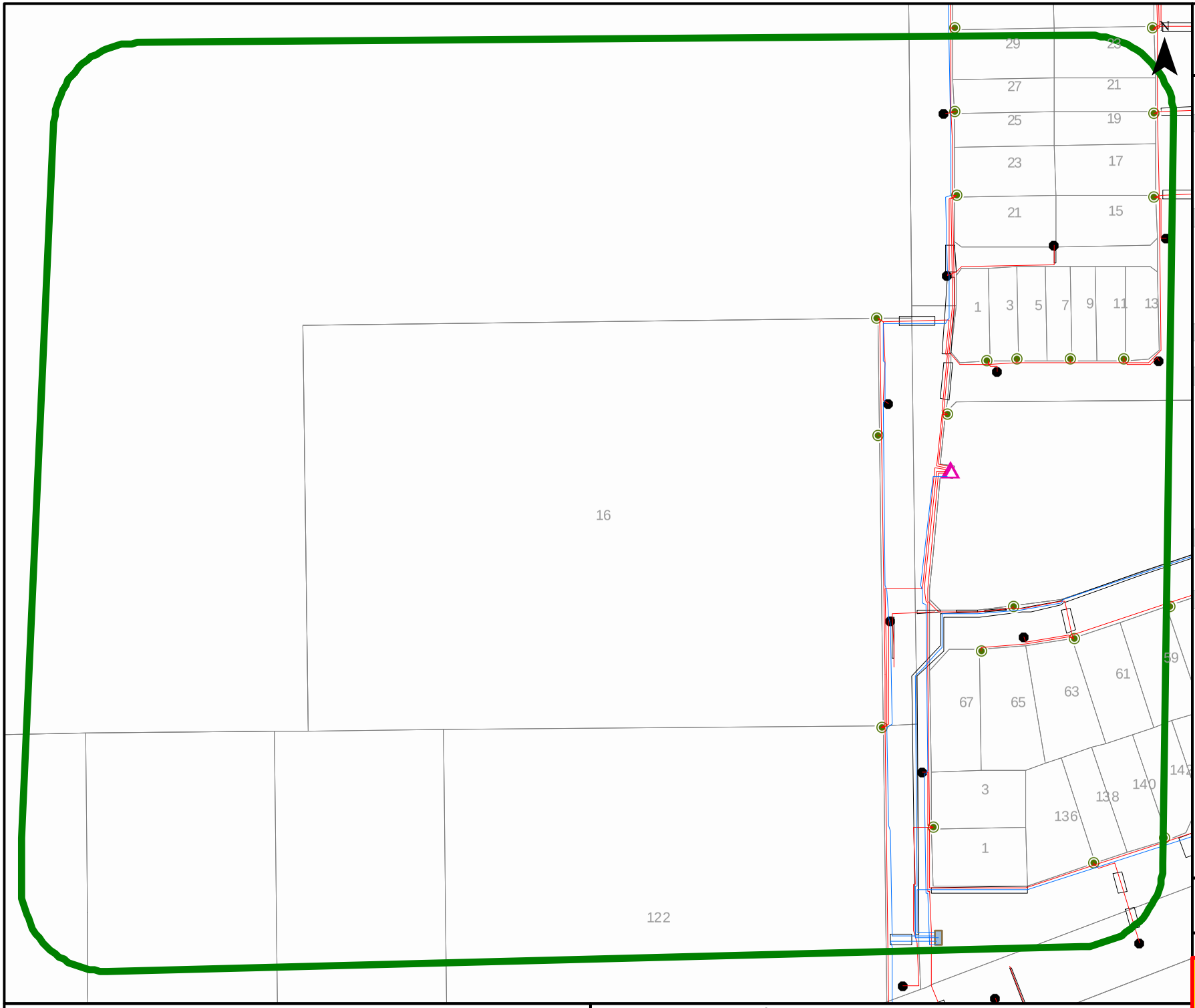
Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.



westernpower

UNDERGROUND LEGEND

Structures

- Pillar
- Metal Pole
- Transformer Site
- UG Crossing *
- Ring Main Unit
- LV Distribution Frame

Distribution Cables

- High Voltage Cable (1kV - 33kV)
- Low Voltage Cable (< 1kV)
- Street Light Circuit (< 1kV)
- Street Light Pilot (< 1kV)
- Earth Wire

Cable Pole Terminations

- HV Termination
- LV Termination

Proposed Construction Assets

- Design Area *
- High Voltage Underground Cable
- Low Voltage Underground Cable
- Metal Pole
- Pillar
- Transformer site
- HV Termination
- LV Termination

State Underground Power Project

- CURRENT Work Area *
- COMPLETED Area *

Feature

- Area of Interest

*** Please refer to coversheet**

Privately owned cables NOT SHOWN (including house services)

This map is INDICATIVE ONLY. Hand exposure via pothole method is MANDATORY.

Telephone Support: 1300 769 345
Mon to Fri - 08:00 to 16:30

Information valid for 30 days from date of issue

A4 | Scale : 1:1500

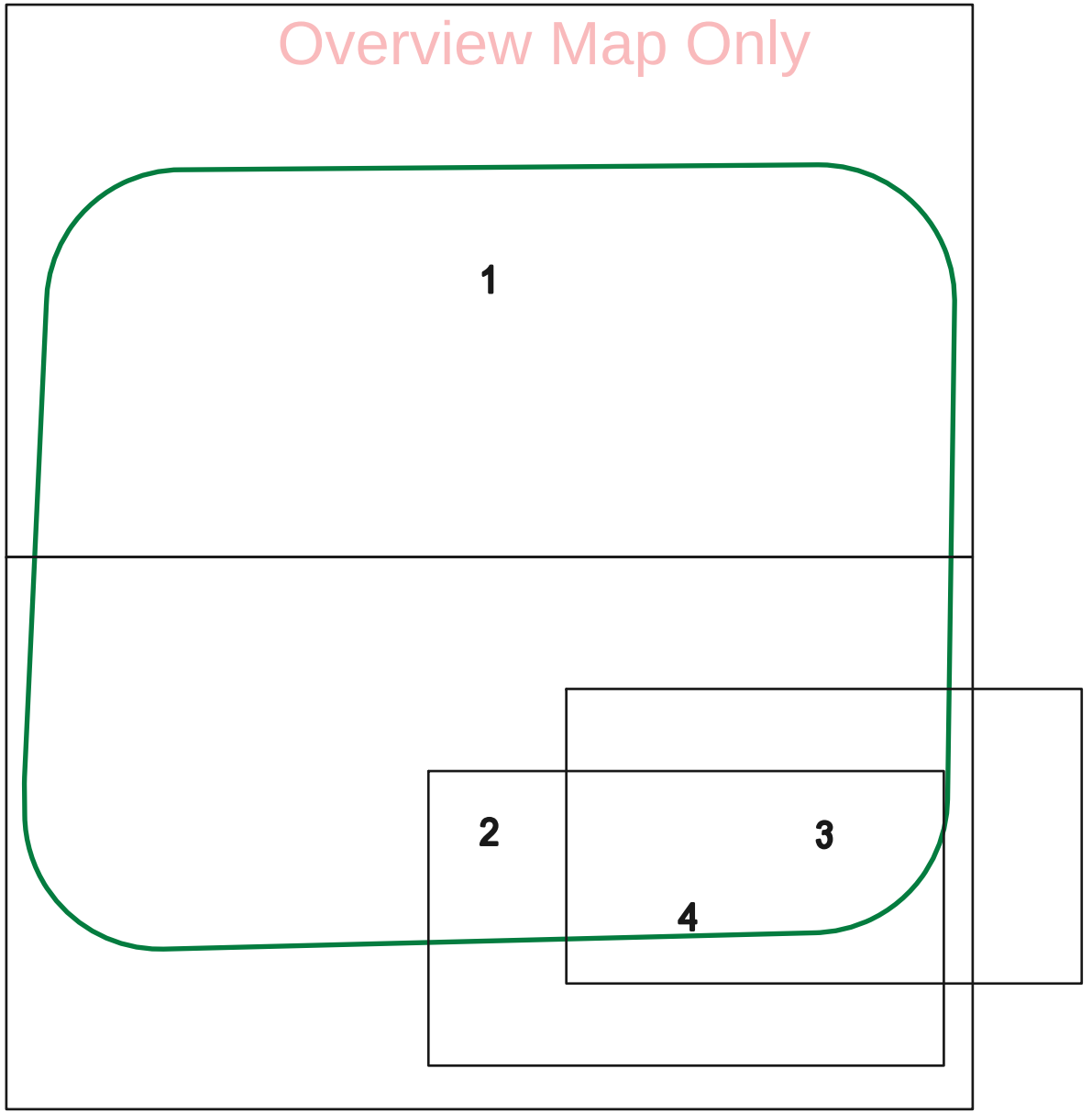
WARNING! Look out for overhead power lines

Sequence Number: 44003104

Date of Issue: 19/02/2015

WARNING - HIGH PRESSURE PIPELINE IN THE VICINITY.

No works within 15 metres of this asset are permitted without prior approval from ATCO Gas Australia PH 1300 926 755



Sequence No: 44003107 Map Tile: Scale: 1:3075

Job No: 8854518 Date:19/02/2015 Location: Mcdonald Road, Baldivis 6171

© 2011 ATCO Gas Australia Pty Ltd
ACN 089 531 975

N
W E
S

ATCO Gas AUSTRALIA

Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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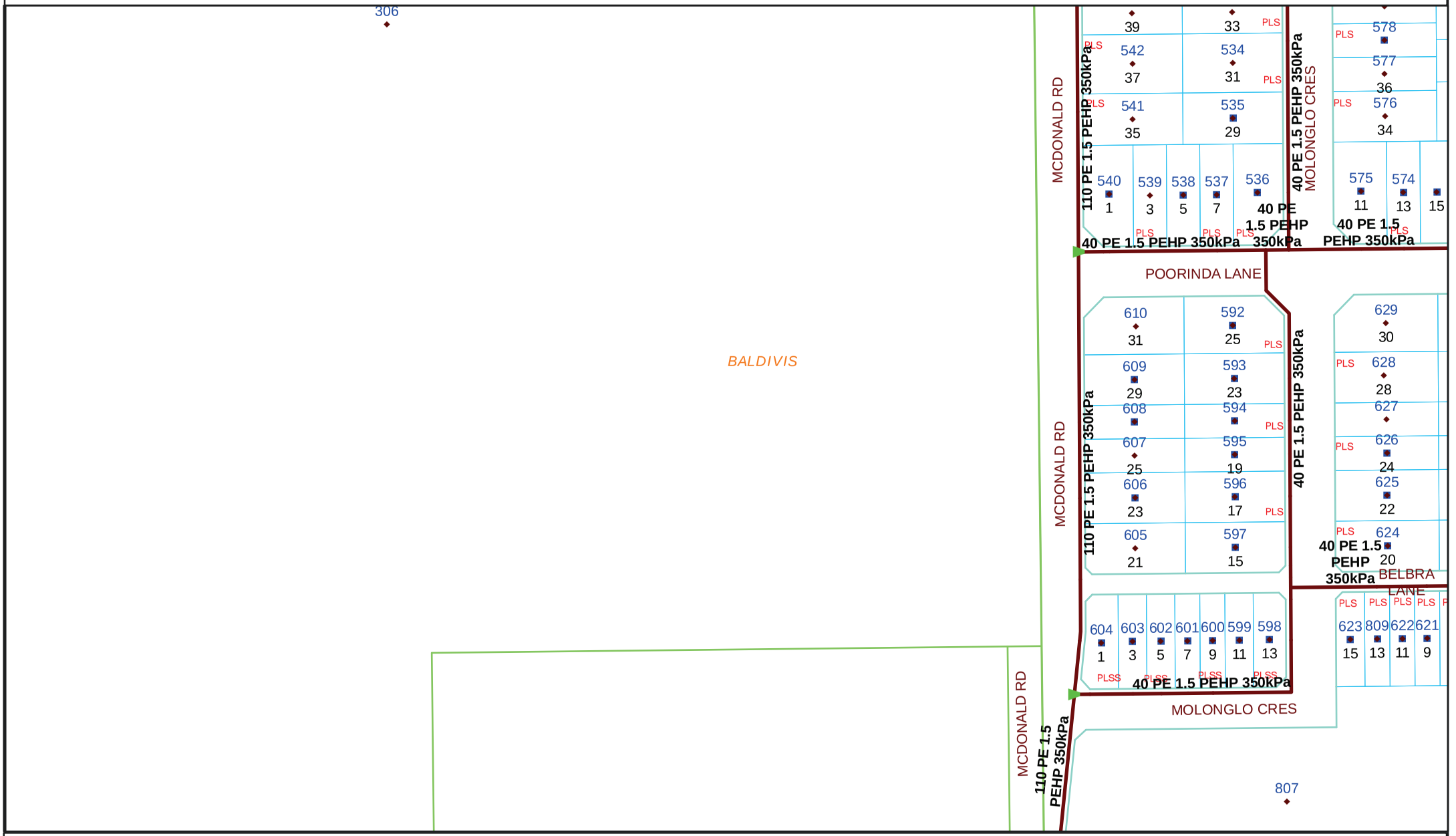
WARNING - HIGH PRESSURE PIPELINE IN THE VICINITY.

No works within 15 metres of this asset are permitted without prior approval from ATCO Gas Australia PH 1300 926 755



Sequence No: 44003107 | Map Tile: 1 | Scale: 1:1500

Job No: 8854518 | Date:19/02/2015 | Location: Mcdonald Road, Baldivis 6171

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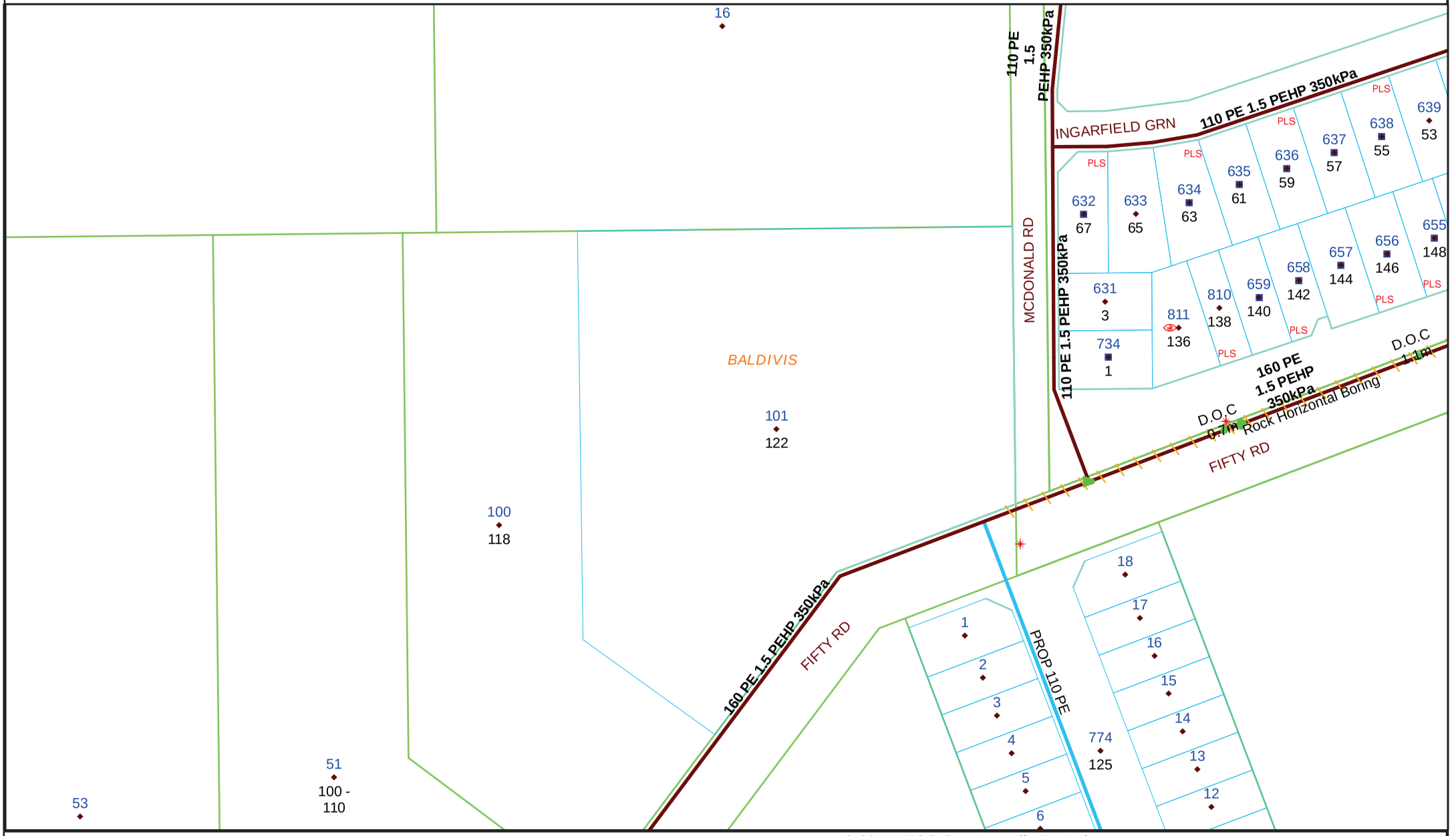

Sequence No: 44003107 | Map Tile: 2 | Scale: 1:1500

Job No: 8854518 | Date:19/02/2015 | Location: Mcdonald Road, Baldivis 6171

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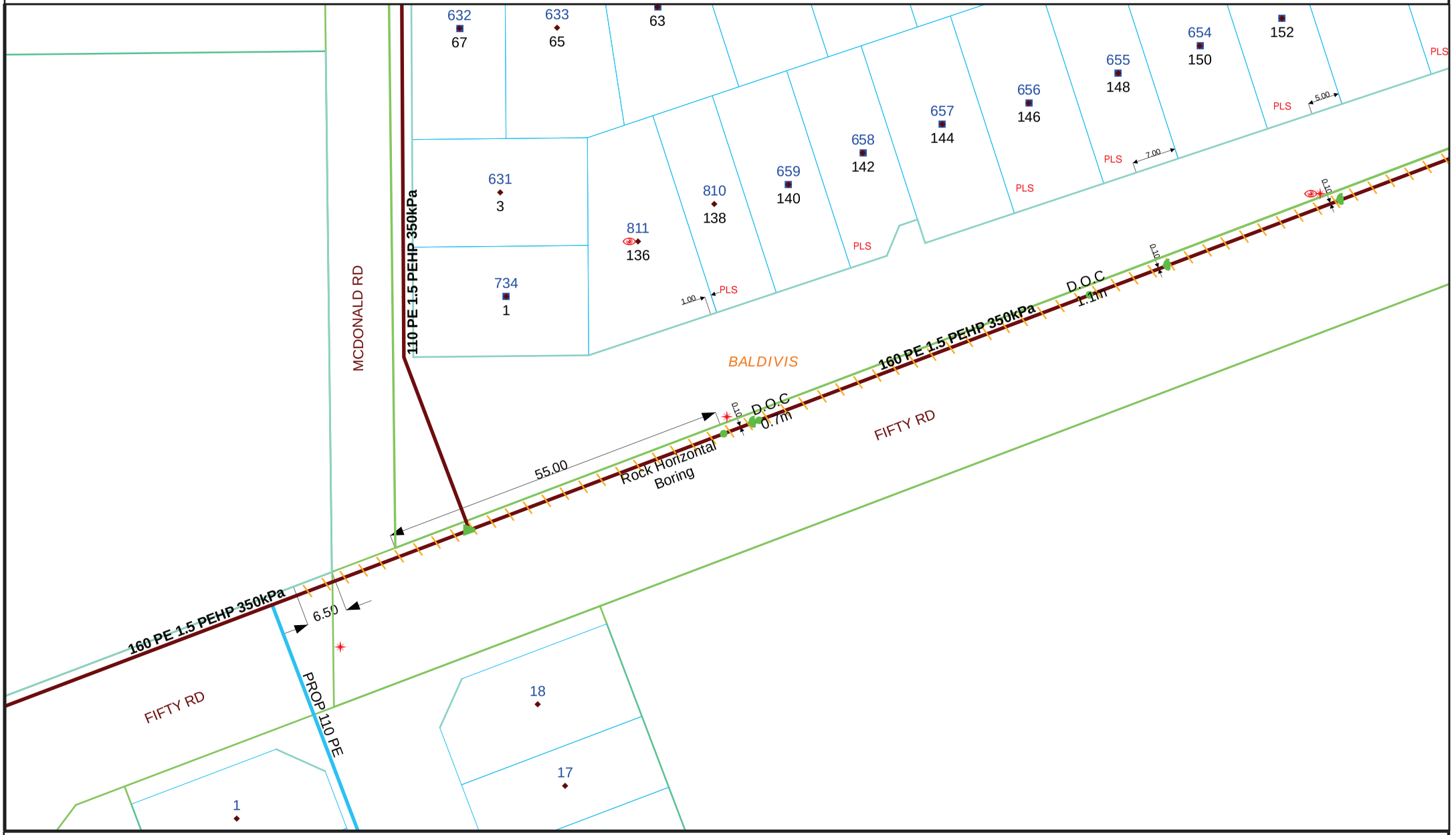

Sequence No: 44003107 Map Tile: 3 Scale: 1:800

Job No: 8854518 Date:19/02/2015 Location: Mcdonald Road, Baldivis 6171

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N W E S

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Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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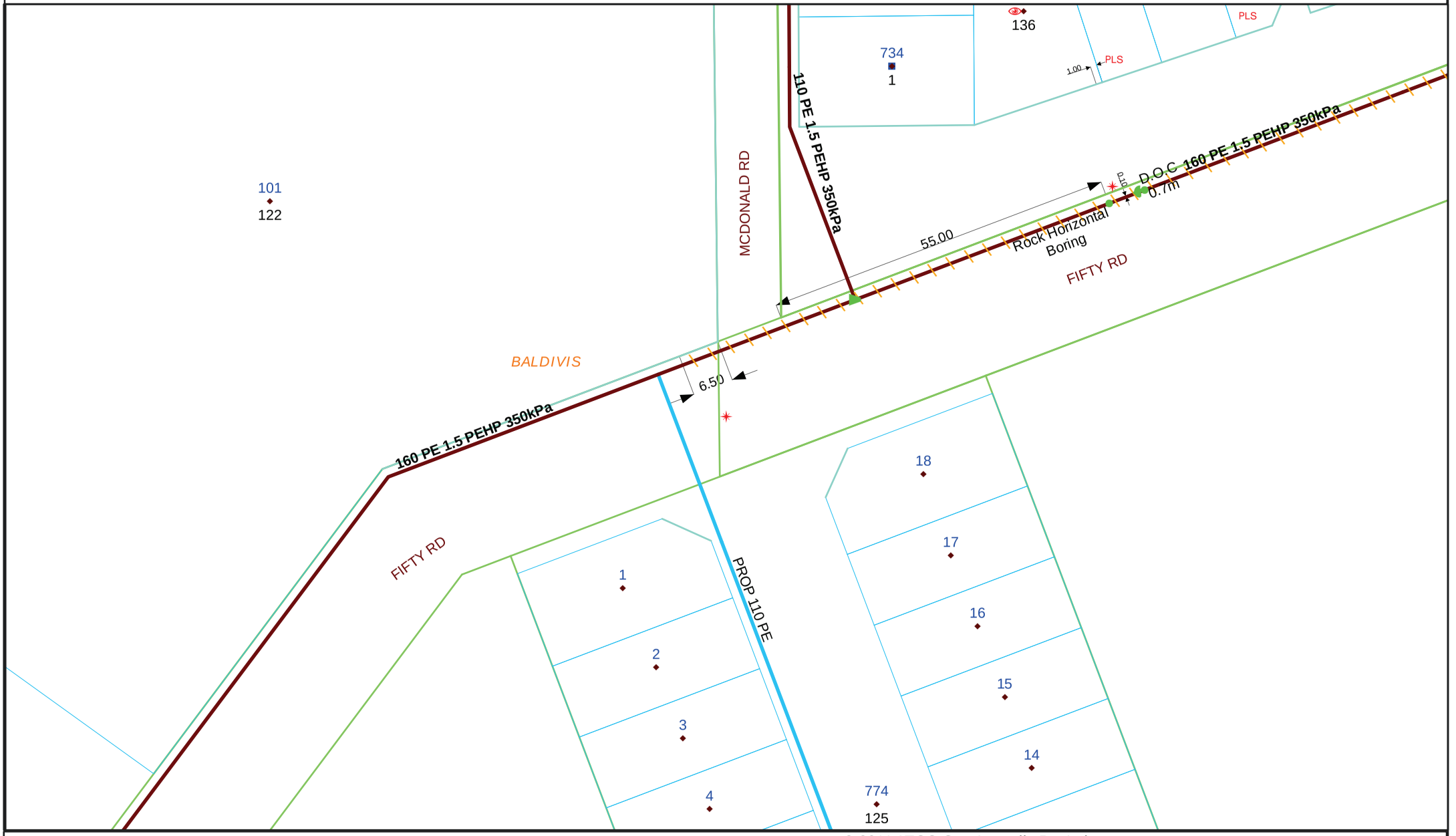
WARNING - HIGH PRESSURE PIPELINE IN THE VICINITY.

No works within 15 metres of this asset are permitted without prior approval from ATCO Gas Australia PH 1300 926 755



Sequence No: 44003107 | Map Tile: 4 | Scale: 1:800

Job No: 8854518 | Date:19/02/2015 | Location: Mcdonald Road, Baldivis 6171

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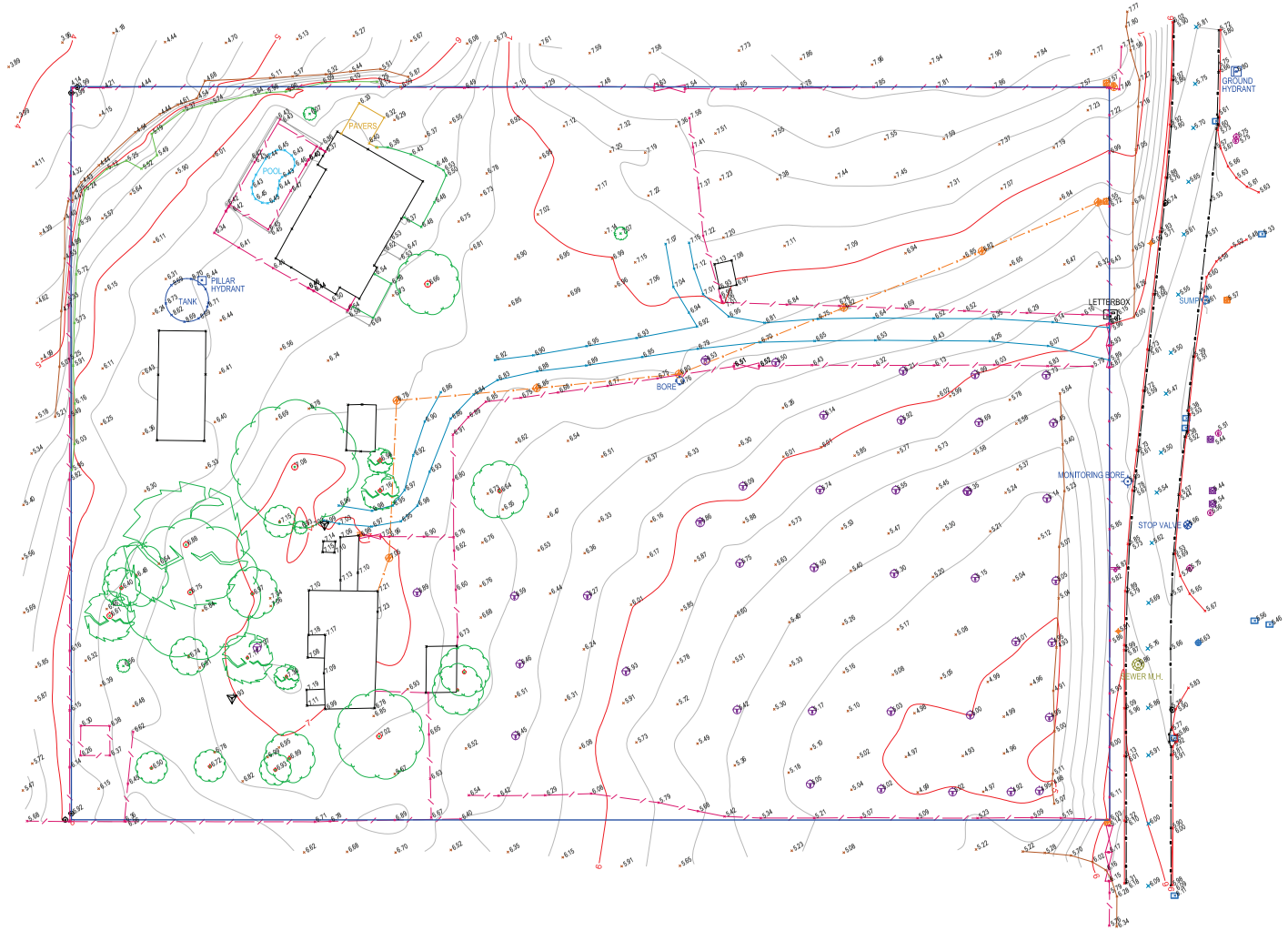
appendix seven: feature survey



LEGEND

- FENCE
- GATE
- EDGE OF BITUMEN
- MOUNTABLE KERB
- BOUNDARY
- TOP OF BANK
- UNSEALED ROAD
- OVERHEAD POWER
- POWER POLE
- LIGHT POLE (WITH ROAD SIGN)
- ELEC. PILLAR
- FUSEBOARD
- FLOOD LIGHT
- DRAINAGE M.H.
- S.E.P. / GRATED SUMP
- COMMS. PIT
- COMMS. MARKER
- IRRIGATION VALVE
- IRRIGATION TAP
- SPRINKLER
- CONTOUR
- INDEX CONTOUR

NO.	REVISION	STAFF	CHECK	DATE

NOTES :

10 0 10 20 metres

SCALE 1: 400

LEVEL DATUM :	AHD	SURVEYOR :	G.J.T. 23/12/2015
LEVEL AUTHORITY :	(PSMs)	DRAFTSMAN :	B.Z.S. 24/12/2015
CO-ORD DATUM :	Perth Coastal Grid 94 (PCG94)	CHECKED :	G.J.T.

Winnellie Central
Unit 7, 14 Winnellie Road
WINNELLIE NT 0820

GPO BOX 37869
WINNELLIE NT 0821

PHONE (08) 8944 7888
FAX (08) 8944 7820
E-MAIL fyfeNT@fyfe.com.au

DETAIL SURVEY
LOT 16
BALDIVIS
MACDONALD ROAD
WESTERN AUSTRALIA

CLIENT	D.H.A.
DATE	24/12/2015
SHEET	1 OF 1
PLAN NO.	71613 / 01
REV.	0

ORIGINAL SIZE A1

Pritchard Francis Pty Ltd

Level 1
430 Roberts Road
SUBIACO WA 6008
PO Box 2150
SUBIACO WA 6904

Tel: (08) 9382 5111
admin@pfeng.com.au

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BROOME WA 6725
PO Box 3634
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broome@pfeng.com.au

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pritchard francis

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