



ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

SOUWEST DEVELOPMENTS P/L

ON

**PRELIMINARY ENVIRONMENTAL SITE
ASSESSMENT**

FOR

PROPOSED REZONING

AT

STATION STREET, MENANGLE, NSW

13 MAY 2014

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EXECUTIVE SUMMARY

Elton Consulting, on behalf of SouWest Developments P/L ('the client') commissioned Environmental Investigation Services (EIS) to undertake a Preliminary Environmental Site Assessment (PESA) for the proposed rezoning of the site located off Station Street, Menangle, NSW.

The site is identified as Lots 201 and 202 in DP590247 and part of Lot 21 in DP581462. The site location is shown on Figure 1. The rezoning footprint, concept plan and the investigation area is shown on the attached Figure 2 and is referred to as 'the site' in this report.

The objectives of the PESA are to: assess the potential risk for widespread soil and groundwater contamination at the site; assess the potential risk to human health and the environment posed by the contaminants; and comment on the suitability of the site for the proposed rezoning and future residential landuse.

The scope of work for the PESA included: a site history assessment; walkover inspection of the site; soil and groundwater sampling; and laboratory analysis of selected samples.

The site history review and site inspection identified the following On-Site Areas of Environmental Concern (AEC) associated with the former use of the site for commercial/agricultural purposes since at least the 1900's:

- The use of chemicals such as pesticides for agricultural purposes. Based on the landuse, the potential for contamination associated with this activity is considered to be widespread;
- The use of fuel and other petroleum hydrocarbons for backup generators, vehicles and machinery. The potential for contamination will be confined to isolated areas associated with the point source;
- Former Above Ground Storage Tank (fuel) (AST) located in Lot 21. The potential for contamination will be confined to the immediate vicinity of the AST;
- Areas of dumped rubbish including galvanised iron drums, metal poles etc. The potential for contamination will be confined to isolated areas associated with the point source;
- Small stockpiles of fill scattered in some sections of the site. The potential for contamination will be confined to isolated areas associated with the point source;
- Former railway line located on Lot 21. The potential for contamination will be along the railway line and confined to the immediate vicinity of the line; and
- Hazardous building material including asbestos in the former rotolactor building, sheds, warehouses and buildings.

Samples for this investigation were obtained from 15 evenly spaced sampling points as shown on the attached Figure 2. The sampling locations were placed on a systematic plan with a grid spacing of approximately 250m between sampling locations.

Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. Some sections of Lot 202 (south-east and east) were excluded from the investigation as the final lot layout had not been finalised at the time of the field work.

The assessment included the installation of 4 groundwater monitoring wells in selected boreholes JK1, JK8, JK9 and JK15 spread across the site (see Figure 2).

Selected soil and groundwater samples were analysed for the potential contaminants of concern (PCC) outlined in **Section 8.4**. The results were assessed against the site assessment criteria (SAC) adopted for the PESA outlined in **Section 7**.



The soil samples analysed for this investigation did not encounter any elevations above the Health Based Investigation Levels (HILs). Based on these results, the occurrence of widespread contamination that may pose a risk to human receptors is considered to be relatively low.

Marginal elevations of lead above the most conservative Ecological Investigation Levels (EILs) was encountered in two surficial fill samples. These results are not considered to pose an ecological risk due to the following:

- The most conservative EILs have been adopted for the assessment as a preliminary screening tool;
- The vegetation across the entire site appears healthy and no visual indicators of stress were identified; and
- Future development of the site will involve large scale earthworks which might remove this material off-site.

The groundwater results indicate the presence of minor elevations of heavy metals above the GILs. Minor elevations of heavy metals are very common in groundwater associated with the Shale formation. These elevations are not considered to pose a significant risk to receptors.

Due to the preliminary nature of the investigation the following data gaps remain:

- Specific point source AEC (see attached Figure 3) have not been adequately investigated;
- Sections of the site were not investigated as the concept plan area (especially in Lot 202) was not finalised at the time of the site inspection and subsequent field work. Based on the review of the current aerial photograph, EIS are of the opinion widespread contamination in this area is unlikely. However, point source AEC cannot be ruled out; and
- Inaccessible areas (eg. beneath buildings and dense vegetation) have not been investigated.

EIS consider that the report objectives (see **Sections 1.2** and **Section 3**) have been addressed. Based on the scope of works undertaken, EIS are of the opinion that the site is suitable for the proposed rezoning to allow for residential and commercial landuses.

Prior to the commencement of earthworks, additional sampling should be undertaken in the vicinity of the point source AEC (shown on the attached Figure 3) to address the data gaps. A contingency plan should also be prepared for any unexpected finds during earthworks.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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1 INTRODUCTION

Elton Consulting, on behalf of SouWest Developments P/L ('the client') commissioned Environmental Investigation Services (EIS)¹ to undertake a Preliminary Environmental Site Assessment (PESA) for the proposed rezoning of the site located off Station Street, Menangle, NSW.

The site is identified as Lots 201 and 202 in DP590247 and part of Lot 21 in DP581462. The site location is shown on Figure 1. The rezoning footprint, concept plan and the investigation area is shown on the attached Figure 2 and is referred to as 'the site' in this report.

This report has been prepared for the proposed rezoning and future residential landuse of the site.

A geotechnical investigation was undertaken in conjunction with the PESA by JK Geotechnics². The results of the investigation are presented in a separate report (Ref. 27284Zrpt, dated May 2014³).

1.1 Proposed Rezoning Details

The concept plans provided for the preparation of this report is attached in the appendices. Based on a review of the plans, we understand that the rezoning area is spread over approximately 30 hectares. The area will accommodate up to approximately 350 residential lots serviced by internal roads. The development also includes a Creamery precinct in part of Lot 21 in DP581462 which will allow for commercial activities.

1.2 Objectives

The objectives of the PESA are to:

- Assess the potential risk for widespread soil and groundwater contamination at the site;
- Assess the potential risk to human health and the environment posed by the contaminants; and
- Comment on the suitability of the site for the proposed rezoning and future landuses.

¹ Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

² Geotechnical consulting division of J&K

³ Referred to as JK 2014 Report



1.3 Scope of Work

The PESA was undertaken generally in accordance with an EIS proposal (Ref: EP7750KB) of 5 February 2014 and email acceptance from the client of 26 February 2014.

The scope of work included:

- A review of background information made available to EIS;
- Preparation of site specific Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs);
- A review of site information and site history documents;
- A site inspection to identify areas of environmental concern (AEC);
- Preparation of a Preliminary Conceptual Site Model (PCSM) to outline the AEC, Potential Contaminants of Concern (PCC) and potential receptors;
- Design and implementation of a field sampling and laboratory analysis program;
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC); and
- Preparation of a report presenting the results of the assessment.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Amendment Act (2008 ⁴)
State Environmental Planning Policy No.55 – Remediation of Land (1998 ⁵)
Guidelines for Consultants Reporting on Contaminated Sites (2011 ⁶)
Guidelines on the Duty to Report Contamination ⁷
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006 ⁸)

⁴ NSW Government Legislation, (2008), *Contaminated Land Management Amendment Act*. (referred to as CLM Amendment Act 2008)

⁵ NSW Government, (1998), *State Environmental Planning Policy No. 55 – Remediation of Land*. (referred to as SEPP55)

⁶ NSW Office of Environment and Heritage (OEH), (2011), *Guidelines for Consultants Reporting on Contaminated Sites*. (referred to as Reporting Guidelines 2011)

⁷ NSW EPA, (Draft 2011), *Guidelines on the Duty to Report Contamination*. (referred to as Duty to Report Contamination 2011)

⁸ NSW DEC, (2006), *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)



Guidelines/Regulations/Documents

National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013)⁹

NSW EPA Contaminated Sites Sampling Design Guidelines (1995)¹⁰

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)¹¹

Australian Drinking Water Guidelines (2011)¹²

⁹ National Environment Protection Council (NEPC), (2013), *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*. (referred to as NEPM 2013)

¹⁰ NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines*. (referred to as EPA Sampling Design Guidelines 1995)

¹¹ ANZECC, (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. (referred to as ANZECC 2000)

¹² National Health and Medical Research Council, (2011), *Australian Drinking Water Guidelines*. (referred to as ADWG 2011)



2 BACKGROUND

2.1 Constraints and Opportunity Mapping (ERM, August 2008¹³)

EIS has been issued with a Draft report on the Constraints and Opportunities Mapping for the Wollondilly Development Site prepared by ERM dated August 2008. The report was prepared for Macquarie Bank Limited and included a brief contamination study (desktop and inspection) of the site.

The study indicated that the site was predominantly used for cattle grazing purposes and contained pastures and some buildings including a rotolactor facility (automated cow milking). The key contamination issues identified at the site included:

- Use and storage of fuels associated with the rotolactor operations;
- Hazardous building materials used in the buildings;
- Waste material remaining from historical operations like oil drums, an above ground storage tank (AST) etc.; and
- ASTs located at the former creamery site.

The ERM report concluded that the risk of potential contamination from the above was relatively high. A limited Phase 2 ESA was recommended prior to development of the site.

¹³ ERM, (2008), *Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW - Draft*. Prepared for Macquarie Bank Limited (Report Ref: 0087207, dated August 2008) (referred to as ERM 2008 Report)



3 DATA QUALITY ASSESSMENT

3.1 Data Quality Objectives (DQOs)

The DQOs provide a systematic approach for undertaking the assessment and outlines the criteria against which the data can be assessed.

A methodology for establishing the DQOs is presented in the document *Data Quality Objectives Process for Hazardous Waste Site Investigations* (2000¹⁴). This methodology has been adopted in the NEPM 2013, AS4482.1-2005¹⁵ and the Site Auditor Guidelines 2006. The main steps involved in preparing the DQOs are summarised in the table below:

Table 3-1: DQOs

Step	Input
State the Problem	The presence of contamination may pose a risk to human health and the environment. A PESA is required to assess the potential risk and to comment on the suitability of the site for the proposed rezoning and future landuse.
Identify the Decisions	The assessment aims to address the objectives outlined in Section 1.2 .
Identify Inputs into the Decision	<p>The following inputs will be used to address the decisions:</p> <ul style="list-style-type: none"> • Review of background information (see Section 2); • Review of site information including: regional geology; topography; acid sulfate soil (ASS) risk; salinity risk; hydrogeology; surface water flow; and review of major services (see Section 4); • Review of site history information (see Section 5); • Undertake a site inspection to identify the AEC (see Section 4); • Prepare a PCSM (see Section 6); • Design and implementation of a field sampling program (see Section 8); • Design and implementation of a laboratory analysis program (see Section 8); • Assessment of analytical data. The DQIs that will be used to assess the analytical data are outlined in Section 3.2; and • Compare the analytical results against the SAC outlined in Section 7.
Study Boundary	The investigation was confined to the proposed development area of the site as shown in Figure 2.

¹⁴ US EPA, (2000), *Data Quality Objectives Process for Hazardous Waste Site Investigations*. (referred to as US EPA 2000)

¹⁵ Standards Australia, (2005), *Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil*. (referred to as AS 2005)



Step	Input
Develop a Decision Rule	<p>The analytical results will be assessed against the SAC (see Section 7).</p> <p>The NEPM 2013 recommends using statistical analysis to assess the laboratory data for soil samples against the health based SAC. The data set should be assessed against the following criteria:</p> <ul style="list-style-type: none"> • The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC; • The standard deviation (SD) of the results must be less than 50% of the SAC; and • No single value exceeds 250% of the relevant SAC. <p>Statistical calculations are not required if all results are below the SAC. Statistical calculations are not undertaken on the following:</p> <ul style="list-style-type: none"> • Health Screening Levels (HSLs) – elevated point source contamination associated with petroleum hydrocarbons can pose a vapour risk; • Ecological Investigation Levels (EILs) – elevated EILs can pose a potential point source ecological risk; and • Groundwater Investigation Levels (GILs) – elevated GILs can indicate a wider groundwater contamination risk.
Specific Limits on Decision Errors	<p>Decision errors are false positive (i.e. stating the site is free of contamination when it is not) or false negative (i.e. stating that the site is contaminated when it is not). The more significant error is the false positive which may result in potential risks to human health and the environment. To account for this, the assessment has assumed that elevated concentrations of contaminants are present in the samples unless demonstrated otherwise.</p>
Optimise the Design for Obtaining Data	<p>The Site Auditor Guidelines 2006 recommend evaluating the data set as a whole to determine any limitations within the data set. The overall data set will be optimised by reviewing the data as the project proceeds. When necessary, adjustments will be made to the sampling or analytical program.</p>

3.2 Data Quality Indicators (DQIs)

The DQIs required to address inputs into the decision include: precision, accuracy, representativeness, completeness and comparability. Reference should be made to the appendices for further information of the DQIs. The DQIs will be addressed as follows:



Table 3-2: DQIs

Indicator	Methods
Completeness	<p>Data and documentation completeness will be achieved by:</p> <ul style="list-style-type: none"> • Preparation of sampling and analysis plan; • Preparation of chain of custody (COC) records; • Review of the laboratory sample receipt information; • Use of National Association of Testing Authorities (NATA) registered laboratories for all analysis; • Visual, olfactory and PID screening of samples during the investigation; and • Laboratory analysis to target PCC. Any changes to the analytical schedule to be documented.
Comparability	<p>Data comparability will be achieved by:</p> <ul style="list-style-type: none"> • Maintaining consistency in sampling techniques; • Use of appropriate preservation, storage and transport methods; and • Use of consistent analysis techniques and reporting standards by the laboratories.
Representativeness	<p>Data representativeness will be achieved by:</p> <ul style="list-style-type: none"> • Appropriate coverage of sample locations across accessible areas of the site as shown on the attached Figure 2; and • Representative coverage of analysis for PCC. Any changes to the analytical schedule to be documented.
Precision	<p>Precision will be achieved by:</p> <ul style="list-style-type: none"> • Calculating the relative percentage difference (RPD) of duplicate samples; • The following acceptance criteria will be used to assess the RPD results: <ul style="list-style-type: none"> ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results < 5 times PQL, RPDs < 100% are acceptable; and • An explanation is provided if RPD results are outside the acceptance criteria.
Accuracy	<p>Accuracy will be achieved by:</p> <ul style="list-style-type: none"> • Use of trained and qualified field staff; • Appropriate industry standard sampling equipment and decontamination procedures; • Sampling and screening equipment will be factory calibrated on a regular basis. Calibration will be checked internally prior to use; • Sampling and equipment decontamination; • Collection and analysis of field Quality Assurance (QA) and Quality Control (QC) samples for PCC;



Indicator	Methods
	<ul style="list-style-type: none"> • The field QA/QC analysis as outlined in Section 10; • Acceptable concentrations in Trip Spike, Trip Blank and Field Rinsate samples. Non-compliance to be documented in the report; • Appropriate sample preservation, handling, holding time and COC procedure; • Review of the primary laboratory QA/QC data including: RPDs, surrogate recovery, repeat analysis, blanks, laboratory control samples (LCS) and matrix spikes; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: <ul style="list-style-type: none"> ➤ <u>RPDs</u>: <ul style="list-style-type: none"> ○ results that are < 5 times the PQL, any RPD is acceptable; and ○ results > 5 times the PQL, RPDs between 0-50% are acceptable; ➤ <u>LCS recovery and matrix spikes</u>: <ul style="list-style-type: none"> ○ 70-130% recovery acceptable for metals and inorganics; ○ 60-140% recovery acceptable for organics; and ○ 10-140% recovery acceptable for VOCs; ➤ <u>Surrogate spike recovery</u>: <ul style="list-style-type: none"> ○ 60-140% recovery acceptable for general organics; and ○ 10-140% recovery acceptable for VOCs; ➤ <u>Blanks</u>: All less than PQL; and • Reporting to industry standards.



4 SITE INFORMATION AND PHYSICAL SETTING

4.1 Site Identification

Table 4-1: Site Identification Information

Site Owner:	El Bethel Pty Ltd (Lots 201 and 202 in DP590247) and The Central Creamery Pty Ltd (Lot 21 in DP581462)
Site Address:	15 Menangle Road, Menangle, NSW (Lot 201) 1370 Moreton Road, Menangle, NSW (Lot 202) 45 Stevens Road, Menangle, NSW (Lot 21)
Lot & Deposited Plan:	Lots 201 and 202 in DP590247 Part of Lot 21 in DP581462
Current Land Use:	Lots 201 and 202 are predominantly rural land Lot 21 is a mix of rural and former commercial land use
Proposed Land Use:	Residential landuse at Lots 201 and 202 Part of Lot 21 will be developed for commercial purposes
Local Government Authority:	Wollondilly
Current Zoning:	Lot 201 – RU1 Primary Production & R2 Low Density Residential Lot 202 – RU1 Primary Production Lot 21 – RU1 Primary Production
Proposed Rezoning Area (hectares):	30 hectares
RL (AHD in m) (approx.):	70m to 90m
Geographical Location (MGA) (approx.):	Lot 201 - N: 6221790 E: 291660 Lot 202 - N: 6221530 E: 292190 Lot 21 - N: 6222005 E: 291900
Site Location Plan:	Figure 1
Borehole Location Plan:	Figure 2
Site Plan Showing AEC:	Figure 3



4.2 Site Location and Setting

The site is located in a predominantly rural area of Menangle as shown on the attached Figure 1. The site is relatively large and generally bounded by Hume Highway to the east, by Menangle Road to the west and by Nepean River to the north. Station Street runs along the west end of the south site boundary.

The site is divided by the existing Southern Highlands Rail Line which generally runs in a north to south direction through the site. Menangle Station is located centrally within the site. The existing Menangle village is located immediately to the south-west of the site.

4.3 Topography

The site is located in a slightly undulating topographic setting which generally falls to the north towards Nepean River and west towards Hume Highway.

The site itself is generally undulating and characterised by shallow gully features and low rolling hills. The railway line in the central section of the site is raised on an embankment which is raised further to the north along the Nepean River.

4.4 Site Inspection

A walkover inspection of the site was undertaken on 6 March 2014. The inspection was limited to accessible areas of the site and did not include an internal inspection of buildings. Some sections of Lot 202 were not inspected as the former rezoning area did not extend to these areas.

The key site features and selected photographs obtained during the site inspection are summarised in the table below:

Table 4-2: Site Description

Lot 201 in DP590247



The lot was predominantly pastoral rural land covered with grass. The north and west sections of the lot were vacant. Numerous gully features were located in the central section of the lot which generally ran from the higher south section to the lower north section. A dam was located in the low lying section of the lot further to the north of the development area. The gully features drained into the dam. Small shrubs and dense vegetation was present in some sections of the lot.

A dirt track was located in the central section of the lot which ran from east to west.

A few small single storey houses were located on the west lot boundary with frontage onto Menangle Road.



The south-east section of the lot was occupied by a dilapidated rotolactor facility and associated infrastructure. A few sheds were located to the north-west and south of the rotolactor facility.

A relatively large shed with a roof comprising of galvanised iron sheeting was located to the south of the rotolactor. A dirt access road was located to the immediate east of the large shed. The road provided access onto the lot from Stevens Road. Smaller sheds were scattered in the immediate vicinity of the rotolactor.



Rubbish

A large area of dumped rubbish predominantly containing metal and construction material was located to the west of the rotolactor. This included a large disused dairy truck and galvanised iron drums. This area has been identified as an AEC in the PCSM.



Stockpiles

Small stockpiles were located to the immediate west of the rubbish dump. The stockpiles were covered with weeds and/or small bushes. These stockpiles have been identified as AEC in the PCSM.



A small single storey residence was located to the south-east of the rotolactor facility. The residence appeared to be occupied at the time of the inspection.

A small stockpile of fill containing building rubble was located to the south of the residence. This stockpile has been identified as an AEC in the PCSM.

The residence was fenced off from the remaining lot with access via Stevens Road.

Lot 202 in DP590247



The lot was predominantly pastoral rural land covered with grass. Large sections of the lot (mainly central and south) were occupied by dense vegetation. The west and north-west sections of the lot were vacant with grass cover. Scattered trees were located in these areas. Dirt roads provided access to these areas from Station Street. The north section of the lot was low lying (potentially flood prone) and generally sloped further to the north towards the Nepean River. A large creek was located in the central section of the lot which generally ran from south to north towards the Nepean River.



A small concrete structure was located on a raised platform on the north-west site boundary. The structure appeared to be associated with the railway infrastructure. The railway line was located along the west lot boundary and was raised above the lot level for the majority of its length.



The central section of the lot was occupied by dilapidated sheds/buildings which appeared to have been used for rural purposes. The immediate surrounds were scattered with dumped rubbish including metal poles and other building material. This area has been identified as an AEC in the PCSM.

Dirt roads provided access to the sheds/buildings from Station Street located to the west.



A relatively small area in the central section of the lot had been cut into. This disturbed area appeared to have been associated with the former rural landuse. Soil was exposed at the surface in some sections.

Stockpiles of fill material were located in the central section of the lot. The stockpiles were covered with weeds. The stockpiles have been identified as an AEC in the PCSM.

A small residence was located in the central section with frontage onto Station Street. Station Street extended onto the lot over a small bridge over the railway line.

The south and south-east sections of the lot were not inspected. This is a data gap which needs to be addressed in the next stage of investigation.

Lot 21 in DP581462



The lot housed the former Creamery building and associated infrastructure. A dirt track provided access onto the lot from the south via Stevens Road. The access road was generally gravel surfaced with some patches of asphalt paving which appeared to be in a poor condition.



The former Creamery building appeared to be dilapidated and derelict. A former railway line was located to the south of the building which appeared to run further to the south. A large shed was located in the vicinity of the railway line.

A disused above ground storage tank (AST) was located to the north of the building. The AST has been identified as an AEC in the PCSM.

4.5 Surrounding Land Use

The immediate surrounds included the following landuses:

- North – Commercial activities associated with Benedict Industries;
- South – Menangle town centre;
- East – Hume Highway; and
- West – Rural and low density residential.

4.6 Underground Services

A brief summary of relevant information is presented below:

Table 4-3: Summary of Services

Service	Location	Contaminant Migratory Pathway
Telecom	The plan indicates that telecommunication services extend onto Lot 21 and Lot 202 from Station Street and Stevens Road towards existing buildings.	These services are not considered to be a potential migratory pathway.

4.7 Regional Geology

A review of the regional geological map of Wollongong (1985¹⁶) indicates that the site is underlain by Hawkesbury Sandstone with the sandstone being capped by the Ashfield Shales over higher lying western portion of the site. Hawkesbury Sandstone typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses. Ashfield Shale typically consists of black to dark grey shale and laminite. Reference should be made to Section 9.1 for site specific information.

4.8 Acid Sulfate Soil (ASS) Risk

The site is not located in an ASS risk area.

4.9 Salinity Risk

The site is located within the area of Western Sydney included in the Salinity Potential Map 2002. Based upon interpretation from the geological formations and soil groups presented on the map, the site is located in a region of moderate to high salinity potential.

¹⁶ Department of Mineral Resources, (1985), *1:100,000 Geological Map of Wollongong-Port Hacking (Series 9029-9129)*.

The moderate classification is attributed to scattered areas of scalding and indicator vegetation, in areas where concentrations have not been mapped. Saline areas may occur in this zone, which have not been identified or may occur if risk factors change adversely.

4.10 Hydrogeology

A review of groundwater bores registered with the NSW Office of Water¹⁷ (NOW) was undertaken by EIS. The search was limited to registered bores located within approximately 5km of the site.

The search indicated the existence of 4 registered bores within the wider site. Copies of the records are attached in the appendices. The bores are located in the low lying areas towards the north section of the lots in the vicinity of the Nepean River. All of the bores are registered for irrigation purposes as outlined on the records attached in the appendices.

The stratigraphy of the site is expected to consist of residual clayey soils overlying relatively shallow bedrock. Based on these conditions, groundwater is not considered to be a significant resource in the development area.

A perched aquifer located in the shallow subsurface is generally of poor quality and high in salinity. Perched aquifers in shale often contain concentrations of naturally occurring heavy metals which may be above the investigation triggers values outlined in ANZECC 2000.

Reference should be made to **Section 9** for further information regarding the groundwater conditions encountered at the site during the investigation.

4.11 Surface Water Flows

Surface water run-off is anticipated to drain into the existing gullies and creeks located at the site. Excess surface water is anticipated to flow in sympathy with the site topography towards the north and north-east of the wider site.

¹⁷ <http://www.waterinfo.nsw.gov.au/gw/>, visited on 30 April 2014

5 SITE HISTORY ASSESSMENT

5.1 Aerial Photographs

Historical aerial photographs of the site and immediate surrounds were reviewed for the assessment. The majority of the photographs were obtained from the NSW Department of Lands. Copies of selected photos are attached in the appendices. A summary of the relevant information is presented in the following table:

Table 5-1: Summary of Historical Aerial Photos

Year	Details
1947	<p>The photograph was of poor quality.</p> <p><u>Lot 201:</u> The majority of the lot was vacant pastoral land. A large dam was located in the central section of the lot. Numerous gullies were located in the central section which drained into the dam. Dirt tracks were located across the site. The east section of the lot was occupied by numerous sheds. A hard stand area was located between the sheds. A dirt track ran from the buildings to the south of the site towards Station Street.</p> <p>A few small residences were located further to the north-west of the dam beyond the development area.</p> <p><u>Lot 21:</u> The lot appeared to form part of the larger Lot 201. Numerous buildings described above were located in this lot.</p> <p><u>Lot 202:</u> The majority of the lot was vacant pastoral land. A large creek was located in the central section of the site which ran from south to north. Dense vegetation was located along the creek line. The area to the east of the creek was bushland. The area to the west of the creek had been used for agricultural purposes. Some sections had been cleared for cattle grazing or similar purpose. Dirt tracks provided access onto the lot from Station Street.</p> <p><u>Regional Surrounds:</u> The majority of the immediate surrounding areas were vacant and/or pastoral land. A few scattered residences were located along Menangle Road and Station Street.</p>
1956	<p><u>Lot 201:</u> The majority of the lot appeared similar to the 1947 photograph. A large rotolactor and associated infrastructure was located in the south-east section of the lot. Large cattle pens were located in the south section of the lot.</p>



Year	Details
	<p><u>Lot 21:</u> Appeared to form part of the wider Lot 201. The Creamery building and associated infrastructure was located on the lot.</p> <p><u>Lot 202:</u> The majority of the lot appeared similar to the 1947 photograph. Numerous smaller pens were clustered in the central section of the lot to the west of the creek. A few buildings were also located in this area.</p> <p><u>Regional Surrounds:</u> The immediate surrounds appeared similar to the 1947 photograph.</p>
1965	<p><u>Lot 201:</u> The majority of the lot appeared similar to the 1956 photograph. A few additional warehouses were located in the vicinity of the rotolactor and associated infrastructure.</p> <p><u>Lot 21:</u> The lot appeared similar to the 1956 photograph.</p> <p><u>Lot 202:</u> The majority of the lot appeared similar to the 1956 photograph.</p> <p><u>Regional Surrounds:</u> The immediate surrounds appeared similar to the 1956 photograph.</p>
1975	The site and immediate surrounds appeared similar to the 1965 photograph.
1984	The site and immediate surrounds appeared similar to the 1975 photograph.
1994	The site and immediate surrounds appeared similar to the 1984 photograph.
2005	The site and immediate surrounds appeared similar to the 1994 photograph.

5.2 Land Title Search

Land title records were reviewed for the assessment. The record search was performed by Advance Legal Searchers Pty Ltd. Copies of the title records are attached in the appendices. A summary of the relevant information is presented in the following table:



Table 5-2: Summary of Land Title Information

Date	Proprietor
Lot 201 DP 590247	
1999 – todate (2003 – todate)	El Bethel Pty Ltd (Profit a Pendre to Menangle Sand & Soil Pty Limited)
1990 – 1999	Halfpenny Hobbs Pty Limited
1988 – 1990	Leppington Pastoral Co Pty Limited (Lot 201 DP 590247 – CTVol 13447 Fol 97)
1986 – 1988	Leppington Pastoral Co Pty Limited
1983 – 1986	Halfpenny Hobbs Pty Limited
1977 – 1983	Camden Park Estate Pty Limited (Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited (Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited (Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited (Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited (Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited (Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited (Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited
Lot 202 DP 590247	
1999 – todate (2003 – todate)	El Bethel Pty Ltd (Profit a Pendre to Menangle Sand & Soil Pty Limited)
1988 – 1999	Halfpenny Hobbs Pty Limited (Lot 202 DP 590247 – CTVol 13447 Fol 98)
1983 – 1988	Halfpenny Hobbs Pty Limited
1977 – 1983	Camden Park Estate Pty Limited (Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited (Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited (Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited (Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited



Date	Proprietor
	(Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited
Lot 21 DP 581462	
2005 – todate	The Central Creamery Pty Limited
1989 – 2005	Ian Russell Kelley, self employed Norma Rae Kelley, wife
1988 – 1989	Dairy Farmers Co-Operative Limited
	(Lot 21 DP 581462 – CTVol 13006 Vol 159)
1976 – 1988	Dairy Farmers Co-Operative Limited
1972 – 1976	Camden Park Estate Pty Limited
	(Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited
	(Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited
	(Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited
	(Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited

5.3 Wollondilly Council Records

5.3.1 Public Information

An application to review the council records was made as part of the assessment. Copies of relevant documents are attached in the appendices. A summary of the relevant information is outlined in the table below:



Table 5-3: Summary of Public Information

Lot Number	Details
Lot 201 in DP590247	<p>An approval was granted in 1989 to Menangle Sand and Soil Supplies Pty Ltd for the extraction of sand and soil from the Nepean River. This activity is confined to the north section of the lot which is outside the development area.</p> <p>The records indicate that development applications (DA) were submitted in 2004 and 2006 for the subdivision of the lot into 24 and 19 lots respectively. In 2009 a DA was submitted for the earthworks in conjunction with an approved subdivision.</p> <p>A planning proposal has been submitted to council in 2012 for the rezoning of the lot for residential and mixed use purposes. This report has been prepared in support of this application.</p>
Lot 202 in DP590247	<p>An approval was granted in 1989 to Menangle Sand and Soil Supplies Pty Ltd for the extraction of sand and soil from the Nepean River. This activity is confined to the north section of the lot which is outside the development area.</p> <p>A planning proposal has been submitted to council in 2012 for the rezoning of the lot for residential and mixed use purposes. This report has been prepared in support of this application.</p>
Lot 21 in DP581462	<p>A planning proposal has been submitted to council in 2012 for the rezoning of the lot for residential and mixed use purposes. This report has been prepared in support of this application.</p>

5.3.2 Section 149 Planning Certificate

The s149 (2 and 5) planning certificates were reviewed for the assessment. Copies of the certificates are attached in the appendices. A summary of the relevant information is presented in the table below:

Table 5-4: Summary of s149 Information

Lot Number	Details
Lot 201 in DP590247	<ul style="list-style-type: none"> The lot contains an item of environmental heritage; The lot is within a proclaimed Mine Subsidence District, approval is required for all subdivision and building work; A portion of the lot has been identified as being flood prone within the Upper Nepean River 1% AEP Flood zone; The lot is partly bushfire prone; The lot is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM



Lot Number	Details
	<p>Act 1997;</p> <ul style="list-style-type: none"> • The lot is not subject to a Site Audit Statement (SAS); and • The lot is not located within an ASS risk area.
Lot 202 in DP590247	<ul style="list-style-type: none"> • The lot contains an item of environmental heritage; • The lot is within a proclaimed Mine Subsidence District, approval is required for all subdivision and building work; • The lot is partly bushfire prone; • The lot is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM Act 1997; • The lot is not subject to a Site Audit Statement (SAS); and • The lot is not located within an ASS risk area.
Lot 21 in DP581462	<ul style="list-style-type: none"> • The lot is within a proclaimed Mine Subsidence District, approval is required for all subdivision and building work; • A portion of the lot has been identified as being flood prone within the Upper Nepean River 1% AEP Flood zone; • The lot is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM Act 1997; • The lot is not subject to a Site Audit Statement (SAS); and • The lot is not located within an ASS risk area.

5.4 WorkCover Records

WorkCover records were reviewed for the assessment. The search did not indicate any licences to store dangerous goods including underground fuel storage tanks (USTs) or above ground storage tanks (ASTs) at the site. A copy of the letter is attached in the appendices.

5.5 NSW EPA Records

The NSW EPA records available online were reviewed for the assessment. Copies of relevant documents are attached in the appendices. A summary of the relevant information is provided in the following table:



Table 5-5: Summary of NSW EPA Online Records

Source	Details
CLM Act 1997 ¹⁸	There were no notices for the site under Section 58 of the Act.
NSW EPA List of Contaminated Sites ¹⁹	The site is not listed on the NSW EPA register.
POEO Register ²⁰	The POEO records indicate the existence of an EPA licence number 3991 (issued in 2000) for Menangle Sand and Soil Pty Ltd. The licence pertains to land-based extractive activity such as crushing, grinding or separating and the recovery of general waste. The activities are outside the development area and hence not addressed in this report.

5.6 Summary of Site History

Table 5-6: Summary of Site History

Time Line	Details	Source
1900's to 1950's	The site was owned by Camden Park Estate Pty Ltd. The aerial photos indicate that the landuse appeared to be predominantly vacant pastoral land. Sections of the site were used for agricultural purposes. Numerous buildings associated with the rural landuse were scattered across the site.	Land Title Records & Aerial Photos
1950's to 1980's	The site was owned by Camden Park Estate Pty Ltd up until the early 1980's. Lot 21 was owned by Dairy Farmers Co-operative Limited between 1976 and 1989. The aerial photos indicate that a large rotolactor and associated infrastructure was constructed at the site in the mid 1950's.	Land Title Records & Aerial Photos
1990's to present	<p>Lots 201 and 202 were owned by numerous companies until 1999. After which the lots were owned by El Bethel Pty Ltd.</p> <p>Lot 21 was owned by The Central Creamery Pty Ltd since 2005.</p> <p>The aerial photos indicate that the landuse in the proposed rezoning area continued to remain rural. The rotolactor and associated activities appeared to have ceased in the late 1990's.</p>	Land Title, Council and EPA Records & Aerial Photos

¹⁸ <http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx>, visited on 5 May 2014

¹⁹ <http://www.epa.nsw.gov.au/clm/publiclist.htm>, visited on 5 May 2014

²⁰ <http://www.epa.nsw.gov.au/prpoeoapp/>, visited on 5 May 2014



Time Line	Details	Source
	<p>The council records indicate that approval was granted to Menangle Sand and Soil Supplies Pty Ltd for the extraction activities on Lots 201 and 202 in 1989. The EPA issued a licence for the activity in 2000. The activity is confined to the north section of the lot which is outside the development area.</p> <p>A planning proposal has been submitted to council in 2012 for the rezoning of the lot for residential and mixed use purposes. This report has been prepared in support of this application.</p>	

5.7 Integrity of Site History Information

The majority of the site history information has been obtained from government organisations as outlined above. The veracity of the information from these sources is considered to be relatively high. A certain degree of information loss can be expected given the age of the development; gap between aerial photographs; and lack of detailed information prior to the 1900's.

6 PRELIMINARY CONCEPTUAL SITE MODEL (PCSM)

6.1 Areas of Environmental Concern (AEC) & Potential Contaminants of Concern (PCC)

The AEC identified in the table below are based on a review of the background information, site history information and site inspection. The AEC are sections of the site that have potentially been impacted by activities, site conditions and/or specific features that could present an environmental concern with regards to potential contamination.

Table 6-1: AEC and PCC

AEC	PCC
<p><u>Commercial/Agricultural On-Site Activity:</u></p> <p>The site was used for commercial and agricultural purposes since at least the 1900's.</p> <p>The following land uses/activities could have resulted in contamination:</p> <ul style="list-style-type: none"> • The use of chemicals such as pesticides for agricultural purposes. Based on the landuse, the potential for contamination associated with this activity is considered to be widespread; • The use of fuel and other petroleum hydrocarbons for backup generators, vehicles and machinery. The potential for contamination will be confined to isolated areas associated with the point source; • Former AST located in Lot 21. The potential for contamination will be confined to the immediate vicinity of the AST; • Areas of dumped rubbish including galvanised iron drums, metal poles etc. The potential for contamination will be confined to isolated areas associated with the point source; • Small stockpiles of fill scattered in some sections of the site. The potential for contamination will be confined to isolated areas associated with the point source; • Former railway line located on Lot 21. The potential for contamination will be along the railway line and confined to the immediate vicinity of the line; and • Hazardous building material including asbestos in the former rotolactor building, sheds, warehouses and buildings. <p>The majority of the above AEC have the potential for point source contamination.</p>	<p>HM, TPH, BTEX, VOCs, PAHs, OCPs, OPPs, PCBs and asbestos</p>



AEC	PCC
<p><u>Commercial/Industrial Activity in the Immediate Surrounds:</u></p> <p>Some sections to the north of the development area have been used for extractive purposes associated with Menangle Sand and Soil Pty Ltd.</p> <p>The activity is not located in the development area. Based on the location and topography of the wider site, EIS consider the risk of contamination from the activity to be relatively low.</p>	

6.2 Contamination Fate and Transport

The fate and transport of PCC identified at the site is summarised in the following table:

Table 6-2: Fate and Transport of PCC

PCC	Fate and Transport
Non-volatile contaminants including: metals, heavy fraction PAHs, OCPs, OPPs, PCBs and asbestos	<p>With the exception of asbestos, non-volatile contaminants are predominantly confined to the soil and groundwater medium. The mobility of these contaminants varies depending on: the nature and type of contaminant present (e.g. leachability, viscosity etc.); soil type/porosity; surface water infiltration; groundwater levels; and the rate of groundwater movement.</p> <p><i>Presence of Ash and Slag:</i></p> <p>Non-volatile contaminants associated with ash and slag waste (some heavy metals, heavy fraction PAHs, and sometimes heavy fraction TPHs) are bound within a relatively insoluble matrix. Slag and ash is usually formed as a by-product of combustion at high temperatures which 'locks in' the contaminants within the matrix.</p> <p><i>Presence of Asbestos:</i></p> <p>The potential transport of asbestos fibres is associated with the disturbance of asbestos contaminated soils and release of fibres into the atmosphere. This is likely to occur during excavation works.</p> <p>A number of studies have found that soils effectively filter out asbestos fibres and retain them within the soil matrix. The studies concluded that there is no significant migration of asbestos fibres, either through soil or groundwater.</p> <p><i>Site Conditions:</i></p> <p>Surface water has the potential to infiltrate into the subsurface at the subject site. Surface water infiltration could increase the migration potential of certain contaminants. Excess surface water</p>

PCC	Fate and Transport
	has the potential to run-off into creek lines, dams and low lying areas like gullies etc. located at the site.
Volatile contaminants including: TPH, BTEX, VOCs and light fraction PAHs	<p>Volatile contaminants are usually more mobile when compared to the non-volatile compounds. The potential for migration of volatile contaminants such as light fraction PAHs and TPH is relatively high in sandy soil with a high water table. These contaminants break down rapidly as a result of microbial activity and availability of nutrients including nitrogen, oxygen etc.</p> <p>The mobile contaminants would be expected to move down to the rock surface or groundwater table and migrate down gradient from the source. The mobility would depend on a range of factors such as: soil type/porosity; surface water infiltration; groundwater levels; confining layers within the aquifer; solubility in groundwater etc.</p>

6.3 Sensitive Receptors and Exposure Pathways

The potential receptors and exposure pathways identified at the site are presented in the following table:

Table 6-3: Potential Receptors and Exposure Pathways

Receptor	Pathway
Human Receptors: <ul style="list-style-type: none"> Site occupants; Site visitors; Contractors and workers; Future site occupants; and Off-site occupants. 	<ul style="list-style-type: none"> Dermal contact, ingestion and inhalation; Inhalation of airborne asbestos fibres; and Abstraction and use of contaminated groundwater.
Environmental Receptors: <ul style="list-style-type: none"> The creek lines and low lying gullies located at the site; The manmade dam located to the north of Lot 201; Nepean River located approximately 500m-600m to the north of the development area. 	<ul style="list-style-type: none"> Exposure by direct contact with plants and animals; Extraction and use of contaminated water for irrigation and other rural landuses; and Surface water run-off into creeks, gullies, dams and other water bodies.



7 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for this PESA are outlined in the table below. The SAC have been derived from NEPM 2013 and other guidelines as outlined in **Section 1.3**. Explanatory notes are included in the attached appendices.

The guideline values for individual contaminants outlined in Schedule B1 of the NEPM 2013 are reproduced in the appendices. The criterion for the individual contaminants analysed for this assessment are presented in the attached report tables.

Table 7-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs)	The future landuse is predominantly residential with accessible soils. The HIL-A criteria has been adopted for this PESA.
Health Screening Levels (HSLs)	The HSL-A criteria for residential with accessible soil have been adopted for this PESA. This criteria will be used to assess both soil and groundwater results.
Ecological Assessment Criteria	<p>The Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) have been adopted for this ESA. The criteria for 'urban residential and public open space (UR&POS)' exposure setting have been adopted.</p> <p>Soil parameters including pH, cation exchange capacity (CEC) and clay content have not been assessed as part of the EAC. On this basis, the EIL and ESL calculations have taken the 'worst case' scenario in order to generate the EAC. The EAC are presented in conjunction with the relevant report tables.</p> <p>The EILs for selected metals includes ABC values (25th percentiles) for low traffic areas for old suburbs of NSW published in Olszowy et. al. (1995²¹) has been adopted for this assessment.</p>
Asbestos in Soil	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion for the Preliminary Site Investigation (PSI).

²¹ Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission.



Guideline	Applicability
Groundwater Investigation Levels (GILs)	<p><u>ANZECC 2000:</u> The closest receiving water body in the vicinity of the site is Nepean River. This water body predominantly sustains a freshwater ecosystem. Hence the freshwater water trigger values have been adopted for the assessment. The NSW EPA promotes the use of trigger values for the protection of 95% of aquatic ecosystems, except where the contaminants have the potential to bio-accumulate, in which case the 99% trigger values are recommended. The 95% trigger values have been adopted for this assessment. Where necessary, the low reliability trigger values are quoted.</p> <p><u>ADWG 2011:</u> The groundwater bore search indicated the existence of bores licensed for irrigation purposes in the wider site area. The abstraction and use of groundwater for drinking purposes cannot be ruled out. These guidelines have been adopted for this PESA.</p> <p><u>HSLs for Groundwater:</u> The HSL-A for groundwater have been adopted for this investigation.</p> <p><u>USEPA:</u> In the absence of locally endorsed guidelines for individual PAHs in groundwater, the USEPA Region 9 PRGs for 'Tap Water' have been adopted as the GILs. It is noted that these guidelines have not been endorsed by NSW EPA and are used only as a preliminary screening tool.</p>

8 INVESTIGATION PROCEDURE

8.1 Soil Sampling Plan

The NSW EPA Sampling Design Guidelines 1995 recommend a sampling density for a contamination assessment based on a systematic sampling pattern. Based on the size of the investigation area, the guidelines provide a minimum number of sampling points required for the investigation.

The guidelines recommend sampling from a minimum of 330 evenly spaced sampling points for a site of this size (approximately 30 hectares). This density is recommended for sites which have been previously developed for residential/commercial/industrial landuses. The EPA states that a targeted sampling plan can be adopted for large rural sites which have not been subject to widespread development.

Samples for this investigation were obtained from 15 evenly spaced sampling points as shown on the attached Figure 2.

The sampling locations were placed on a systematic plan with a grid spacing of approximately 250m between sampling locations. A systematic plan was adopted to identify widespread contamination issues.

Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. Some sections of Lot 202 (south-east and east) were excluded from the investigation as the final lot layout had not been finalised at the time of the investigation.

8.2 Soil Sampling Methodology

Fieldwork for this investigation was undertaken on 6th and 7th March 2014. Sampling locations were set out using a hand held GPS unit with an accuracy of $\pm 5\text{m}$. Locations were marked using wooden pegs and cleared for services prior to drilling.

The sample locations were drilled using a truck mounted hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler.

Soil samples were collected from the fill and natural profiles encountered during the investigation. Additional fill samples were obtained when relatively deep fill ($>0.5\text{m}$) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. All samples were recorded on the borehole logs attached in the appendices.

During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.

Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date.

8.2.1 VOC Screening

A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for BTEX analysis.

The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source.

The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. The PID headspace data is presented on the COC documents attached in the appendices. PID calibration records are attached in the appendices.

8.2.2 Decontamination and Sample Preservation

Details of the decontamination procedure adopted during sampling are presented in the appendices. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Rinsate samples were obtained during the decontamination process as part of the field QA/QC.

Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS4482.1-2005 and AS4482.2-1999²² as summarised in the following table:

Table 8-1: Soil Sample Preservation and Storage

Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4°, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals).
VOCs (TPH/BTEX)	As above	Store at <4°, analysis within 14 days
PAHs, OCP, OPP & PCBs	As above	Store at <4°, analysis within 14 days
Asbestos	Sealed plastic bag	None

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures. Field sampling protocols adopted for this assessment are summarised in the attached appendices.

8.3 Groundwater Sampling

The assessment included the installation of 4 groundwater monitoring wells in selected boreholes JK1, JK8, JK9 and JK15 spread across the site as shown on Figure 2. The monitoring wells were placed in low lying areas of the site with a spread to also obtain general site coverage. The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices.

The monitoring wells were not developed due to low infiltration of perched groundwater. Groundwater grab samples were obtained from the wells using dedicated disposable PVC bailers on 18 March 2014. Reference should be made to the field records attached in the appendices for further details. Field sampling protocols adopted for this assessment are summarised in the appendices.

The samples were preserved in accordance with water sampling requirements detailed in NEPM 2013 and placed in an insulated container with ice. During the investigation, groundwater samples were preserved by immediate storage in an insulated sample

²² *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part2: Volatile Substances*, Standards Australia, 1999 (referred to as AS 1999)

container with ice in accordance with AS/NZS 5667.1:1998²³ as summarised in the following table:

Table 8-2: Groundwater Sample Preservation and Storage

Analyte	Preservation	Storage
Heavy metals	45µm Filter, acidify with nitric acid to pH 1-2	Store at <4°, analysis within 30 days
VOCs (mid to heavy fraction TPH)	Zero headspace, teflon seal	Store at <4°, analysis within 7 days
VOCs (BTEX & light fraction TPH)	Zero headspace, Teflon seal, acidify with HCl to pH 1-2	Store at <4°, analysis within 7 days
sVOCs (PAHs)	Nil	Store at <4°, analysis within 7 days
pH	Nil	Store at <4°, analysis within 6 hours ¹
Conductivity (EC)	Nil	Store at <4°, analysis within 28 days
Hardness	Nil	Store at <4°, analysis within 28 days

Notes:

1 – Analysing the sample for pH within 6 hours is not practical in most situations. In order to account for this, a calibrated field pH meter is used during sampling.

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

8.4 Analytical Schedule

The analytical schedule is outlined in the following table:

²³ *Water Quality – Part 1: Sampling, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples*, Standards Australia, 1998 (referred to as AS/NZS 5667.1:1998)

Table 8-3: Analytical Schedule

PCC	No. of Fill Soil Samples	No. of Natural Soil Samples	No. of Groundwater Samples
Heavy Metals	14	8	3
TPH/BTEX	14	8	3
PAHs	14	8	3
OCPs/OPPs	7	-	-
PCBs	7	-	-
Asbestos	14	8	-
pH/EC/hardness	Na	Na	1

8.5 Laboratory Analysis

The samples were analysed by the following laboratories:

Table 8-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples, intra-laboratory duplicates, trip blanks, trip spikes and field rinsate samples	Envirolab Services Pty Ltd, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	106508 and 106786
Inter-laboratory duplicates	Envirolab Services Pty Ltd (VIC), NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	3510

Samples were analysed by the laboratories using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

9 INVESTIGATION RESULTS

9.1 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

Table 9-1: Summary of Subsurface Conditions

Profile	Description ¹
Fill	<p>Fill material was encountered at the surface in all of the boreholes drilled for the investigation. The fill ranged in depth from approximately 0.1m to 0.5m. The fill typically comprised of: silty clay topsoil, silty clay, silty gravel and silty sandy clay.</p> <p>The fill contained inclusions of root fibres, clay fines, and ironstone gravel.</p>
Natural Soil	<p>Silty clay natural soil was encountered beneath the fill in all of the boreholes drilled for the investigation and extended to depths of approximately 0.4m to 2.1m. The clay was low to high plasticity and contained inclusions of root fibres, extremely weathered shale seams, fine to medium grained sand and ironstone gravel.</p>
Bedrock	<p>Bedrock was encountered beneath the clay in the majority of the boreholes drilled for the investigation and extended to the maximum termination depth of approximately 6m.</p> <p>The bedrock mainly comprised of: shale; sandstone; and inter-bedded shale and sandstone. The bedrock was extremely to distinctly weathered and of extremely low to medium strength on first contact.</p>
Groundwater	<p>Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling and a short time after.</p> <p>The monitoring wells JK1, JK9 and JK15 encountered standing water level (SWL) on 18 March 2014 at depths ranging from 2.31m to 4.64m below ground level (bgl). Monitoring well JK8 was 'dry' on 18 March 2014.</p>

Note:

1 – Depths described in metres below ground level

9.1.1 VOC Screening

PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. All results were 0 ppm equivalent isobutylene which indicates a lack of PID detectable VOCs.



9.2 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 9-2: Summary of Soil Laboratory Results

Analyte	Results Compared to SAC
Heavy Metals	<p><u>HILs:</u> All heavy metal results were below the HIL-A criteria.</p> <p><u>EILs:</u> The majority of the heavy metal results were below the EIL-UR&POS criteria. Two fill samples JK7 (0.1m-0.2m) and JK13 (0.0m-0.1m) encountered elevated concentrations of zinc of 200mg/kg and 180mg/kg respectively, above the EIL value of 147mg/kg.</p>
TPH	<p><u>HSLs:</u> All TPH results were below the HSL-A criteria.</p> <p><u>ESLs:</u> All TPH results were below the ESL-UR&POS criteria.</p>
BTEX	<p><u>HSLs:</u> All BTEX results were below the HSL-A criteria.</p> <p><u>ESLs:</u> All BTEX results were below the ESL-UR&POS criteria.</p>
PAHs	<p><u>HILs:</u> All PAH results were below the HIL-A criteria.</p> <p><u>HSLs:</u> All naphthalene results were below the HSL-A criteria.</p> <p><u>ESLs:</u> All benzo(a)pyrene results were below the ESL-UR&POS criteria,</p> <p><u>EILs:</u> All naphthalene results were below the EIL-UR&POS criteria.</p>
OCPs & OPPs	<p><u>HILs:</u> All OCP and OPP results were below the HIL-A criteria.</p> <p><u>EILs:</u> All DDT results were below the EIL-UR&POS criteria.</p>

Analyte	Results Compared to SAC
PCBs	HILs: All PCB results were below the HIL-A criterion.
Asbestos	PSI: Asbestos was not detected in the soil samples analysed for the investigation.

9.3 Groundwater Laboratory Results

The groundwater laboratory results are presented in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 9-3: Summary of Groundwater Laboratory Results

Analyte	Results Compared to SAC			
Heavy Metals	<u>ANZECC 2000 / ADWG 2011:</u> concentrations of individual metals were encountered above the GIL criteria as outlined below:			
	Analyte	Sample	GIL (µg/L)	Concentration (µg/L)
	Arsenic	MW1	10	13
	Chromium	MW1	3.3	6
	Copper	MW1, MW15	1.4	5 to 8
	Nickel	MW15	11	20
	Zinc	MW1, MW9, MW15	8	12 to 23
TPH & BTEX	<u>HSLs:</u> All TPH and BTEX results were below the GIL-HSL criteria.			
PAHs	<u>ANZECC 2000:</u> All PAH results were below the GIL-ANZECC criteria.			
	<u>HSLs:</u> All naphthalene results were below the GIL-HSL criteria.			
Other Parameters	Groundwater sample MW9 was analysed for pH, EC and hardness. The results are summarised below: <ul style="list-style-type: none">pH of 8.1;EC of 7,700µS/cm; andHardness of 850mgCaCO₃/L			

10 QA/QC ASSESSMENT

The QA/QC assessment includes a review of the DQIs established for the investigation (see **Section 3.2**). A summary of the field QA/QC samples are outlined below:

Table 10-1: Field QA/QC Samples

Field QA/QC	Frequency	Sample Details
Intra-laboratory duplicates	4.5% of Primary Soil Samples	<u>Soil Samples:</u> Dup A is a soil duplicate of sample JK7 (0.5m-0.95m)
	33% of Primary Groundwater Samples	<u>Groundwater Samples:</u> Dup BG1 is a water duplicate of sample MW9
Inter-laboratory duplicates	4.5% of Primary Samples	<u>Soil Samples:</u> Dup B is a soil duplicate of sample JK8 (0.1m-0.2m)
TB	1 per batch	TB1 (sand blank) of 6 March 2014
FR	1 per day	FR1 is a field rinsate from the SPT decontamination process of 6 March 2014
TS	1 per batch of volatiles	TS1 is a soil BTEX spike of 6 March 2014
		TS is a water BTEX spike of 18 March 2014

An assessment of the DQIs is summarised in the following table.



Table 10-2: Assessment of DQIs

Completeness

Data and documentation completeness was achieved through the following measures:

- A sampling and analysis plan was prepared for the investigation;
- COC records were prepared for each batch of samples sent to the labs (refer to appendices);
- Laboratory sample receipt information was reviewed for each batch (refer to appendices);
- NATA registered laboratories were used for all analysis;
- Visual observations and PID screening of samples was undertaken during the investigation as noted on the documents attached in the appendices; and
- All soil samples were analysed for the PCC identified in **Section 6.1**, except for VOCs which were screened using a PID.

Comparability

Data comparability was achieved through the following measures:

- Similar sampling techniques were used during the investigation;
- Appropriate preservation, storage and transport methods were adopted for all samples; and
- Consistent analysis techniques and reporting standards were adopted by the laboratories.

Representativeness

Data representativeness was achieved through the following measures:

- The sampling plan was optimised to obtain adequate coverage of sample locations. Some sections of Lot 202 were not included in the investigation; and
- The assessment included a representative coverage of analysis for PCC.

Precision

Intra-laboratory RPD Results:

The intra-laboratory soil RPD results are presented in the attached report tables. The results indicated that field precision was acceptable.

The intra-laboratory groundwater RPD results presented in the attached report tables. The results indicated that field precision was acceptable.

Inter-laboratory RPD Results:

The inter-laboratory soil RPD results are presented in the attached report tables. The results indicated that field precision was acceptable.

The RPD values for a range of individual PAHs were outside the acceptance criteria. Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. Where applicable, the higher duplicate value has been adopted as a conservative measure (see attached report tables). As both the primary and duplicate sample results were less than the SAC, these exceedances are not considered to have had an adverse impact on the data set as a whole.

Accuracy

Accuracy was achieved through the following measures:

- Trained and qualified field staff were used for the investigation;

-
- Appropriate industry standard sampling equipment and decontamination procedures were adopted for the investigation as outlined in the attached appendices;
 - Sampling and screening equipment are routinely factory calibrated. An in-house calibration check was undertaken prior to using onsite. The calibration records are attached in the appendices;
 - Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation;
 - The report was prepared generally in accordance with Reporting Guidelines 2011;
 - Accuracy of field sampling was assessed as follows:
 - TS Results: The trip spike results are presented in the attached report tables. The BTEX results for the trip spikes ranged from 100% to 110% and indicated that field preservation methods were appropriate;
 - FR Results: The field rinsate results are presented in the attached report tables. All results were below the PQL which indicates that cross-contamination artefacts associated with sampling equipment were not present;
 - TB Results: The trip blank results are presented in the attached report tables and were all less than the PQLs.
 - Review of laboratory QA/QC data is summarised below:
 - Laboratory Duplicate RPD Results: Laboratory duplicate RPD results for the soil/groundwater analysis were generally within the acceptance criteria adopted by the laboratory;
 - Matrix Spike Recovery: Matrix spike recovery concentrations were within the acceptable limits. The TPH % recovery was not possible in some samples due to the interference caused by high concentration of analytes;
 - Surrogate Spike Recovery: Surrogate spike recovery concentrations were within the acceptable limits; and
 - LCS recovery: LCS recovery concentrations were within the acceptable limits.
-

The DQIs adopted for this investigation (see **Section 3.2**) have been addressed.



11 SITE CHARACTERISATION AND TIER 1 RISK ASSESSMENT

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is considered to be relatively low. The PCSM and site conditions have been reviewed in light of the above and the findings of the preliminary ESA:

Table 11-1: Review of CSM and Tier 1 Risk Assessment

AEC	Risk Category	Discussion
Commercial and agricultural activities on site	Low to moderate	<p>The soil samples analysed from 15 boreholes drilled across the site did not encounter any elevations above the HILs. Based on these results, the occurrence of widespread contamination that may pose a risk to human receptors is considered to be relatively low.</p> <p>Marginal elevations of lead above the most conservative EIL was encountered in two surficial fill samples. These results are not considered to pose an ecological risk due to the following:</p> <ul style="list-style-type: none"> • The most conservative EILs have been adopted for the assessment as a preliminary screening tool; • The vegetation across the entire site appears healthy and no visual indicators of stress were identified; and • Future development of the site will involve large scale earthworks which might remove this material off-site. <p>The groundwater results indicate the presence of minor elevations of heavy metals above the GILs. Minor elevations of heavy metals are very common in groundwater associated with the Shale formation. These elevations are not considered to pose a significant risk to receptors.</p> <p>There is moderate risk to receptors from the point source AEC identified in Section 6.1. The AEC are shown on the attached Figure 3 and include the following:</p>

AEC	Risk Category	Discussion
		<ul style="list-style-type: none"> Point source contamination associated with the use of fuel and other petroleum hydrocarbons for backup generators, vehicles and machinery; The AST located in Lot 21; Areas of dumped rubbish including galvanised iron drums, metal poles etc.; Small stockpiles of fill scattered in some sections of the site; Former railway line located on Lot 21; and Hazardous building material. <p>In order to reduce the risk associated with the above point source AEC, EIS recommend undertaking additional sampling in these areas prior to the commencement of rezoning works.</p>
Commercial/Industrial activity in the immediate surrounds	Low	<p>Some sections to the north of the development area have been used for extractive purposes associated with Menangle Sand and Soil Pty Ltd.</p> <p>The activity is not located in the development area. Based on the location and topography of the wider site, EIS consider the risk of potential contamination from this activity, impacting the development area to be relatively low.</p>

11.1 Data Gaps

Due to the preliminary nature of the investigation the following data gaps remain:

- Specific point source AEC (see attached Figure 3) have not been adequately investigated;
- Sections of the site were not investigated as the concept plan area (especially in Lot 202) was not finalised at the time of the site inspection and subsequent field work. Based on the review of the current aerial photograph, EIS are of the opinion widespread contamination in this area is unlikely. However, point source AEC cannot be ruled out; and
- Inaccessible areas (eg. beneath buildings and dense vegetation) have not been investigated.



12 **CONCLUSIONS**

EIS consider that the report objectives (see **Sections 1.2** and **Section 3**) have been addressed. Based on the scope of works undertaken, EIS are of the opinion that the site is suitable for the proposed rezoning to allow for residential and commercial landuses.

Prior to the commencement of earthworks, additional sampling should be undertaken in the vicinity of the point source AEC to address the data gaps. A contingency plan should also be prepared for any unexpected finds during earthworks.

12.1 **Regulatory Requirement**

The regulatory requirements applicable for the site are outlined in the following table:

Table 12-1: Regulatory Requirement

Guideline	Applicability
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.
Work Health and Safety Code of Practice 2011 ²⁴	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.

²⁴ WorkCover NSW, (2011), *WHS Regulation: Code of Practice – How to Manage and Control Asbestos in the Workplace*.



13 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and



- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.



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IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is Based on a Unique Set of Project Specific Factors:

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- the proposed land use is altered;
- the defined subject site is increased or sub-divided;
- the proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- the proposed development levels are altered, eg addition of basement levels; or
- ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is Based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.



Assessment Limitations

Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

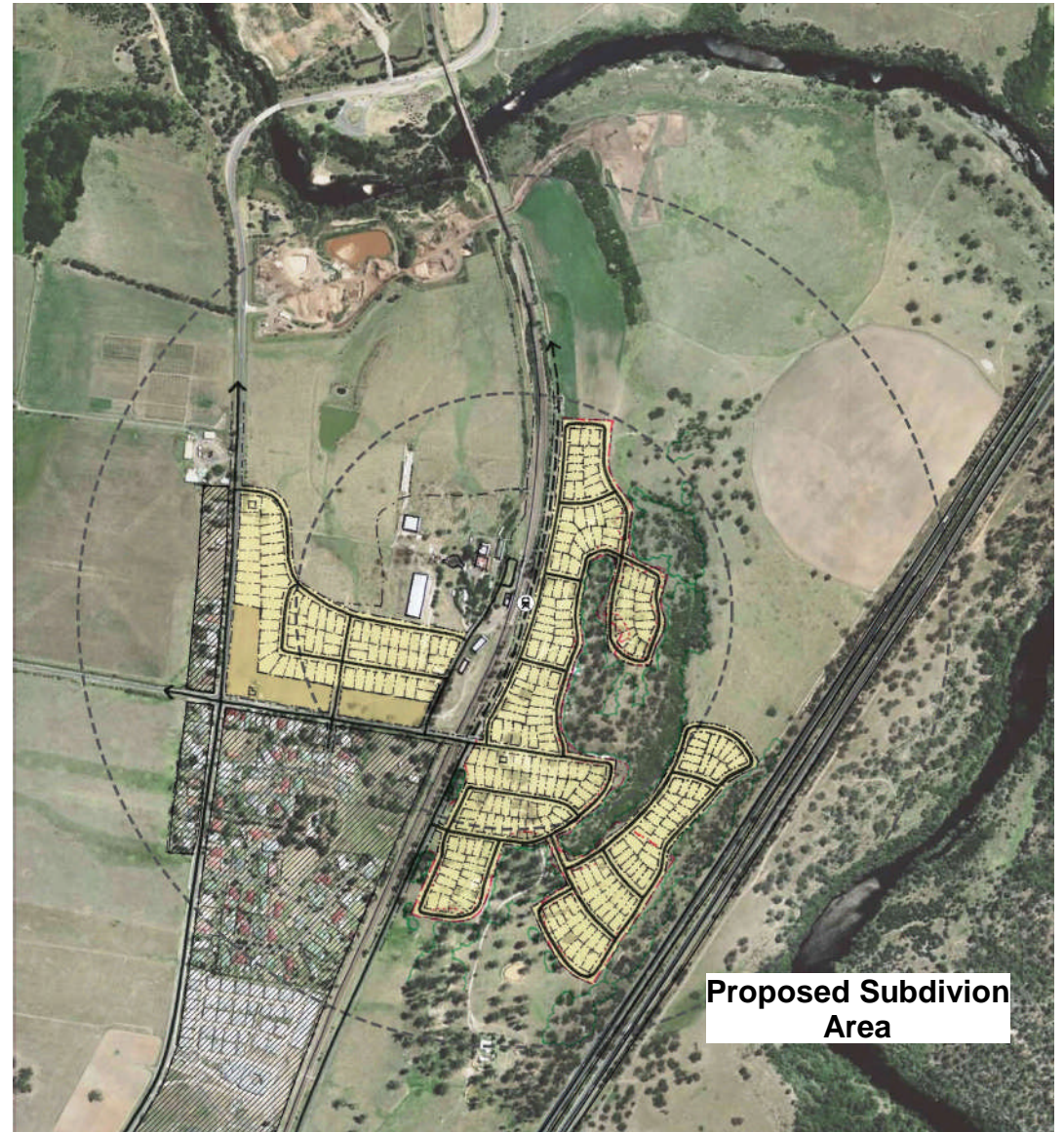
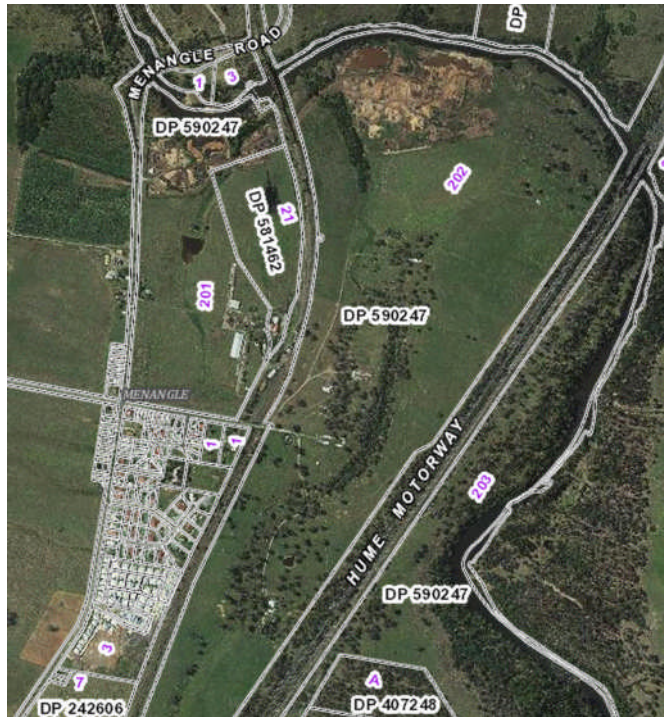
To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.



REPORT FIGURES

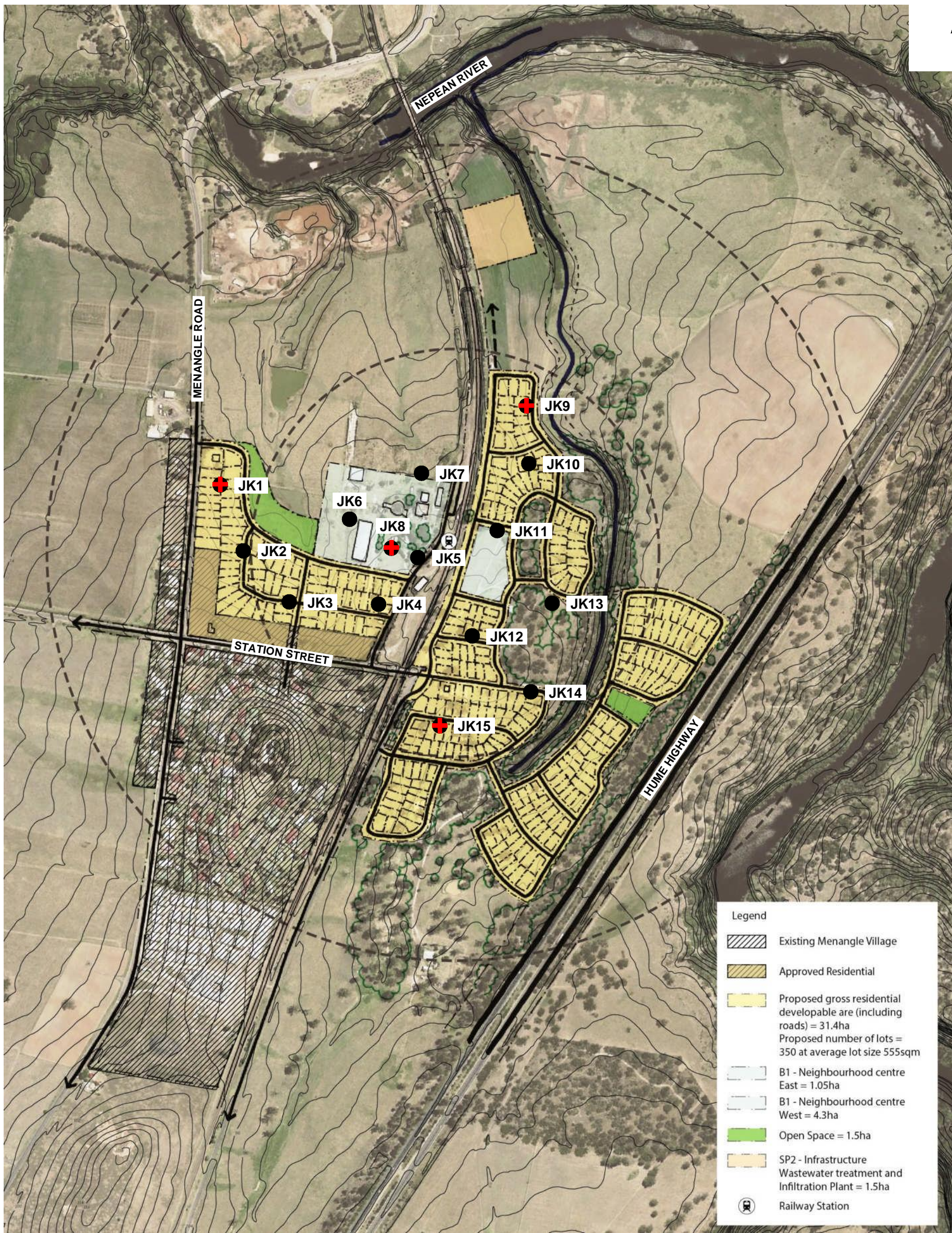


NOTES:
Figure 1 has been recreated from WhereIs and NSW Department of Lands SIX Maps. Figure is not to scale.

Reference should be made to the report text for a full understanding of this plan.



Project Number: E27284KB	Title: SITE LOCATION PLAN
Figure: 1	Address: STATION STREET, MENANGLE, NSW



NOTES:
Figure 2 has been recreated from the Site Concept Plan prepared by Elton Consulting

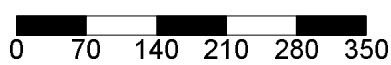
The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

LEGEND:

- JK1 Borehole location and number
- ✚ Groundwater monitoring well location

Approximate Scale (m):



Project Number: E27284KB	Title: BOREHOLE LOCATION PLAN
Figure: 2	Address: STATION STREET, MENANGLE, NSW



NOTE:

Figure 3 has been recreated from the 2012 Aerial Photograph obtained from SIX Maps (<http://maps.six.nsw.gov.au/>)


The AEC presented on this plan have been established from site observations and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

LEGEND:



Area of Environmental Concern (AEC)

 ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E27284KB	Title: SITE PLAN SHOWING AREAS OF ENVIRONMENTAL CONCERN (AEC)
	Figure: 3A	Address: STATION STREET, MENANGLE, NSW



NOTE:

Figure 3 has been recreated from the 2012 Aerial Photograph obtained from SIX Maps (<http://maps.six.nsw.gov.au/>)


The AEC presented on this plan have been established from site observations and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

LEGEND:



Area of Environmental Concern (AEC)

 ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E27284KB	Title: SITE PLAN SHOWING AREAS OF ENVIRONMENTAL CONCERN (AEC)
	Figure: 3B	Address: STATION STREET, MENANGLE, NSW



REPORT TABLES



TABLE A
SOIL LABORATORY RESULTS COMPARED TO HILs
All data in mg/kg unless stated otherwise

			HEAVY METALS							PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES		
			Arsenic	Cadmium	Chromium VI ²	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P TEQ ³	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor			Chlorpyrifos	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC) ¹			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected	
Sample Reference	Sample Depth	Sample Description																					
JK1	0.1-0.2	Silty Clay	9	LPQL	18	29	34	0.2	12	64	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK2	0.1-0.2	Fill - Silty Clay	7	LPQL	25	23	25	0.1	10	52	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK3	0.1-0.2	Fill - Silty Clay	7	LPQL	15	22	23	LPQL	12	34	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK4	0.1-0.2	Fill - Silty Clay	6	LPQL	19	41	96	LPQL	12	140	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK4	0.5-0.95	Silty Clay	7	LPQL	21	17	25	LPQL	8	30	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK5	0.1-0.2	Fill - Silty Clay	6	LPQL	12	34	68	LPQL	16	93	1.22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK5	0.5-0.95	Silty Clay	6	LPQL	11	21	21	LPQL	5	30	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK6	0.1-0.2	Fill - Silty Gravel	LPQL	LPQL	5	26	15	LPQL	15	76	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK6	0.5-0.95	Silty Clay	LPQL	LPQL	7	26	15	LPQL	7	44	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK7	0.1-0.2	Fill - Silty Clay	7	LPQL	15	34	130	0.2	9	200	0.69	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK7	0.5-0.95	Silty Clay	9	LPQL	14	15	20	LPQL	5	24	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK8	0.1-0.2	Fill - Silty Clay	6	LPQL	11	23	34	LPQL	12	49	0.66	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK9	0.1-0.2	Fill - Silty Clay	5	LPQL	12	13	15	LPQL	6	21	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK9	0.5-0.95	Silty Clay	8	LPQL	12	7	12	LPQL	3	19	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK10	0.1-0.2	Fill - Silty Clay	7	LPQL	12	20	29	LPQL	7	54	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK11	0.1-0.2	Fill - Silty Clay	7	LPQL	11	14	18	LPQL	9	44	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK11	0.5-0.75	Silty Clay	10	LPQL	9	13	14	LPQL	15	57	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK12	0.1-0.2	Fill - Silty Clay	7	LPQL	19	11	22	LPQL	5	23	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK13	0-0.1	Fill - Silty Sandy Clay	8	LPQL	15	26	73	LPQL	7	180	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected	
JK13	0.5-0.95	Silty Clay	9	LPQL	8	18	17	LPQL	4	30	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK14	0-0.1	Fill - Silty Sandy Clay	8	LPQL	21	6	130	0.1	5	25	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
JK15	0-0.1	Fill - Silty Clay	6	LPQL	9	11	17	LPQL	7	26	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected	
Total Number of Samples			22	22	22	22	22	22	22	22	22	22	7	7	7	7	7	7	7	7	7	22	
Maximum Value			10	LPQL	25	41	130	0.2	16	200	1.22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NC	

Explanation:

- 1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-A: 'Residential with garden/accessible soils; children's day care centers; preschools; and primary schools'
- 2 - The results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- 3 - B(a)P TEQ - Benzo(a)pyrene Toxicity Equivalence Quotient has been calculated based on 8 carcinogenic PAHs and their Toxic Equivalence Factors (TEFs) outlined in NEPM 2013

Concentration above the SAC

VALUE

Abbreviations:

- PAHs: Polycyclic Aromatic Hydrocarbons
- B(a)P: Benzo(a)pyrene
- PQL: Practical Quantitation Limit
- LPQL: Less than PQL
- OPP: Organophosphorus Pesticides
- OCP: Organochlorine Pesticides
- PCBs: Polychlorinated Biphenyls
- UCL: Upper Level Confidence Limit on Mean Value
- HILs: Health Investigation Levels
- NA: Not Analysed
- NC: Not Calculated
- NSL: No Set Limit
- SAC: Site Assessment Criteria
- NEPM: National Environmental Protection Measure



TABLE B												
SOIL LABORATORY RESULTS COMPARED TO HSLs												
All data in mg/kg unless stated otherwise												
				C ₆ -C ₁₀ (F1)	> C ₁₀ -C ₁₆ (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID ²	
PQL - Envirolab Services				25	50	0.2	0.5	1	3	1		
HSL Land Use Category ¹				RESIDENTIAL WITH ACCESSIBLE SOIL								
Sample Reference	Sample Depth	Depth Category	Soil Category									
JK1	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK2	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK3	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK4	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK4	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK5	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK5	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK6	0.1-0.2	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK6	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK7	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK7	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK8	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK9	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK9	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK10	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK11	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK11	0.5-0.75	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK12	0.1-0.2	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK13	0-0.1	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK13	0.5-0.95	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK14	0-0.1	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
JK15	0-0.1	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
Total Number of Samples				22	22	22	22	22	22	22	22	
Maximum Value				LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	
Explanation:												
1 - Site Assessment Criteria (SAC): NEPM 2013												
2 - Field PID values obtained during the investigation												
Concentration above the SAC												
VALUE												
The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below												
Abbreviations:												
UCL: Upper Level Confidence Limit on Mean Value				PQL: Practical Quantitation Limit				NC: Not Calculated				
HSLs: Health Screening Levels				LPQL: Less than PQL				NL: Not Limiting				
NA: Not Analysed				SAC: Site Assessment Criteria				NEPM: National Environmental Protection Measure				

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SITE ASSESSMENT CRITERIA												
				C ₆ -C ₁₀ (F1)		> C ₁₀ -C ₁₆ (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	
PQL - Envirolab Services				25		50	0.2	0.5	1	3	1	
HSL Land Use Category ¹				RESIDENTIAL WITH ACCESSIBLE SOIL								
Sample Reference	Sample Depth	Depth Category	Soil Category									
JK1	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK2	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK3	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK4	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK4	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK5	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK5	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK6	0.1-0.2	0m to < 1m	Sand	45	110	0.5	160	55	40	3		
JK6	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK7	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK7	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK8	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK9	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK9	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK10	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK11	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK11	0.5-0.75	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK12	0.1-0.2	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK13	0-0.1	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK13	0.5-0.95	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK14	0-0.1	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		
JK15	0-0.1	0m to < 1m	Clay	50	280	0.7	480	NL	110	5		

TABLE C
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO GILs
All results in $\mu\text{g/L}$ unless stated otherwise.

	PQL Envirolab Services	GIL - ANZECC 2000 ¹ Fresh Waters	GIL - ADWG ²	SAMPLES		
				MW1	MW9	MW15
Field Measurements ³						
Dissolved oxygen (ppm)	-	NSL	> 85% ^d	4.8	3.4	4.1
Redox potential (mV)	-	NSL	NSL	69	112.6	86.9
pH	-	6.5 - 8.5 ⁱ	6.5 - 8.5 ^d	7.2	7	7.12
Electrical Conductivity (μ S/cm)	-	NSL	NSL	4285	8011	8110
Temperature °C	-	NSL	NSL	22.3	22.8	22.3
Inorganic Compounds and Parameters						
pH	0.1	6.5 - 8.5 ⁱ	6.5 - 8.5 ^d	NA	8.1	NA
Electrical Conductivity (μ S/cm)	1	NSL	NSL	NA	7700	NA
Hardness (mgCaCo3/L)	3	NSL	200 ^d	NA	850	NA
Metals and Metalloids						
Arsenic (As III)	1	24	10	LPQL	3	13
Cadmium	0.1	0.2	2	LPQL	LPQL	0.2
Chromium (total)	1	3.3 ^{a#}	NSL	6	LPQL	1
Copper	1	1.4	2000	8	LPQL	5
Lead	1	3.4	10	LPQL	LPQL	LPQL
Total Mercury (inorganic)	0.05	0.06	1	LPQL	LPQL	LPQL
Nickel	1	11	20	8	6	20
Zinc	1	8	3000 ^d	12	17	23
Polycyclic Aromatic Hydrocarbons (PAHs)						
Naphthalene	0.1	16 ^a	0.14 ⁵	LPQL	LPQL	LPQL
Acenaphthylene	0.1	NSL	NSL	LPQL	LPQL	LPQL
Acenaphthene	0.1	NSL	400 ⁵	LPQL	LPQL	LPQL
Fluorene	0.1	NSL	220 ⁵	LPQL	LPQL	LPQL
Phenanthrene	0.1	0.6 ^c	NSL	0.1	LPQL	LPQL
Anthracene	0.1	0.01 ^c	1300 ⁵	LPQL	LPQL	LPQL
Fluoranthene	0.1	1 ^c	630 ⁵	LPQL	LPQL	LPQL
Pyrene	0.1	NSL	87 ⁵	LPQL	LPQL	LPQL
Benzo(a)anthracene	0.1	NSL	0.029 ⁵	LPQL	LPQL	LPQL
Chrysene	0.1	NSL	2.9 ⁵	LPQL	LPQL	LPQL
Benzo(b,k)fluoranthene	0.2	NSL	0.029 ^{r5}	LPQL	LPQL	LPQL
Benzo(a)pyrene	0.1	0.1 ^c	0.01	LPQL	LPQL	LPQL
Indeno(1,2,3-c,d)pyrene	0.1	NSL	NSL	LPQL	LPQL	LPQL
Dibenzo(a,h)anthracene	0.1	NSL	NSL	LPQL	LPQL	LPQL
Benzo(g,h,i)perylene	0.1	NSL	NSL	LPQL	LPQL	LPQL
Total PAHs	-	NSL	NSL	0.1	LPQL	LPQL

EXPLANATION:

- 1 - ANZECC Australian Water Quality Guidelines for Fresh Waters (ANZECC 2000) - Trigger Values for protection of 95% of species
2 - NHMRC Australian Drinking Water Guidelines (ADWG 2011)
3 - Field Measurements obtained during sampling on 18/03/2014
5 - In the absence of Australian guidelines, the USEPA Region 9 Screening Levels for tapwater have been adopted

- a - In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been quoted
c - 99% trigger values adopted due to the potential for bioaccumulation effects
d - In the absence of a health guideline the aesthetic guideline concentration has been quoted
i - ANZECC 2000 - Level for NSW Lowland Rivers.
r - The more conservative value for Benzo(b)fluoranthene has been adopted
a# - The GIL for Cr III has been adopted as Cr VI is relatively unstable and breakdowns rapidly

Concentration above the GIL

VALUE

ABBREVIATIONS:

NA: Not Analysed
NSL: No Set Limit
GIL - Groundwater Investigation Levels
PQL: Practical Quantitation Limit
LPQL: Less than Practical Quantitation Limit
(-) : Not Applicable



TABLE D GROUNDWATER LABORATORY RESULTS COMPARED TO HSLs All data in µg/L unless stated otherwise											
				C ₆ -C ₁₀ (F1)	>C ₁₀ -C ₁₆ (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID ²
PQL - Envirolab Services				10	50	1	1	1	3	1	
Land Use Category ¹				LOW DENSITY RESIDENTIAL							
Sample Reference	Water Depth	Depth Category	Soil Category								
MW1	3.12	2m to <4m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-
MW9	2.31	2m to <4m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-
MW15	4.64	4m to <8m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-
Total Number of Samples				3	3	3	3	3	3	3	-
Maximum Value				LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-
Explanation: 1 - Groundwater Investigation Levels (GILs): NEPM 2013 2 - Field PID values obtained during the investigation Concentration above the SAC <div>VALUE</div> Site specific assesment required <div>VALUE</div> The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below Abbreviations: UCL: Upper Level Confidence Limit on Mean Value PQL: Practical Quantitation Limit HSLs: Health Screening Levels LPQL: Less than PQL NA: Not Analysed SAC: Site Assessment Criteria NC: Not Calculated NEPM: National Environmental Protection Measure NL: Not Limiting SSA: Site Specific Assessment											

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HSL GROUNDWATER ASSESSMENT CRITERIA

				C ₆ -C ₁₀ (F1)	>C ₁₀ -C ₁₆ (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
Land Use Category ¹				LOW DENSITY RESIDENTIAL						
Sample Reference	Water Depth	Depth Category	Soil Category							
MW1	3.12	2m to <4m	Clay	NL	NL	5000	NL	NL	NL	NL
MW9	2.31	2m to <4m	Clay	NL	NL	5000	NL	NL	NL	NL
MW15	4.64	4m to <8m	Clay	NL	NL	5000	NL	NL	NL	NL



TABLE E SOIL LABORATORY RESULTS COMPARED TO EILs AND ESLs All data in mg/kg unless stated otherwise																						
Land Use Category ¹			URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
			pH	CEC (cmol _e /kg)	Clay Content (% clay)	AGED HEAVY METALS-EILs						EILs		ESLs				Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
						Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C ₆ -C ₁₀ (F1)	>C ₁₀ -C ₁₆ (F2)	>C ₁₆ -C ₃₄ (F3)	>C ₃₄ -C ₄₀ (F4)					
PQL - Envirolab Services			-	1	-	4	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05	
Ambient Background Concentration (ABC) ²			-	-	-	NSL	8	18	NSL	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	
Sample Reference	Sample Depth	Soil Texture																				
JK1	0.1-0.2	Fine	NA	NA	NA	9	18	29	34	12	64	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK2	0.1-0.2	Fine	NA	NA	NA	7	25	23	25	10	52	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK3	0.1-0.2	Fine	NA	NA	NA	7	15	22	23	12	34	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK4	0.1-0.2	Fine	NA	NA	NA	6	19	41	96	12	140	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK4	0.5-0.95	Fine	NA	NA	NA	7	21	17	25	8	30	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK5	0.1-0.2	Fine	NA	NA	NA	6	12	34	68	16	93	LPQL	LPQL	LPQL	LPQL	280	130	LPQL	LPQL	LPQL	0.12	
JK5	0.5-0.95	Fine	NA	NA	NA	6	11	21	21	5	30	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK6	0.1-0.2	Coarse	NA	NA	NA	LPQL	5	26	15	15	76	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK6	0.5-0.95	Fine	NA	NA	NA	LPQL	7	26	15	7	44	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK7	0.1-0.2	Fine	NA	NA	NA	7	15	34	130	9	200	LPQL	LPQL	LPQL	LPQL	240	120	LPQL	LPQL	LPQL	0.09	
JK7	0.5-0.95	Fine	NA	NA	NA	9	14	15	20	5	24	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK8	0.1-0.2	Fine	NA	NA	NA	6	11	23	34	12	49	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.06	
JK9	0.1-0.2	Fine	NA	NA	NA	5	12	13	15	6	21	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK9	0.5-0.95	Fine	NA	NA	NA	8	12	7	12	3	19	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK10	0.1-0.2	Fine	NA	NA	NA	7	12	20	29	7	54	LPQL	NA	LPQL	LPQL	110	LPQL	LPQL	LPQL	LPQL	LPQL	
JK11	0.1-0.2	Fine	NA	NA	NA	7	11	14	18	9	44	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK11	0.5-0.75	Fine	NA	NA	NA	10	9	13	14	15	57	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK12	0.1-0.2	Fine	NA	NA	NA	7	19	11	22	5	23	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK13	0-0.1	Fine	NA	NA	NA	8	15	26	73	7	180	LPQL	LPQL	LPQL	LPQL	120	LPQL	LPQL	LPQL	LPQL	0.1	
JK13	0.5-0.95	Fine	NA	NA	NA	9	8	18	17	4	30	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK14	0-0.1	Fine	NA	NA	NA	8	21	6	130	5	25	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
JK15	0-0.1	Fine	NA	NA	NA	6	9	11	17	7	26	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	
Total Number of Samples			-	-	-	22	22	22	22	22	22	22	7	22	22	22	22	22	22	22	22	
Maximum Value			-	-	-	10	25	41	130	16	200	LPQL	LPQL	LPQL	LPQL	280	130	LPQL	LPQL	LPQL	0.12	
Explanation: 1 - Site Assessment Criteria (SAC): NEPM 2013 2 - ABC Values for selected metals has been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with low traffic have been quoted)																						
Concentration above the SAC VALUE The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below																						
Abbreviations: EILs: Ecological Investigation Levels B(a)P: Benzo(a)pyrene PQL: Practical Quantitation Limit UCL: Upper Level Confidence Limit on Mean Value ESLs: Ecological Screening Levels NA: Not Analysed LPQL: Less than PQL SAC: Site Assessment Criteria NEPM: National Environmental Protection Measure NC: Not Calculated NSL: No Set Limit ABC: Ambient Background Concentration																						

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EIL AND ESL ASSESSMENT CRITERIA

Land Use Category ¹			URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
			pH	CEC (cmol _e /kg)	Clay Content (% clay)	AGED HEAVY METALS-EILs					EILs		ESLs									
						Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C ₆ -C ₁₀ (F1)	>C ₁₀ -C ₁₆ (F2)	>C ₁₆ -C ₃₄ (F3)	>C ₃₄ -C ₄₀ (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services			-	1	-	4	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05	
Ambient Background Concentration (ABC) ²			-	-	-	NSL	8	18	NSL	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	
Sample Reference	Sample Depth	Soil Texture																				
JK1	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK2	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK3	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK4	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK4	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK5	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK5	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK6	0.1-0.2	Coarse	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	300	2800	50	85	70	105	0.7
JK6	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK7	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK7	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK8	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK9	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK9	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK10	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK11	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK11	0.5-0.75	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK12	0.1-0.2	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK13	0-0.1	Fine	NA	NA	NA	100	198	78	1100	35	147	710	180	180	120	1300	5600	60	105	125	45	0.7
JK13	0.5-0.95	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK14	0-0.1	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7
JK15	0-0.1	Fine	NA	NA	NA	100	198	78	1100	35	147	710	--	180	120	1300	5600	60	105	125	45	0.7

TABLE F
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = JK7 (0.5-0.95) Dup Ref = Dup A Envirolab Report: 106508	Arsenic	4	9	8	8.5	11.8
	Cadmium	0.4	LPQL	LPQL	NC	NC
	Chromium	1	14	10	12	33.3
	Copper	1	15	15	15	0.0
	Lead	1	20	19	19.5	5.1
	Mercury	0.1	LPQL	LPQL	NC	NC
	Nickel	1	5	4	4.5	22.2
	Zinc	1	24	25	24.5	4.1
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b)&(k)fluorant	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)pyrene TEQ	0.5	LPQL	LPQL	NC	NC
	Total PAHs	2.05	LPQL	LPQL	NC	NC
	C ₆ -C ₁₀ (F1)	25	LPQL	LPQL	NC	NC
	> C ₁₀ -C ₁₆ (F2)	50	LPQL	LPQL	NC	NC
	> C ₁₆ -C ₃₄ (F3)	100	LPQL	LPQL	NC	NC
	> C ₃₄ -C ₄₀ (F4)	100	LPQL	LPQL	NC	NC
	Benzene	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	m + p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

RPD Results Above the Acceptance Criteria

VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

NA: Not Analysed

NC: Not Calculated

OCP: Organochlorine Pesticides

OPP: Organophosphorus Pesticides

PCBs: Polychlorinated Biphenyls

TPH: Total Petroleum Hydrocarbons

TABLE G
SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = JK8 (0.1-0.2) Dup Ref = Dup B Envirolab Report: 106508 Envirolab VIC Report: 3510	Arsenic	4	4	6	7	6.5	15.4
	Cadmium	0.4	0.4	LPQL	LPQL	NC	NC
	Chromium	1	1	11	13	12	16.7
	Copper	1	1	23	26	24.5	12.2
	Lead	1	1	34	28	31	19.4
	Mercury	0.1	0.1	LPQL	LPQL	NC	NC
	Nickel	1	1	12	13	12.5	8.0
	Zinc	1	1	49	45	47	8.5
	Naphthalene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	0.1	0.2	0.8	0.5	120.0
	Anthracene	0.1	0.1	LPQL	0.2	0.2	NC
	Fluoranthene	0.1	0.1	0.2	0.9	0.55	127.3
	Pyrene	0.1	0.1	0.2	0.8	0.5	120.0
	Benzo(a)anthracene	0.1	0.1	LPQL	0.4	0.4	NC
	Chrysene	0.1	0.1	LPQL	0.3	0.3	NC
	Benzo(b)&(k)fluorant	0.2	0.2	LPQL	0.5	0.5	NC
	Benzo(a)pyrene	0.05	0.05	0.06	0.34	0.2	140.0
	Indeno(123-cd)pyrene	0.1	0.1	LPQL	0.2	0.2	NC
	Dibenzo(ah)anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	0.1	LPQL	0.2	0.2	NC
	Benzo(a)pyrene TEQ	0.5	0.5	LPQL	LPQL	NC	NC
	Total PAHs	2.05	2.05	0.66	4.64	2.65	150.2
	C ₆ -C ₁₀ (F1)	25	25	LPQL	LPQL	NC	NC
	> C ₁₀ -C ₁₆ (F2)	50	50	LPQL	LPQL	NC	NC
	> C ₁₆ -C ₃₄ (F3)	100	100	LPQL	LPQL	NC	NC
	> C ₃₄ -C ₄₀ (F4)	100	100	LPQL	LPQL	NC	NC
	Benzene	0.5	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	1	LPQL	LPQL	NC	NC
	m + p-xylene	2	2	LPQL	LPQL	NC	NC
	o-xylene	1	1	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

RPD Results Above the Acceptance Criteria

VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

NA: Not Analysed

NC: Not Calculated

OCP: Organochlorine Pesticides

OPP: Organophosphorus Pesticides

PCBs: Polychlorinated Biphenyls

TPH: Total Petroleum Hydrocarbons

TABLE H
GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in $\mu\text{g/L}$ unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MW9 Dup Ref = Dup GB1 Envirolab Report: 106786	Arsenic	1	3	3	3	0.0
	Cadmium	0.1	LPQL	LPQL	NC	NC
	Chromium	1	LPQL	LPQL	NC	NC
	Copper	1	LPQL	LPQL	NC	NC
	Lead	1	LPQL	LPQL	NC	NC
	Mercury	0.5	LPQL	LPQL	NC	NC
	Nickel	1	6	6	6	0.0
	Zinc	1	17	13	15	26.7
	Benzene	1	LPQL	LPQL	NC	NC
	Toluene	1	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	m + p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value \leq 50% are acceptable

Results between 5 & 10 times PQL = RPD value \leq 75% are acceptable

Results < 5 times PQL = RPD value \leq 100% are acceptable

RPD Results Above the Acceptance Criteria

VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

NA: Not Analysed

NC: Not Calculated

OCP: Organochlorine Pesticides

OPP: Organophosphorus Pesticides

PCBs: Polychlorinated Biphenyls

TPH: Total Petroleum Hydrocarbons



TABLE I
SUMMARY OF QA/QC - TRIP SPIKE, TRIP BLANK AND RINSATE RESULTS

ANALYSIS	EnviroLab PQL		TB1 ^s 6/03/2014 106508 mg/kg	TS ^w 18/03/2014 106786 µg/L	FR1 ^s 6/03/2014 106508 mg/kg	TS1 ^s 6/03/2014 106508 % Recovery
	mg/kg	µg/L				
Benzene	1	1	LPQL	107%	LPQL	100%
Toluene	1	1	LPQL	105%	LPQL	100%
Ethylbenzene	1	1	LPQL	109%	LPQL	100%
m + p-xylene	2	2	LPQL	106%	LPQL	101%
o-xylene	1	1	LPQL	110%	LPQL	101%

EXPLANATION:

^w Sample type (water)

^s Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria

VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit

TB: Trip Blank

LPQL: Less than PQL

TS: Trip Spike

NA: Not Analysed

RS: Rinsate Sample

NC: Not Calculated

E27284KBrpt
May, 2014







Appendix A: Borehole Logs and Explanatory Notes



BOREHOLE LOG

Borehole No.
JK1
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z			Method: SPIRAL AUGER					R.L. Surface: ≈ 79.0m				
Date: 6-3-14			JK350					Datum: ASSUMED				
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION & AFTER 20 HRS	■			N = 28 7,12,16	0		CH	FILL: Silty clay topsoil, low plasticity, dark brown, trace of root fibres.	MC<PL	(H)		GRASS COVER
	■					CL	SILTY CLAY: high plasticity, brown, trace of root fibres.	MC<PL	TOO FRIABLE FOR HP TESTING			
						1			SILTY CLAY: medium plasticity, light grey, with fine to medium grained ironstone gravel.			
ON 18-3-14					2		-	SHALE: dark grey and red brown.	DW	M		MODERATE 'TC' BIT RESISTANCE
								as above, but with clay seams.				BANDED MODERATE RESISTANCE
					3		-	INTERBEDDED SHALE AND SANDSTONE: fine grained, dark grey and red brown.		H		HIGH RESISTANCE
					4			END OF BOREHOLE AT 3.5m				'TC' BIT REFUSAL
					5							CLASS 18 PVC STANDPIPE INSTALLED TO 3.5m DEPTH. MACHINE SLOTTED BETWEEN 3.5m AND 0.5m, CASING 0.5m TO SURFACE, BACKFILLED WITH 2mm SAND FILTER SAND 3.5m TO 0.5m, BENTONITE SEAL 0.5m TO 0.2m, METAL MONUMENT CONCRETED AT SURFACE
					6							
					7							



Borehole No.
JK2
1/1

BOREHOLE LOG

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 6-3-14 JK350												
R.L. Surface: ≈ 81.0m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CH	FILL: Silty clay topsoil, medium plasticity, brown, trace of root fibres.	MC<PL			GRASS COVER
					1		CL	SILTY CLAY: high plasticity, red brown, trace of fine to medium grained ironstone gravel.	MC<PL	H		
								SILTY CLAY: medium plasticity, light grey and orange brown, with XW shale seams.			>600 >600 >600	BANDED VERY LOW 'TC' BIT RESISTANCE
					2		-	SHALE: light grey and dark grey, with iron indurated seams and L strength seams.	XW	EL		VERY LOW RESISTANCE WITH LOW BANDS
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.

JK3

1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER R.L. Surface: ≈ 81.5m												
Date: 6-3-14 JK350 Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CH	FILL: Silty clay, medium plasticity, brown, trace of root fibres.	MC<PL			GRASS COVER
								SILTY CLAY: high plasticity, orange brown, trace of root fibres.	MC<PL	(H)		
									SILTY CLAY: high plasticity, light grey, with fine to medium grained ironstone gravel.		H	
				N = 32 8,12,20	1		-	SHALE: brown and red brown.	DW	M		MODERATE RESISTANCE
					2							
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							

COPYRIGHT



Borehole No.
JK5
1/1

BOREHOLE LOG





Client: SOUWEST DEVELOPMENT
Project: PROPOSED SUB-DIVISION
Location: OFF STATION STREET, MENANGLE, NSW
Job No. 27284Z
Date: 7-3-14
Method: SPIRAL AUGER JK350
R.L. Surface: ~ 83.5m
Datum: ASSUMED
Logged/Checked by: D.S./A.Z.

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CL	FILL: Silty clay, medium plasticity, brown, trace of fine to medium grained ironstone gravel and root fibres.	MC<PL	(VSt)		VEGETATION COVER
								SILTY CLAY: medium plasticity, brown, with fine to medium grained ironstone gravel.	MV<PL			TOO FRIABLE FOR HP TESTING
				N = 20 7,10,10	1		CH	SILTY CLAY: high plasticity, light grey.				
				N = 43 4,16,27	2		-	SHALE: light grey, with iron indurated bands.	XW	EL		VERY LOW 'TC' BIT RESISTANCE
								SHALE: dark grey and red brown.	DW	M-H		MODERATE RESISTANCE
					3			END OF BORHOLE AT 3.0m				
					4							
					5							
					6							
					7							



Borehole No.
JK6
1/1

BOREHOLE LOG

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 6-3-14 JK350												
R.L. Surface: ≈ 80.0m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0			FILL: Silty gravel, fine to coarse grained shale, dark grey, trace of clay fines and root fibres.	D			GRASS COVER
				N = 18 4,8,10	1		CH	SILTY CLAY: high plasticity, orange brown mottled light grey, with fine to medium grained ironstone gravel, trace of root fibres.	MC<PL	H	550 550 >600	BANDED VERY LOW 'TC' BIT RESISTANCE
				N = 28 10,15,13	2		CL	SILTY CLAY: low plasticity, light grey and orange brown, with L strength shale seams.			>600 >600 >600	
					3		-	SHALE: dark grey and red brown.	DW	L-M		LOW TO MODERATE RESISTANCE
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK7
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 6-3-14 JK350												
R.L. Surface: ≈ 80.0m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION	█				0		CL	FILL: Silty clay topsoil, medium plasticity, brown, trace of root fibres.	MC<PL	H		GRASS COVER
	█							SILTY CLAY: medium plasticity, light grey and orange brown, trace of root fibres.			>600 >600 >600	
					1		-	SHALE: brown and red brown.	DW	L-M		LOW TO MODERATE 'TC' BIT RESISTANCE
					2			SHALE: dark grey, brown and red brown.			M-H	
				3				END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK8
1/1

<div>Client: SOUWEST DEVELOPMENT</div> <div>Project: PROPOSED SUB-DIVISION</div> <div>Location: OFF STATION STREET, MENANGLE, NSW</div>												
<div>Job No. 27284Z</div> <div>Date: 6-3-14</div>			<div>Method: SPIRAL AUGER</div> <div>JK350</div> <div>Logged/Checked by: D.S./A.Z.</div>					<div>R.L. Surface: ≈ 84.0m</div> <div>Datum: ASSUMED</div>				
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
	DS											
DRY ON COMPLETION, AFTER 22.5 HRS & ON 18-3-14												
	</											



BOREHOLE LOG

Borehole No.
JK9
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 7-3-14 JK350												
R.L. Surface: ≈ 72.5m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CL	FILL: Silty clay topsoil, medium plasticity, dark brown, trace of root fibres.	MC<PL			GRASS COVER
								SILTY CLAY: medium plasticity, light grey and orange brown, with fine to medium grained sand.	MC<PL	H	450 400 400	
				N = 16 7,8,8	1		-	SANDSTONE: fine grained, brown and light grey.	DW	M		MODERATE 'TC' BIT RESISTANCE
					2			SHALE: dark grey, brown and red brown, with M strength sandstone seams.	SW	M-H		MODERATE TO HIGH RESISTANCE
					3			SANDSTONE: fine to medium grained, light grey and brown.		H		HIGH RESISTANCE
ON 18-3-14								END OF BOREHOLE AT 3.2m				'TC' BIT REFUSAL
					4							CLASS 18 PVC STANDPIPE INSTALLED TO 3.2m DEPTH. MACHINE SLOTTED BETWEEN 0.5m AND 3.2m, CASING TO 0.5m TO SURFACE, BACKFILLED WITH 2mm SAND FILTER SAND 0.5m TO 3.2m, BENTONITE SEAL 0.2m TO 0.5m, METAL MONUMENT CONCRETED AT SURFACE
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK10
1/1

<div><div>Client: SOUWEST DEVELOPMENT</div><div>Project: PROPOSED SUB-DIVISION</div><div>Location: OFF STATION STREET, MENANGLE, NSW</div></div>												
<div><div>Job No. 27284Z</div><div>Method: SPIRAL AUGER JK350</div><div>R.L. Surface: ≈ 74.5m</div><div>Date: 7-3-14</div><div>Datum: ASSUMED</div><div>Logged/Checked by: D.S./A.Z.</div></div>												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CL	FILL: Silty clay topsoil, medium plasticity, brown, trace of fine to medium grained ironstone gravel and root fibres.	MC<PL	H		GRASS COVER
								SILTY CLAY: low plasticity, light grey and orange brown, trace of fine grained sand.	DW	M-H	>600	MODERATE 'TC' BIT RESISTANCE
								SANDSTONE: fine grained, light grey and orange brown.				
					1			SANDSTONE: fine grained, light grey.	SW	H	>600	
					2			END OF BOREHOLE AT 2.0m				'TC' BIT REFUSAL
					3							
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK11
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 7-3-14 JK350												
R.L. Surface: ≈ 80.0m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION	█				0		CL	FILL: Silty clay, low plasticity, brown, with fine to medium grained ironstone gravel, trace of fine grained sand and root fibres.	MC<PL	H		GRASS COVER
	█							SILTY CLAY: medium plasticity, orange brown and light grey, with fine to medium grained ironstone gravel, trace of root fibres.	MC<PL			
				N > 22 8,22/ 100mm	1		-	SHALE: dark grey and brown.	DW	L-M	>600 >600 >600	LOW TO MODERATE 'TC' BIT RESISTANCE
				REFUSAL				SANDSTONE: fine grained, light grey.	SW	H		HIGH RESISTANCE
					2							
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK12
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
Job No. 27284Z Method: SPIRAL AUGER												
Date: 7-3-14 JK350												
R.L. Surface: ≈ 88.0m												
Datum: ASSUMED												
Logged/Checked by: D.S./A.Z.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION	█				0		CH	FILL: Silty clay topsoil, medium plasticity, brown, trace of root fibres.	MC<PL	H		GRASS COVER
	█				N = 24 5,10,14			SILTY CLAY: high plasticity, red brown and light grey, trace of fine to medium grained ironstone gravel and root fibres.			>600 >600 >600	
	█							N = 30 8,15,15			SILTY CLAY: high plasticity, light grey, with fine to medium grained ironstone gravel, trace of fine grained sand.	
	█				2						-	
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK13
1/1

Client: SOUWEST DEVELOPMENT												
Project: PROPOSED SUB-DIVISION												
Location: OFF STATION STREET, MENANGLE, NSW												
<hr/>												
Job No. 27284Z			Method: SPIRAL AUGER JK350			R.L. Surface: ≈ 84.0m						
Date: 7-3-14			Logged/Checked by: D.S./A.Z.					Datum: ASSUMED				
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0			FILL: Silty sandy clay, low plasticity, brown, trace of fine to medium grained ironstone gravel and root fibres.	MC<PL			GRASS COVER
					1		CH	SILTY CLAY: high plasticity, light grey and red brown, with fine to medium grained ironstone gravel.	MC<PL	H		
							N = 27 7,11,16				>600 >600 >600	
						2		-	SHALE: dark grey and red brown.	DW	M	
					3			END OF BOREHOLE AT 3.0m				
					4							
					5							
					6							
					7							



BOREHOLE LOG

Borehole No.
JK14
1/1

Client: SOUWEST DEVELOPMENT													
Project: PROPOSED SUB-DIVISION													
Location: OFF STATION STREET, MENANGLE, NSW													
Job No. 27284Z Method: SPIRAL AUGER													
Date: 7-3-14 JK350													
R.L. Surface: ≈ 87.0m													
Datum: ASSUMED													
Logged/Checked by: D.S./A.Z.													
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks	
	ES	U50	DB										DS
DRY ON COMPLET- ION					0		CL	FILL: Silty sandy clay, low plasticity, brown, fine to medium grained sand, trace of root fibres.	MC<PL	H		GRASS COVER	
								SILTY CLAY: medium plasticity, orange brown, with fine grained sand. as above, but mottled light grey.	MC<PL				
				N > 20 8,20/ 150mm REFUSAL	1		-	SANDSTONE: fine grained, light grey and red brown.	DW	M	>600 >600 >600		
										H		HIGH 'TC' BIT RESISTANCE	
					2			END OF BOREHOLE AT 2.0m				'TC' BIT REFUSAL	
					3								
					4								
					5								
					6								
					7								



BOREHOLE LOG

Borehole No.
JK15
1/1

Client: SOUWEST DEVELOPMENT
Project: PROPOSED SUB-DIVISION
Location: OFF STATION STREET, MENANGLE, NSW
Job No. 27284Z
Date: 7-3-14
Method: SPIRAL AUGER JK350
R.L. Surface: ~ 87.0m
Datum: ASSUMED
Logged/Checked by: D.S./A.Z.

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	U50	DB									
DRY ON COMPLETION					0		CL	FILL: Silty clay, medium plasticity, brown, trace of root fibres.	MC<PL	(H)		GRASS COVER
					1		-	SILTY CLAY: low plasticity, light grey, with fine to medium grained ironstone gravel, trace of root fibres. SHALES: dark grey and red brown.	DW	L-M		LOW TO MODERATE 'TC' BIT RESISTANCE
					2					M		MODERATE RESISTANCE
					3							
					4							
					5							
					6			END OF BOREHOLE AT 6.0m				
					7							

CLASS 18 PVC STANDPIPE INSTALLED TO 3.5m DEPTH. MACHINE SLOTTED BETWEEN 6m AND 1m, CASING 1m TO SURFACE, BACKFILLED WITH 2mm SAND FILTER SAND 6.0m TO 0.5m, BENTONITE SEAL 0.5m TO 0.2m, METAL MONUMENT CONCRETED AT SURFACE



REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

Sampling is carried out during drilling or from other excavations to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.



Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as
$$N = 13$$
$$4, 6, 7$$
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as
$$N > 30$$
$$15, 30/40\text{mm}$$

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as " N_c " on the borehole logs, together with the number of blows per 150mm penetration.



Static Cone Penetrometer Testing and Interpretation:

Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.



More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 'Methods of Testing Soil for Engineering Purposes'. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document 'Guidelines for the Provision of Geotechnical Information in Tender Documents', published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

- i) a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or
- iii) full time engineering presence on site.



GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL		ROCK		DEFECTS AND INCLUSIONS	
	FILL		CONGLOMERATE		CLAY SEAM
	TOPSOIL		SANDSTONE		SHEARED OR CRUSHED SEAM
	CLAY (CL, CH)		SHALE		BRECCIATED OR SHATTERED SEAM/ZONE
	SILT (ML, MH)		SILTSTONE, MUDSTONE, CLAYSTONE		IRONSTONE GRAVEL
	SAND (SP, SW)		LIMESTONE		ORGANIC MATERIAL
	GRAVEL (GP, GW)		PHYLLITE, SCHIST		
	SANDY CLAY (CL, CH)		TUFF		
	SILTY CLAY (CL, CH)		GRANITE, GABBRO		
	CLAYEY SAND (SC)		DOLERITE, DIORITE		
	SILTY SAND (SM)		BASALT, ANDESITE		
	GRAVELLY CLAY (CL, CH)		QUARTZITE		
	CLAYEY GRAVEL (GC)				
	SANDY SILT (ML)				
	PEAT AND ORGANIC SOILS				
				OTHER MATERIALS	
					CONCRETE
					BITUMINOUS CONCRETE, COAL
					COLLUVIUM



Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)				Group Symbols	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria								
Coarse-grained soils More than half of material is larger than 75 μm sieve size ^b (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: <i>Silty sand, gravelly</i> ; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line, or PI less than 4 Atterberg limits above "A" line, with PI greater than 7 Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols								
			Predominantly one size or a range of sizes with some intermediate sizes missing	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines										
		Gravels with fines (appreciable amount of fines)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures											
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures			For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: <i>Silty sand, gravelly</i> ; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line, or PI less than 4 Atterberg limits above "A" line, with PI greater than 7 Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols						
			Predominantly one size or a range of sizes with some intermediate sizes missing	SW	Well graded sands, gravelly sands, little or no fines										
		Sands with fines (appreciable amount of fines)	SP	Poorly graded sands, gravelly sands, little or no fines											
	Sands with fines (appreciable amount of fines)		SM	Silty sands, poorly graded sand-silt mixtures	For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: <i>Silty sand, gravelly</i> ; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)					$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line, or PI less than 4 Atterberg limits above "A" line, with PI greater than 7 Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols					
		Nonplastic fines (for identification procedures, see ML below)	SC	Clayey sands, poorly graded sand-clay mixtures											
		Plastic fines (for identification procedures, see CL below)													
	Identification Procedures on Fraction Smaller than 380 μm Sieve Size														
Fine-grained soils More than half of material is smaller than 75 μm sieve size (The 75 μm sieve size is about the smallest particle visible to naked eye)	Sils and clays liquid limit less than 50	Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)											
			None to slight	Quick to slow		None	ML				Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: <i>Clayey silt, brown</i> ; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line, or PI less than 4 Atterberg limits above "A" line, with PI greater than 7 Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols		
			Medium to high	None to very slow		Medium	CL				Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		Slight to medium	Slow	Slight		OL	Organic silts and organic silt-clays of low plasticity								
		Sils and clays liquid limit greater than 50	Slight to medium	Slow to none		Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	OH		Organic clays of medium to high plasticity				
														High to very high	None
	Medium to high				None to very slow					Slight to medium					
		Readily identified by colour, odour, spongy feel and frequently by fibrous texture													

Determine percentages of gravel and sand from grain size curve

Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows:
GW, GP, SW, SP
GM, GC, SM, SC
Borderline cases requiring use of dual symbols

Use grain size curve in identifying the fractions as given under field identification

Comparing soils at equal liquid limit

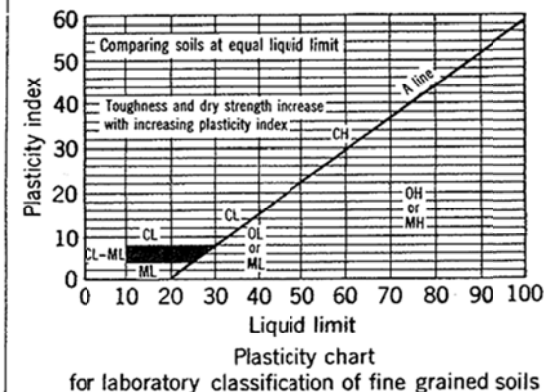
Toughness and dry strength increase with increasing plasticity index

Plasticity index

Liquid limit

Plasticity chart for laboratory classification of fine grained soils





Determine percentages of gravel and sand from grain size curve
Depending on percentage of fines (fraction smaller than 75 μ m sieve size) coarse grained soils are classified as follows:
Less than 5% GW, GP, SW, SP
More than 5% GM, GC, SM, SC
Borderline cases requiring use of dual symbols



- Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.



LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown.
		Extent of borehole collapse shortly after drilling.
		Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N _c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils) (Cohesionless Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
	D	DRY – Runs freely through fingers.
	M	MOIST – Does not run freely but no free water visible on soil surface.
	W	WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – Unconfined compressive strength less than 25kPa
	S	SOFT – Unconfined compressive strength 25-50kPa
	F	FIRM – Unconfined compressive strength 50-100kPa
	St	STIFF – Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF – Unconfined compressive strength 200-400kPa
	H	HARD – Unconfined compressive strength greater than 400kPa
	()	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)	VL	Density Index (I_p) Range (%) Very Loose <15
	L	Loose 15-35
	MD	Medium Dense 35-65
	D	Dense 65-85
	VD	Very Dense >85
	()	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
		SPT 'N' Value Range (Blows/300mm) 0-4 4-10 10-30 30-50 >50
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
		Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.



LOG SYMBOLS continued

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low: -----	EL -----	0.03	Easily remoulded by hand to a material with soil properties.
Very Low: -----	VL -----	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low: -----	L -----	0.3	A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength: -----	M -----	1	A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High: -----	H -----	3	A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High: -----	VH -----	10	A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	



Appendix B: Laboratory Reports and Chain of Custody Documents

CERTIFICATE OF ANALYSIS

106508

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	E27284KB, Menangle
No. of samples:	35 Soils
Date samples received / completed instructions received	13/3/2014 / 13/3/2014

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	20/03/14 / 20/03/14
Date of Preliminary Report:	None Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:



Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-1 JK1 0.1-0.2 6/03/2014 Soil	106508-3 JK2 0.1-0.2 6/03/2014 Soil	106508-5 JK3 0.1-0.2 6/03/2014 Soil	106508-7 JK4 0.1-0.2 6/03/2014 Soil	106508-8 JK4 0.5-0.95 6/03/2014 Soil
Date extracted	-	17/03/2014	17/03/2014	17/03/2014	17/03/2014	17/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRHC ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	95	95	95	93

vTRH(C6-C10)/BTEXN in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-9 JK5 0.1-0.2 6/03/2014 Soil	106508-10 JK5 0.5-0.95 6/03/2014 Soil	106508-11 JK6 0.1-0.2 6/03/2014 Soil	106508-12 JK6 0.5-0.95 6/03/2014 Soil	106508-13 JK7 0.1-0.2 6/03/2014 Soil
Date extracted	-	17/03/2014	17/03/2014	17/03/2014	17/03/2014	17/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRHC ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	93	98	93	92

vTRH(C6-C10)/BTEXN in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-14 JK7 0.5-0.95 6/03/2014 Soil	106508-15 JK8 0.1-0.2 6/03/2014 Soil	106508-17 JK9 0.1-0.2 6/03/2014 Soil	106508-18 JK9 0.5-0.95 6/03/2014 Soil	106508-19 JK10 0.1-0.2 6/03/2014 Soil
Date extracted	-	17/03/2014	17/03/2014	17/03/2014	17/03/2014	17/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRHC ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	95	96	97	98	96

vTRH(C6-C10)/BTEXN in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-21 JK11 0.1-0.2 6/03/2014 Soil	106508-22 JK11 0.5-0.75 6/03/2014 Soil	106508-23 JK12 0.1-0.2 6/03/2014 Soil	106508-25 JK13 0-0.1 6/03/2014 Soil	106508-26 JK13 0.5-0.95 6/03/2014 Soil
Date extracted	-	17/03/2014	17/03/2014	17/03/2014	17/03/2014	17/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₆ - C ₉	mg/kg	<25	<25	<25	<25	<25
TRHC ₆ - C ₁₀	mg/kg	<25	<25	<25	<25	<25
vTPHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	100	101	98	100

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	106508-27	106508-29	106508-31	106508-33	106508-34
Your Reference	-----	JK14	JK15	TB1	TS	Dup A
Depth	-----	0-0.1	0-0.1	-	-	-
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/03/2014	17/03/2014	17/03/2014	17/03/2014	17/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₆ - C ₉	mg/kg	<25	<25	[NA]	[NA]	<25
TRHC ₆ - C ₁₀	mg/kg	<25	<25	[NA]	[NA]	<25
vTPHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25	<25	[NA]	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	100%	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	100%	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	100%	<1
m+p-xylene	mg/kg	<2	<2	<2	101%	<2
o-Xylene	mg/kg	<1	<1	<1	101%	<1
naphthalene	mg/kg	<1	<1	[NA]	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	97	99	102	100	97

svTRH (C10-C40) in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-1 JK1 0.1-0.2 6/03/2014 Soil	106508-3 JK2 0.1-0.2 6/03/2014 Soil	106508-5 JK3 0.1-0.2 6/03/2014 Soil	106508-7 JK4 0.1-0.2 6/03/2014 Soil	106508-8 JK4 0.5-0.95 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	<100
TRH>C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	<100
TRH>C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	111	100	105	106	107

svTRH (C10-C40) in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-9 JK5 0.1-0.2 6/03/2014 Soil	106508-10 JK5 0.5-0.95 6/03/2014 Soil	106508-11 JK6 0.1-0.2 6/03/2014 Soil	106508-12 JK6 0.5-0.95 6/03/2014 Soil	106508-13 JK7 0.1-0.2 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	120	<100	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	220	<100	<100	<100	220
TRH>C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₆ -C ₃₄	mg/kg	280	<100	<100	<100	240
TRH>C ₃₄ -C ₄₀	mg/kg	130	<100	<100	<100	120
Surrogate o-Terphenyl	%	107	106	102	107	107

svTRH (C10-C40) in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-14 JK7 0.5-0.95 6/03/2014 Soil	106508-15 JK8 0.1-0.2 6/03/2014 Soil	106508-17 JK9 0.1-0.2 6/03/2014 Soil	106508-18 JK9 0.5-0.95 6/03/2014 Soil	106508-19 JK10 0.1-0.2 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100	110
TRH>C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	<100	110
TRH>C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	108	103	102	106	104

svTRH (C10-C40) in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-21 JK11 0.1-0.2 6/03/2014 Soil	106508-22 JK11 0.5-0.75 6/03/2014 Soil	106508-23 JK12 0.1-0.2 6/03/2014 Soil	106508-25 JK13 0-0.1 6/03/2014 Soil	106508-26 JK13 0.5-0.95 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	<100	<100	<100	110	<100
TRH>C ₁₀ -C ₁₆	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C ₁₆ -C ₃₄	mg/kg	<100	<100	<100	120	<100
TRH>C ₃₄ -C ₄₀	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	107	106	104	103	102

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	106508-27	106508-29	106508-34
Your Reference	-----	JK14	JK15	Dup A
Depth	-----	0-0.1	0-0.1	-
Date Sampled		6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	100	<100	<100
TRH>C ₁₀ -C ₁₆	mg/kg	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH>C ₁₆ -C ₃₄	mg/kg	<100	<100	<100
TRH>C ₃₄ -C ₄₀	mg/kg	<100	<100	<100
Surrogate o-Terphenyl	%	104	101	105

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-1 JK1 0.1-0.2 6/03/2014 Soil	106508-3 JK2 0.1-0.2 6/03/2014 Soil	106508-5 JK3 0.1-0.2 6/03/2014 Soil	106508-7 JK4 0.1-0.2 6/03/2014 Soil	106508-8 JK4 0.5-0.95 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQNEPMB1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	105	97	101	103	108

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-9 JK5 0.1-0.2 6/03/2014 Soil	106508-10 JK5 0.5-0.95 6/03/2014 Soil	106508-11 JK6 0.1-0.2 6/03/2014 Soil	106508-12 JK6 0.5-0.95 6/03/2014 Soil	106508-13 JK7 0.1-0.2 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Benzo(b+k)fluoranthene	mg/kg	0.3	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.12	<0.05	<0.05	<0.05	0.09
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQNEPMB1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	1.3	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.72
Surrogate p-Terphenyl-d14	%	97	108	106	108	106

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-14 JK7 0.5-0.95 6/03/2014 Soil	106508-15 JK8 0.1-0.2 6/03/2014 Soil	106508-17 JK9 0.1-0.2 6/03/2014 Soil	106508-18 JK9 0.5-0.95 6/03/2014 Soil	106508-19 JK10 0.1-0.2 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.06	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQNEPMB1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	0.57	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	105	99	99	103	104

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-21 JK11 0.1-0.2 6/03/2014 Soil	106508-22 JK11 0.5-0.75 6/03/2014 Soil	106508-23 JK12 0.1-0.2 6/03/2014 Soil	106508-25 JK13 0-0.1 6/03/2014 Soil	106508-26 JK13 0.5-0.95 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQNEPMB1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.31	NIL (+)VE
Surrogate p-Terphenyl-d14	%	108	104	113	104	100

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-27 JK14 0-0.1 6/03/2014 Soil	106508-29 JK15 0-0.1 6/03/2014 Soil	106508-34 Dup A - 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQNEPMB1	mg/kg	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	103	103	108

Organochlorine Pesticides in soil						
Our Reference:	UNITS	106508-7	106508-9	106508-11	106508-13	106508-17
Your Reference	-----	JK4	JK5	JK6	JK7	JK9
Depth	-----	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	97	93	98	99

Organochlorine Pesticides in soil			
Our Reference:	UNITS	106508-21	106508-25
Your Reference	-----	JK11	JK13
Depth	-----	0.1-0.2	0-0.1
Date Sampled		6/03/2014	6/03/2014
Type of sample		Soil	Soil
Date extracted	-	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCMX	%	102	91

Organophosphorus Pesticides						
Our Reference:	UNITS	106508-7	106508-9	106508-11	106508-13	106508-17
Your Reference	-----	JK4	JK5	JK6	JK7	JK9
Depth	-----	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	97	93	98	99

Organophosphorus Pesticides			
Our Reference:	UNITS	106508-21	106508-25
Your Reference	-----	JK11	JK13
Depth	-----	0.1-0.2	0-0.1
Date Sampled		6/03/2014	6/03/2014
Type of sample		Soil	Soil
Date extracted	-	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014
Diazinon	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Surrogate TCMX	%	102	91

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-7 JK4 0.1-0.2 6/03/2014 Soil	106508-9 JK5 0.1-0.2 6/03/2014 Soil	106508-11 JK6 0.1-0.2 6/03/2014 Soil	106508-13 JK7 0.1-0.2 6/03/2014 Soil	106508-17 JK9 0.1-0.2 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	97	93	98	99

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-21 JK11 0.1-0.2 6/03/2014 Soil	106508-25 JK13 0-0.1 6/03/2014 Soil
Date extracted	-	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	102	91

Acid Extractable metals in soil						
Our Reference:	UNITS	106508-1	106508-3	106508-5	106508-7	106508-8
Your Reference	-----	JK1	JK2	JK3	JK4	JK4
Depth	-----	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.5-0.95
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Arsenic	mg/kg	9	7	7	6	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	18	25	15	19	21
Copper	mg/kg	29	23	22	41	17
Lead	mg/kg	34	25	23	96	25
Mercury	mg/kg	0.2	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	12	10	12	12	8
Zinc	mg/kg	64	52	34	140	30

Acid Extractable metals in soil						
Our Reference:	UNITS	106508-9	106508-10	106508-11	106508-12	106508-13
Your Reference	-----	JK5	JK5	JK6	JK6	JK7
Depth	-----	0.1-0.2	0.5-0.95	0.1-0.2	0.5-0.95	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Arsenic	mg/kg	6	6	<4	<4	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	11	5	7	15
Copper	mg/kg	34	21	26	26	34
Lead	mg/kg	68	21	15	15	130
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	16	5	15	7	9
Zinc	mg/kg	93	30	76	44	200

Acid Extractable metals in soil						
Our Reference:	UNITS	106508-14	106508-15	106508-17	106508-18	106508-19
Your Reference	-----	JK7	JK8	JK9	JK9	JK10
Depth	-----	0.5-0.95	0.1-0.2	0.1-0.2	0.5-0.95	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Arsenic	mg/kg	9	6	5	8	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	11	12	12	12
Copper	mg/kg	15	23	13	7	20
Lead	mg/kg	20	34	15	12	29
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	12	6	3	7
Zinc	mg/kg	24	49	21	19	54

Acid Extractable metals in soil						
Our Reference:	UNITS	106508-21	106508-22	106508-23	106508-25	106508-26
Your Reference	-----	JK11	JK11	JK12	JK13	JK13
Depth	-----	0.1-0.2	0.5-0.75	0.1-0.2	0-0.1	0.5-0.95
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Arsenic	mg/kg	7	10	7	8	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	9	19	15	8
Copper	mg/kg	14	13	11	26	18
Lead	mg/kg	18	14	22	73	17
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	15	5	7	4
Zinc	mg/kg	44	57	23	180	30

Acid Extractable metals in soil				
Our Reference:	UNITS	106508-27	106508-29	106508-34
Your Reference	-----	JK14	JK15	Dup A
Depth	-----	0-0.1	0-0.1	-
Date Sampled		6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil
Date digested	-	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	18/03/2014	18/03/2014	18/03/2014
Arsenic	mg/kg	8	6	8
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	21	9	10
Copper	mg/kg	6	11	15
Lead	mg/kg	130	17	19
Mercury	mg/kg	0.1	<0.1	<0.1
Nickel	mg/kg	5	7	4
Zinc	mg/kg	25	26	25

Moisture						
Our Reference:	UNITS	106508-1	106508-3	106508-5	106508-7	106508-8
Your Reference	-----	JK1	JK2	JK3	JK4	JK4
Depth	-----	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.5-0.95
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Moisture	%	17	15	18	18	16

Moisture						
Our Reference:	UNITS	106508-9	106508-10	106508-11	106508-12	106508-13
Your Reference	-----	JK5	JK5	JK6	JK6	JK7
Depth	-----	0.1-0.2	0.5-0.95	0.1-0.2	0.5-0.95	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Moisture	%	12	15	6.1	17	17

Moisture						
Our Reference:	UNITS	106508-14	106508-15	106508-17	106508-18	106508-19
Your Reference	-----	JK7	JK8	JK9	JK9	JK10
Depth	-----	0.5-0.95	0.1-0.2	0.1-0.2	0.5-0.95	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Moisture	%	15	13	11	11	14

Moisture						
Our Reference:	UNITS	106508-21	106508-22	106508-23	106508-25	106508-26
Your Reference	-----	JK11	JK11	JK12	JK13	JK13
Depth	-----	0.1-0.2	0.5-0.75	0.1-0.2	0-0.1	0.5-0.95
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Moisture	%	12	5.8	9.9	10	10

Moisture				
Our Reference:	UNITS	106508-27	106508-29	106508-34
Your Reference	-----	JK14	JK15	Dup A
Depth	-----	0-0.1	0-0.1	-
Date Sampled		6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil
Date prepared	-	18/03/2014	18/03/2014	18/03/2014
Date analysed	-	19/03/2014	19/03/2014	19/03/2014
Moisture	%	12	13	12

Asbestos ID - soils						
Our Reference:	UNITS	106508-1	106508-3	106508-5	106508-7	106508-8
Your Reference	-----	JK1	JK2	JK3	JK4	JK4
Depth	-----	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.5-0.95
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Sample mass tested	g	Approx 45g	Approx 35g	Approx 35g	Approx 35g	Approx 40g
Sample Description	-	Brown fine-grained soil	Brpwn fine-grained clay soil	Brown fine-grained soil	Brown fine-grained soil	Orange fine-grained clay soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	106508-9	106508-10	106508-11	106508-12	106508-13
Your Reference	-----	JK5	JK5	JK6	JK6	JK7
Depth	-----	0.1-0.2	0.5-0.95	0.1-0.2	0.5-0.95	0.1-0.2
Date Sampled		6/03/2014	6/03/2014	6/03/2014	6/03/2014	6/03/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Sample mass tested	g	Approx 30g	Approx 50g	Approx 70g	Approx 50g	Approx 35g
Sample Description	-	Brown fine-grained soil	Orange fine-grained clay soil	Brown fine-grained soil & rocks	Orange fine-grained clay soil	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-14 JK7 0.5-0.95 6/03/2014 Soil	106508-15 JK8 0.1-0.2 6/03/2014 Soil	106508-17 JK9 0.1-0.2 6/03/2014 Soil	106508-18 JK9 0.5-0.95 6/03/2014 Soil	106508-19 JK10 0.1-0.2 6/03/2014 Soil
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Sample mass tested	g	Approx 35g	Approx 45g	Approx 30g	Approx 55g	Approx 40g
Sample Description	-	Orange fine-grained clay soil	Brown fine-grained soil	Brown fine-grained soil	Beige fine-grained clay soil	Brown fine-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	106508-21 JK11 0.1-0.2 6/03/2014 Soil	106508-22 JK11 0.5-0.75 6/03/2014 Soil	106508-23 JK12 0.1-0.2 6/03/2014 Soil	106508-25 JK13 0-0.1 6/03/2014 Soil	106508-26 JK13 0.5-0.95 6/03/2014 Soil
Date analysed	-	19/03/2014	19/03/2014	19/03/2014	19/03/2014	19/03/2014
Sample mass tested	g	Approx 40g	Approx 50g	Approx 35g	Approx 35g	Approx 40g
Sample Description	-	Brown fine-grained soil	Beige fine-grained soil	Brown fine-grained soil	Brown fine-grained soil	Orange fine-grained clay soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils			
Our Reference:	UNITS	106508-27	106508-29
Your Reference	-----	JK14	JK15
Depth	-----	0-0.1	0-0.1
Date Sampled		6/03/2014	6/03/2014
Type of sample		Soil	Soil
Date analysed	-	19/03/2014	19/03/2014
Sample mass tested	g	Approx 40g	Approx 40g
Sample Description	-	Brown fine-grained soil	Brown fine-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected

BTEX in Water		
Our Reference:	UNITS	106508-32
Your Reference	-----	FR1
Depth	-----	-
Date Sampled		6/03/2014
Type of sample		Water
Date extracted	-	18/03/2014
Date analysed	-	19/03/2014
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	97
Surrogate toluene-d8	%	96
Surrogate 4-BFB	%	100

MethodID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

Client Reference: E27284KB, Menangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTRH(C6-C10)/BTEXN in Soil						Base II Duplicate II %RPD		
Date extracted	-			17/03/2014	106508-7	17/03/2014 17/03/2014	LCS-3	17/03/2014
Date analysed	-			19/03/2014	106508-7	19/03/2014 19/03/2014	LCS-3	19/03/2014
TRHC ₆ - C ₉	mg/kg	25	Org-016	<25	106508-7	<25 <25	LCS-3	96%
TRHC ₆ - C ₁₀	mg/kg	25	Org-016	<25	106508-7	<25 <25	LCS-3	96%
Benzene	mg/kg	0.2	Org-016	<0.2	106508-7	<0.2 <0.2	LCS-3	90%
Toluene	mg/kg	0.5	Org-016	<0.5	106508-7	<0.5 <0.5	LCS-3	91%
Ethylbenzene	mg/kg	1	Org-016	<1	106508-7	<1 <1	LCS-3	96%
m+p-xylene	mg/kg	2	Org-016	<2	106508-7	<2 <2	LCS-3	101%
o-Xylene	mg/kg	1	Org-016	<1	106508-7	<1 <1	LCS-3	97%
naphthalene	mg/kg	1	Org-014	<1	106508-7	<1 <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	92	106508-7	95 95 RPD: 0	LCS-3	97%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
svTRH (C10-C40) in Soil						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Date analysed	-			19/03/2014	106508-7	19/03/2014 19/03/2014	LCS-3	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	106508-7	<50 <50	LCS-3	124%
TRHC ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	106508-7	<100 <100	LCS-3	114%
TRHC ₂₈ - C ₃₆	mg/kg	100	Org-003	<100	106508-7	<100 <100	LCS-3	124%
TRH>C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	106508-7	<50 <50	LCS-3	124%
TRH>C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	106508-7	<100 <100	LCS-3	114%
TRH>C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	106508-7	<100 <100	LCS-3	124%
Surrogate o-Terphenyl	%		Org-003	96	106508-7	106 105 RPD: 1	LCS-3	106%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Date analysed	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	83%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	105%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	99%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	97%

Client Reference: E27284KB, Menangle

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	101%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	LCS-3	93%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	106508-7	<0.2 <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	106508-7	<0.05 <0.05	LCS-3	99%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	98	106508-7	103 105 RPD: 2	LCS-3	97%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Organochlorine Pesticides in soil						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Date analysed	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
HCB	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	87%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	65%
Heptachlor	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	91%
delta-BHC	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	96%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	115%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	85%
Dieldrin	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	86%
Endrin	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	83%
pp-DDD	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	91%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	LCS-3	82%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	92	106508-7	97 101 RPD: 4	LCS-3	86%

Client Reference: E27284KB, Menangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Organophosphorus Pesticides						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Date analysed	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Diazinon	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Chlorpyrifos-methyl	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Chlorpyrifos	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	LCS-3	79%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	LCS-3	74%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	106508-7	<0.1 <0.1	LCS-3	61%
Surrogate TCMX	%		Org-008	92	106508-7	97 101 RPD: 4	LCS-3	93%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PCBs in Soil						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Date analysed	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-3	18/03/2014
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	LCS-3	99%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	106508-7	<0.1 <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	92	106508-7	97 101 RPD: 4	LCS-3	108%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Date digested	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-4	18/03/2014
Date analysed	-			18/03/2014	106508-7	18/03/2014 18/03/2014	LCS-4	18/03/2014
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	106508-7	6 6 RPD: 0	LCS-4	82%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	106508-7	<0.4 <0.4	LCS-4	104%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	106508-7	19 18 RPD: 5	LCS-4	103%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	106508-7	41 60 RPD: 38	LCS-4	99%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	106508-7	96 100 RPD: 4	LCS-4	99%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	106508-7	<0.1 <0.1	LCS-4	91%

Client Reference: E27284KB, Menangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	106508-7	12 12 RPD: 0	LCS-4	101%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	106508-7	140 150 RPD: 7	LCS-4	103%
QUALITYCONTROL Moisture								
Date prepared	-			[NT]				
Date analysed	-			[NT]				
Moisture	%	0.1	Inorg-008	[NT]				
QUALITYCONTROL Asbestos ID - soils								
Date analysed	-			[NT]				
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
BTEX in Water						Base II Duplicate II %RPD		
Date extracted	-			18/03/2014	[NT]	[NT]	LCS-W1	18/03/2014
Date analysed	-			19/03/2014	[NT]	[NT]	LCS-W1	19/03/2014
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	104%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	103%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	103%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	103%
Surrogate Dibromofluoromethane	%		Org-016	92	[NT]	[NT]	LCS-W1	98%
Surrogate toluene-d8	%		Org-016	88	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-016	99	[NT]	[NT]	LCS-W1	94%
QUALITYCONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#		Duplicate Base + Duplicate + %RPD		Spike Sm#	Spike % Recovery	
Date extracted	-	106508-14		17/03/2014 17/03/2014		LCS-4	17/03/2014	
Date analysed	-	106508-14		19/03/2014 19/03/2014		LCS-4	19/03/2014	
TRHC ₆ - C ₉	mg/kg	106508-14		<25 <25		LCS-4	102%	
TRHC ₆ - C ₁₀	mg/kg	106508-14		<25 <25		LCS-4	102%	
Benzene	mg/kg	106508-14		<0.2 <0.2		LCS-4	93%	
Toluene	mg/kg	106508-14		<0.5 <0.5		LCS-4	95%	
Ethylbenzene	mg/kg	106508-14		<1 <1		LCS-4	104%	
m+p-xylene	mg/kg	106508-14		<2 <2		LCS-4	108%	
o-Xylene	mg/kg	106508-14		<1 <1		LCS-4	103%	
naphthalene	mg/kg	106508-14		<1 <1		[NR]	[NR]	
Surrogate aaa-Trifluorotoluene	%	106508-14		95 99 RPD: 4		LCS-4	98%	

Client Reference: E27284KB, Menangle

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	106508-14	18/03/2014 18/03/2014	LCS-4	18/03/2014
Date analysed	-	106508-14	19/03/2014 19/03/2014	LCS-4	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	106508-14	<50 <50	LCS-4	111%
TRHC ₁₅ - C ₂₈	mg/kg	106508-14	<100 <100	LCS-4	119%
TRHC ₂₈ - C ₃₆	mg/kg	106508-14	<100 <100	LCS-4	116%
TRH>C ₁₀ -C ₁₆	mg/kg	106508-14	<50 <50	LCS-4	111%
TRH>C ₁₆ -C ₃₄	mg/kg	106508-14	<100 <100	LCS-4	119%
TRH>C ₃₄ -C ₄₀	mg/kg	106508-14	<100 <100	LCS-4	116%
Surrogate o-Terphenyl	%	106508-14	108 107 RPD: 1	LCS-4	112%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	106508-14	18/03/2014 18/03/2014	LCS-4	18/03/2014
Date analysed	-	106508-14	18/03/2014 18/03/2014	LCS-4	18/03/2014
Naphthalene	mg/kg	106508-14	<0.1 <0.1	LCS-4	100%
Acenaphthylene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	106508-14	<0.1 <0.1	LCS-4	107%
Phenanthrene	mg/kg	106508-14	<0.1 <0.1	LCS-4	102%
Anthracene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	106508-14	<0.1 <0.1	LCS-4	100%
Pyrene	mg/kg	106508-14	<0.1 <0.1	LCS-4	104%
Benzo(a)anthracene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	106508-14	<0.1 <0.1	LCS-4	95%
Benzo(b+k)fluoranthene	mg/kg	106508-14	<0.2 <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	106508-14	<0.05 <0.05	LCS-4	105%
Indeno(1,2,3-c,d)pyrene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	106508-14	<0.1 <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	106508-14	105 108 RPD: 3	LCS-4	100%

Client Reference: E27284KB, Menangle

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-9	18/03/2014
Date analysed	-	[NT]	[NT]	106508-9	18/03/2014
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	106508-9	69%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	106508-9	68%
Heptachlor	mg/kg	[NT]	[NT]	106508-9	97%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	106508-9	102%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	106508-9	102%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	106508-9	89%
Dieldrin	mg/kg	[NT]	[NT]	106508-9	91%
Endrin	mg/kg	[NT]	[NT]	106508-9	88%
pp-DDD	mg/kg	[NT]	[NT]	106508-9	95%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	106508-9	92%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	106508-9	93%

Client Reference: E27284KB, Menangle

QUALITYCONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-9	18/03/2014
Date analysed	-	[NT]	[NT]	106508-9	18/03/2014
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyrifos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyrifos	mg/kg	[NT]	[NT]	106508-9	127%
Fenitrothion	mg/kg	[NT]	[NT]	106508-9	118%
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	106508-9	94%
Surrogate TCMX	%	[NT]	[NT]	106508-9	101%
QUALITYCONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-9	18/03/2014
Date analysed	-	[NT]	[NT]	106508-9	18/03/2014
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	106508-9	99%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	106508-9	110%
QUALITYCONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	106508-14	18/03/2014 18/03/2014	106508-9	18/03/2014
Date analysed	-	106508-14	18/03/2014 18/03/2014	106508-9	18/03/2014
Arsenic	mg/kg	106508-14	9 9 RPD: 0	106508-9	80%
Cadmium	mg/kg	106508-14	<0.4 <0.4	106508-9	80%
Chromium	mg/kg	106508-14	14 14 RPD: 0	106508-9	82%
Copper	mg/kg	106508-14	15 16 RPD: 6	106508-9	90%
Lead	mg/kg	106508-14	20 21 RPD: 5	106508-9	72%
Mercury	mg/kg	106508-14	<0.1 <0.1	106508-9	88%
Nickel	mg/kg	106508-14	5 6 RPD: 18	106508-9	76%
Zinc	mg/kg	106508-14	24 28 RPD: 15	106508-9	79%

Client Reference: E27284KB, Menangle

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	106508-27	17/03/2014 17/03/2014	106508-9	17/03/2014
Date analysed	-	106508-27	19/03/2014 19/03/2014	106508-9	19/03/2014
TRHC ₆ - C ₉	mg/kg	106508-27	<25 <25	106508-9	101%
TRHC ₆ - C ₁₀	mg/kg	106508-27	<25 <25	106508-9	101%
Benzene	mg/kg	106508-27	<0.2 <0.2	106508-9	97%
Toluene	mg/kg	106508-27	<0.5 <0.5	106508-9	98%
Ethylbenzene	mg/kg	106508-27	<1 <1	106508-9	101%
m+p-xylene	mg/kg	106508-27	<2 <2	106508-9	105%
o-Xylene	mg/kg	106508-27	<1 <1	106508-9	101%
naphthalene	mg/kg	106508-27	<1 <1	[NR]	[NR]
Surrogate aaa- Trifluorotoluene	%	106508-27	97 102 RPD: 5	106508-9	93%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	106508-27	18/03/2014 18/03/2014	106508-9	18/03/2014
Date analysed	-	106508-27	19/03/2014 19/03/2014	106508-9	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	106508-27	<50 <50	106508-9	133%
TRHC ₁₅ - C ₂₈	mg/kg	106508-27	<100 <100	106508-9	136%
TRHC ₂₉ - C ₃₆	mg/kg	106508-27	100 <100	106508-9	#
TRH>C ₁₀ -C ₁₆	mg/kg	106508-27	<50 <50	106508-9	133%
TRH>C ₁₆ -C ₃₄	mg/kg	106508-27	<100 <100	106508-9	136%
TRH>C ₃₄ -C ₄₀	mg/kg	106508-27	<100 <100	106508-9	#
Surrogate o-Terphenyl	%	106508-27	104 103 RPD: 1	106508-9	120%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	106508-27	18/03/2014 18/03/2014	106508-9	18/03/2014
Date analysed	-	106508-27	18/03/2014 18/03/2014	106508-9	18/03/2014
Naphthalene	mg/kg	106508-27	<0.1 <0.1	106508-9	86%
Acenaphthylene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Acenaphthene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Fluorene	mg/kg	106508-27	<0.1 <0.1	106508-9	109%
Phenanthrene	mg/kg	106508-27	<0.1 <0.1	106508-9	105%
Anthracene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Fluoranthene	mg/kg	106508-27	<0.1 <0.1	106508-9	102%
Pyrene	mg/kg	106508-27	<0.1 <0.1	106508-9	107%
Benzo(a)anthracene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Chrysene	mg/kg	106508-27	<0.1 <0.1	106508-9	97%
Benzo(b+k)fluoranthene	mg/kg	106508-27	<0.2 <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	106508-27	<0.05 <0.05	106508-9	108%
Indeno(1,2,3-c,d)pyrene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]

Client Reference: E27284KB, Menangle

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	106508-27	<0.1 <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	106508-27	103 103 RPD: 0	106508-9	101%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	106508-27	18/03/2014 18/03/2014	106508-29	18/03/2014
Date analysed	-	106508-27	18/03/2014 18/03/2014	106508-29	18/03/2014
Arsenic	mg/kg	106508-27	8 7 RPD: 13	106508-29	73%
Cadmium	mg/kg	106508-27	<0.4 <0.4	106508-29	76%
Chromium	mg/kg	106508-27	21 18 RPD: 15	106508-29	79%
Copper	mg/kg	106508-27	6 6 RPD: 0	106508-29	84%
Lead	mg/kg	106508-27	130 110 RPD: 17	106508-29	78%
Mercury	mg/kg	106508-27	0.1 0.2 RPD: 67	106508-29	79%
Nickel	mg/kg	106508-27	5 4 RPD: 22	106508-29	73%
Zinc	mg/kg	106508-27	25 22 RPD: 13	106508-29	87%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-29	17/03/2014
Date analysed	-	[NT]	[NT]	106508-29	19/03/2014
TRHC ₆ - C ₉	mg/kg	[NT]	[NT]	106508-29	106%
TRHC ₆ - C ₁₀	mg/kg	[NT]	[NT]	106508-29	106%
Benzene	mg/kg	[NT]	[NT]	106508-29	95%
Toluene	mg/kg	[NT]	[NT]	106508-29	97%
Ethylbenzene	mg/kg	[NT]	[NT]	106508-29	110%
m+p-xylene	mg/kg	[NT]	[NT]	106508-29	115%
o-Xylene	mg/kg	[NT]	[NT]	106508-29	109%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa- Trifluorotoluene	%	[NT]	[NT]	106508-29	93%

Client Reference: E27284KB, Menangle

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-29	18/03/2014
Date analysed	-	[NT]	[NT]	106508-29	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	[NT]	[NT]	106508-29	129%
TRHC ₁₅ - C ₂₈	mg/kg	[NT]	[NT]	106508-29	122%
TRHC ₂₈ - C ₃₆	mg/kg	[NT]	[NT]	106508-29	140%
TRH>C ₁₀ -C ₁₆	mg/kg	[NT]	[NT]	106508-29	129%
TRH>C ₁₆ -C ₃₄	mg/kg	[NT]	[NT]	106508-29	122%
TRH>C ₃₄ -C ₄₀	mg/kg	[NT]	[NT]	106508-29	140%
Surrogate o-Terphenyl	%	[NT]	[NT]	106508-29	98%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	106508-29	18/03/2014
Date analysed	-	[NT]	[NT]	106508-29	18/03/2014
Naphthalene	mg/kg	[NT]	[NT]	106508-29	87%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	106508-29	111%
Phenanthrene	mg/kg	[NT]	[NT]	106508-29	105%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	106508-29	102%
Pyrene	mg/kg	[NT]	[NT]	106508-29	106%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	106508-29	97%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	106508-29	108%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	106508-29	104%

Client Reference: E27284KB, Menangle

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	LCS-5	18/03/2014
Date analysed	-	[NT]	[NT]	LCS-5	18/03/2014
Arsenic	mg/kg	[NT]	[NT]	LCS-5	87%
Cadmium	mg/kg	[NT]	[NT]	LCS-5	104%
Chromium	mg/kg	[NT]	[NT]	LCS-5	102%
Copper	mg/kg	[NT]	[NT]	LCS-5	98%
Lead	mg/kg	[NT]	[NT]	LCS-5	98%
Mercury	mg/kg	[NT]	[NT]	LCS-5	114%
Nickel	mg/kg	[NT]	[NT]	LCS-5	101%
Zinc	mg/kg	[NT]	[NT]	LCS-5	102%

Report Comments:

Total Recoverable Hydrocarbons in soil:(NEPM) # Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Asbestos ID was analysed by Approved Identifier: Matt Mansfield
Asbestos ID was authorised by Approved Signatory: Matt Mansfield

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000

Fax: 02 9888 5001

Attention: Vittal Boggaram

Sample log in details:

Your reference:

E27284KB, Menangle

Envirolab Reference:

106508

Date received:

13/3/2014

Date results expected to be reported:

20/03/14

Samples received in appropriate condition for analysis:

YES

No. of samples provided

35 Soils

Turnaround time requested:

Standard

Temperature on receipt (°C)

9.6

Cooling Method:

Ice Pack

Sampling Date Provided:

YES

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst

ph: 02 9910 6200 fax: 02 9910 6201

email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO: Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E27284KB Date Results Required: STANDARD	FROM: Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: VITTAL BOGGARAM
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Sheet 1/2

Project: Proposed Development
 Location: Menangle, NSW
 Sampler: DS

Sample Preservation:
 In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 3a	8 Metals	TPH	BTEX	PAHs	OC/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs
6/3/14	1	JK1	0.1-0.2	Glass jar + Asb Bag	0	So: 1			X								
	2	↓	0.5-0.95	Glass jar + Asb Bag	0												
	3	JK2	0.1-0.2	Glass jar + Asb Bag	0				X								
	4	↓	0.5-0.95	Glass jar + Asb Bag	0												
	5	JK3	0.1-0.2	Glass jar + Asb Bag	0				X								
	6	↓	0.5-0.95	Glass jar + Asb Bag	0												
	7	JK4	0.1-0.2	Glass jar + Asb Bag	0			X									
	8	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	9	JK5	0.1-0.2	Glass jar + Asb Bag	0			X									
	10	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	11	JK6	0.1-0.2	Glass jar + Asb Bag	0			X									
	12	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	13	JK7	0.1-0.2	Glass jar + Asb Bag	0			X									
	14	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	15	JK8	0.1-0.2	Glass jar + Asb Bag	0				X								
	16	↓	0.5-0.95	Glass jar + Asb Bag	0												
	17	JK9	0.1-0.2	Glass jar + Asb Bag	0			X									
	18	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	19	JK10	0.1-0.2	Glass jar + Asb Bag	0				X								
	20	↓	0.5-0.95	Glass jar + Asb Bag	0												
	21	JK11	0.1-0.2	Glass jar + Asb Bag	0			X									
	22	↓	0.5-0.95	Glass jar + Asb Bag	0				X								
	23	JK12	0.1-0.2	Glass jar + Asb Bag	0				X								
	24	↓	0.5-0.95	Glass jar + Asb Bag	0												
	25	JK13	0-0.1	Glass jar + Asb Bag	0			X									

Envirolab Services
 12 Ashley St
 Chatswood NSW 2067
 Ph: (02) 9910 6200
 Job No: 106508
 Date Received: 13/3/14
 Time Received: 5 PM
 Received by: [Signature]
 Temp: Cool/Ambient
 Cooling: Ice/cool pack
 Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By: Vittal B.S	Date: 13/3/14	Time:	Received By: [Signature] EIS 13/3/14 5P
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SAMPLE AND CHAIN OF CUSTODY FORM

[illegible]

CERTIFICATE OF ANALYSIS

106786

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	<u>E27284KB, Manangle</u>
No. of samples:	5 Waters
Date samples received / completed instructions received	19/03/2014 / 19/03/2014

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date: 26/03/14 / 24/03/14
Date of Preliminary Report: n

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:



Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference:	UNITS	106786-1	106786-2	106786-3	106786-4	106786-5
Your Reference	-----	MW1	MW9	MW15	DupGB1	TS
Date Sampled	-----	18/03/2014	18/03/2014	18/03/2014	18/03/2014	7/03/2014
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/03/2014	20/03/2014	20/03/2014	20/03/2014	20/03/2014
Date analysed	-	21/03/2014	21/03/2014	21/03/2014	21/03/2014	21/03/2014
TRHC ₆ - C ₉	µg/L	<10	<10	<10	[NA]	[NA]
TRHC ₆ - C ₁₀	µg/L	<10	<10	<10	[NA]	[NA]
TRHC ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	[NA]	[NA]
Benzene	µg/L	<1	<1	<1	<1	107%
Toluene	µg/L	<1	<1	<1	<1	105%
Ethylbenzene	µg/L	<1	<1	<1	<1	109%
m+p-xylene	µg/L	<2	<2	<2	<2	106%
o-xylene	µg/L	<1	<1	<1	<1	110%
Naphthalene	µg/L	<1	<1	<1	[NA]	[NA]
Surrogate Dibromofluoromethane	%	92	91	91	91	92
Surrogate toluene-d8	%	94	95	94	94	100
Surrogate 4-BFB	%	100	101	102	100	97

svTRH (C10-C40) in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	106786-1 MW1 18/03/2014 Water	106786-2 MW9 18/03/2014 Water	106786-3 MW15 18/03/2014 Water
Date extracted	-	20/03/2014	20/03/2014	20/03/2014
Date analysed	-	21/03/2014	21/03/2014	21/03/2014
TRHC ₁₀ - C ₁₄	µg/L	<50	<50	<50
TRHC ₁₅ - C ₂₈	µg/L	<100	<100	<100
TRHC ₂₉ - C ₃₆	µg/L	<100	<100	<100
TRH>C ₁₀ - C ₁₆	µg/L	<50	<50	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50
TRH>C ₁₆ - C ₃₄	µg/L	<100	<100	<100
TRH>C ₃₄ - C ₄₀	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	119	91	72

PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	106786-1 MW1 18/03/2014 Water	106786-2 MW9 18/03/2014 Water	106786-3 MW15 18/03/2014 Water
Date extracted	-	20/03/2014	20/03/2014	20/03/2014
Date analysed	-	21/03/2014	21/03/2014	21/03/2014
Naphthalene	µg/L	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.15	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	106	89	71

HM in water - dissolved					
Our Reference:	UNITS	106786-1	106786-2	106786-3	106786-4
Your Reference	-----	MW1	MW9	MW15	DupGB1
Date Sampled	-----	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Type of sample		Water	Water	Water	Water
Date prepared	-	20/03/2014	20/03/2014	20/03/2014	20/03/2014
Date analysed	-	20/03/2014	20/03/2014	20/03/2014	20/03/2014
Arsenic-Dissolved	µg/L	<1	3	13	3
Cadmium-Dissolved	µg/L	<0.1	<0.1	0.2	<0.1
Chromium-Dissolved	µg/L	6	<1	1	<1
Copper-Dissolved	µg/L	8	<1	5	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	8	6	20	6
Zinc-Dissolved	µg/L	12	17	23	13

Miscellaneous Inorganics		
Our Reference:	UNITS	106786-2
Your Reference	-----	MW9
Date Sampled	-----	18/03/2014
Type of sample		Water
Date prepared	-	19/03/2014
Date analysed	-	19/03/2014
pH	pH Units	8.1
Electrical Conductivity	µS/cm	7,700

Cations in water Dissolved		
Our Reference:	UNITS	106786-2
Your Reference	-----	MW9
Date Sampled	-----	18/03/2014
Type of sample		Water
Date digested	-	20/03/2014
Date analysed	-	20/03/2014
Calcium - Dissolved	mg/L	68
Magnesium - Dissolved	mg/L	160
Hardness	mgCaCO3 /L	850

MethodID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

Client Reference: E27284KB, Manangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTRH(C6-C10)/BTEXNin Water						Base II Duplicate II %RPD		
Date extracted	-			20/03/2014	[NT]	[NT]	LCS-W1	20/03/2014
Date analysed	-			21/03/2014	[NT]	[NT]	LCS-W1	21/03/2014
TRHC ₆ - C ₉	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	102%
TRHC ₆ - C ₁₀	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	102%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	96%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	103%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	106%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	103%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	104%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	97	[NT]	[NT]	LCS-W1	102%
Surrogate toluene-d8	%		Org-016	92	[NT]	[NT]	LCS-W1	104%
Surrogate 4-BFB	%		Org-016	100	[NT]	[NT]	LCS-W1	95%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
svTRH (C10-C40) in Water						Base II Duplicate II %RPD		
Date extracted	-			20/03/2014	[NT]	[NT]	LCS-W3	20/03/2014
Date analysed	-			21/03/2014	[NT]	[NT]	LCS-W3	21/03/2014
TRHC ₁₀ - C ₁₄	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W3	68%
TRHC ₁₅ - C ₂₈	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W3	106%
TRHC ₂₉ - C ₃₆	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W3	135%
TRH>C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W3	68%
TRH>C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W3	106%
TRH>C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W3	135%
Surrogate o-Terphenyl	%		Org-003	119	[NT]	[NT]	LCS-W3	76%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Water - Low Level						Base II Duplicate II %RPD		
Date extracted	-			20/03/2014	[NT]	[NT]	LCS-W2	20/03/2014
Date analysed	-			21/03/2014	[NT]	[NT]	LCS-W2	21/03/2014
Naphthalene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	81%
Acenaphthylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	90%
Phenanthrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	83%

Client Reference: E27284KB, Manangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Water - Low Level						Base II Duplicate II %RPD		
Anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	89%
Pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	92%
Benzo(a)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	77%
Benzo(b+k)fluoranthene	µg/L	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W2	89%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	98	[NT]	[NT]	LCS-W2	83%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	-			20/03/2014	[NT]	[NT]	LCS-W2	20/03/2014
Date analysed	-			20/03/2014	[NT]	[NT]	LCS-W2	20/03/2014
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	94%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W2	94%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	98%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	100%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	100%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-W2	96%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	94%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W2	94%

Client Reference: E27284KB, Manangle

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics						Base II Duplicate II %RPD		
Date prepared	-			19/03/2014	[NT]	[NT]	LCS-W1	19/03/2014
Date analysed	-			19/03/2014	[NT]	[NT]	LCS-W1	19/03/2014
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-W1	101%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	LCS-W1	102%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Cations in water Dissolved						Base II Duplicate II %RPD		
Date digested	-			20/03/2014	106786-2	20/03/2014 20/03/2014	LCS-W2	20/03/2014
Date analysed	-			20/03/2014	106786-2	20/03/2014 20/03/2014	LCS-W2	20/03/2014
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	106786-2	68 67 RPD: 1	LCS-W2	117%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	106786-2	160 160 RPD: 0	LCS-W2	117%
Hardness	mgCaCO ₃ /L	3		3.0	106786-2	850 830 RPD: 2	[NR]	[NR]

Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
 Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000

Fax: 02 9888 5001

Attention: Vittal Boggaram

Sample log in details:

Your reference:

E27284KB, Manangle

Envirolab Reference:

106786

Date received:

19/03/2014

Date results expected to be reported:

26/03/14

Samples received in appropriate condition for analysis:

YES

No. of samples provided

5 Waters

Turnaround time requested:

Standard

Temperature on receipt (°C)

15

Cooling Method:

Ice Pack

Sampling Date Provided:

YES

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst

ph: 02 9910 6200 fax: 02 9910 6201

email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

TO: Envirolab Services Pty Ltd 12 Ashley St, Chatswood 2067 Phone: (02) 9910 6200 Fax: (02) 9910 6201 Attention: Aileen Date Results Required:		SAMPLE AND CHAIN OF CUSTODY FORM										FROM: Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Vittal Boggaram				
		EIS Job Number: E27284KB										Sheet 1/1				
Project: Proposed Development Location: Menangle, NSW Sampler: JDC							Tests Required							Sample Preservation: In esky on ice		
Date Sampled	Time Sampled	Location	Sample/Borehole Number	Sample Container	PID (ppm/Odour)	Sample Description	Combo 3L	Heavy metals	TPH	BTEX	PAHs (low level)	pH / EC / Hardness				Comments/Detection Limits Required
18/3/14			MW 1	1 * Soomel Amber 1 * HNO3 wash 1 * BTEX Vial	-	Water	X									Priority is TPH, Metals & BTEX
			MW 9	2 * Soomel Amber 2 * BTEX Vials 1 * HNO3 wash 1 * PVC	-		X					X				
			MW 15	1 * Soomel Amber 2 * BTEX Vials 1 * HNO3 wash	-		X									Priority is TPH, Metals & BTEX
			DUP GIB 1	2 * BTEX Vials 1 * HNO3 wash	-			X	X							<div style="text-align: right;"> Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200 </div>
7/3/14			TS	1 BTEX Vial	-	Water				X						Job No: 106786 Date Received: 19/03/14 Time Received: 3:15pm SL Received by: Temp: Cool/Ambient Cooling: Ice/Icepack Security: Intact/Broken/None
Relinquished By:			Date: 19/3/14		Received By:		Remarks: All analysis PQLs to ANZECC (2000) Detection Limits Please									
Vittal B-S			Time: 1:30pm		S.L 19/03/14 3:15pm											
Relinquished By:			Date:		Received By:											
			Time:													

CERTIFICATE OF ANALYSIS**3510****Client:****Environmental Investigation Services**

PO Box 976

North Ryde BC

NSW 1670

Attention: Vittal Boggaram**Sample log in details:**

Your Reference:

E27284KB - Proposed Development

No. of samples:

1 soil

Date samples received / completed instructions received

18/03/2014 / 18/03/2014

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.**Report Details:**

Date results requested by: / Issue Date:

21/03/14 / 21/03/14

Date of Preliminary Report:

Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025.

Tests not covered by NATA are denoted with *.**Results Approved By:**

Analisa Mathrick

Laboratory Supervisor



Envirolab Reference: 3510

Revision No: R 00

Page 1 of 11

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	3510-1
Your Reference	-----	DUPB
Date Sampled	-----	6/03/2014
Type of sample		Soil
Date extracted	-	19/3/14
Date analysed	-	19/3/14
vTRHC ₆ - C ₉	mg/kg	<25
vTPHC ₆ - C ₁₀	mg/kg	<25
TRHC ₆ - C ₁₀ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	88

TRH Soil C10-C40 NEPM		
Our Reference:	UNITS	3510-1
Your Reference	-----	DUPB
Date Sampled	-----	6/03/2014
Type of sample		Soil
Date extracted	-	19/03/2014
Date analysed	-	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100
TRHC ₂₉ - C ₃₆	mg/kg	<100
Total TRH (C10-C36)	mg/kg	<250
TRH>C ₁₀ -C ₁₆	mg/kg	<50
TRH>C ₁₀ - C ₁₆ less Naphthalene (F2)	mg/kg	<50
TRH>C ₁₆ -C ₃₄	mg/kg	<100
TRH>C ₃₄ -C ₄₀	mg/kg	<100
Total TRH (>C10-C40)	mg/kg	<250
Surrogate o-Terphenyl	%	86

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ----- -----	3510-1 DUPB 6/03/2014 Soil
Date extracted	-	19/03/2014
Date analysed	-	19/03/2014
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	0.8
Anthracene	mg/kg	0.2
Fluoranthene	mg/kg	0.9
Pyrene	mg/kg	0.8
Benzo(a)anthracene	mg/kg	0.4
Chrysene	mg/kg	0.3
Benzo(b, j & k)fluoranthene	mg/kg	0.5
Benzo(a)pyrene	mg/kg	0.34
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2
Total +ve PAH's	mg/kg	4.7
Benzo(a)pyrene TEQ	mg/kg	<0.5
Surrogate p-Terphenyl-d ₁₄	%	82

Acid Extractable metals in soil		
Our Reference:	UNITS	3510-1
Your Reference	-----	DUPB
Date Sampled	-----	6/03/2014
Type of sample		Soil
Date digested	-	19/3/14
Date analysed	-	19/3/14
Arsenic	mg/kg	7
Cadmium	mg/kg	<0.4
Chromium	mg/kg	13
Copper	mg/kg	26
Lead	mg/kg	28
Mercury	mg/kg	<0.1
Nickel	mg/kg	13
Zinc	mg/kg	45

Moisture		
Our Reference:	UNITS	3510-1
Your Reference	-----	DUPB
Date Sampled	-----	6/03/2014
Type of sample		Soil
Date prepared	-	19/03/2014
Date analysed	-	20/03/2014
Moisture	%	14

MethodID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater 2013.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.

Client Reference: E27284KB - Proposed Development

QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
vTRH(C6-C10)/BTEXN in Soil						Base II Duplicate II %RPD		
Date extracted	-			19/3/14	[NT]	[NT]	LCS-1	19/3/14
Date analysed	-			19/3/14	[NT]	[NT]	LCS-1	19/3/14
vTRHC ₆ - C ₉	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	74%
vTPHC ₆ - C ₁₀	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	69%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-1	106%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-1	100%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	100%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-1	115%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	106%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	[NT]	[NT]	LCS-1	106%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
TRHSoil C10-C40 NEPM						Base II Duplicate II %RPD		
Date extracted	-			19/03/2014	[NT]	[NT]	LCS-1	19/03/2014
Date analysed	-			19/03/2014	[NT]	[NT]	LCS-1	19/03/2014
TRHC ₁₀ - C ₁₄	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	94%
TRHC ₁₅ - C ₂₈	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	95%
TRHC ₂₉ - C ₃₆	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	85%
TRH>C ₁₀ -C ₁₆	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	96%
TRH>C ₁₆ -C ₃₄	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	96%
TRH>C ₃₄ -C ₄₀	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	85%
Surrogate o-Terphenyl	%		Org-003	77	[NT]	[NT]	LCS-1	95%
QUALITYCONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Date extracted	-			19/03/2014	[NT]	[NT]	LCS-1	19/03/2014
Date analysed	-			19/03/2014	[NT]	[NT]	LCS-1	19/03/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	96%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	99%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	92%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	101%

Client Reference: E27284KB - Proposed Development

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
PAHs in Soil						Base II Duplicate II %RPD		
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	101%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	93%
Benzo(b, j & k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-1	101%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	80	[NT]	[NT]	LCS-1	76%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Date digested	-			19/3/14	[NT]	[NT]	LCS-1	19/3/14
Date analysed	-			19/3/14	[NT]	[NT]	LCS-1	19/3/14
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-1	100%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-1	103%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	102%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	103%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	100%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-1	107%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	102%

QUALITY CONTROL	UNITS	PQL	METHOD	Blank
Moisture				
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

Report Comments:

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
 Asbestos ID was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
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Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

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Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

SAMPLE AND CHAIN OF CUSTODY FORM

TO: Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen						EIS Job Number: E27284KB Date Results Required: STANDARD <div style="text-align: right;">Sheet 2 / 2</div>								FROM: Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: VITTAL BOGGARAM							
Project: Proposed Development Location: Menangle, NSW Sampler: DS										Tests Required Sample Preservation: In esky on ice											
Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 3g	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	Combo 3			
6/3/14		JK13	0.5-0.95	Glass jar + Asb Bag	o	Soil			X												
		JK14	0-0.1	Glass jar + Asb Bag	o				X												
		↓	0.5-0.8	Glass jar + Asb Bag	o																
		JK15	0-0.1	Glass jar + Asb Bag	o				X												
		↓	0.3-0.4	Glass jar + Asb Bag	o																
		TB1	-	Glass jar + Asb Bag	-	-						X									
		FRI	-	Glass jar + Asb Bag	-	WATER						X									
		TS	-	Glass jar + Asb Bag	-	-						X									
		DUPA	-	Glass jar + Asb Bag	-	soil												X			
		DUPB	-	Glass jar + Asb Bag	-	↓												X			
		DUPC	-	Glass jar + Asb Bag	-	soil												X			
				Glass jar + Asb Bag																	
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				Glass jar + Asb Bag																	
Remarks (comments/detection limits required):																					
Relinquished By: Vittal B.S. Pratishtha					Date: 13/3/14 14/3/14 13:00					Time: 					Received By: Dudley R.S SR 13/3/14						

Envirolab Services
 12 Delmore Drive
 Carribbean Park
 Scoresby VIC 3179
 Ph: (03) 9763 2500

 Job No: 3510
 Date Received: 18/3/14
 Time Received: 11:50
 Received by: MS
 Temp: Cool/Ambient
 Cooling: Ice/No pack
 Security: Intact/Broken/None

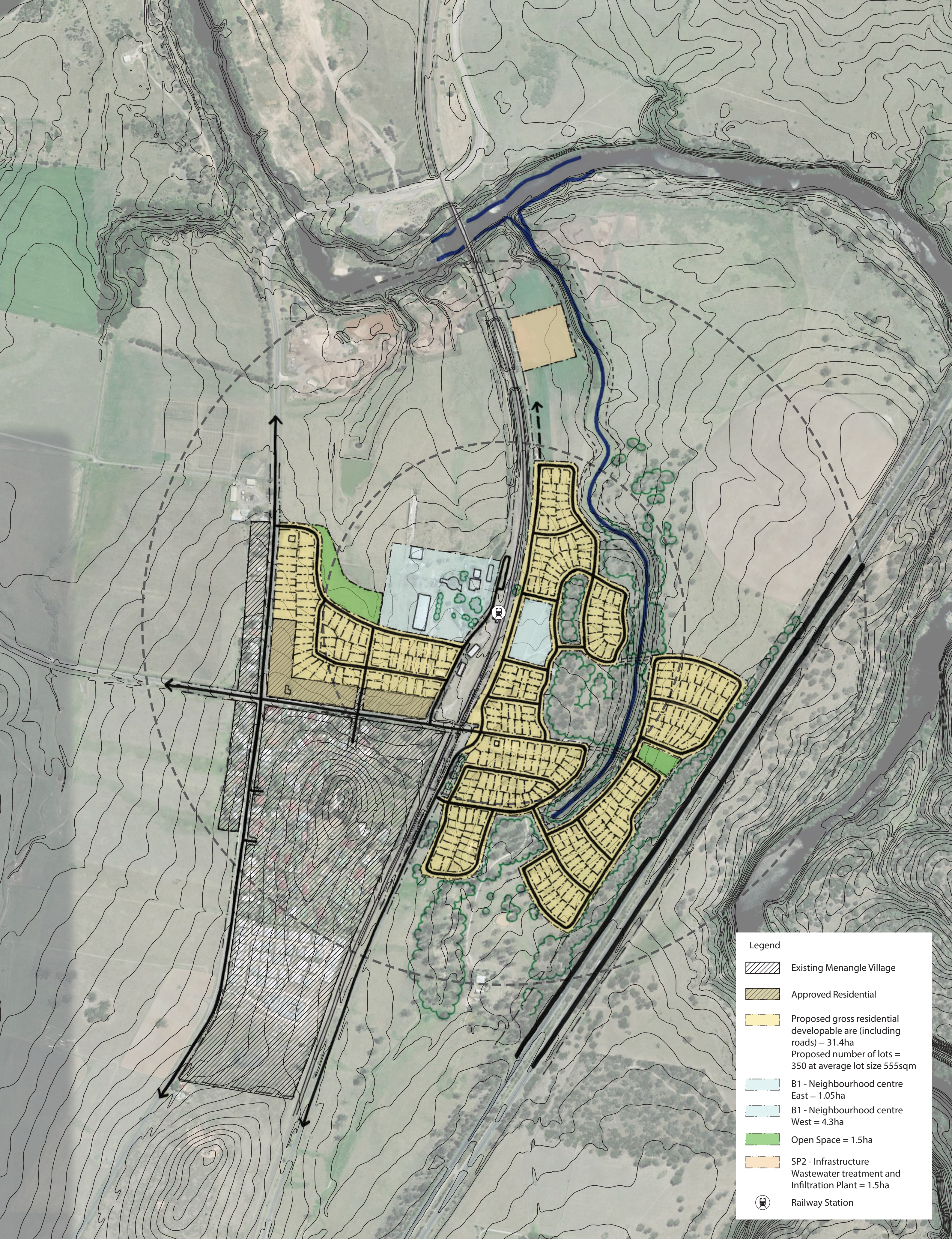
21°C



Appendix C: Site Information and Site History Documents



Appendix C1: Proposed Subdivision Plan

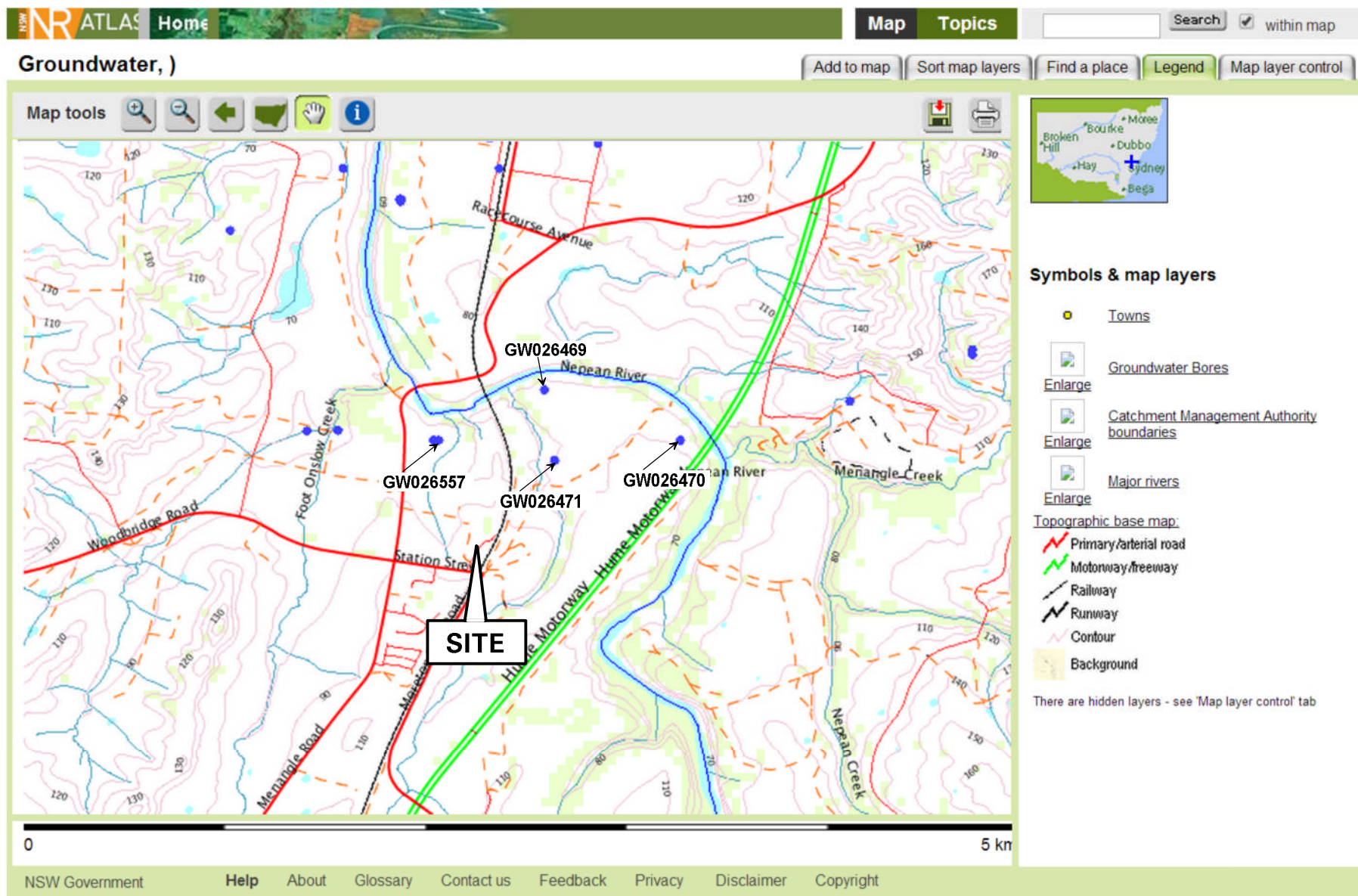


Legend

- Existing Menangle Village
- Approved Residential
- Proposed gross residential developable area (including roads) = 31.4ha
Proposed number of lots = 350 at average lot size 555sqm
- B1 - Neighbourhood centre East = 1.05ha
- B1 - Neighbourhood centre West = 4.3ha
- Open Space = 1.5ha
- SP2 - Infrastructure Wastewater treatment and Infiltration Plant = 1.5ha
- Railway Station



Appendix C2: Groundwater Bore Records



NOTES:

This Figure has been recreated from the NSW Government NR Atlas website www.nratlas.nsw.gov.au visited on 30 April 2014. The scale on the figure is approximate only.

Reference should be made to the report text for a full understanding of this plan.



Project Number:	E27284KB	Title:	GROUNDWATER BORE RECORDS
Figure:		Address:	STATION STREET, MENANGLE, NSW

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
Document Generated on Wednesday, April 30, 2014

[Works Details](#)[Site Details](#)[Form A](#)[Licensed](#)[Construction](#)[Water Bearing Zones](#)[Drillers Log](#)

Work Requested -- GW026557

Works Details [\(top\)](#)

GROUNDWATER NUMBER	GW026557
LIC-NUM	10BL019642
AUTHORISED-PURPOSES	IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1966-05-01
FINAL-DEPTH (metres)	28.30
DRILLED-DEPTH (metres)	28.40
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details [\(top\)](#)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9029-4N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6222192.00
EASTING	291625.00
LATITUDE	34 7' 13"

LONGITUDE	150 44' 26"
GS-MAP	0075C1
AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Licensed [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Water Bearing Zones [\(top\)](#)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
15.80	28.20	12.40	Unconsolidated						(Unknown)

Drillers Log [\(top\)](#)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	3.66	3.66	Loam Dark Brown Sandy		
3.66	16.46	12.80	Sand Water Supply		
3.66	16.46	12.80	Silt Traces		
16.46	18.90	2.44	Sand Pete Water Supply		
18.90	20.12	1.22	Sand Grey Silt Water Supply		
20.12	26.06	5.94	Sand Silt Water Supply		
26.06	28.04	1.98	Sand Grey Silt Water Supply		
28.04	28.35	0.31	Sand Grey Silt Water Supply		
28.04	28.35	0.31	Boulders		
28.35	28.36	0.01	Shale Black		

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
Document Generated on Wednesday, April 30, 2014

[Works Details](#) [Site Details](#) [Form A](#) [Licensed](#) [Construction](#) [Water Bearing Zones](#) [Drillers Log](#)

Work Requested -- GW026469

Works Details [\(top\)](#)

GROUNDWATER NUMBER	GW026469
LIC-NUM	10BL019648
AUTHORISED-PURPOSES	IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-11-01
FINAL-DEPTH (metres)	20.40
DRILLED-DEPTH (metres)	20.40
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details [\(top\)](#)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9029-4N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)

NORTHING	6222513.00
EASTING	292182.00
LATITUDE	34 7' 3"
LONGITUDE	150 44' 48"
GS-MAP	0075C1
AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Licensed [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Water Bearing Zones [\(top\)](#)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
15.80	19.70	3.90	Unconsolidated						(Unknown)

Drillers Log [\(top\)](#)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	10.66	10.66	Sand Black Loose Moist Silty Fine		
10.66	15.84	5.18	Sand Dark Brown Loose Silty Wet Fine-medium		
15.84	19.81	3.97	Sand Loose Silty Fine Water Supply		
19.81	20.42	0.61	Clay Sandy Moist Firm Stiff		

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
Document Generated on Wednesday, April 30, 2014

[Works Details](#)[Site Details](#)[Form A](#)[Licensed](#)[Construction](#)[Water Bearing Zones](#)[Drillers Log](#)

Work Requested -- GW026471

Works Details [\(top\)](#)

GROUNDWATER NUMBER	GW026471
LIC-NUM	10BL019650
AUTHORISED-PURPOSES	IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-11-01
FINAL-DEPTH (metres)	5.40
DRILLED-DEPTH (metres)	5.50
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details [\(top\)](#)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9029-4N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6222082.00
EASTING	292243.00
LATITUDE	34 7' 17"

LONGITUDE	150 44' 50"
GS-MAP	0075C1
AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Licensed [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Water Bearing Zones [\(top\)](#)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
2.70	4.90	2.20	Unconsolidated						(Unknown)

Drillers Log [\(top\)](#)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	2.74	2.74	Silt Dark Brown Firm Moist		
2.74	5.02	2.28	Silt Dark Brown Soft Water Supply		
5.02	5.48	0.46	Clay Firm Stiff		
5.02	5.48	0.46	Sand Fine		

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
Document Generated on Wednesday, April 30, 2014

Work Requested -- GW026470

Works Details [\(top\)](#)

GROUNDWATER NUMBER	GW026470
LIC-NUM	10BL019649
AUTHORISED-PURPOSES	IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	Test Hole
CONSTRUCTION-METHOD	Cable Tool
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1965-11-01
FINAL-DEPTH (metres)	1.90
DRILLED-DEPTH (metres)	2.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details [\(top\)](#)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9029-1N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6222220.00
EASTING	292880.00
LATITUDE	34 7' 13"
LONGITUDE	150 45' 15"
GS-MAP	0075D1
AMG-ZONE	56
COORD-SOURCE	GD,,ACC.MAP
REMARK	

Form-A [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Licensed [\(top\)](#)

COUNTY	CAMDEN
PARISH	CAMDEN
PORTION-LOT-DP	2

Water Bearing Zones [\(top\)](#)

no details

Drillers Log [\(top\)](#)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.98	1.98	Sand Traces Moist Fine		
0.00	1.98	1.98	Silt Dark Brown Firm		

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.



Appendix C3: Historical Aerial Photos

1947 AERIAL
PHOTOGRAPH
OF MENANGLE



LANDSPHOTO ↑ 0200 12 12 13 JAN 47 RUN -CAMDEN

53-45

1956 AERIAL
PHOTOGRAPH OF
MENANGLE



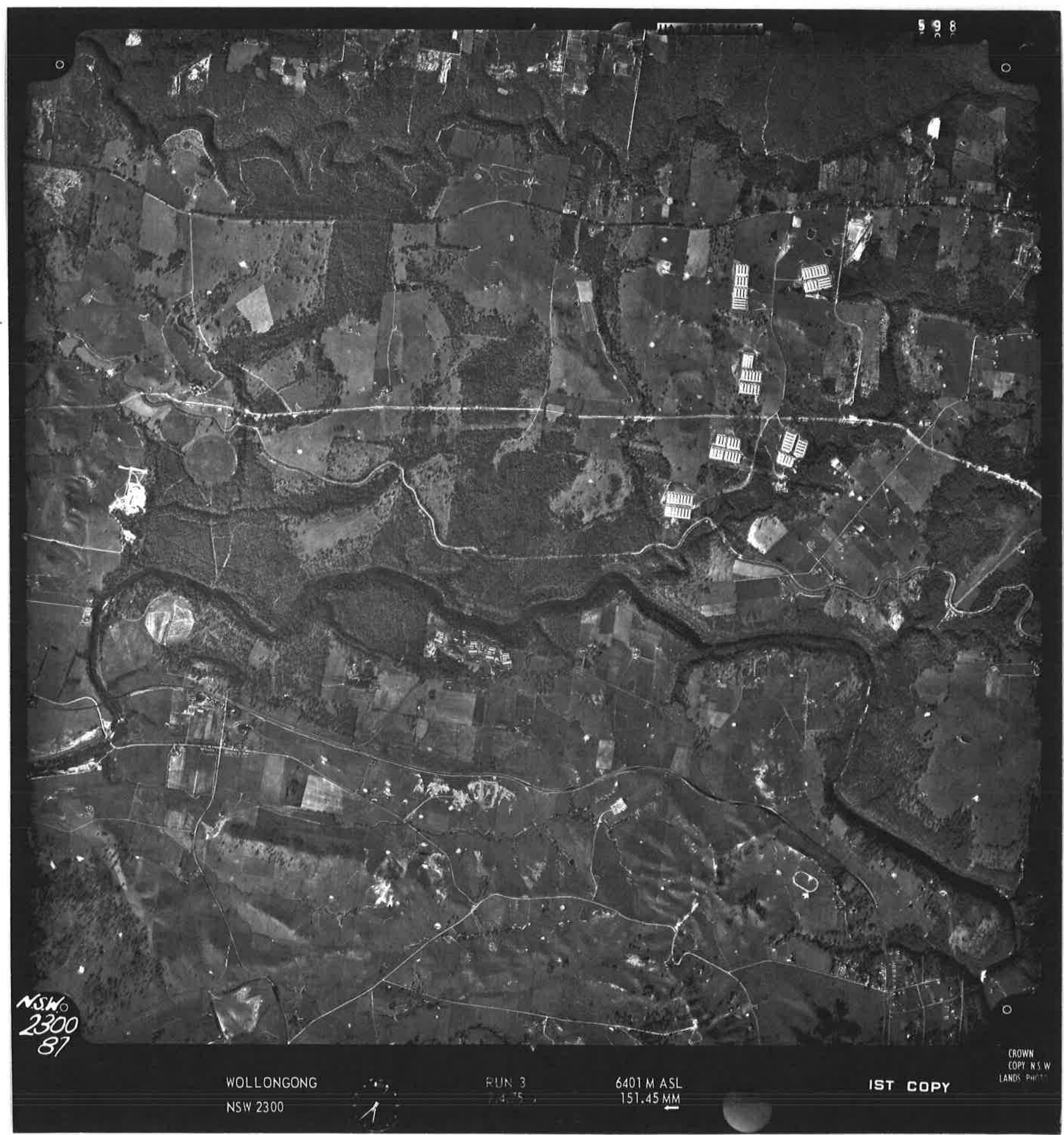
BLOW-UP OF 1956
IMAGE



1965 AERIAL
PHOTOGRAPH
OF MENANGLE



1975 AERIAL
PHOTOGRAPH
OF MENANGLE



NSW
2300
87

WOLLONGONG
NSW 2300



RUN 3
14.75

6401 M ASL
151.45 MM

IST COPY

CROWN
COPY N.S.W.
LANDS PHOTO

BLOW-UP OF 1975
IMAGE



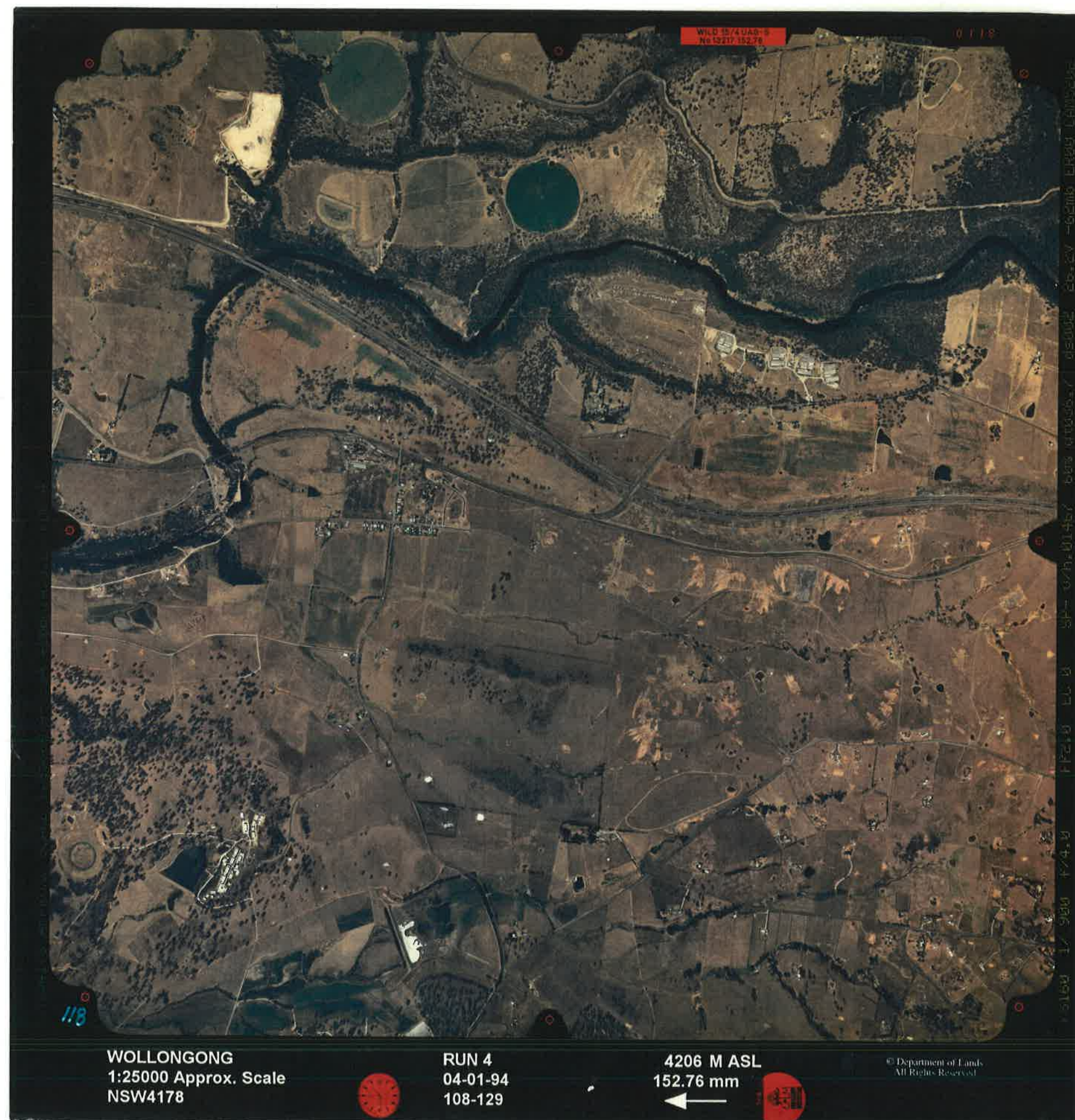
1984 AERIAL
PHOTOGRAPH OF
MENANGLE



BLOW-UP OF 1984
IMAGE



94



BLOW-UP OF 1994
IMAGE



2005 AERIAL
PHOTOGRAPH
OF MENANGLE



BLOW-UP OF 2005
IMAGE





Appendix C4: Historical Land Title Records

VB.

ADVANCE LEGAL SEARCHERS PTY LTD

(ACN 147 943 842)
ABN 82 147 943 842

PO Box 149
Yagoona NSW 2199

E7 MAR 2014

Telephone: +612 9644 1679
Mobile: 0412 169 809
Facsimile: +612 8076 3026
Email: alsearch@optusnet.com.au

5th March, 2014

Environmental Investigation Services
PO Box 976
NORTH RYDE BC NSW 1670

Attention: Vittal Boggaram

RE: Menangle Road, Menangle
Job No. E27284KB

Note 1: Lot 201 DP 590247 (page 1)
Note 2: Lot 202 DP 590247 (page 4)
Note 3: Lot 21 DP 581462 (page 6)

Note 1:

Current Search

Folio Identifier 201/590247 (attached)
DP 590247 (plan attached)
Dated 3rd March, 2014
Registered Proprietor:
EL BETHEL PTY LTD

Title Tree
Lot 201 DP 590247

Folio Identifier 201/590247

Certificate of Title Volume 13447 Folio 97

Certificate of Title Volume 13006 Folio 160

Certificate of Title Volume 12900 Folio 103

Certificate of Title Volume 10969 Folio 112

Certificate of Title Volume 5208 Folio 142

Certificate of Title Volume 5010 Folio 164

Certificate of Title Volume 2734 Folio 9

Certificate of Title Volume 2314 Folio 198

Summary of Proprietors Lot 201 DP 590247

Year	Proprietor
	(Lot 201 DP 590247)
1999 – todate	El Bethel Pty Ltd
<i>(2003 – todate)</i>	<i>(Profit a Pendre to Menangle Sand & Soil Pty Limited)</i>
1990 – 1999	Halfpenny Hobbs Pty Limited
1988 – 1990	Leppington Pastoral Co Pty Limited
	(Lot 201 DP 590247 – CTVol 13447 Fol 97)
1986 – 1988	Leppington Pastoral Co Pty Limited
1983 – 1986	Halfpenny Hobbs Pty Limited
1977 – 1983	Camden Park Estate Pty Limited
	(Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited
	(Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited
	(Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited
	(Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited

Note 2:

Current Search

Folio Identifier 202/590247 (attached)

DP 590247 (plan attached)

Dated 3rd March, 2014

Registered Proprietor:

EL BETHEL PTY LTD

Title Tree

Lot 202 DP 590247

Folio Identifier 202/590247

Certificate of Title Volume 13447 Folio 98

Certificate of Title Volume 13006 Folio 160

Certificate of Title Volume 12900 Folio 103

Certificate of Title Volume 10969 Folio 112

Certificate of Title Volume 5208 Folio 142

Certificate of Title Volume 5010 Folio 164

Certificate of Title Volume 2734 Folio 9

Certificate of Title Volume 2314 Folio 198

Summary of Proprietors Lot 202 DP 590247

Year	Proprietor
	(Lot 202 DP 590247)
1999 – todate	El Bethel Pty Ltd
<i>(2003 – todate)</i>	<i>(Profit a Pendre to Menangle Sand & Soil Pty Limited)</i>
1988 – 1999	Halfpenny Hobbs Pty Limited
	(Lot 202 DP 590247 – CTVol 13447 Fol 98)
1983 – 1988	Halfpenny Hobbs Pty Limited
1977 – 1983	Camden Park Estate Pty Limited
	(Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited
	(Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited
	(Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited
	(Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited

Note 3:

Current Search

Folio Identifier 21/581462 (attached)

DP 581462 (plan attached)

Dated 3rd March, 2014

Registered Proprietor:

THE CENTRAL CREAMERY PTY LIMITED

Title Tree

Lot 21 DP 581462

Folio Identifier 21/581462

Certificate of Title Volume 13006 Folio 159

Certificate of Title Volume 12900 Folio 103

Certificate of Title Volume 10969 Folio 112

Certificate of Title Volume 5208 Folio 142

Certificate of Title Volume 5010 Folio 164

Certificate of Title Volume 2734 Folio 9

Certificate of Title Volume 2314 Folio 198

Summary of Proprietors Lot 21 DP 581462

Year	Proprietor
	(Lot 21 DP 581462)
2005 – todate	The Central Creamery Pty Limited
1989 – 2005	Ian Russell Kelley, self employed Norma Rae Kelley, wife
1988 – 1989	Dairy Farmers Co-Operative Limited
	(Lot 21 DP 581462 – CTVol 13006 Vol 159)
1976 – 1988	Dairy Farmers Co-Operative Limited
1972 – 1976	Camden Park Estate Pty Limited
	(Lot 22 DP 581462 – CTVol 13006 Fol 160)
1976 – 1977	Camden Park Estate Pty Limited
	(Lot 1 DP 573955 – CTVol 12900 Fol 103)
1975 – 1976	Camden Park Estate Pty Limited
	(Lot 10 DP 531899 – CTVol 10969 Fol 112)
1969 – 1975	Camden Park Estate Pty Limited
	(Part Portion 3, Parish Camden and other lands – Area 3462 Acres 0 Roods 31 Perches – CTVol 5208 Fol 142)
1941 – 1969	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 3470 Acres 3 Roods 3 Perches – CTVol 5010 Fol 164)
1939 – 1941	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 8151 Acres 2 Roods 10 ½ Perches – CTVol 2734 Fol 9)
1917 – 1939	Camden Park Estate Pty Limited
	(Part Portion 3, Parish of Camden with other lands – Area 9423 Acres 2 Roods 6 ½ Perches – CTVol 2314 Fol 198)
1912 – 1917	Camden Park Estate Pty Limited

Cadastral Records Enquiry Report

Ref : EIS - Menangle

Locality : MENANGLE

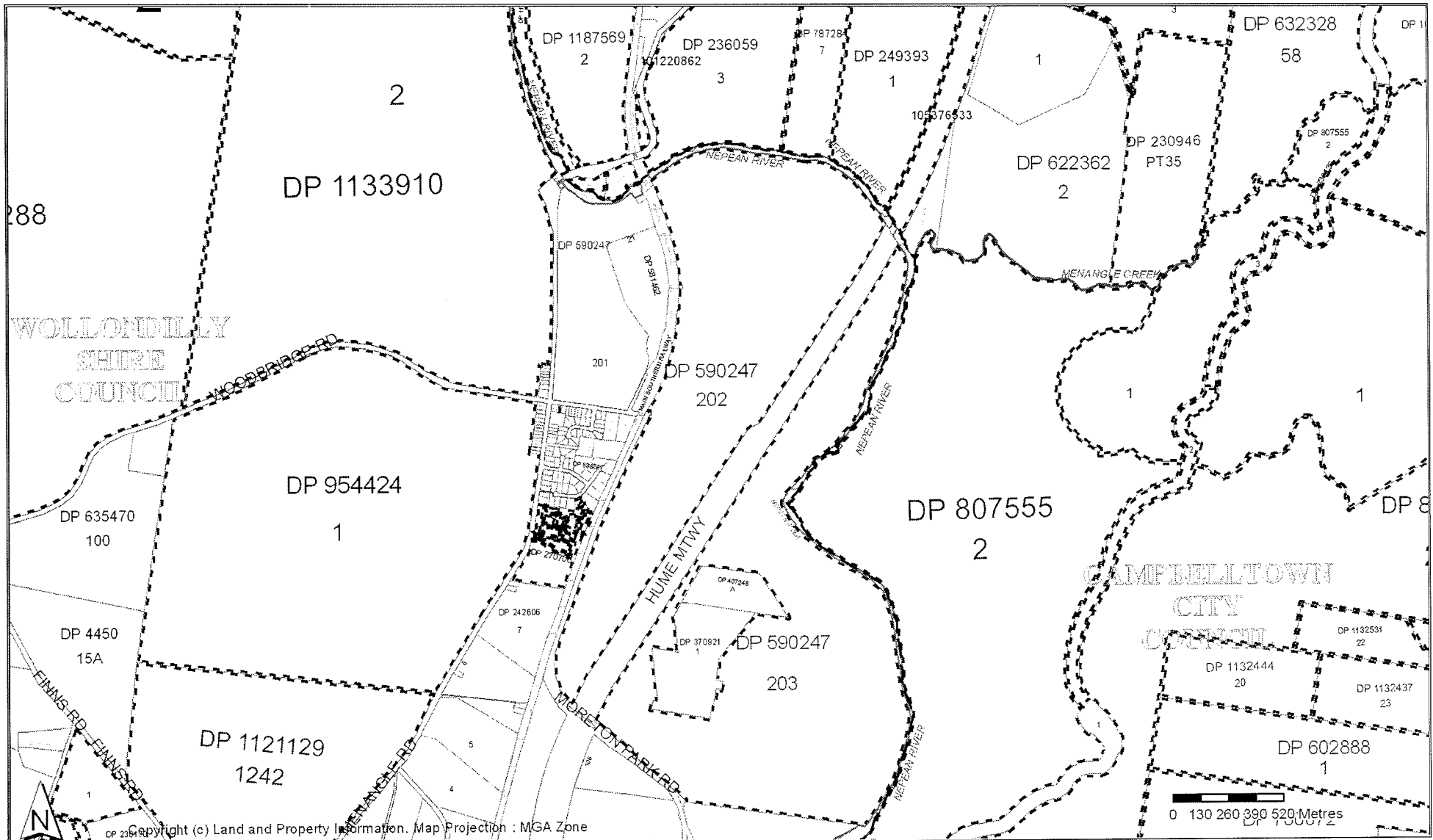
Requested Parcel : Lot 202 DP 590247

LGA : WOLLONDILLY

Parish : CAMDEN

Identified Parcel : Lot 202 DP 590247

County : CAMDEN





Advance Legal Searchers Pty Ltd hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 201/590247

SEARCH DATE	TIME	EDITION NO	DATE
3/3/2014	3:46 PM	7	26/6/2009

LAND

LOT 201 IN DEPOSITED PLAN 590247
AT MENANGLE
LOCAL GOVERNMENT AREA WOLLONDILLY
PARISH OF CAMDEN COUNTY OF CAMDEN
TITLE DIAGRAM DP590247

FIRST SCHEDULE

EL BETHEL PTY LTD

(T 6209162)

SECOND SCHEDULE (16 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 LAND EXCLUDES MINERALS RESERVED BY THE CROWN GRANT VOL 1690 FOL 21
- 3 LAND EXCLUDES MINERALS BELOW A DEPTH FROM THE SURFACE OF 304.8 METRES COMPRISED IN VOL 13006 FOL 160
- 4 H533697 EASEMENTS FOR WATER PIPES APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN AS H533697
- 5 H990961 EASEMENTS FOR WATER PIPES 6 FT WIDE IN DP531899
- 6 P355416 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE RIGHT OF WAY 50 LINKS WIDE SHOWN IN DP531897
- 7 DP581462 COVENANT
- 8 DP581462 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED
- 9 DP581462 EASEMENT FOR PIPELINE APPURTENANT TO THE LAND ABOVE DESCRIBED
- 10 DP581462 EASEMENT FOR SEWER APPURTENANT TO THE LAND ABOVE DESCRIBED
- 11 DP595674 EASEMENT FOR PIPELINE APPURTENANT TO THE LAND ABOVE DESCRIBED
- 12 DP595674 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF PIPES AFFECTING THE LAND WITHIN DESCRIBED SHOWN SO BURDENED IN DP595674
- 13 DP595674 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF PIPES APPURTENANT TO THE LAND WITHIN DESCRIBED AFFECTING THE PART OF LOT 203 SHOWN SO BURDENED IN DP595674
- 14 DP595674 RIGHT OF CARRIAGEWAY 7.32 AND 10.06 WIDE APPURTENANT TO THE LAND WITHIN DESCRIBED AFFECTING THE PART OF LOT 203 IN DP590247 SHOWN SO BURDENED IN DP595674
- 15 DP610634 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF PIPES APPURTENANT TO THE LAND ABOVE DESCRIBED

END OF PAGE 1 - CONTINUED OVER

EIS - Menangle

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 201/590247

PAGE 2

SECOND SCHEDULE (16 NOTIFICATIONS) (CONTINUED)

- 14 R866169 RIGHTS TO MINE
- * 15 R866169 EXCEPTING THE SOIL AND SAND DEPOSITS WITHIN THE
NEPEAN RIVER INCLUDED IN THE LAND ABOVE DESCRIBED
(TOGETHER WITH RIGHTS AS SET OUT IN TRANSFER R866169)
UNTIL 28-2-1987
- * 16 9407317 PROFIT A PRENDRE TO MENANGLE SAND & SOIL PTY
LIMITED. EXPIRES 29/11/2011 TOGETHER WITH AN OPTION
FOR A FURTHER TERM OF 10 YEARS.
AB591838 VARIATION OF PROFIT A PRENDRE

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING
UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.



Advance Legal Searchers Pty Ltd hereby certifies that the information contained in this document has been provided electronically by the Registrar General.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

3/3/2014 3:48PM

FOLIO: 201/590247

First Title(s): SEE PRIOR TITLE(S)

Prior Title(s): VOL 13447 FOL 97

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/8/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
28/8/1990	Z192524	DISCHARGE OF MORTGAGE	
28/8/1990	Z192525	TRANSFER	EDITION 1
24/10/1990	Z291701	CAVEAT	
29/7/1998	5161631	CAVEAT	
17/3/1999	5686143	DEPARTMENTAL DEALING	EDITION 2
12/4/1999	5713343	TRANSFER GRANTING EASEMENT	EDITION 3
12/4/1999	5740601	WITHDRAWAL OF CAVEAT	
12/4/1999	5740602	WITHDRAWAL OF CAVEAT	
20/9/1999	6209162	* TRANSFER	EDITION 4
26/2/2003	9407317	* TRANSFER CREATING PROFIT A PRENDRE OR FORESTRY RIGHT	EDITION 5
8/8/2005	AB591838	REQUEST	
19/12/2007	AD650193	CAVEAT	
31/3/2008	AD854548	WITHDRAWAL OF CAVEAT	
31/3/2008	AD844263	MORTGAGE	EDITION 6
26/6/2009	AE785431	DISCHARGE OF MORTGAGE	EDITION 7
13/9/2012	AH236260	DEPARTMENTAL DEALING	
5/3/2013	AH589306	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.

Form: 01TH
Release: 1
www.lpi.nsw.gov.au

**TRANSFER CREAT
PROFIT A PRENDRE
FORESTRY RIGHT**



New South Wales

9407317Y

Sections 87A and 88AA Conveyancing

PRIVACY NOTE: this information is legally required and will become part of the public record

(A) TORRENS TITLE	Servient Tenement Folio Identifiers 201/590247, 202/590247 and 203/590247		Dominant Tenement (if applicable) NEW SOUTH WALES DUTY 15-01-2003 0001248522-001 SECTION 18(2)	
(B) LODGED BY	Delivery Box 415S	Name, Address or DX and Telephone MESSRS HOUSTON DEARN O'CONNOR SOLICITORS DX 8565 BURWOOD TELE: 9744 9247 Reference: -AJH:DC:M570		DUTY * 000000 CODE TH
(C) TRANSFEROR	EL BETHEL PTY LTD (ACN 087 585 260)			
(D) TRANSFeree	MENANGLE SAND & SOIL PTY LIMITED (ACN 001 425 921)			
(E)	TENANCY: OFF AA 5713343.			

The transferor ~~acknowledges receipt of the consideration of \$-~~ for the consideration set out in clause 5 of Annexure "A" hereto and

- (F) transfers and grants a **PROFIT A' PRENDRE** pursuant to section 88AA of the Conveyancing Act 1919 to the transferee as follows:
- (G) 1. **Term:** TEN (10) YEARS 2. **Commencing date:** 30 November 2001 3. **Terminating date:** 29 November 2011
4. **Particulars** of the profit a' prendre are set out in annexure "A" consisting of 33 pages.
5. Incorporates the **covenants** set out in annexure "A" consisting of 33 pages. (including an option for a further term of ten (10) years specified in clause 6(B) of Annexure "A")
6. Incorporates the **provisions** set out in memorandum No. filed at Land and Property Information New South Wales.

(H) Encumbrances (if applicable):

DATE

- (I) I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of witness:

Signature of transferor:

SEE ANNEXURE "B" HERETO

Name of witness:

Address of witness:

I certify that the person(s) signing opposite, with whom I am personally acquainted or as to whose identity I am otherwise satisfied, signed this instrument in my presence.

Certified correct for the purposes of the Real Property Act 1900 by the transferee.

SEE ANNEXURE "B" HERETO

Signature of witness:

Signature of transferee:

Name of witness:

Address of witness:

Annexure "B" to TRANSFER CREATING PROFIT A' PRENDRE OR FORESTRY RIGHT

Parties:

TRANSFEROR: EL BETHEL PTY LTD (ACN 087 585 260)

TRANSFeree: MENANGLE SAND & SOIL PTY LIMITED (ACN 001 425 921)

Dated: 14/1/2003

Certified correct for the purposes of the Real Property Act 1900 by the Transferor
Execution by Transferor

Executed by
EL BETHEL PTY LIMITED
ACN 060 079 638 by :

H. M. Halfpenny
Director

HELEN MAE HALFPENNY

[Signature]
Director

RUSSELL JAMES HALFPENNY

THE COMMON SEAL of
MENANGLE SAND & SOIL PTY
LIMITED was hereunto affixed
by authority of the Board in
the presence of:



Witness: *[Signature]*

Lydia Petrovski
Justice of the Peace

Reg No: 9420047
271 Guildford Rd, Guildford.

[Signature]
Director

M. A. Smith
Secretary

Ronald B. Smith
Name

MARGARET ANNE SMITH
Name

Ref:EIS - Menangle /Src:T

Licence: MID/0734/97

TRANSFER

New South Wales
Real Property Act 1900

6209162G



Office of State Revenue use only

0002% 20/590247 202/590247 203/590247
1100 JMBLS "M" S" N

(A) **LAND TRANSFERRED**

If appropriate, specify the share or part transferred.

FOLIO IDENTIFIER 201/590247, 202/590247 AND 203/590247

(B) **LODGED BY**

LTO Box

432
(S)

Name, Address or DX and Telephone

JENNER'S
Title Searching Co.
Est. 1949

Reference (15 character max):

WFB / El Bethel

(C) **TRANSFEROR**

HALFPENNY HOBBS PTY LIMITED IN LIQUIDATION

(D) acknowledges receipt of the consideration of \$5,600,000.00 and as regards the land specified above transfers to the transferee an estate in fee simple.

(E) Encumbrances (if applicable): 1. 5713343 2. 3.

(F) **TRANSFEEEE**

T

TS

(s713 LGA)

TW

(Sheriff)

EL BETHEL PTY LTD ACN 087 585 260

(G)

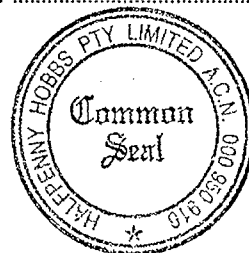
(H) We certify this dealing correct for the purposes of the Real Property Act 1900. DATE

THE COMMON SEAL OF HALFPENNY HOBBS PTY. LTD.
~~Signed in my presence by the transferor who is personally known to me.~~
was hereunto affixed by its Liquidator in
the presence of:

Signature of Witness

Name of Witness (BLOCK LETTERS)

Address of Witness



AR M KLINTOSH Signature of Transferor

Signature of WARREN FRAZER BALL
Solicitor for the Transferee

CATE OF TITLE
PROPERTY ACT, 1900



13447 97

NEW SOUTH WALES

Appln. Nos. 11487 and 16305
(parts)

Vol. 13447 Fol. 97

Prior Title Vol. 13006 Fol. 160



CANCELLED

EDITION ISSUED

30 9 1977

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second

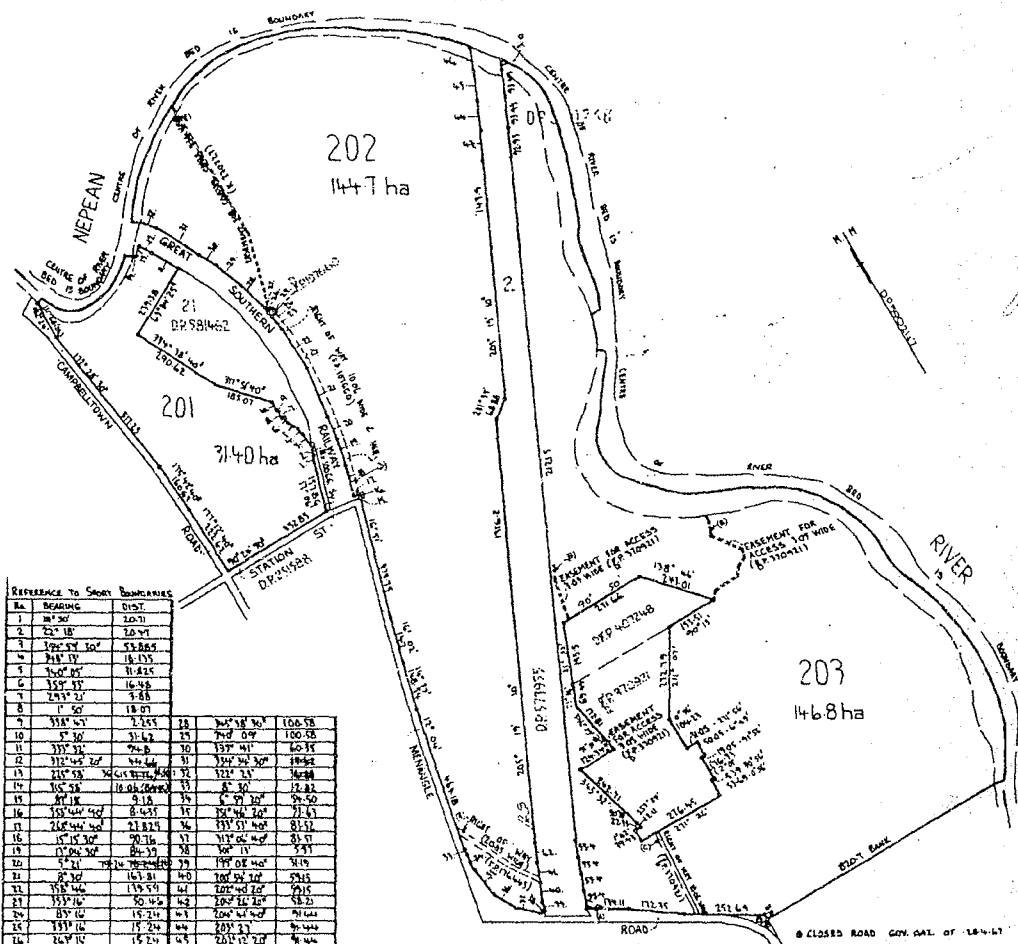
SEE AUTO FOLIO

[Signature]
Registrar General.



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



BEARING	DIST.	REFERENCE TO CROWN BOUNDARIES
1 10° 30'	10.71	1
2 75° 15'	20.41	2
3 100° 30'	53.864	3
4 110° 15'	14.135	4
5 100° 15'	11.435	5
6 150° 15'	16.48	6
7 270° 15'	1.85	7
8 17° 30'	18.01	8
9 110° 15'	1.151	9
10 17° 30'	11.62	10
11 110° 15'	1.151	11
12 110° 15'	1.151	12
13 110° 15'	1.151	13
14 110° 15'	1.151	14
15 110° 15'	1.151	15
16 110° 15'	1.151	16
17 110° 15'	1.151	17
18 110° 15'	1.151	18
19 110° 15'	1.151	19
20 110° 15'	1.151	20
21 110° 15'	1.151	21
22 110° 15'	1.151	22
23 110° 15'	1.151	23
24 110° 15'	1.151	24
25 110° 15'	1.151	25
26 110° 15'	1.151	26
27 110° 15'	1.151	27
28 110° 15'	1.151	28
29 110° 15'	1.151	29
30 110° 15'	1.151	30

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 201 in Deposited Plan 590247 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden being part of Portion 3 granted to John McArthur on 18-12-1805 and part of 19.22 hectares granted by Crown Grant Volume 1690 Folio 21. EXCEPTING THEREOUT the minerals reserved by Crown Grant Volume 1690 Folio 21, and all minerals and other metals below a depth of 304.8 metres from the surface comprised in Certificate of Title Volume 13006 Folio 160.

CAMDEN PARK ESTATE, LIMITED

FIRST SCHEDULE

SECOND SCHEDULE

EA

RCZ

CV

RCZ

EPZ

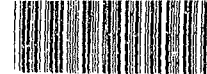
EAZ

- Reservations and conditions, if any, contained in the Crown Grant above referred to.
- Easements for Water Pipes created by Transfer No. H533697 appurtenant to the land above described affecting the pieces of land shown as "H533697 Easements for Water Pipes 6 ft Wide" in Deposited Plan 531899.
- Right of Carriageway created by Transfer No. H990961 appurtenant to the land above described affecting the Right of Way 50 links wide shown in Deposited Plan 531897.
- Covenant created by Transfer No. P355416.P
- Right of Carriageway appurtenant to the land above described created by the registration of Deposited Plan 581462.P See P539503.
- Easement for Pipeline appurtenant to the land above described created by the registration of Deposited Plan 581462.P See P539503.
- Easement for Sewer appurtenant to the land above described created by the registration of Deposited Plan 581462.P See P539503.

NOTE: ENTRIES DULLED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TILES OFFICE

CERTIFICATE OF TITLE



13006-160

NEW SOUTH WALES

Appln. Nos.11487 and 16305 (pa

PROPERTY ACT, 1900

Prior Title Vol.12900 Fol.103

Vol. 13006 Fol. 160

EDITION ISSUED

15 3 1976



I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

J. J. J. J.
Registrar General.



CANCELLED

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 22 in Deposited Plan 581462 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden being part of Portion 3 granted to John McArthur on 18-12-1805, part of Portion 2 granted to Walter Davidson on 18-12-1805 and part of 19.22 hectares granted by Crown Grant Volume 1690 Folio 21. EXCEPTING THEREOUT the road and closed road shown in the plan hereon but only to a depth of 30.48 metres from the surface and the minerals reserved by Crown Grant Volume 1690 Folio 21.

FIRST SCHEDULE

CAMDEN PARK ESTATE PTY. LIMITED.

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
2. Right of Way created by Transfer No.B130397 affecting the part of the land above described shown as "Right of Way 20.115 wide (D.P.176445)" in the plan hereon.
3. Easement for Water Supply Pipeline created by Transfer No.F138949 affecting the part of the land above described shown as "Easement for Access 3.05 wide (D.P.370921)" in the plan hereon.
4. Right of Way created by Transfer No.F138949 affecting the part of the land above described shown as "Right of Way 10.06 wide (D.P.370921)" in the plan hereon.
5. Easements for Water Pipes created by Transfer No.H533697 appurtenant to the land above described affecting the pieces of land shown as "H533697 Easements for Water Pipes 6 ft Wide" in Deposited Plan 531899.
6. Right of Carriageway created by Transfer No.H860443 affecting the part of the land above described shown as "Right of Way 10.06 wide & var. (D.P.107660)" in the plan hereon.
7. Right of Carriageway created by Transfer No.H990961 appurtenant to the land above described affecting the Right of Way 50 links wide shown in Deposited Plan 531897.
8. Easement for P.M.G. Co-Axial Cable created by Transfer No.K230727 affecting the part of the land above described shown as "Easement for Co-Axial Cable 3.66 wide (K230727)" in the plan hereon.
9. Covenant created by Transfer No.P355416.
10. Caveat No.P349914 of part being "Approximate Position of Easement Required for Drainage Purposes" in plan annexed to Caveat No.P349914.
11. Right of Carriageway appurtenant to the land above described created by the registration of Deposited Plan 581462. See P539503.
12. Easement for Pipeline appurtenant to the land above described created by the registration of Deposited Plan 581462. See P539503.
13. Easement for Sewer appurtenant to the land above described created by the registration of Deposited Plan 581462. See P539503.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

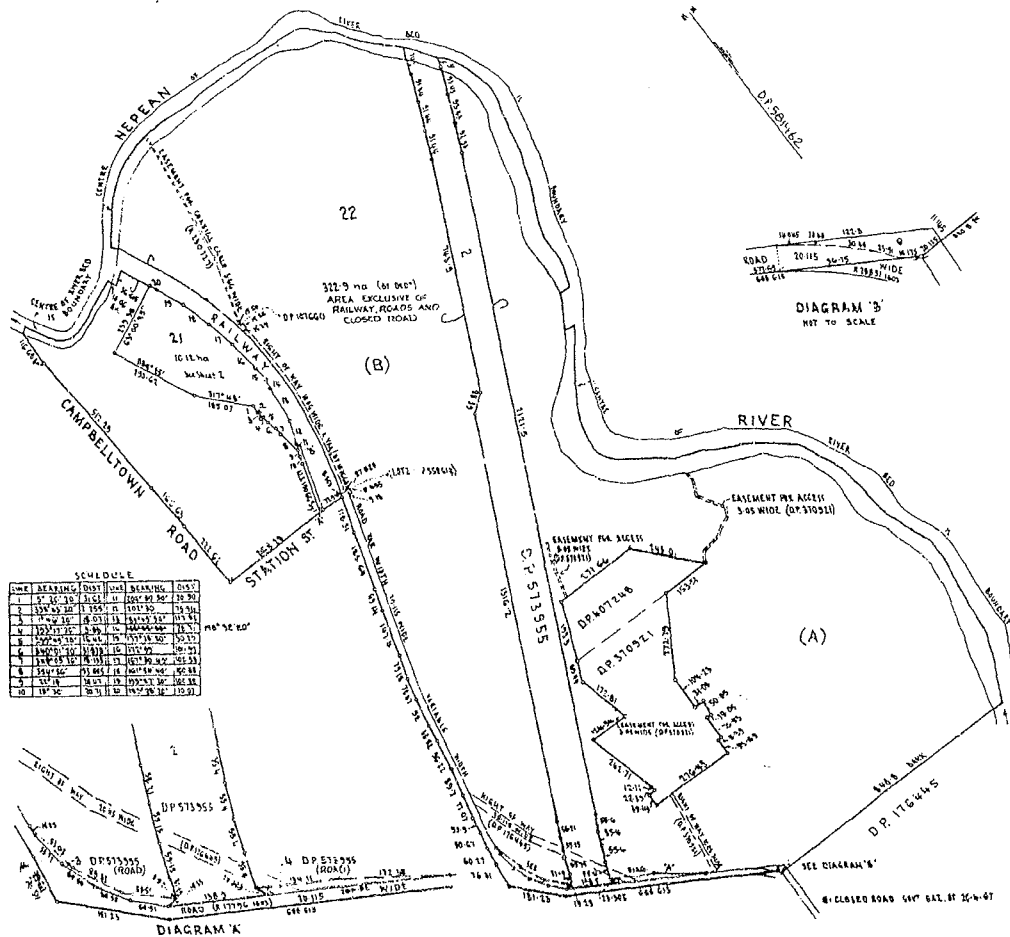


PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES


1976M7

Reg. Gen.
 15-3-1977

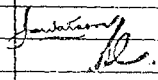




SCHEDULE

LINE	BEARING	DIST	DATE	BEARING	DIST
1	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
2	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
3	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
4	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
5	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
6	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
7	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
8	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
9	10° 15' 30"	100.00	1976	10° 15' 30"	100.00
10	10° 15' 30"	100.00	1976	10° 15' 30"	100.00

FIRST SCHEDULE (continued)					
REGISTERED PROPRIETOR	INSTRUMENT			ENTERED	Signature of Registrar General
	NATURE	NUMBER	DATE		
<p>This deed is cancelled as to <u>the whole ex road</u></p> <p>New Certificates of Title have Issued on <u>28-9-1977</u></p> <p>for lots in <u>Deposited</u> Plan No. <u>590247</u> as follows:-</p> <p>Lots <u>201 to 203</u> Vol <u>13447</u> Fol <u>971009</u> respectively</p>					
<p>REGISTRAR GENERAL</p> 					
<p>NEW CERTIFICATE(S) OF TITLE ISSUED ON <u>DP 590247</u></p> <p>NO DEALING TO BE REGISTERED WITHOUT REFERENCE TO</p> <p>SURVEY DRAFTING BRANCH</p>					

19738767
DP 590247
28/9/77
R86616944
R92899144

SECOND SCHEDULE (continued)						
NATURE	INSTRUMENT		PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION
	NUMBER	DATE				
Transfer	PA93876		<p>EASEMENT</p> <p>Right of Carriageway for Pipeline and easement for sewer created by the Registration of D.P. 581462 (see P539503) are hereby released in so far as it affects Lot 21 in the plan hereon, they are appurtenant to the parts of Lot 22 designated A and B in the plan hereon.</p>	12-1-1977		
<p>The residue of land in this folio comprises road and all minerals and other metals below road to a depth of 304.8 metres from the surface.</p> <p>Registered 28th September 1977.</p> <p>REGISTRAR GENERAL</p>  <p>6-9-1982</p>						

197647

Reg. Gen.
15-3-1977

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

STATE OF TITLE
PROPERTY ACT, 1900



12900103

NEW SOUTH WALES

Appln. Nos.11487 & 16305 (part)

Prior Title Vol.10969 Fol.112



Vol. 12900 Fol. 103

EDITION ISSUED

14 10 1975

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

J. Watson
Registrar General.



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 1 in Deposited Plan 573955 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden being part of Portion 3 granted to John McArthur on 18-12-1805, part of Portion 2 granted to Walter Davidson on 18-12-1805 and part of 19.22 hectares granted by Crown Grant Volume 1690 Folio 21. EXCEPTING THEREOUT the road and closed road shown in the plan hereon but only to a depth of 30.48 metres from the surface and the minerals reserved by the Crown Grant of 19.22 hectares.

FIRST SCHEDULE

CAMDEN PARK ESTATE PTY.LIMITED.

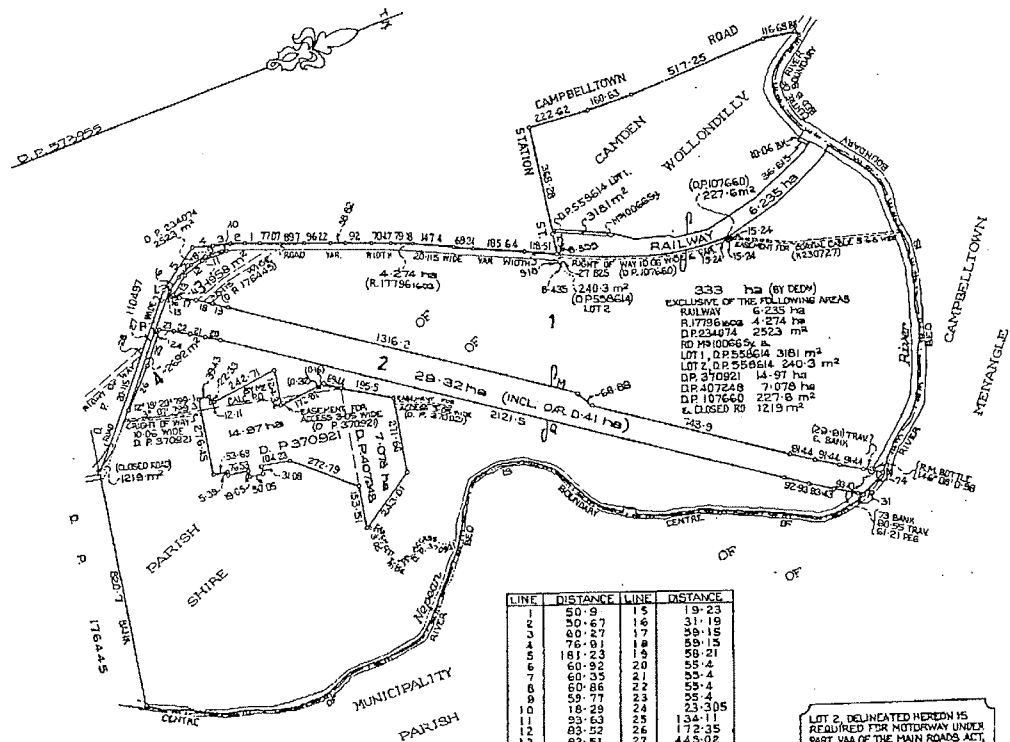
SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
2. Right of Way created by Transfer No.B130397 affecting the part of the land above described shown as "Right of Way 20.115 wide (DP176445)" in the plan hereon.
3. Easement for Water Supply Pipeline created by Transfer No.F138949 affecting the parts of the land above described shown as "Easement for Access 3.05 wide (DP370921)" in the plan hereon.
4. Right of Way created by Transfer No.F138949 affecting the part of the land above described shown as "Right of Way 10.06 wide DP370921" in the plan hereon.
5. Easements for Water Pipes created by Transfer No.H533697 appurtenant to the land above described affecting the pieces of land shown as "H533697 Easements for Water Pipes 6 ft. wide" in Deposited Plan 531899.
6. Right of Carriageway created by Transfer No.H860443 affecting the part of the land above described shown as "Right of Way 10.06 wide & Var. (DP107660)" in the plan hereon.
7. Right of Carriageway created by Transfer No.H990961 appurtenant to the land above described affecting the Right of Way 50 Links wide shown in Deposited Plan 531897.
8. Easement for P.M.G. Co-Oxial Cable created by Transfer No.K230727 affecting the part of the land above described shown as "Easement for Co-Axial Cable 3.66 (K230727)" in the plan hereon.
9. Covenant created by Transfer No.P355416.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

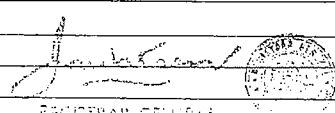
NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.



LINE	DISTANCE	LINE	DISTANCE
1	50-9	15	19-23
2	50-67	16	31-19
3	60-27	17	59-15
4	76-91	18	59-15
5	181-23	19	58-21
6	60-92	20	55-4
7	60-35	21	55-4
8	60-86	22	53-4
9	59-77	23	55-4
10	18-29	24	23-305
11	93-63	25	134-11
12	83-52	26	172-35
13	83-51	27	445-02
14	5-97	28	577-69

LOT 2, DELINEATED HEREON IS
REQUIRED FOR MOTORWAY UNDER
PART VAA OF THE MAIN ROADS ACT,
1924.

ACCESS WILL BE DENIED ACROSS
THE BOUNDARIES MARKED L-H-N
AND P-Q-R.

FIRST SCHEDULE (continued)					
REGISTERED PROPRIETOR	INSTRUMENT			ENTERED	Signature of Registrar General
	NATURE	NUMBER	DATE		
New 1/2 section on DP 581462 - No alterations to be made without 1/2 to SDR					
This deed is cancelled as to the whole					
New Certificates of Title have been issued on 15.3.1976					
for lots in Deposited Plan 581462 as follows:					
lots 21922 & 13006 for 58462 respectively.					
					
REGISTRAR GENERAL					

SECOND SCHEDULE (continued)					
INSTRUMENT			ENTERED	Signature of Registrar General	CANCELLATION
NATURE	NUMBER	DATE			
<i>Grant</i>	<i>P349914</i>				
<i>SSA 1/2</i>	<i>P539503</i>				
<i>of part being "Approximate P.O. of Section Required for Drainage Purposes" in plan annexed to Grant No P349914.</i>			<i>26.11.1975</i>	<i>[Signature]</i>	
<i>Interests created pursuant to Section 88B Conveyancing Act, 1919, by the registration of Deposited Plan 581462.</i>			<i>12-2-1976</i>	<i>[Signature]</i>	

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

P349914
DP 581462
16/2/76
P639603
(1/2) DP
58462

[illegible][illegible]

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

NEW SOUTH WALES

CERTIFICATE OF TITLE
PROPERTY ACT, 1900, as amended.



Applications Nos.11487 and 16305
Prior Title Volume 5208 Folio 142

Vol. 10969 Fol. 112



10969 112
CANCELLED
Edition issued 17-1-1969.

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness *M. Flint*

Jawatson
Registrar General.



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 10 in Deposited Plan 531899 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden being part of Portion 3 granted to John McArthur on 18-12-1805, part of Portion 2 granted to Walter Davidson on 18-12-1805 and part of 47 acres 2 roods granted by Crown Grant Volume 1690 Folio 21 EXCEPTING THEREOUT the road shown in the plan hereon but only to a depth of 100 feet from the surface, and the minerals reserved by Crown Grant Volume 1690 Folio 21.

FIRST SCHEDULE

~~CAMDEN PARK ESTATE COY. LIMITED.~~

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
2. Right of Way created by Transfer No.B130397 affecting the Right of Way 100 links wide shown in the plan hereon.
3. Easement for Water Supply Pipeline and Right of Way created by Transfer No.F138949 affecting the pieces of land shown as "Easement for Access 10 ft. wide" and "Right of Way 50 lks. wide" respectively shown in the plan hereon.
4. Easements for Water Pipes created by Transfer No.H533697 appurtenant to the land above described affecting the Easements for Water Supply 6 ft. wide shown in the plan hereon.
5. Right of Carriageway created by Transfer No. H860443 affecting the Right of Carriageway 33 feet wide and variable width shown in the plan hereon.
6. Right of Carriageway created by Transfer No. H990961 appurtenant to the land above described affecting the Right of Way 50 links wide shown in Deposited Plan 531897.
7. Easement for P.M.G. Co-Axial Cable created by Transfer No. H20027 affecting the Easement for Co-Axial cable 12 feet wide shown in the plan hereon.

1962M7500

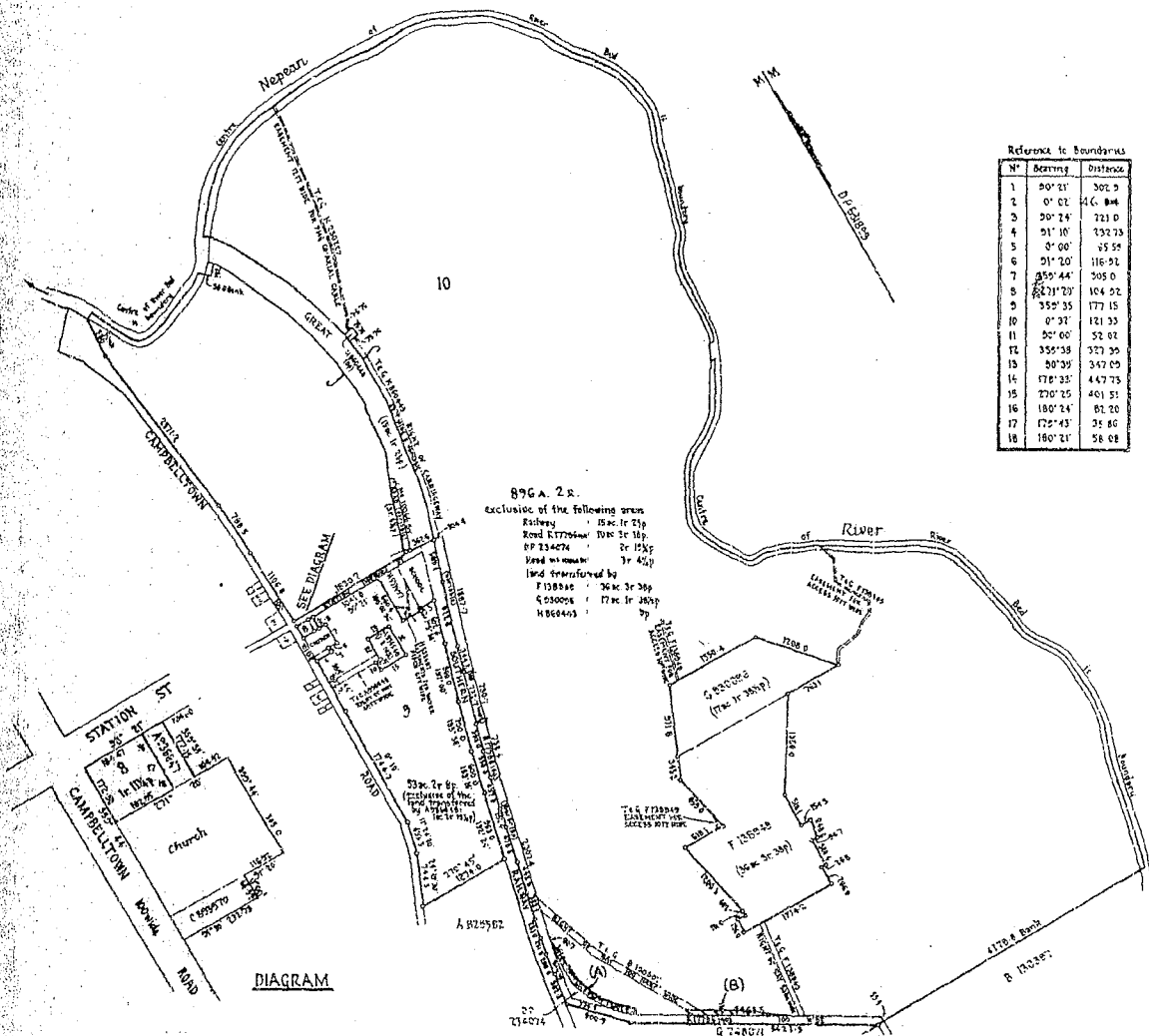
Jawatson
Reg. Gen.
9-14-1974

Jawatson
Registrar General

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.



(A) LOT 3 IN DP 573955, 1958m²
 (B) LOT 4 IN DP 573955, 2692m² } NOW PUBLIC ROAD. — S435178.

DP 5

42

RF 100-546

10



Advance Legal Searchers Pty Ltd hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 202/590247

SEARCH DATE	TIME	EDITION NO	DATE
3/3/2014	3:47 PM	7	21/7/2010

LAND

LOT 202 IN DEPOSITED PLAN 590247
AT MENANGLE
LOCAL GOVERNMENT AREA WOLLONDILLY
PARISH OF CAMDEN COUNTY OF CAMDEN
TITLE DIAGRAM DP590247

FIRST SCHEDULE

EL BETHEL PTY LTD (T 6209162)

SECOND SCHEDULE (22 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 LAND EXCLUDES MINERALS RESERVED BY CROWN GRANT VOL 1690 FOL 21
- 3 LAND EXCLUDES MINERALS BELOW A DEPTH FROM THE SURFACE OF 304.8 METRES COMPRISED IN VOL 13006 FOL 160
- 4 B130397 RIGHT OF WAY AFFECTING THE SITE DESIGNATED (A) IN THE TITLE DIAGRAM
- 5 H533697 EASEMENTS FOR WATER PIPES APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN AS H533697 EASEMENTS FOR WATER PIPES 6 FT WIDE IN DP531899
- 6 H860443 RIGHT OF CARRIAGEWAY AFFECTING THE SITE DESIGNATED (D) IN THE TITLE DIAGRAM
- 7 H990961 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE RIGHT OF WAY 50 LINKS WIDE SHOWN IN DP531897
- 8 K230727 EASEMENT FOR P.M.G. CO-AXIAL CABLE AFFECTING THE SITE DESIGNATED (E) IN THE TITLE DIAGRAM
- 9 P355416 COVENANT
- 10 DP595674 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF PIPES AFFECTING THE LAND WITHIN DESCRIBED SHOWN SO BURDENED IN DP595674
- 11 DP595674 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF PIPES APPURTENANT TO THE LAND WITHIN DESCRIBED AFFECTING LOT 203 SHOWN SO BURDENED IN DP595674
- 12 DP595674 EASEMENT FOR PIPELINE 6 WIDE AFFECTING THE PART OF THE LAND WITHIN DESCRIBED SHOWN SO BURDENED IN DP595674
- 13 DP595674 RIGHT OF CARRIAGEWAY 7.32 AND 10.06 WIDE APPURTENANT TO THE LAND WITHIN DESCRIBED AFFECTING LOT 203 IN DP590247 SHOWN SO BURDENED IN DP595674
- 14 DP610634 EASEMENT FOR PIPELINE PURPOSES OVER EXISTING LINE OF

END OF PAGE 1 - CONTINUED OVER

EIS - Menangle

PRINTED ON 3/3/2014



LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 202/590247

PAGE 2

SECOND SCHEDULE (22 NOTIFICATIONS) (CONTINUED)

-
- 15 R960935 PIPES APPURTENANT TO THE LAND ABOVE DESCRIBED
EASEMENT FOR DRAINAGE AFFECTING THE LAND ABOVE
DESCRIBED SHOWN SO BURDENED IN DP603325
- 16 R866169 RIGHTS TO MINE
- * 17 R866169 EXCEPTING THE SOIL AND SAND DEPOSITS WITHIN THE
NEPEAN RIVER INCLUDED IN THE LAND ABOVE DESCRIBED
(TOGETHER WITH RIGHTS AS SET OUT IN TRANSFER R866169)
UNTIL 28-2-1987
- * 18 9407317 PROFIT A PRENDRE TO MENANGLE SAND & SOIL PTY
LIMITED. EXPIRES 29/11/2011 TOGETHER WITH AN OPTION
FOR A FURTHER TERM OF 10 YEARS.
AB591838 VARIATION OF PROFIT A PRENDRE
- 19 DP1064386 RIGHT OF CARRIAGEWAY 6 METRE(S) WIDE AND VARIABLE
AFFECTING THE PART(S) SHOWN SO BURDENED IN DP1064386
- 20 DP1064386 EASEMENT FOR PIPELINE PURPOSES 6 METRE(S) WIDE AND
VARIABLE AFFECTING THE PART(S) SHOWN SO BURDENED IN
DP1064386
- 21 DP1064386 EASEMENT FOR ELECTRICITY SUPPLY 6 METRE(S) WIDE AND
VARIABLE AFFECTING THE PART(S) SHOWN SO BURDENED IN
DP1064386
- 22 DP1152514 EASEMENT FOR OVERHEAD POWER LINE(S) 10 METRE(S) WIDE
AND VARIABLE AFFECTING THE PART(S) SHOWN SO BURDENED
IN DP1152514

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.



Advance Legal Searchers Pty Ltd hereby certifies that the information contained in this document has been provided electronically by the Registrar General.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

3/3/2014 3:50PM

FOLIO: 202/590247

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 13447 FOL 98

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/8/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
24/10/1990	Z291701	CAVEAT	
29/7/1998	5161631	CAVEAT	
12/4/1999	5713343	TRANSFER GRANTING EASEMENT	EDITION 1
12/4/1999	5740601	WITHDRAWAL OF CAVEAT	
12/4/1999	5740602	WITHDRAWAL OF CAVEAT	
20/9/1999	6209162	TRANSFER	EDITION 2
26/2/2003	9407317	TRANSFER CREATING PROFIT A PRENDRE OR FORESTRY RIGHT	EDITION 3
18/2/2004	DP1064386	DEPOSITED PLAN	EDITION 4
8/8/2005	AB591838	REQUEST	
19/12/2007	AD650193	CAVEAT	
31/3/2008	AD854548	WITHDRAWAL OF CAVEAT	
31/3/2008	AD844263	MORTGAGE	EDITION 5
26/6/2009	AE785431	DISCHARGE OF MORTGAGE	EDITION 6
21/7/2010	DP1152514	DEPOSITED PLAN	EDITION 7
13/9/2012	AH236260	DEPARTMENTAL DEALING	
5/3/2013	AH589306	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.

NEW SOUTH WALES

Appln. Nos. 11487 and 16305
(parts)

Prior Title Vol. 13006 Fol. 160

CERTIFICATE OF TITLE

PROPERTY ACT, 1900

Vol. 13447 Fol. 98

EDITION ISSUED

30 9 1977



CANCELLED

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule

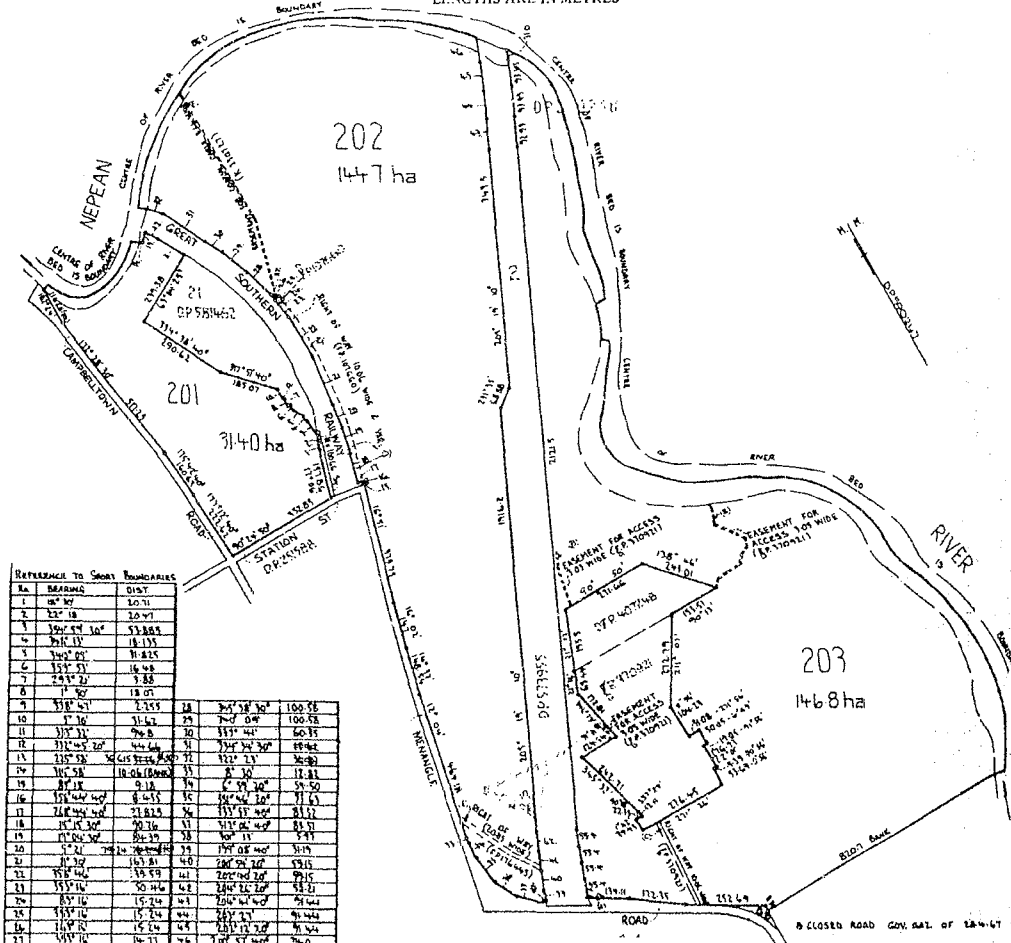
SEE AUTO FOLIO

Registrar General.



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



BEARINGS TO SHOWN BOUNDARIES	DIST.
1. 10° 10' 00"	10.71
2. 12° 18' 00"	10.71
3. 150° 04' 30"	53.889
4. 161° 17'	18.155
5. 150° 04' 30"	18.825
6. 153° 21'	18.48
7. 143° 21'	3.88
8. 11° 00'	18.01
9. 153° 41'	2.355
10. 11° 30'	2.355
11. 153° 13'	2.355
12. 153° 13'	2.355
13. 153° 13'	2.355
14. 153° 13'	2.355
15. 153° 13'	2.355
16. 153° 13'	2.355
17. 153° 13'	2.355
18. 153° 13'	2.355
19. 153° 13'	2.355
20. 153° 13'	2.355
21. 153° 13'	2.355
22. 153° 13'	2.355
23. 153° 13'	2.355
24. 153° 13'	2.355
25. 153° 13'	2.355
26. 153° 13'	2.355
27. 153° 13'	2.355
28. 153° 13'	2.355
29. 153° 13'	2.355
30. 153° 13'	2.355
31. 153° 13'	2.355
32. 153° 13'	2.355
33. 153° 13'	2.355
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35. 153° 13'	2.355
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38. 153° 13'	2.355
39. 153° 13'	2.355
40. 153° 13'	2.355
41. 153° 13'	2.355
42. 153° 13'	2.355
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80. 153° 13'	2.355
81. 153° 13'	2.355
82. 153° 13'	2.355
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84. 153° 13'	2.355
85. 153° 13'	2.355
86. 153° 13'	2.355
87. 153° 13'	2.355
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90. 153° 13'	2.355
91. 153° 13'	2.355
92. 153° 13'	2.355
93. 153° 13'	2.355
94. 153° 13'	2.355
95. 153° 13'	2.355
96. 153° 13'	2.355
97. 153° 13'	2.355
98. 153° 13'	2.355
99. 153° 13'	2.355
100. 153° 13'	2.355

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 202 in Deposited Plan 590247 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden being part of Portion 3 granted to John McArthur on 18-12-1805, part of Portion 2 granted to Walter Davidson on 18-12-1805 and part of 19.22 hectares granted by Crown Grant Volume 1690 Folio 21. EXCEPTING THEREOUT the minerals reserved by Crown Grant Volume 1690 Folio 21. and all minerals and other metals below a depth of 304.8 metres from the surface

FIRST SCHEDULE

CAMDEN PARK ESTATE PTY. LIMITED.

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
2. Right of Way created by Transfer No. B130397 affecting the part of the land above described designated (A) shown in the plan hereon.
3. Easements for Water Pipes created by Transfer No. H533697 appurtenant to the land above described affecting the pieces of land shown as "H533697 Easements for Water Pipes 6 ft Wide" in Deposited Plan 531899.
4. Right of Carriageway created by Transfer No. H860443 affecting the part of the land above described designated (D) shown in the plan hereon.
5. Right of Carriageway created by Transfer No. H990961 appurtenant to the land above described affecting the Right of Way 50 links wide shown in Deposited Plan 531897.
6. Easement for P.M.G. Co-Axial Cable created by Transfer No. K230727 affecting the part of the land above described designated (E) shown in the plan hereon.
7. Covenant created by Transfer No. P355416.
8. Covenant No. P349944 of part being "Approximate Position of Easement Required for Drainage Purposes" designated (F) shown in the plan hereon.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TILES OFFICE.

FIRST SCHEDULE (continued)	
REGISTERED PROPRIETOR	Registrar General
Halfpenny Hobbs Pty. Limited by Transfer R866169. Registered 7-11-1983.	

SECOND SCHEDULE (continued)		
PARTICULARS	Registrar General	CANCELLATION
RM R866169 ^P Rights to mine. Registered 7-11-1983.	<i>[Signature]</i>	
AA R866169 <u>Exception of soil and sand deposits within the Nepean River included in the land above described (together with rights as set out in Transfer R866169) until 28-2-1987. Registered 7-11-1983.</u>	<i>[Signature]</i>	

CANCELLED
 SEE AUTO FOLIO

NOTATIONS AND UNREGISTERED DEALINGS		

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

FIRST SCHEDULE (continued)	
REGISTERED PROPRIETOR	Registrar General

SECOND SCHEDULE (continued)		
PARTICULARS	Registrar General	CANCELLATION
<p style="text-align: center; font-size: 2em; transform: rotate(-45deg);">CANCELLED</p>		

NOTATIONS AND UNREGISTERED DEALINGS		

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED



Advance Legal Searchers Pty Ltd hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act.

Information provided through Tri-Search an approved LPI/NSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 21/581462

SEARCH DATE	TIME	EDITION NO	DATE
3/3/2014	3:47 PM	3	20/10/2005

LAND

LOT 21 IN DEPOSITED PLAN 581462
AT MENANGLE
LOCAL GOVERNMENT AREA WOLLONDILLY
PARISH OF CAMDEN COUNTY OF CAMDEN
TITLE DIAGRAM DP581462

FIRST SCHEDULE

THE CENTRAL CREAMERY PTY LIMITED (T AB852610)

SECOND SCHEDULE (11 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 H533697 EASEMENTS FOR WATER PIPES APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE PIECES OF LAND SHOWN AS H533697 EASEMENTS FOR WATER PIPES 6 FEET WIDE IN DP531899
- 3 H990961 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE RIGHT OF WAY 50 LINKS WIDE SHOWN IN DP531897
- 4 DP581462 EASEMENT FOR PIPELINE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
P993876 IS RELEASED IN SO FAR AS ARE APPURTENANT TO THE PART OF LOT 22 EAST OF THE BOUNDARY OF THE RAILWAY & EAST OF THE ROAD 20.115 WIDE & VARIABLE WIDTH SHOWN IN DP581462
- 5 DP581462 RIGHT OF CARRIAGEWAY AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
P993876 IS RELEASED IN SO FAR AS ARE APPURTENANT TO THE PART OF LOT 22 EAST OF THE BOUNDARY OF THE RAILWAY & EAST OF THE ROAD 20.115 WIDE & VARIABLE WIDTH SHOWN IN DP581462
- 6 DP581462 EASEMENT FOR SEWER AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
P993876 IS RELEASED IN SO FAR AS ARE APPURTENANT TO THE PART OF LOT 22 EAST OF THE BOUNDARY OF THE RAILWAY & EAST OF THE ROAD 20.115 WIDE & VARIABLE WIDTH SHOWN IN DP581462
- 7 DP595674 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED
- 8 DP595674 EASEMENT FOR PIPELINE APPURTENANT TO THE LAND ABOVE

END OF PAGE 1 - CONTINUED OVER

EIS - Menangle

PRINTED ON 3/3/2014



LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 21/581462

PAGE 2

SECOND SCHEDULE (11 NOTIFICATIONS) (CONTINUED)

	DESCRIBED
9 S961466	EASEMENT FOR PIPELINE AND ELECTRICITY LINE APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN SO BURDENED IN PLAN WITH S961466
10 S961466	EASEMENT FOR WATER PUMP APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN SO BURDENED IN PLAN WITH S961466
11 S961466	RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE LAND SHOWN SO BURDENED IN PLAN WITH S961466

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.



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Information provided through Tri-Search an approved LPINSW Information Broker

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

3/3/2014 3:51PM

FOLIO: 21/581462

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 13006 FOL 159

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
26/8/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
2/2/1989	Y143236	* TRANSFER	EDITION 1
4/7/2005	AB599419	CAVEAT	
31/8/2005	AB734754	APPLICATION FOR REPLACEMENT CERTIFICATE OF TITLE	EDITION 2
20/10/2005	AB852609	WITHDRAWAL OF CAVEAT	
20/10/2005	AB852610	TRANSFER	EDITION 3

*** END OF SEARCH ***

EIS - Menangle

PRINTED ON 3/3/2014

*ANY ENTRIES PRECEDED BY AN ASTERISK DO NOT APPEAR ON THE CURRENT EDITION OF THE CERTIFICATE OF TITLE. WARNING: THE INFORMATION APPEARING UNDER NOTATIONS HAS NOT BEEN FORMALLY RECORDED IN THE REGISTER.

RP 13

STAMP DUTY



TRANSFER

REAL PROPERTY ACT, 1900

CB	1 of 1	X
\$ 42		

Q1/1

DESCRIPTION
OF LAND
Note (a)

Torrens Title Reference	If Part Only, Delete Whole and Give Details	Location
Volume: 13006 Folio: 159 NOW BEING <u>whole</u> OF LAND COMPRISED IN FOLIO 21/58/462	WHOLE	MENANGLE

TRANSFEROR
Note (b)

DAIRY FARMERS CO-OPERATIVE LIMITED

ESTATE
Note (c)

(the abovenamed TRANSFEROR) hereby acknowledges receipt of the consideration of \$230,000.00
and transfers an estate in fee simple
in the land above described to the TRANSFEREE

TRANSFEREE
Note (d)

IAN RUSSELL KELLEY of 50 Deepfields Road, CATHERINE FIELDS,
Self-employed, and NORMA RAE KELLEY of the same place, his wife.

OFFICE USE ONLY

JT2

TENANCY
Note (e)

as joint tenants/tenants in common

PRIOR
ENCUMBRANCES
Note (f)

subject to the following PRIOR ENCUMBRANCES 1.

2. 3.

DATE 13th January 1989

We hereby certify this dealing to be correct for the purposes of the Real Property Act, 1900.

EXECUTION
Note (g)

Signed in my presence by the transferor who is personally known to me
DAIRY FARMERS CO-OPERATIVE LIMITED By its Attorney DONALD STUART KINNERSLEY who states that at the
date of his execution hereof he has had no notice of the revocation of the Power of Attorney dated
10th September, 1986 registered No. 810 Bk. 3678 under the authority of which he has executed this
Transfer in the presence of:

Name of Witness (BLOCK LETTERS)

Address and occupation of Witness

D.S. KINNERSLEY

Note (g)

Signed in my presence by the transferee who is personally known to me

Signature of Witness

Name of Witness (BLOCK LETTERS)

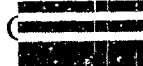
Address and occupation of Witness

Signature of Transferee S. KERRISON
R.F. KERRISON

TO BE COMPLETED
BY LODGING PARTY
Notes (h)
and (i)

OFFICE USE ONLY

LODGED BY		LOCATION OF DOCUMENTS	
CT	OTHER	CT	OTHER
Lawagents			Herewith:
Delivery Box Number 3120			In L.T.O. with
			Produced by
Checked 1702	Passed	REGISTERED 2 FEB 1989	Secondary Directions
Signed	Extra Fee		Delivery Directions



IFICATE OF TITLE

PROPERTY ACT, 1900



NEW SOUTH WALES

Appln. Nos. 11487 and 16305
(part)

Prior Title Vol.12900 Fol.103



Vol. 13006 Fol. 159

EDITION ISSUED

15 3 1976

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

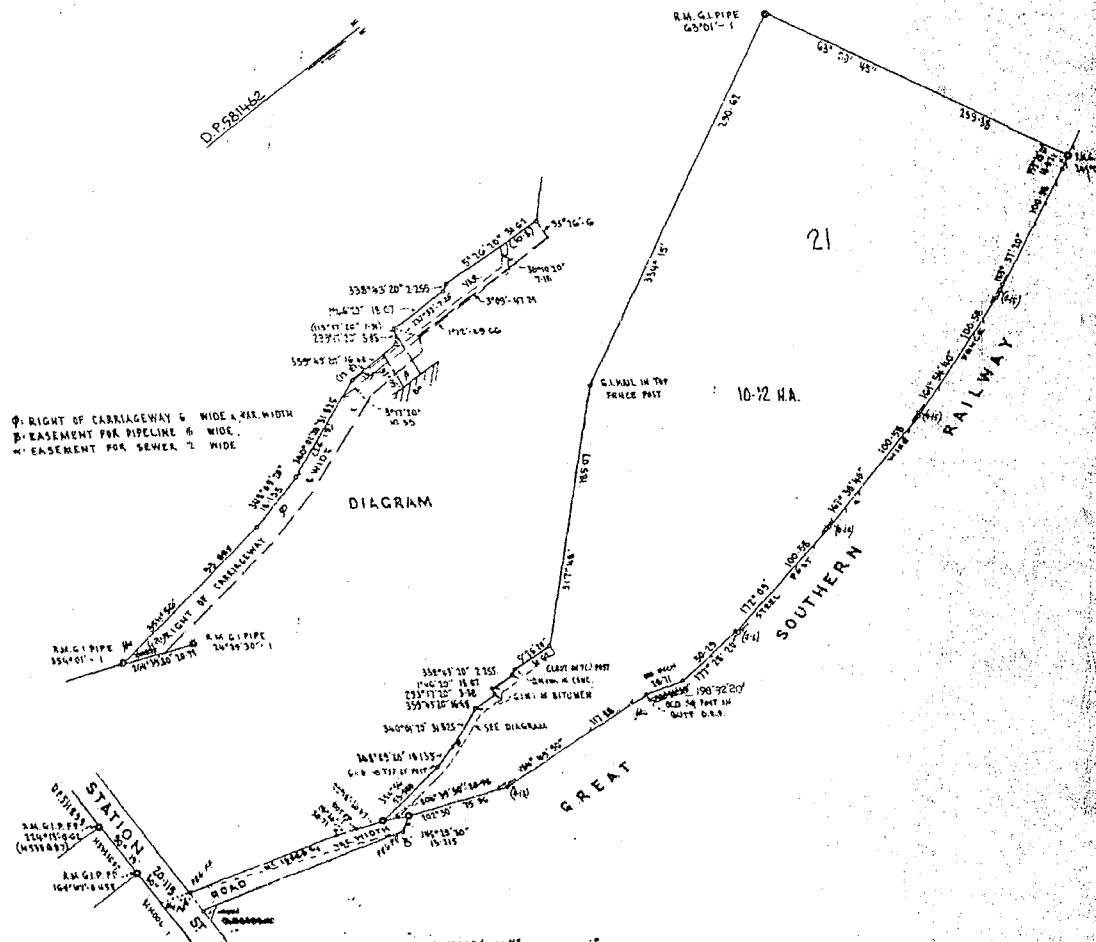
CANCELLED

Registrar General,
SEE AUTO FOLIO



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 21 in Deposited Plan 581462 at Menangle in the Shire of Wollondilly Parish of Camden and County of Camden: being part of Portion 3 granted to John McArthur on 18-12-1805, part of Portion 2 granted to Walter Davidson on 18-12-1805 and part of 19.22 hectares granted by Crown Grant Volume 1690 Folio 21.

FIRST SCHEDULE


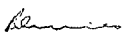
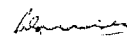
~~CAMDEN PARK ESTATE PTY. LIMITED~~

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grants above referred to.
- EA 2. Easements for Water Pipes created by Transfer No. H533697¹ appurtenant to the land above described affecting the pieces of land shown as "H533697 Easements for Water Pipes 6 feet wide" in Deposited Plan 531899.
- RC 23. Right of Carriageway created by Transfer No. H990961¹ appurtenant to the land above described affecting the Right of Way 50 links wide shown in Deposited Plan 531897.
4. Government created by Transfer No. P355416. Released P443877.
- EP (SB) 5. Easement for Pipeline affecting the part of the land above described 6 wide shown in the plan hereon created by the registration of Deposited Plan 581462¹ See P539503.
- RC (SB) 6. Right of Carriageway affecting the part of the land above described 6 wide & var. shown in the plan hereon created by the registration of Deposited Plan 581462¹ See P539503.
- EA 7. Easement for Sewer affecting the part of the land above described 2 wide shown in the plan hereon created by the registration of Deposited Plan 581462¹ See P539503.

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

SECOND SCHEDULE (continued)					
NATURE	INSTRUMENT NUMBER	DATE	PARTICULARS	ENTERED	Signature of Registrar General
Transfer	999876	—	Right of Carriageway, Easement for Pipeline and Easement Rec Sewer created by the Registration of D.P. 581462 (see P 539503) are hereby released in so far as it is appurtenant to Lot 22 in the plan because they are appurtenant to the part of Lot 22 east of the eastern boundary of the railway and east of the road 20.115 wide and variable width shown in DP 581462.	10-1-1977 Reg. Gen.	J. J. J.
			D.P. 595674 Right of Carriageway 7.32 and 12.06 wide appurtenant to the land within described affecting the part of lot 203 in D.P. 590247 shown so burdened is p.p. 595674.	6-6-1978	[Signature]
			DP 595674 Easement for Pipeline & wide appurtenant to the land within described affecting the part of Lot 202 in DP 590247 shown so burdened in DP 595674.	6-6-1978	[Signature]

FIRST SCHEDULE (continued)		
REGISTERED PROPRIETOR	Registrar General	
SECOND SCHEDULE (continued)		
PARTICULARS	Registrar General	CANCELLATION
EP S961466 ^P <u>Easement for pipeline and electricity line appurtenant to the land above described affecting the land shown so burdened in plan with S961466.</u> <u>Registered 7-11-1983.</u>		
EA S961466 ^P <u>Easement for water pump appurtenant to the land above described affecting the land shown so burdened in plan with S961466.</u> <u>Registered 7-11-1983.</u>		
ACZ S961466 ^P <u>Right of carriageway appurtenant to the land above described affecting the land shown so burdened in plan with S961466.</u> <u>Registered 7-11-1983.</u>		
NOTATIONS AND UNREGISTERED DEALINGS		

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

FIRST SCHEDULE (continued)	
REGISTERED PROPRIETOR	Registrar General
<p style="text-align: center;">CANCELLED</p> <p style="text-align: center;">SEE AUTO FOLIO</p>	

SECOND SCHEDULE (continued)		
PARTICULARS	Registrar General	CANCELLATION

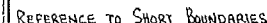
NOTATIONS AND UNREGISTERED DEALINGS		

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

THE COMMON SEAL OF CANADIAN PACIFIC ESTATE
F.TY. LIMITED WAS HEREON AFFIXED BY THE AUTHORITY
OF A RESOLUTION OF THE BOARD OF DIRECTORS AND IN PROSECUTION
OF TWO DIRECTORS WHOSE SIGNATURES ARE HEREON AFFIXED
HEREIN



21 Kitecote



(Signature)..... Council Clerk.

*This part of certificate to be dated where the application is made for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Metropolitan Water Sewerage and Drainage Board and the Hunter District Water Board.

†Delete if inapplicable.

Abstract. *Springer* www.springer.com

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

I, Bruce Richard Davies, Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this 15th day of August, 1977

Registered: 006 12-B-1977
C.A. _____
Title System: TORRENS
Purpose: SUBDIVISION
Ref. Map: PARISH *
Last Plan: D. P. 581462

PLAN OF SUBDIVISION OF LOT 22
IN D.P. 581462

Reduction Ratio 1: 8000
Lengths are in metres.

Mun./Shire City: WOLLONDILLY
Locality: MENANGLE
Parish: CAMDEN
County: CAMDEN

This is sheet 1 of my plan in _____ sheets
(Delete if inapplicable)

BARRY JAMES INWOOD
of J.P. BATES & INWOOD
of 140 ARGYLE ST. CAMDEN
a surveyor registered under the Surveyors Act, 1924, a
somerset, hereby certify that the following is a true and
correct copy of the original as deposited in the
plan D.25158, 1152555, F.P.107660.2 & 211761301.
It is accurate and was made by me or under
my immediate supervision in accordance with the
Regulation 1924, and was completed on 1st
9th March 1977

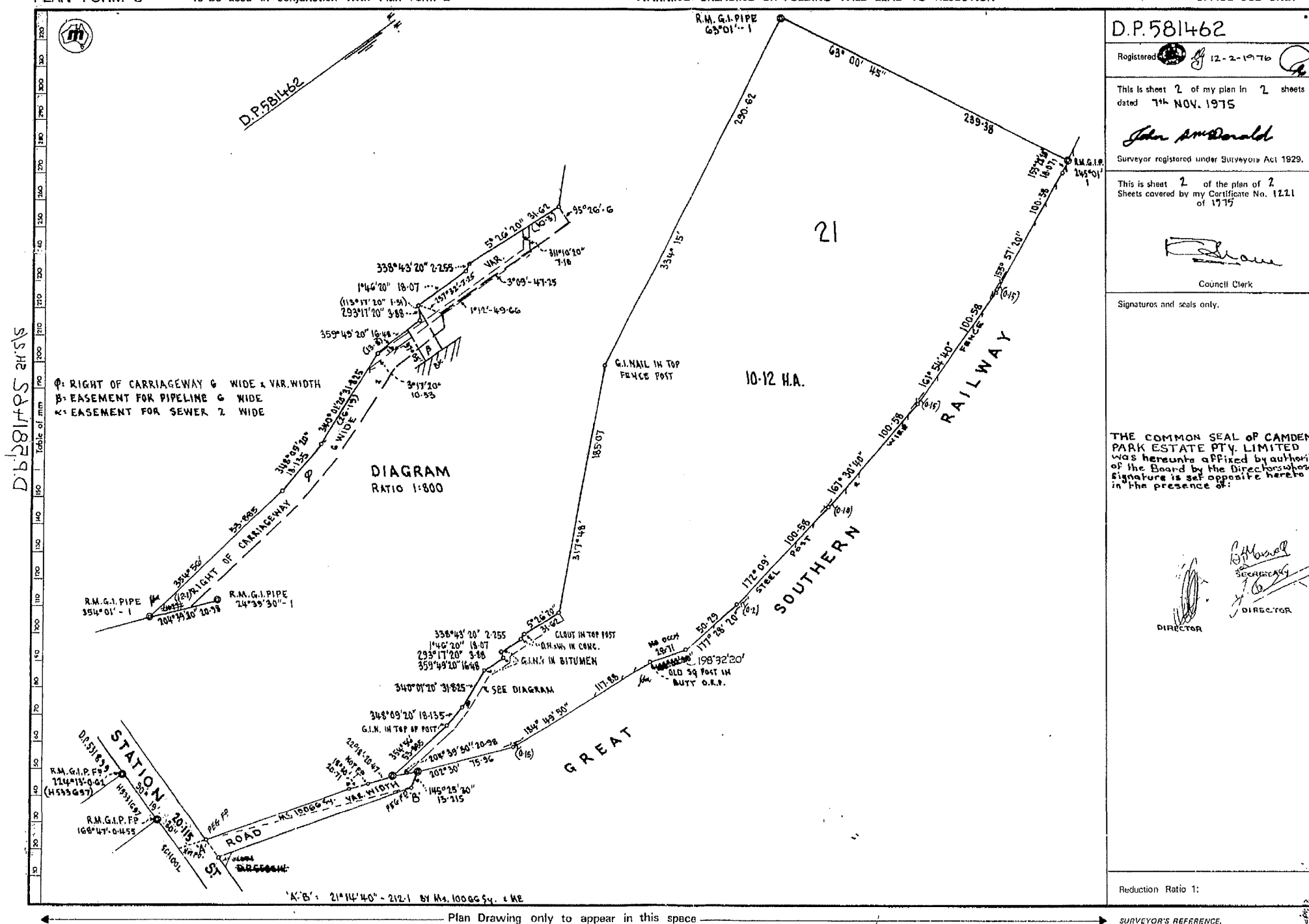
Signature B. Woodward
 Surveyor registered under Surveyors Act, 1929, as amended
 Datum Line of Azimuth.
 *Strike out either (1) or (2) insert date of survey.

Panel for use only for statements of intention to dedicate public roads or to create public reserves, drainage reserves, easements or restrictions as to user.

● CLOSED ROAD GOV. GAZ. OF 28.4.67

ALTERATIONS BY ME 5/8/77 B. JENNARD.

SURVEYOR'S REFERENCE: 1073/77



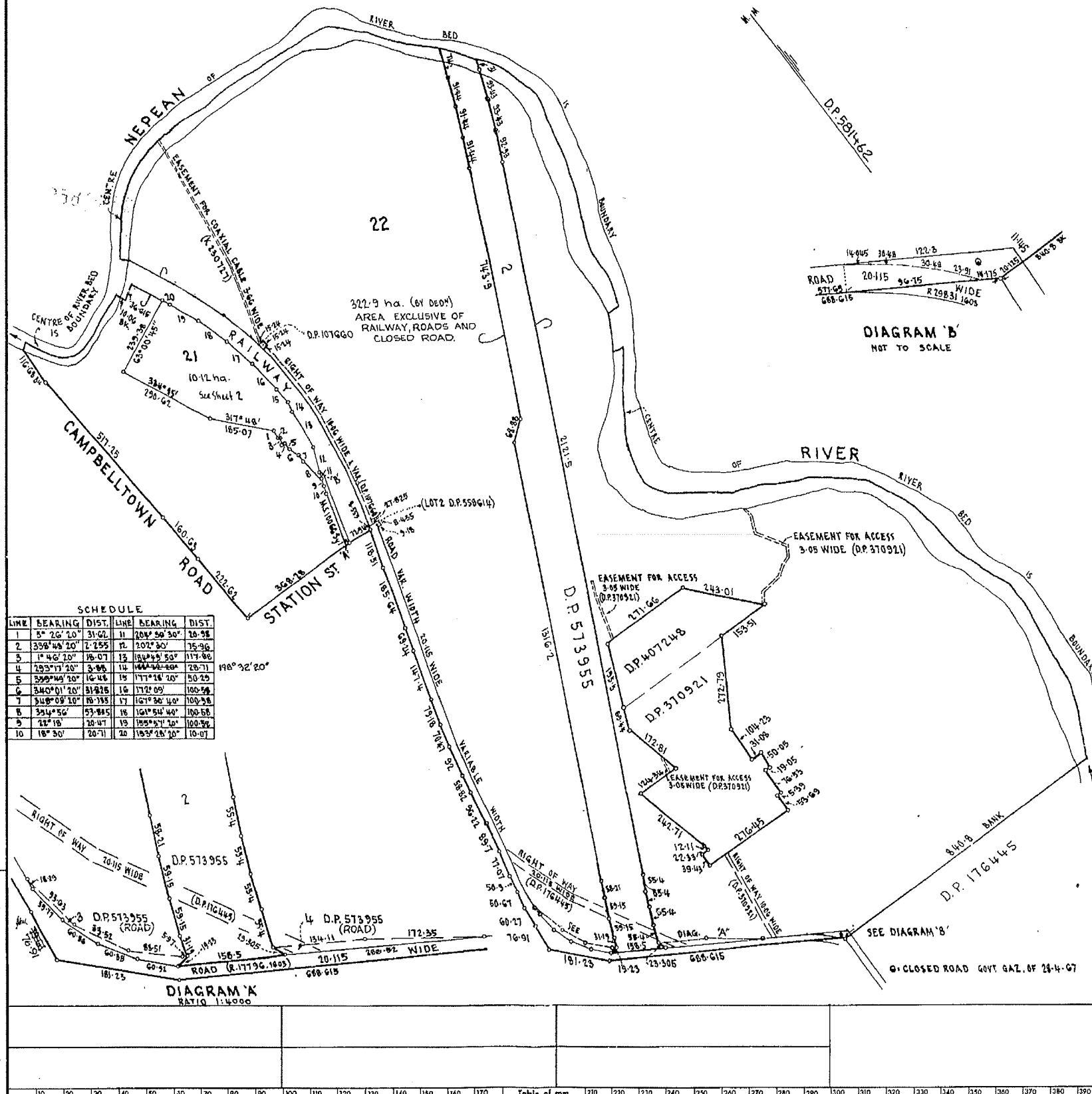
I, Jack Hayward Watson, Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this 16th day of February, 1976.

Janatson

Signatures and seals only.

THE COMMON SEAL OF CAMDEN
PARK ESTATE PTY. LIMITED
was hereunto affixed by authority
of the Board by the Directors whose
signature is set opposite hereto
in the presence of:

DIRECTOR

SECRETARY
DIRECTOR

Council Clerk's Certificate

I hereby certify that -

- (a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and
- (b) the requirements of section 34B of the Metropolitan Water, Sewerage and Drainage Act, 1924, as amended. (Hunter District Water, Sewerage and Drainage Act, 1928, as amended).

have been complied with by the applicant in relation to the proposed SUBDIVISION (Insert "new road", "subdivision" or "consolidated lot") set out herein

Subdivision No. 1221 OF 1975

Date 8/12/75

(Signature)

Council Clerk

*This part of certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the area of operations of the Metropolitan Water, Sewerage and Drainage Board and the Hunter District Water Board.

1 Delete if inapplicable.

MPD

Assess No. 2848

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

I, Jack Hayward Watson, Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this 16th day of February, 1976.

SURVEYOR'S REFERENCE:

D.P. 581462

Registered 12-2-1976

C.A. NO. 1221/1975 OF 8/12/1975

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: PARISH

Last Plan: D.P. 573955

PLAN
OF SUBDIVISION OF
LOT 1 IN D.P. 573955

Reduction Ratio 1: 6000

Lengths are in metres.

WOLLONDILLY

Locality: MENANGLE

Parish: CAMDEN

County: CAMDEN

This is sheet 1 of my plan in 2 sheets.
(Delete if inapplicable).

I, John Selwyn McDonald,
John M. Daly & Associates Pty. Ltd.
of 155-161 Queen St., CAMDEN, N.S.W.,
a surveyor registered under the Surveyors Act, 1920, as
amended, hereby certify that the survey represented in this
plan is accurate and has been made (1) by me (2) under my
immediate supervision in accordance with the Survey
Practice Regulations, 1923, and was completed on 1.....
11th Nov. 1975

Signature John McDonald
Surveyor registered under Surveyors Act, 1920, as amended.
Datum Line of Azimuth: A-B
*Strike out either (1) or (2). Insert date of survey.

Panel for use only for statements of intention
to dedicate public roads or to create public res-
erves, drainage reserves, easements or restrictions
as to user.

Pursuant to Section 88 of the
Conveyancing Act 1919 as amended
it is intended to create

1. Right of Carriageway 6m wide x
Variable Width
2. Easement for Pipeline 6m. wide
3. Easement for Sewer 2m. wide

INSTRUMENT FILED AS P539503.

D.P. 581462

D.P. 581462



Appendix C5: Council Property Records (BA/DA/Property Files)

Document Edit Attachments Help

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1 of 1

Parcel 10703 Parcel Flag Registered
 H/No. / 15 Street Side L Address Sequence
 Street Menangle RD MENANGLE
 Title 1 Lot 201 Sec
 DP 590247 Entitlement 0

Application Details

Current Property ☒ Historic Properties ☐ Both Current & Historic ☒ Line 1 of 5

Indicator	Formatted Account	Precis	External Reference	Determination	Determination Date	Document Type
010.2009.00000650.001		Landfilling in conjunction with approved subdivision		Approved under Dele	10/12/2009	Development Applicati
010.2007.00060222.001		S96 modification received to amend condition 13.1 to delete the road b	AD499-07	Approved Historic	29/08/2007	Development Applicati
010.2005.00060006.001		Nineteen (19) Lot Subdivision	ID202-05	Approved Historic	27/07/2006	Development Applicati
010.2003.00053483.001		24 Lot Torrens Title Subdivision	I826-03	Withdrawn	08/06/2004	Development Applicati
006.1950.00003398.001			S489/50			1986 to 1998 DAs

Document Edit Attachments Help

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OK Cancel Cut Copy Paste Ins Line Del Line Excel Help

⏮ ⏪ ⏩ ⏭ ⏮ ⏭ 1 of 1

Parcel 10704

Parcel Flag Registered

H/No. / 1370 -

Street Side L Address Sequence

Street Moreton Park

RD MENANGLE

Title 1 Lot 202 Sec

DP 590247

Entitlement 0

Application Details

Current Property ☒ Historic Properties ☒ Both Current & Historic ☒ Line of 0

Indicator	Formatted Account	Precis	External Reference	Determination	Determination Date	Document Type
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Document Edit Attachments Help

☒ OK
 ☐ Cancel
 ☐ Cut
 ☐ Copy
 ☐ Paste
 ☐ Ins Line
 ☐ Del Line
 ☐ Excel
 ☐ Help

1 of 1

Parcel 12309 Parcel Flag Registered
 H/No. / 45 Street Side L Address Sequence
 Street Stevens RD MENANGLE
 Title 1 Lot 21 Sec
 DP 581462 Entitlement 0

Application Details

Current Property ☒ Historic Properties ☐ Both Current & Historic ☒ Line of 0

Indicator	Formatted Account	Precis	External Reference	Determination	Determination Date	Document Type
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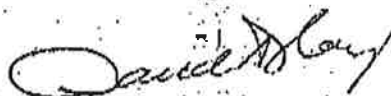
02847(1)

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

DETERMINATION OF A DEVELOPMENT APPLICATION
PURSUANT TO SECTION 101

In pursuance of Section 101 of the Environmental Planning and Assessment Act, 1979, I determine the development application referred to below by granting consent to that application subject to the conditions set out in the Schedule.

The reason for the imposition of the conditions is to minimize the adverse impact the development may cause.



DAVID HAY
Minister for Planning

Signed at Sydney this 15th day of March, 1989.

File No. 85/2865.

APPLICANT: Menangle Sand and Soil Supplies Pty. Limited
P.O. Box 263
INGLEBURN 2565

COUNCILS: Campbelltown City Council
Wollondilly Shire Council

LAND: Lots 201-203 D.P. 590247
Lot 1 D.P. 168893
Lot 11 D.P. 531897
Lot 4 D.P. 595181
Lot 3 D.P. 593211
Lot 2 D.P. 236059
Lot 2 D.P. 116069

PROPOSED DEVELOPMENT: Extraction of sand and soil from the bed and banks of the Nepean River at Menangle.

- NOTES: (1) To ascertain the date upon which the consent becomes effective, refer to section 93 of the Act.
- (2) To ascertain the extent to which the consent is liable to lapse, refer to section 99 of the Act.



Office of Water

Contact: Mohammed Usma
Phone: 02 9895 7978
Fax: 02 9895 7501
Email: mohammed.usma@oow.nsw.gov.au

David White
PO Box 431
Frenchs Forest NSW 1580

Doc Ref: 13-ERM2009-0369
File No: 6463413
You Ref: 332855

Attention: David White

11 December 2009

Dear Sir

Re: **Controlled Activity Approval - Issue Date 11/12/2009**
Stage 7a - Extraction of sand and soil from site adjacent to the Nepean River at Menangle, Menangle being Lot 202 on DP590247

I refer to your application dated 17 August 2009 for a Controlled Activity Approval under the *Water Management Act 2000*. The NSW Office of Water acknowledges receipt of your application fee of \$1615.

Controlled Activity Approval

The NSW Office of Water has determined to grant you a Controlled Activity Approval. Please find enclosed the **Notice of Determination** together with your Controlled Activity Approval.

Your Controlled Activity Approval will expire on 11/12/2013.

Please read carefully the conditions of the Controlled Activity Approval and seek clarification from the NSW Office of Water for any condition not fully understood.

You are required to provide a copy of this Approval and any annotated documentation to your certifier and to all contractors engaged in the implementation of these works or the Vegetation Management Plan (VMP) to ensure they are also aware of the conditions.

The Controlled Activity Approval must be kept current until all works have been completed. Applications for extension of the Controlled Activity Approval should be made to the NSW Office of Water, in writing, at least one month prior to the expiry date.

Security Deposit

The NSW Office of Water acknowledges receipt of your security which will be held until such time as the works, rehabilitation and any specified maintenance period related to this Controlled Activity Approval are complete. If the application is amended or the scope of the works is changed, then the value of the security may also be amended. Details of the security are as follows.

Environment, Climate Change and Water

Notice of Determination – Controlled Activity Approval

Issued under Part 3, Chapter 3 of the Water Management Act 2000 - for matters assessed as integrated development under Part 4 of the Environmental Planning & Assessment Act 1979

Approval Number: 10 ERM2009/0880

Applicant's Details:(First applicant)

Title / Surname: Mr White
Given Name: David
Company Name:
Address: PO Box 431 Frenchs Forest NSW 1540
Phone: 02 84389417
Fax:

Second applicant if applicable

Title / Surname:
Given Name:
Address:
Town: State: Postcode:

Determination:

Type of Approval: Controlled Activity Approval
Date of Determination: 10 December 2009
Determination: ☒ Granted (subject to conditions) ☐ Refused
Location: Menangle being Lot 202 on DP590247
Description of Works: Stage 7a - Extraction of sand and soil at Menangle Wollondilly

Reasons for determination: This Controlled Activity Approval is granted on the basis that the Department is satisfied the proposed development has adequate arrangements in place to ensure that no more than minimal harm will be done to waterfront land at this site as a consequence of carrying out the proposed controlled activity.

Right of Appeal: Section 308 of the Water Management Act 2000 gives a right of appeal in certain circumstances. As this application has been assessed as integrated development it will not be subject to any third party rights of appeal under the Water Management Act 2000. This does not affect any right of appeal an objector may be entitled to under section 98 of the Environmental Planning and Assessment Act 1979.

Signature:

Name: Monammet Ismail
By Delegation from the Minister for Water



Our Reference: **TRIM 6814**

Wollondilly Shire Council
PO Box 21
PICTON NSW 2571

WOLLONDILLY SHIRE COUNCIL	
TRIM No.	568.69d 370.170
PROP. No.	
- 7 MAY 2012	
AUTH. No.	P21550
ASSIGNED TO:	msutton

4 May 2012

Dear Sir/Madam,

'STATION STREET, MENANGLE' – RESIDENTIAL AND MIXED USE HERITAGE PRECINCT PLANNING PROPOSAL

This letter has two purposes:

- (i) to advise you that Council has received a Planning Proposal to rezone land in Station Street Menangle to R2 Low Density Residential, R3 Medium Density Residential and B1 Neighbourhood Centre OR alternatively R1 General Residential and B1 Neighbourhood Centre; and
- (ii) to seek your initial comments on this proposal.

Council is consulting with you regarding this matter because you own property which adjoins or is in close proximity to the land proposed to be rezoned. Council is interested in the community's preliminary feedback on the draft planning proposal to assist in deciding whether to commence the process of rezoning this land.

Location of Draft Planning Proposal

The subject site comprises approximately 27 hectares of agricultural land north of Menangle village (on the site containing the rotolactor and creamery buildings) and north east of Menangle village (on the eastern side of the main southern railway line) on the following parcels of land:

- Part Lot 201 DP 590247; Part Lot 21 in DP 581462; and, Part Lot 202 in DP 590247.

The attached map shows the location of the subject land.

Objective of Draft Planning Proposal

The application states that the objective of the planning proposal is to facilitate a residential and mixed use heritage precinct development located north of Menangle village on Station Street, Menangle.

Amendment to Wollondilly Local Environmental Plan (WLEP) 2011

To achieve this objective, the proposal seeks the following amendments to the Wollondilly Local Environmental Plan, 2011 (WLEP 2011):

- Preferred Amendment of the WLEP 2011 Land Zoning Map from RU1 Primary Production to R1 General Residential and B1 Neighbourhood Centre, as detailed in 'Figure 2.1 Preferred Zoning' on page 22 of the Planning Proposal..
- An alternative amendment of the WLEP 2011 Land Zoning Map from RU1 Primary Production to R2 Low Density Residential, R3 Medium Density Residential and B1 Neighbourhood Centre as detailed in 'Figure 2.2 Alternate Zoning Plan' on page 24 of the Planning Proposal.

Note: Council will consider the appropriate zoning for the site during its preliminary assessment of the Planning Proposal.

- Amendment of the WLEP 2011 Lot Size Map from 100ha to 900, 600, 500 and 200m² as detailed in 'Figure 2.4 Minimum Lot Size' located on page 28 of the Planning Proposal.
- Amend the WLEP 2011 Height of Buildings Map from 0 metres to: 6.8 metres for the proposed R1 General Residential Zone (**OR** the alternate R2 Low Density Residential and R3 Medium Density Residential Zones); and, 9 metres for the proposed B1 Neighbourhood Centre Zone.

Viewing Draft Planning Proposal Documents

Should you wish to view any of the documents related to this draft planning proposal they will be available for viewing from **4 May 2012 to 25 May 2012** at the following locations:

- Council's Customer Service Counter, 62-64 Menangle Street, Picton, Monday to Friday, 8.00am to 4.00pm.
- Council's website www.wollondilly.nsw.gov.au under Your Council > Advertisements, Exhibitions & Consultations > Draft Planning Proposal – Station Street, Menangle.

Making a submission on the Draft Planning Proposal

In the meantime Council is interested in your views and opinions on this proposal. Should you wish to make any comment on the proposal please forward such comments in writing (letter, facsimile or email are acceptable). All correspondence is to be addressed to the General Manager quoting reference number **TRIM 6814**.

Council's address for written correspondence is:

Wollondilly Shire Council
Attention: Strategic Planning Team
P.O. Box 21
PICTON NSW 2571

Council's email address is: council@wollondilly.nsw.gov.au.

Council's facsimile number is (02) 4677 2339.

Written submissions should be received at Council before **Friday 25 May** so that feedback can be used in preparing the report for the Ordinary Meeting of Council.

Report to Ordinary Meeting of Council

A report is expected to be considered at an Ordinary Meeting of Council in July 2012 to determine whether Council will support further investigations into the Planning Proposal. Those who make a written submission shall be further notified of the dates and times when Council will consider this report.

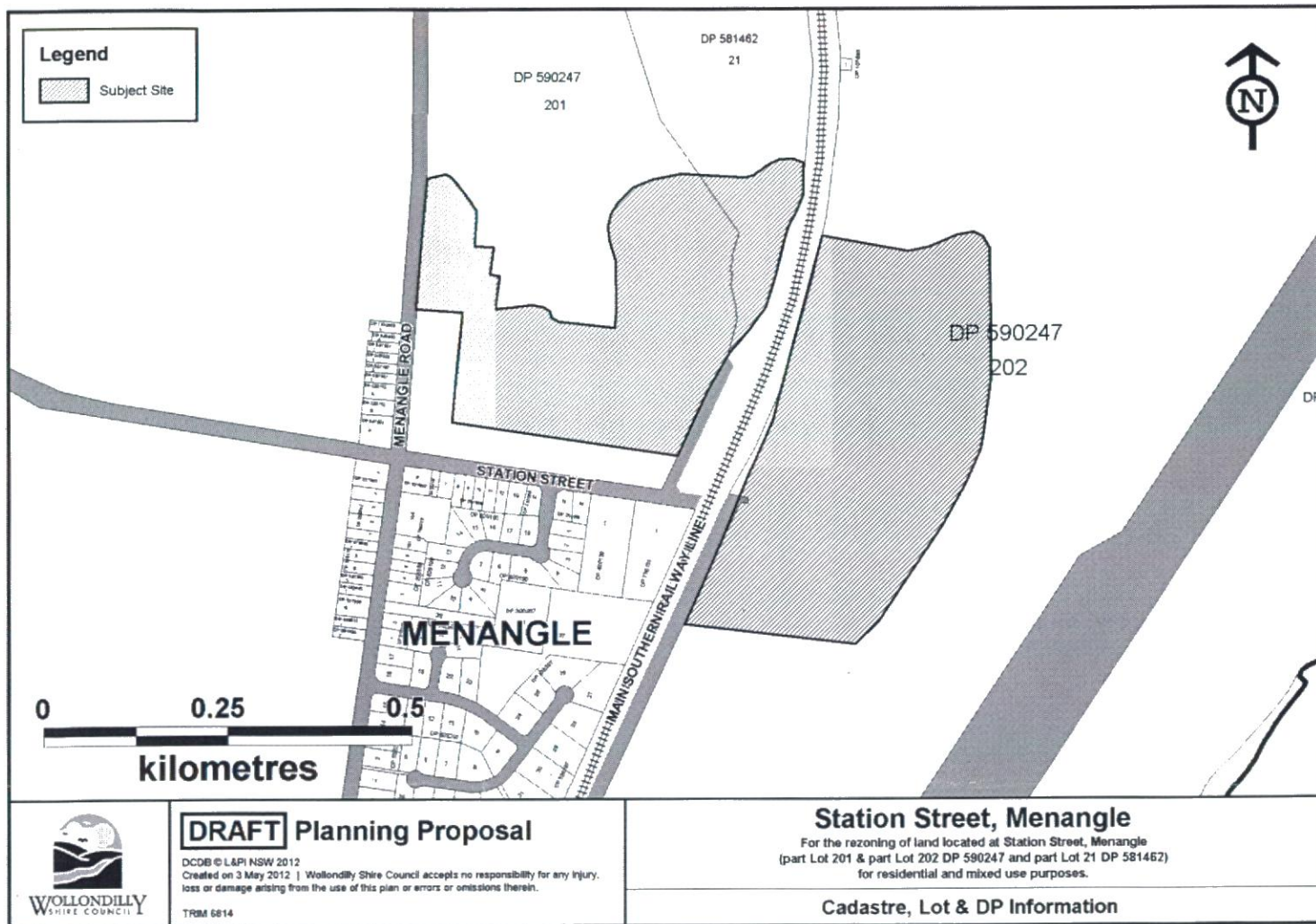
Should you have any questions regarding this matter please contact Mr Martin Cooper in Council's Strategic Planning section direct on Phone (02) 4677 1173.

Yours sincerely,



Martin Cooper
Rural Projects Officer
STRATEGIC PLANNING

Under S147 of the EP&A Act, any person making a submission is required to disclose reportable political donations and gifts (\$1000 or more) made to any local councillor or staff member within 2 years of making of the submission. If the application or gift is made after the submission, a disclosure must be made within 7 days of that donation or gift having been made. Details of information required in the disclosure can be found on Council's website at <http://www.wollondilly.nsw.gov.au/files/21608/File/DisclosureofPoliticalDonations.pdf>





Appendix C6: Council Section 149 Certificates

21 MAR 2014

RURAL LIVING

**PLANNING CERTIFICATE UNDER SECTION
149(2) & (5)
ENVIRONMENTAL PLANNING & ASSESSMENT ACT, 1979**

APPLICANT:

Mr V Boggaram
PO Box 976
NORTH RYDE BC NSW 1670

Planning Certificate No.: 20140402
Receipt No.: 516090
Issue Date: 19 March 2014
Applicant's Reference: E27284KB
Property No.: 10704

DESCRIPTION OF PROPERTY

Address: 1370 Moreton Park Road MENANGLE 2568
Land Description: Lot: 202 DP: 590247

Notes:

The following prescribed matters may apply to the land to which this certificate relates.

Where this certificate refers to a specific allotment (or allotments) within a strata plan, the certificate is issued for the whole of the land within the strata plan, not just the specific allotment(s) referred to, and any information contained in the certificate may relate to the whole, or any part, of the strata plan.

The following information is provided pursuant to Section 149(2) of the Environmental Planning and Assessment Act 1979 as prescribed by Schedule 4 of the Environmental Planning and Assessment Regulation 2000 and is applicable as at the date of this certificate.

Information provided in this certificate should be interpreted in conjunction with the relevant plans, policies and documents held at Council. In order to obtain copies of these documents you may purchase them from Council's Administration Centre at 62-64 Menangle Street, Picton or view free of charge on Council's Website www.wollondilly.nsw.gov.au.

1. NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPS

- (1) The name of each environmental planning instrument that applies to the carrying out of development on the land.
- (2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).
- (3) The name of each development control plan that applies to the carrying out of development on the land.
- (4) In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

ENVIRONMENTAL PLANNING INSTRUMENTS

Wollondilly Local Environmental Plan 2011.

Sydney Regional Environmental Plan No 20 - Hawkesbury-Nepean River (No 2 - 1997)

Sydney Regional Environmental Plan No 9 Extractive Industries (No 2 - 1995)

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

State Environmental Planning Policy No 21 - Caravan Parks

State Environmental Planning Policy No 30 - Intensive Agriculture

State Environmental Planning Policy No 33 - Hazardous and Offensive Development

State Environmental Planning Policy No 44 - Koala Habitat Protection
(Note: Excludes land dedicated or reserved as National Park)

State Environmental Planning Policy No 50 - Canal Estate Development

State Environmental Planning Policy No 55 - Remediation of Land

State Environmental Planning Policy No 64 - Advertising and Signage

State Environmental Planning Policy No 65 - Design Quality of Residential Flat Development

State Environmental Planning Policy (Major Development) 2005

State Environmental Planning Policy (Temporary Structures) 2007

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

State Environmental Planning Policy No 62 - Sustainable Aquaculture

State Environmental Planning Policy (Affordable Rental Housing) 2009

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2013

PROPOSED ENVIRONMENTAL PLANNING INSTRUMENTS

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

Draft State Environmental Planning Policy (Competition) 2010

DEVELOPMENT CONTROL PLANS

Wollondilly Development Control Plan 2011

2. ZONING AND LAND USE UNDER RELEVANT LEPS

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

WOLLONDILLY LOCAL ENVIRONMENTAL PLAN 2011

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Zone RU1 Primary Production

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Extensive agriculture; Home occupations and development listed in Schedule 2 of Wollondilly Local Environmental Plan 2011 provided it meets the criteria in that schedule

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Agriculture; Air transport facilities; Animal boarding or training establishments; Bed and breakfast accommodation; Cellar door premises; Cemeteries; Community facilities; Crematoria; Depots; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Funeral homes; Group homes; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Information and education facilities; Intensive livestock agriculture; Intensive plant agriculture; Landscaping material supplies; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Research stations; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings; Signage; Transport depots; Truck depots; Veterinary hospitals; Water recreation structures; Water supply systems

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Any development not specified in item (b) or (c)

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

A dwelling house cannot be erected on any lot created under clause 4.2 of Wollondilly Local Environmental Plan 2011. That is, a dwelling house cannot be erected on lots less than the minimum allotment size for subdivision which have only been created for the purpose of primary production.

Reference must be made to clause 4.2 of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

Wollondilly Local Environmental Plan 2011 Clause 4.2A and the Minimum Lot Size Map sets the minimum land dimensions for the erection of a dwelling house on this land as follows:

Development consent for the purposes of the erection of a dwelling house may only be granted if no dwelling house has been erected on the land (unless the application is to replace the existing dwelling-house) and;

- (a) the lot is at least the minimum lot size specified for that land by the Lot Size Map being 100 hectares; or
- (b) the lot was created before this Plan commenced and on which a dwelling house was permissible immediately before that commencement; or
- (c) the lot resulted from a subdivision for which development consent (or equivalent) was granted before this Plan commenced and on which the

erection of a dwelling house would have been permissible if the plan of subdivision has been registered before that commencement.

Reference must be made to Clause 4.2A of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is not located within a Heritage Conservation Area as provided by clause 5.10 and Schedule 5 of Wollondilly Local Environmental Plan 2011.

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land contains an item of environmental heritage as provided by clause 5.10 and Schedule 5 Part 1 of Wollondilly Local Environmental Plan 2011.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is not located within a Heritage Conservation Area as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land does not contain an item of environmental heritage as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

2A. ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

This clause is not applicable to the Wollondilly Local Government Area.

3. COMPLYING DEVELOPMENT

- (1) Whether or not the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.
- (2) If complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of that Policy, the reasons why it may not be carried out under that clause.

- (3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

THE GENERAL HOUSING CODE

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE RURAL HOUSING CODE

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

THE HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on any of the land. The land wholly comprises, or is land on which there is, a draft heritage item.

THE GENERAL DEVELOPMENT CODE

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE GENERAL COMMERCIAL AND INDUSTRIAL CODE

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE SUBDIVISIONS CODE

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE DEMOLITION CODE

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the *Coastal Protection Act 1979*, but only to the extent that the council has been notified by the Department of Services, Technology and Administration.

No

4A. CERTAIN INFORMATION RELATING TO BEACHES AND COASTS

This clause is not applicable to the Wollondilly Local Government Area.

4B. ANNUAL CHARGES UNDER LOCAL GOVERNMENT ACT 1993 FOR COASTAL PROTECTION SERVICES THAT RELATE TO EXISTING COASTAL PROTECTION WORKS

This clause is not applicable to the Wollondilly Local Government Area.

5. MINE SUBSIDENCE

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961*.

The land is within a proclaimed Mine Subsidence District under the Mine Subsidence Compensation Act 1961. The approval of the Mine Subsidence Board is required for all subdivision and building, except for certain minor structures. Surface development controls are in place to prevent damage from old, current or future mining. It is strongly recommended prospective purchasers consult with the Mine Subsidence Board regarding mine subsidence and any surface development guidelines. The Board can assist with information about mine subsidence and advise whether existing structures comply with the requirements of the Act.

6. ROAD WIDENING AND ROAD REALIGNMENT

Whether or not the land is affected by any road widening or road realignment under:

- (a) Division 2 or Part 3 of the *Roads Act 1993*, or
- (b) Any environmental planning instrument, or
- (c) Any resolution of the council.

No

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Whether or not the land is affected by a policy:

- (a) Adopted by the council, or
- (b) Adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council,

that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

No

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

- (1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

No

- (2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

No

- (3) Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006.
-

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

Wollondilly Local Environmental Plan 2011 does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

9. CONTRIBUTIONS PLANS

The name of each contributions plan applying to the land.

Wollondilly Development Contribution Plan 2011 applies to the land.

9A. BIODIVERSITY CERTIFIED LAND

If the land is biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*), a statement to that effect.

The land is not biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*).

10. BIOBANKING AGREEMENTS

If the land is land to which a biobanking agreement under Part 7A of the *Threatened Species Conservation Act 1995* relates, a statement to that effect (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water).

Council has not been notified by the Director-General of the Department of Environment, Climate Change and Water of any biobanking agreement approved under the *Threatened Species Conservation Act 1995* for this land.

11. BUSH FIRE PRONE LAND

If any of the land is bush fire prone land (as defined in the Act), a statement that all or as the case may be, some of the land is bush fire prone land.

If none of the land is bush fire prone land, a statement to that effect.

The land is partially bush fire prone land as shown in Council's records. Further details of any applicable restrictions on development of the land may be obtained on application to Council.

12. PROPERTY VEGETATION PLANS

Whether or not the land is land to which a property vegetation plan under the *Native Vegetation Act 2003* applies, a statement to that effect (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under the Act).

Council has not been notified of any such plan that affects this land.

13. ORDER UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

Whether an order has been made under the *Trees (Disputes between Neighbours) Act 2006* to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

No

14. DIRECTIONS UNDER PART 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

No

15. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR SENIORS HOUSING

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

- (a) a statement of whether there is a current site compatibility certificate (seniors housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:
 - (i) the period for which the certificate is current, and
 - (ii) that a copy may be obtained from the head office of the Department of Planning, and

There is not a current site compatibility certificate (seniors housing) as described that applies to this land.

- (b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

There are currently no conditions of consent relating to a development application for seniors housing that apply to the land.

16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

A statement of whether there is a valid site compatibility certificate (infrastructure), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is valid, and
- (b) that a copy may be obtained from the head office of the Department of Planning.

There is not a valid site compatibility certificate (infrastructure) as described that applies to this land.

17. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

- (1) A statement of whether there is a current site compatibility certificate (affordable rental housing), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is current, and
 - (b) that a copy may be obtained from the head office of the Department of Planning.

There is not a current site compatibility certificate (affordable rental housing) as described that applies to this land.

- (2) A statement setting out any terms of a kind referred to in clause 17 (1) or 37 (1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that have been imposed as a condition of consent to a development application in respect of the land.

There are currently no conditions of consent relating to a development application for affordable rental housing that apply to the land.

18. PAPER SUBDIVISION INFORMATION

- (1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

None

- (2) The date of any subdivision order that applies to the land.

None

- (3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.
-

19. SITE VERIFICATION CERTIFICATES

A statement of whether there is a current site verification certificate, of which the council is aware, in respect of the land and, if there is a certificate, the statement is to include:

- (a) the matter certified by the certificate, and

NOTE. A site verification certificate sets out the Director-General's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land – see Division 3 of Part 4AA of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

- (b) the date on which the certificate ceases to be current (if any), and
- (c) that a copy may be obtained from the head office of the Department of Planning and Infrastructure

There is no current *Site Verification Certificate* as described that applies to this land.

NOTE. The following matters are prescribed by section 59(2) of the *Contaminated Land Management Act 1997* as additional matters to be specified in a planning certificate:

- (a) that the land to which the certificate relates is significantly contaminated land within the meaning of that Act – if the land (or part of the land) is significantly contaminated land at the date when the certificate is issued,

No.

- (b) that the land to which the certificate relates is subject to a management order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (c) that the land to which the certificate relates is the subject of an approved voluntary management proposal within the meaning of that Act – if it is the subject of such an approved proposal at the date when the certificate is issued,

No.

- (d) that the land to which the certificate relates is subject to an ongoing maintenance order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (e) that the land to which the certificate relates is the subject of a site audit statement within the meaning of that Act – if a copy of such a statement has been provided at any time to the local authority issuing the certificate.

No.

NOTE. Section 26 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* provides that a planning certificate must include advice about any exemption under section 23 or authorisation under section 24 of that Act if the council is provided with a copy of the exemption or authorisation by the Co-ordinator General under that Act.

Council has not been provided any advice about any exemption under section 23 or authorisation under section 24 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* which affects this land.

THE FOLLOWING ADDITIONAL INFORMATION IS PROVIDED UNDER:

SECTION 149(5) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

For the purposes of Section 149(5), the following information is provided in relation to the subject property:

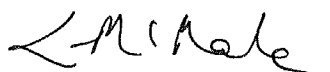
1. The subject land is not affected by a Foreshore Building Line.
2. Any enquiries relating to whether or not the land has frontage to a classified road or a controlled access road should be referred directly to the RTA on 02 4221 2495.

3. **SECOND SYDNEY AIRPORT PROPOSAL**

In November 1996 the Commonwealth Government released details of five airport options being considered for the development of a second major airport for Sydney at either Badgerys Creek or the Holsworthy Military Area. In September 1997, the Government abandoned the Holsworthy option and announced that the Draft Environmental Impact Statement would concentrate on Badgerys Creek. The Government also released the Draft Environmental Impact Statement Summary, which gives an indication of the impact of the proposal on the local environment. Information on the proposal and the Summary of the Draft Environmental Impact Statement can be obtained from the Federal Department of Transport.

4. Other Matters (if applicable)

In respect of matters beyond the control and/or responsibility of Council, information provided is provided only to the extent that Council has been so notified by the relevant Authorities or Departments, which have responsibility for the administration of the particular status referred to.

A handwritten signature in black ink, appearing to read 'L McMahon', with a stylized, cursive script.

L McMahon
GENERAL MANAGER

Any request for further information in connection with the above should be directed to Council's Duty Planner, Monday to Friday between the hours of 8am and 12pm, by telephoning (02) 4677 1100.

NOTICE TO PURCHASERS OF RURAL LAND

Wollondilly Shire Council supports the rights of persons in rural areas of the Shire to undertake and pursue agricultural production activities that are consistent with land capability and use reasonable and practical measures to avoid environmental harm and minimise impact to adjoining land users. Intending purchasers are advised that agricultural production **can** include the following activities that may have implications for occupiers and prospective purchasers of rural land:

Use of agricultural machinery (tractors, chainsaws, motorbikes)

Use of bird-scare devices

Intensive livestock production (cattle feedlots, poultry farms, piggeries, restricted dairies)

Operation of rural industries (packing sheds, abattoirs, stock and sale yards, sawmills)

Vegetation clearing

Grazing of livestock

Crop and fodder production

Soil cultivation

Crop harvesting

Use of firearms

Bushfire hazard reduction burning

Construction of firebreaks

Earthworks (construction of dams, drains, contour banks, access roads and tracks)

Fencing

Pumping and irrigation

Use of pesticides and herbicides

Spreading of manure, compost and treated effluent

Fertiliser usage

Slashing and mowing of grass

Production of silage

Re-vegetation activities (planting trees and shrubs)

Agroforestry

Livestock droving on roads

This is not an exhaustive list and intending purchasers of rural land should assess surrounding agricultural land uses and the impact these activities may have when being pursued in close proximity their proposed purchase. If you think these types of activities will affect your ability to live in a rural locality then intending purchasers are advised to reconsider their purchase and seek independent advice.

This notice is not intended to affect the rights of individuals to take action under the common law or legislation and is provided for information purposes only.

**PLANNING CERTIFICATE UNDER SECTION
149(2) & (5)
ENVIRONMENTAL PLANNING & ASSESSMENT ACT, 1979**

APPLICANT:

Mr V Boggaram
PO Box 976
NORTH RYDE BC NSW 1670

Planning Certificate No.: 20140401
Receipt No.: 516090
Issue Date: 19 March 2014
Applicant's Reference: E27284KB
Property No.: 10703

DESCRIPTION OF PROPERTY

Address: 15 Menangle Road MENANGLE 2568
Land Description: Lot: 201 DP: 590247

Notes:

The following prescribed matters may apply to the land to which this certificate relates.

Where this certificate refers to a specific allotment (or allotments) within a strata plan, the certificate is issued for the whole of the land within the strata plan, not just the specific allotment(s) referred to, and any information contained in the certificate may relate to the whole, or any part, of the strata plan.

The following information is provided pursuant to Section 149(2) of the Environmental Planning and Assessment Act 1979 as prescribed by Schedule 4 of the Environmental Planning and Assessment Regulation 2000 and is applicable as at the date of this certificate.

Information provided in this certificate should be interpreted in conjunction with the relevant plans, policies and documents held at Council. In order to obtain copies of these documents you may purchase them from Council's Administration Centre at 62-64 Menangle Street, Picton or view free of charge on Council's Website www.wollondilly.nsw.gov.au.

1. NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPS

- (1) The name of each environmental planning instrument that applies to the carrying out of development on the land.
- (2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).
- (3) The name of each development control plan that applies to the carrying out of development on the land.
- (4) In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

ENVIRONMENTAL PLANNING INSTRUMENTS

Wollondilly Local Environmental Plan 2011.

Sydney Regional Environmental Plan No 20 - Hawkesbury-Nepean River (No 2 - 1997)

Sydney Regional Environmental Plan No 9 Extractive Industries (No 2 - 1995)

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

State Environmental Planning Policy No 21 - Caravan Parks

State Environmental Planning Policy No 30 - Intensive Agriculture

State Environmental Planning Policy No 33 - Hazardous and Offensive Development

State Environmental Planning Policy No 44 - Koala Habitat Protection
(Note: Excludes land dedicated or reserved as National Park)

State Environmental Planning Policy No 50 - Canal Estate Development

State Environmental Planning Policy No 55 - Remediation of Land

State Environmental Planning Policy No 64 - Advertising and Signage

State Environmental Planning Policy No 65 - Design Quality of Residential Flat Development

State Environmental Planning Policy (Major Development) 2005

State Environmental Planning Policy (Temporary Structures) 2007

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy No 32 - Urban Consolidation (Redevelopment of Urban Land)

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

State Environmental Planning Policy No 62 - Sustainable Aquaculture

State Environmental Planning Policy (Affordable Rental Housing) 2009

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2013

PROPOSED ENVIRONMENTAL PLANNING INSTRUMENTS

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

Draft State Environmental Planning Policy (Competition) 2010

DEVELOPMENT CONTROL PLANS

Wollondilly Development Control Plan 2011

2. ZONING AND LAND USE UNDER RELEVANT LEPS

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

WOLLONDILLY LOCAL ENVIRONMENTAL PLAN 2011

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Zone RU1 Primary Production

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Extensive agriculture; Home occupations and development listed in Schedule 2 of Wollondilly Local Environmental Plan 2011 provided it meets the criteria in that schedule

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Agriculture; Air transport facilities; Animal boarding or training establishments; Bed and breakfast accommodation; Cellar door premises; Cemeteries; Community facilities; Crematoria; Depots; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Funeral homes; Group homes; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Information and education facilities; Intensive livestock agriculture; Intensive plant agriculture; Landscaping material supplies; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Research stations; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings; Signage; Transport depots; Truck depots; Veterinary hospitals; Water recreation structures; Water supply systems

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Any development not specified in item (b) or (c)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Zone R2 Low Density Residential

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Home occupations and development listed in Schedule 2 of Wollondilly Local Environmental Plan 2011 provided it meets the criteria in that schedule

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Bed and breakfast accommodation; Boarding houses; Cemeteries; Child care centres; Community facilities; Dwelling houses; Educational establishments; Emergency services facilities; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition villages; Flood mitigation works; Group homes; Health consulting rooms; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Neighbourhood shops; Places of public worship; Recreation areas; Residential accommodation; Respite day care centres; Roads; Sewerage systems; Signage; Veterinary hospitals; Water supply systems

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Attached dwellings; Multi dwelling housing; Residential flat buildings; Rural workers' dwellings; Shop top housing; Water treatment facilities; Any other development not specified in item (b) or (c)

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

A dwelling house cannot be erected on any lot created under clause 4.2 of Wollondilly Local Environmental Plan 2011. That is, a dwelling house cannot be erected on lots less than the minimum allotment size for subdivision which have only been created for the purpose of primary production.

Reference must be made to clause 4.2 of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

Wollondilly Local Environmental Plan 2011 Clause 4.2A and the Minimum Lot Size Map sets the minimum land dimensions for the erection of a dwelling house on this land as follows:

Development consent for the purposes of the erection of a dwelling house may only be granted if no dwelling house has been erected on the land (unless the application is to replace the existing dwelling-house) and;

- (a) the lot is at least the minimum lot size specified for that land by the Lot Size Map being 100 hectares; or
- (b) the lot was created before this Plan commenced and on which a dwelling house was permissible immediately before that commencement; or
- (c) the lot resulted from a subdivision for which development consent (or equivalent) was granted before this Plan commenced and on which the erection of a dwelling house would have been permissible if the plan of subdivision has been registered before that commencement.

Reference must be made to Clause 4.2A of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is located within a Heritage Conservation Area as provided by clause 5.10 and Schedule 5 Part 2 of Wollondilly Local Environmental Plan 2011.

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land contains an item of environmental heritage as provided by clause 5.10 and Schedule 5 Part 1 of Wollondilly Local Environmental Plan 2011.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is not located within a Heritage Conservation Area as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land does not contain an item of environmental heritage as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

2A. ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

This clause is not applicable to the Wollondilly Local Government Area.

3. COMPLYING DEVELOPMENT

- (1) Whether or not the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.
- (2) If complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of that Policy, the reasons why it may not be carried out under that clause.

- (3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

THE GENERAL HOUSING CODE

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on any of the land, unless the development is a detached outbuilding or swimming pool. The land is identified as land partly within a heritage conservation area or a draft heritage conservation area.

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE RURAL HOUSING CODE

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land, unless the development is a detached outbuilding or swimming pool. The land is identified as land partly within a heritage conservation area or a draft heritage conservation area.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

THE HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on any of the land. The land wholly comprises, or is land on which there is, a draft heritage item.

THE GENERAL DEVELOPMENT CODE

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE GENERAL COMMERCIAL AND INDUSTRIAL CODE

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE SUBDIVISIONS CODE

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE DEMOLITION CODE

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the *Coastal Protection Act 1979*, but only to the extent that the council has been notified by the Department of Services, Technology and Administration.

No

4A. CERTAIN INFORMATION RELATING TO BEACHES AND COASTS

This clause is not applicable to the Wollondilly Local Government Area.

4B. ANNUAL CHARGES UNDER LOCAL GOVERNMENT ACT 1993 FOR COASTAL PROTECTION SERVICES THAT RELATE TO EXISTING COASTAL PROTECTION WORKS

This clause is not applicable to the Wollondilly Local Government Area.

5. MINE SUBSIDENCE

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961*.

The land is within a proclaimed Mine Subsidence District under the Mine Subsidence Compensation Act 1961. The approval of the Mine Subsidence Board is required for all subdivision and building, except for certain minor structures. Surface development controls are in place to prevent damage from old, current or future mining. It is strongly recommended prospective purchasers consult with the Mine Subsidence Board regarding mine subsidence and any surface development guidelines. The Board can assist with information about mine subsidence and advise whether existing structures comply with the requirements of the Act.

6. ROAD WIDENING AND ROAD REALIGNMENT

Whether or not the land is affected by any road widening or road realignment under:

- (a) Division 2 or Part 3 of the *Roads Act 1993*, or
- (b) Any environmental planning instrument, or
- (c) Any resolution of the council.

No

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Whether or not the land is affected by a policy:

- (a) Adopted by the council, or
- (b) Adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council,

that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

No

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

- (1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

Yes. The land has been identified as affected by the Upper Nepean River 1% AEP Flood. Flood related development controls apply to development. Flood levels are available from Council upon application and payment of the appropriate fee.

- (2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

Yes. The land has been identified as affected by the Upper Nepean River 1% AEP Flood. Flood related development controls apply to development. Flood levels are available from Council upon application and payment of the appropriate fee.

- (3) Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006.

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

Wollondilly Local Environmental Plan 2011 does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

9. CONTRIBUTIONS PLANS

The name of each contributions plan applying to the land.

Wollondilly Development Contribution Plan 2011 applies to the land.

9A. BIODIVERSITY CERTIFIED LAND

If the land is biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*), a statement to that effect.

The land is not biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*).

10. BIOBANKING AGREEMENTS

If the land is land to which a biobanking agreement under Part 7A of the *Threatened Species Conservation Act 1995* relates, a statement to that effect (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water).

Council has not been notified by the Director-General of the Department of Environment, Climate Change and Water of any biobanking agreement approved under the *Threatened Species Conservation Act 1995* for this land.

11. BUSH FIRE PRONE LAND

If any of the land is bush fire prone land (as defined in the Act), a statement that all or as the case may be, some of the land is bush fire prone land.

If none of the land is bush fire prone land, a statement to that effect.

The land is partially bush fire prone land as shown in Council's records. Further details of any applicable restrictions on development of the land may be obtained on application to Council.

12. PROPERTY VEGETATION PLANS

Whether or not the land is land to which a property vegetation plan under the *Native Vegetation Act 2003* applies, a statement to that effect (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under the Act).

Council has not been notified of any such plan that affects this land.

13. ORDER UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

Whether an order has been made under the *Trees (Disputes between Neighbours) Act 2006* to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

No

14. DIRECTIONS UNDER PART 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

No

15. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR SENIORS HOUSING

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

- (a) a statement of whether there is a current site compatibility certificate (seniors housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:
 - (i) the period for which the certificate is current, and
 - (ii) that a copy may be obtained from the head office of the Department of Planning, and

There is not a current site compatibility certificate (seniors housing) as described that applies to this land.

- (b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

There are currently no conditions of consent relating to a development application for seniors housing that apply to the land.

16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

A statement of whether there is a valid site compatibility certificate (infrastructure), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is valid, and
- (b) that a copy may be obtained from the head office of the Department of Planning.

There is not a valid site compatibility certificate (infrastructure) as described that applies to this land.

17. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

- (1) A statement of whether there is a current site compatibility certificate (affordable rental housing), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is current, and
 - (b) that a copy may be obtained from the head office of the Department of Planning

There is not a current site compatibility certificate (affordable rental housing) as described that applies to this land.

- (2) A statement setting out any terms of a kind referred to in clause 17 (1) or 37 (1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that have been imposed as a condition of consent to a development application in respect of the land.

There are currently no conditions of consent relating to a development application for affordable rental housing that apply to the land.

18. PAPER SUBDIVISION INFORMATION

- (1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

None

- (2) The date of any subdivision order that applies to the land.

None

- (3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.
-

19. SITE VERIFICATION CERTIFICATES

A statement of whether there is a current site verification certificate, of which the council is aware, in respect of the land and, if there is a certificate, the statement is to include:

- (a) the matter certified by the certificate, and

NOTE. A site verification certificate sets out the Director-General's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land – see Division 3 of Part 4AA of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

- (b) the date on which the certificate ceases to be current (if any), and
- (c) that a copy may be obtained from the head office of the Department of Planning and Infrastructure

There is no current *Site Verification Certificate* as described that applies to this land.

NOTE. The following matters are prescribed by section 59(2) of the *Contaminated Land Management Act 1997* as additional matters to be specified in a planning certificate:

- (a) that the land to which the certificate relates is significantly contaminated land within the meaning of that Act – if the land (or part of the land) is significantly contaminated land at the date when the certificate is issued,

No.

- (b) that the land to which the certificate relates is subject to a management order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (c) that the land to which the certificate relates is the subject of an approved voluntary management proposal within the meaning of that Act – if it is the subject of such an approved proposal at the date when the certificate is issued,

No.

- (d) that the land to which the certificate relates is subject to an ongoing maintenance order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (e) that the land to which the certificate relates is the subject of a site audit statement within the meaning of that Act – if a copy of such a statement has been provided at any time to the local authority issuing the certificate.

No.

NOTE. Section 26 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* provides that a planning certificate must include advice about any exemption under section 23 or authorisation under section 24 of that Act if the council is provided with a copy of the exemption or authorisation by the Co-ordinator General under that Act.

Council has not been provided any advice about any exemption under section 23 or authorisation under section 24 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* which affects this land.

THE FOLLOWING ADDITIONAL INFORMATION IS PROVIDED UNDER:

SECTION 149(5) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

For the purposes of Section 149(5), the following information is provided in relation to the subject property:

1. The subject land is not affected by a Foreshore Building Line.
2. Any enquiries relating to whether or not the land has frontage to a classified road or a controlled access road should be referred directly to the RTA on 02 4221 2495.

3. **SECOND SYDNEY AIRPORT PROPOSAL**

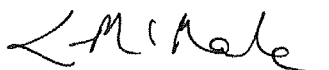
In November 1996 the Commonwealth Government released details of five airport options being considered for the development of a second major airport for Sydney at either Badgerys Creek or the Holsworthy Military Area. In September 1997, the Government abandoned the Holsworthy option and announced that the Draft Environmental Impact Statement would concentrate on Badgerys Creek. The Government also released the Draft Environmental Impact Statement Summary, which gives an indication of the impact of the proposal on the local environment. Information on the proposal and the Summary of the Draft Environmental Impact Statement can be obtained from the Federal Department of Transport.

4. Other Matters (if applicable)

The land has been identified as affected by the Upper Nepean River PMF Flood.

Council's records indicate the property may be affected by flooding. For further information please contact Council's Traffic and Design Section.

In respect of matters beyond the control and/or responsibility of Council, information provided is provided only to the extent that Council has been so notified by the relevant Authorities or Departments, which have responsibility for the administration of the particular status referred to.

A handwritten signature in black ink, appearing to read 'L McMahon', with a stylized, cursive script.

L McMahon
GENERAL MANAGER

Any request for further information in connection with the above should be directed to Council's Duty Planner, Monday to Friday between the hours of 8am and 12pm, by telephoning (02) 4677 1100.

NOTICE TO PURCHASERS OF RURAL LAND

Wollondilly Shire Council supports the rights of persons in rural areas of the Shire to undertake and pursue agricultural production activities that are consistent with land capability and use reasonable and practical measures to avoid environmental harm and minimise impact to adjoining land users. Intending purchasers are advised that agricultural production **can** include the following activities that may have implications for occupiers and prospective purchasers of rural land:

Use of agricultural machinery (tractors, chainsaws, motorbikes)

Use of bird-scare devices

Intensive livestock production (cattle feedlots, poultry farms, piggeries, restricted dairies)

Operation of rural industries (packing sheds, abattoirs, stock and sale yards, sawmills)

Vegetation clearing

Grazing of livestock

Crop and fodder production

Soil cultivation

Crop harvesting

Use of firearms

Bushfire hazard reduction burning

Construction of firebreaks

Earthworks (construction of dams, drains, contour banks, access roads and tracks)

Fencing

Pumping and irrigation

Use of pesticides and herbicides

Spreading of manure, compost and treated effluent

Fertiliser usage

Slashing and mowing of grass

Production of silage

Re-vegetation activities (planting trees and shrubs)

Agroforestry

Livestock droving on roads

This is not an exhaustive list and intending purchasers of rural land should assess surrounding agricultural land uses and the impact these activities may have when being pursued in close proximity their proposed purchase. If you think these types of activities will affect your ability to live in a rural locality then intending purchasers are advised to reconsider their purchase and seek independent advice.

This notice is not intended to affect the rights of individuals to take action under the common law or legislation and is provided for information purposes only.

**PLANNING CERTIFICATE UNDER SECTION
149(2) & (5)
ENVIRONMENTAL PLANNING & ASSESSMENT ACT, 1979**

APPLICANT: Mr V Boggaram
PO Box 976
NORTH RYDE BC NSW 1670

Planning Certificate No.: 20140400
Receipt No.: 516090
Issue Date: 19 March 2014
Applicant's Reference: E27284KB
Property No.: 12309

DESCRIPTION OF PROPERTY

Address: 45 Stevens Road MENANGLE 2568
Land Description: Lot: 21 DP: 581462

Notes:

The following prescribed matters may apply to the land to which this certificate relates.

Where this certificate refers to a specific allotment (or allotments) within a strata plan, the certificate is issued for the whole of the land within the strata plan, not just the specific allotment(s) referred to, and any information contained in the certificate may relate to the whole, or any part, of the strata plan.

The following information is provided pursuant to Section 149(2) of the Environmental Planning and Assessment Act 1979 as prescribed by Schedule 4 of the Environmental Planning and Assessment Regulation 2000 and is applicable as at the date of this certificate.

Information provided in this certificate should be interpreted in conjunction with the relevant plans, policies and documents held at Council. In order to obtain copies of these documents you may purchase them from Council's Administration Centre at 62-64 Menangle Street, Picton or view free of charge on Council's Website www.wollondilly.nsw.gov.au.

1. NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPS

- (1) The name of each environmental planning instrument that applies to the carrying out of development on the land.
- (2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).
- (3) The name of each development control plan that applies to the carrying out of development on the land.
- (4) In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

ENVIRONMENTAL PLANNING INSTRUMENTS

Wollondilly Local Environmental Plan 2011.

Sydney Regional Environmental Plan No 20 - Hawkesbury-Nepean River (No 2 - 1997)

Sydney Regional Environmental Plan No 9 Extractive Industries (No 2 - 1995)

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

State Environmental Planning Policy No 21 - Caravan Parks

State Environmental Planning Policy No 30 - Intensive Agriculture

State Environmental Planning Policy No 33 - Hazardous and Offensive Development

State Environmental Planning Policy No 44 - Koala Habitat Protection
(Note: Excludes land dedicated or reserved as National Park)

State Environmental Planning Policy No 50 - Canal Estate Development

State Environmental Planning Policy No 55 - Remediation of Land

State Environmental Planning Policy No 64 - Advertising and Signage

State Environmental Planning Policy No 65 - Design Quality of Residential Flat Development

State Environmental Planning Policy (Major Development) 2005

State Environmental Planning Policy (Temporary Structures) 2007

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

State Environmental Planning Policy No 62 - Sustainable Aquaculture

State Environmental Planning Policy (Affordable Rental Housing) 2009

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2013

PROPOSED ENVIRONMENTAL PLANNING INSTRUMENTS

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

Draft State Environmental Planning Policy (Competition) 2010

DEVELOPMENT CONTROL PLANS

Wollondilly Development Control Plan 2011

2. ZONING AND LAND USE UNDER RELEVANT LEPS

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

WOLLONDILLY LOCAL ENVIRONMENTAL PLAN 2011

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Zone RU1 Primary Production

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Extensive agriculture; Home occupations and development listed in Schedule 2 of Wollondilly Local Environmental Plan 2011 provided it meets the criteria in that schedule

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Agriculture; Air transport facilities; Animal boarding or training establishments; Bed and breakfast accommodation; Cellar door premises; Cemeteries; Community facilities; Crematoria; Depots; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Funeral homes; Group homes; Home-based child care; Home businesses; Home industries; Home occupations (sex services); Information and education facilities; Intensive livestock agriculture; Intensive plant agriculture; Landscaping material supplies; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Research stations; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings; Signage; Transport depots; Truck depots; Veterinary hospitals; Water recreation structures; Water supply systems

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Any development not specified in item (b) or (c)

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

A dwelling house cannot be erected on any lot created under clause 4.2 of Wollondilly Local Environmental Plan 2011. That is, a dwelling house cannot be erected on lots less than the minimum allotment size for subdivision which have only been created for the purpose of primary production.

Reference must be made to clause 4.2 of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

Wollondilly Local Environmental Plan 2011 Clause 4.2A and the Minimum Lot Size Map sets the minimum land dimensions for the erection of a dwelling house on this land as follows:

Development consent for the purposes of the erection of a dwelling house may only be granted if no dwelling house has been erected on the land (unless the application is to replace the existing dwelling-house) and;

- (a) the lot is at least the minimum lot size specified for that land by the Lot Size Map being 100 hectares; or
- (b) the lot was created before this Plan commenced and on which a dwelling house was permissible immediately before that commencement; or
- (c) the lot resulted from a subdivision for which development consent (or equivalent) was granted before this Plan commenced and on which the

erection of a dwelling house would have been permissible if the plan of subdivision has been registered before that commencement.

Reference must be made to Clause 4.2A of Wollondilly Local Environmental Plan 2011 and the Lot Size Map for further information.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is not located within a Heritage Conservation Area as provided by clause 5.10 and Schedule 5 of Wollondilly Local Environmental Plan 2011.

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land contains an item of environmental heritage as provided by clause 5.10 and Schedule 5 Part 1 of Wollondilly Local Environmental Plan 2011.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area)

- (a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2 (a)"),

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent:

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (d) the purposes for which the instrument provides that development is prohibited within the zone,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling house on the land and, if so, the minimum land dimensions so fixed,

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not propose any changes to the existing zone under Wollondilly Local Environmental Plan 2011.

- (f) whether the land includes or comprises critical habitat,

None known

- (g) whether the land is in a conservation area (however described),

The land is not located within a Heritage Conservation Area as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

- (h) whether an item of environmental heritage (however described) is situated on the land.

The land does not contain an item of environmental heritage as provided by Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area).

2A. ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

This clause is not applicable to the Wollondilly Local Government Area.

3. COMPLYING DEVELOPMENT

- (1) Whether or not the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.
- (2) If complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18A (1) (c3) and 1.19 of that Policy, the reasons why it may not be carried out under that clause.

- (3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

THE GENERAL HOUSING CODE

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on any of the land, unless the development is a detached outbuilding or swimming pool. The land is identified as land partly within a heritage conservation area or a draft heritage conservation area.

Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE RURAL HOUSING CODE

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land, unless the development is a detached outbuilding or swimming pool. The land is identified as land partly within a heritage conservation area or a draft heritage conservation area.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

Note: The land is a lot to which the Rural Housing Code applies, complying development may be carried out on the part of the lot to which this clause does not apply.

THE HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Housing Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on any of the land. The land wholly comprises, or is land on which there is, a draft heritage item.

THE GENERAL DEVELOPMENT CODE

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE GENERAL COMMERCIAL AND INDUSTRIAL CODE

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE SUBDIVISIONS CODE

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

THE DEMOLITION CODE

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, an item of environmental heritage that is identified as such an item in an environmental planning instrument.

Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 MAY NOT be carried out on part of the land. The land partly comprises, or is land on which there is, a draft heritage item.

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the *Coastal Protection Act 1979*, but only to the extent that the council has been notified by the Department of Services, Technology and Administration.

No

4A. CERTAIN INFORMATION RELATING TO BEACHES AND COASTS

This clause is not applicable to the Wollondilly Local Government Area.

4B. ANNUAL CHARGES UNDER LOCAL GOVERNMENT ACT 1993 FOR COASTAL PROTECTION SERVICES THAT RELATE TO EXISTING COASTAL PROTECTION WORKS

This clause is not applicable to the Wollondilly Local Government Area.

5. MINE SUBSIDENCE

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961*.

The land is within a proclaimed Mine Subsidence District under the Mine Subsidence Compensation Act 1961. The approval of the Mine Subsidence Board is required for all subdivision and building, except for certain minor structures. Surface development controls are in place to prevent damage from old, current or future mining. It is strongly recommended prospective purchasers consult with the Mine Subsidence Board regarding mine subsidence and any surface development guidelines. The Board can assist with information about mine subsidence and advise whether existing structures comply with the requirements of the Act.

6. ROAD WIDENING AND ROAD REALIGNMENT

Whether or not the land is affected by any road widening or road realignment under:

- (a) Division 2 or Part 3 of the *Roads Act 1993*, or
- (b) Any environmental planning instrument, or
- (c) Any resolution of the council.

No

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Whether or not the land is affected by a policy:

- (a) Adopted by the council, or
- (b) Adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council,

that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

No

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

- (1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

Yes. The land has been identified as affected by the Upper Nepean River 1% AEP Flood. Flood related development controls apply to development. Flood levels are available from Council upon application and payment of the appropriate fee.

- (2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

Yes. The land has been identified as affected by the Upper Nepean River 1% AEP Flood. Flood related development controls apply to development. Flood levels are available from Council upon application and payment of the appropriate fee.

- (3) Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006.

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

Wollondilly Local Environmental Plan 2011 does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

Planning Proposal - Draft Wollondilly Local Environmental Plan 2011 (Menangle Landscape Conservation Area) does not provide for the acquisition of the subject land by a public authority as referred to in section 27 of the Act.

9. CONTRIBUTIONS PLANS

The name of each contributions plan applying to the land.

Wollondilly Development Contribution Plan 2011 applies to the land.

9A. BIODIVERSITY CERTIFIED LAND

If the land is biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*), a statement to that effect.

The land is not biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*).

10. BIOBANKING AGREEMENTS

If the land is land to which a biobanking agreement under Part 7A of the *Threatened Species Conservation Act 1995* relates, a statement to that effect (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water).

Council has not been notified by the Director-General of the Department of Environment, Climate Change and Water of any biobanking agreement approved under the *Threatened Species Conservation Act 1995* for this land.

11. BUSH FIRE PRONE LAND

If any of the land is bush fire prone land (as defined in the Act), a statement that all or as the case may be, some of the land is bush fire prone land.

If none of the land is bush fire prone land, a statement to that effect.

The land is not shown as bushfire prone land in Council's records.

12. PROPERTY VEGETATION PLANS

Whether or not the land is land to which a property vegetation plan under the *Native Vegetation Act 2003* applies, a statement to that effect (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under the Act).

Council has not been notified of any such plan that affects this land.

13. ORDER UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

Whether an order has been made under the *Trees (Disputes between Neighbours) Act 2006* to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

No

14. DIRECTIONS UNDER PART 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

No

15. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR SENIORS HOUSING

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

- (a) a statement of whether there is a current site compatibility certificate (seniors housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:
 - (i) the period for which the certificate is current, and
 - (ii) that a copy may be obtained from the head office of the Department of Planning, and

There is not a current site compatibility certificate (seniors housing) as described that applies to this land.

- (b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

There are currently no conditions of consent relating to a development application for seniors housing that apply to the land.

16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

A statement of whether there is a valid site compatibility certificate (infrastructure), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is valid, and
- (b) that a copy may be obtained from the head office of the Department of Planning.

There is not a valid site compatibility certificate (infrastructure) as described that applies to this land.

17. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

- (1) A statement of whether there is a current site compatibility certificate (affordable rental housing), of which the Council is aware, in respect of proposed development on the land and, if there is a certificate, that statement is to include:

- (a) the period for which the certificate is current, and
 - (b) that a copy may be obtained from the head office of the Department of Planning

There is not a current site compatibility certificate (affordable rental housing) as described that applies to this land.

- (2) A statement setting out any terms of a kind referred to in clause 17 (1) or 37 (1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that have been imposed as a condition of consent to a development application in respect of the land.

There are currently no conditions of consent relating to a development application for affordable rental housing that apply to the land.

18. PAPER SUBDIVISION INFORMATION

- (1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

None

- (2) The date of any subdivision order that applies to the land.

None

- (3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.
-

19. SITE VERIFICATION CERTIFICATES

A statement of whether there is a current site verification certificate, of which the council is aware, in respect of the land and, if there is a certificate, the statement is to include:

- (a) the matter certified by the certificate, and

NOTE. A site verification certificate sets out the Director-General's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land – see Division 3 of Part 4AA of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

- (b) the date on which the certificate ceases to be current (if any), and
- (c) that a copy may be obtained from the head office of the Department of Planning and Infrastructure

There is no current *Site Verification Certificate* as described that applies to this land.

NOTE. The following matters are prescribed by section 59(2) of the *Contaminated Land Management Act 1997* as additional matters to be specified in a planning certificate:

- (a) that the land to which the certificate relates is significantly contaminated land within the meaning of that Act – if the land (or part of the land) is significantly contaminated land at the date when the certificate is issued,

No.

- (b) that the land to which the certificate relates is subject to a management order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (c) that the land to which the certificate relates is the subject of an approved voluntary management proposal within the meaning of that Act – if it is the subject of such an approved proposal at the date when the certificate is issued,

No.

- (d) that the land to which the certificate relates is subject to an ongoing maintenance order within the meaning of that Act – if it is subject to such an order at the date when the certificate is issued,

No.

- (e) that the land to which the certificate relates is the subject of a site audit statement within the meaning of that Act – if a copy of such a statement has been provided at any time to the local authority issuing the certificate.

No.

NOTE. Section 26 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* provides that a planning certificate must include advice about any exemption under section 23 or authorisation under section 24 of that Act if the council is provided with a copy of the exemption or authorisation by the Co-ordinator General under that Act.

Council has not been provided any advice about any exemption under section 23 or authorisation under section 24 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* which affects this land.

THE FOLLOWING ADDITIONAL INFORMATION IS PROVIDED UNDER:

SECTION 149(5) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

For the purposes of Section 149(5), the following information is provided in relation to the subject property:

1. The subject land is not affected by a Foreshore Building Line.
2. Any enquiries relating to whether or not the land has frontage to a classified road or a controlled access road should be referred directly to the RTA on 02 4221 2495.

3. **SECOND SYDNEY AIRPORT PROPOSAL**

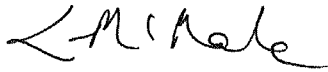
In November 1996 the Commonwealth Government released details of five airport options being considered for the development of a second major airport for Sydney at either Badgerys Creek or the Holsworthy Military Area. In September 1997, the Government abandoned the Holsworthy option and announced that the Draft Environmental Impact Statement would concentrate on Badgerys Creek. The Government also released the Draft Environmental Impact Statement Summary, which gives an indication of the impact of the proposal on the local environment. Information on the proposal and the Summary of the Draft Environmental Impact Statement can be obtained from the Federal Department of Transport.

4. Other Matters (if applicable)

The land has been identified as affected by the Upper Nepean River PMF Flood.

Council's records indicate the property may be affected by flooding. For further information please contact Council's Traffic and Design Section.

In respect of matters beyond the control and/or responsibility of Council, information provided is provided only to the extent that Council has been so notified by the relevant Authorities or Departments, which have responsibility for the administration of the particular status referred to.

A handwritten signature in black ink, appearing to read 'L McMahon', written in a cursive style.

L McMahon
GENERAL MANAGER

Any request for further information in connection with the above should be directed to Council's Duty Planner, Monday to Friday between the hours of 8am and 12pm, by telephoning (02) 4677 1100.

NOTICE TO PURCHASERS OF RURAL LAND

Wollondilly Shire Council supports the rights of persons in rural areas of the Shire to undertake and pursue agricultural production activities that are consistent with land capability and use reasonable and practical measures to avoid environmental harm and minimise impact to adjoining land users. Intending purchasers are advised that agricultural production **can** include the following activities that may have implications for occupiers and prospective purchasers of rural land:

Use of agricultural machinery (tractors, chainsaws, motorbikes)

Use of bird-scare devices

Intensive livestock production (cattle feedlots, poultry farms, piggeries, restricted dairies)

Operation of rural industries (packing sheds, abattoirs, stock and sale yards, sawmills)

Vegetation clearing

Grazing of livestock

Crop and fodder production

Soil cultivation

Crop harvesting

Use of firearms

Bushfire hazard reduction burning

Construction of firebreaks

Earthworks (construction of dams, drains, contour banks, access roads and tracks)

Fencing

Pumping and irrigation

Use of pesticides and herbicides

Spreading of manure, compost and treated effluent

Fertiliser usage

Slashing and mowing of grass

Production of silage

Re-vegetation activities (planting trees and shrubs)

Agroforestry

Livestock droving on roads

This is not an exhaustive list and intending purchasers of rural land should assess surrounding agricultural land uses and the impact these activities may have when being pursued in close proximity their proposed purchase. If you think these types of activities will affect your ability to live in a rural locality then intending purchasers are advised to reconsider their purchase and seek independent advice.

This notice is not intended to affect the rights of individuals to take action under the common law or legislation and is provided for information purposes only.



Appendix C7: WorkCover Records

21 MAR 2014

WorkCover

WorkCover NSW
92-100 Donnison Street, Gosford, NSW 2250
Locked Bag 2906, Lisarow, NSW 2252
T 02 4321 5000 F 02 4325 4145
WorkCover Assistance Service 13 10 50
DX 731 Sydney workcover.nsw.gov.au

Our Ref: D14/0334419
Your Ref: Vittal Boggaram

19 March 2014

Attention: Vittal Boggaram
Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

Dear Mr Boggaram,


RE SITE: Lots 201 & 202 DP 590247 & Lot 21 DP 581462 Menangle NSW

I refer to your site search request received by WorkCover NSW on 14 March 2014 requesting information on licences to keep dangerous goods for the above site.

A search of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover NSW has not located any records pertaining to the above mentioned premises.

If you have any further queries please contact the Dangerous Goods Licensing Team on (02) 4321 5500.

Yours Sincerely


Brent Jones
Senior Licensing Officer
Dangerous Goods Team



Appendix C8: NSW EPA Records



You are here: [Home](#) > [Environment protection licences](#) > [POEO Public Register](#) > [Search for licences, applications and notices](#)

Licence summary

Search Again

Return to Previous Page

Summary Licence No: 3991

[View this licence](#) (PDF document 112 kb)

Licence holder: MENANGLE SAND & SOIL PTY LTD

Premises: MENANGLE SAND & SOIL PTY LTD
MENANGLE ROAD, MENANGLE, NSW, 2568
LGA: CAMPBELLTOWN Catchment: Hawkesbury

Administrative fee: \$5,650.00

Licence status: Issued

Activity type: Land-based extractive activity
Crushing, grinding or separating
Recovery of general waste

Licence review: Complete date 26 Feb 2011
Complete date 26 Feb 2006
Complete date 26 Feb 2003
Due date 26 Feb 2016

Pollution incident management plan: Yet to be confirmed

Applications

Number	Application type	Current status	Date received
145170	s.58 Licence Variation	Withdrawn	27 Sep 2007
1065159	s.58 Licence Variation	Issued	07 Aug 2006
1510030	s.58 Licence Variation	Issued	19 Oct 2012

Connect

Feedback

We put you first

Notices

Number	Issue date	Notice type
1005557	31 Jul 2001	s.58 Licence Variation
1014245	26 Sep 2002	s.58 Licence Variation
1031944	23 Oct 2003	s.91 Clean Up Notice
1038757	05 Jul 2004	s.110 Variation of Clean Up Notice
1054657	25 Jan 2006	s.58 Licence Variation
1065159	14 Sep 2006	s.58 Licence Variation
1085004	29 May 2008	s.58 Licence Variation
1504714	06 Mar 2012	s.58 Licence Variation
1510030	22 Feb 2013	s.58 Licence Variation

Annual Returns

Start date	End date	Date received	Non-compliance	LBL data
11-Jun-2012	10-Jun-2013	26-Jul-2013	No	Not available
11-Jun-2011	10-Jun-2012	07-Aug-2012	No	Not available
11-Jun-2010	10-Jun-2011	09-Aug-2011	No	Not available
11-Jun-2009	10-Jun-2010	04-Aug-2010	No	Not available
11-Jun-2008	10-Jun-2009	04-Aug-2009	No	Not available
11-Jun-2007	10-Jun-2008	24-Nov-2008	No	Not available
11-Jun-2006	10-Jun-2007	26-Jul-2007	No	Not available

11-Jun-2005	10-Jun-2006	08-Aug-2006	No	Not available
11-Jun-2004	10-Jun-2005	05-Aug-2005	No	Not available
11-Jun-2003	10-Jun-2004	06-Aug-2004	yes	Not available
11-Jun-2002	10-Jun-2003	08-Aug-2003	No	Not available
11-Jun-2001	10-Jun-2002	02-Aug-2002	No	Not available
11-Jun-2000	10-Jun-2001	03-Jul-2001	No	Not available



Appendix D: Report Explanatory Notes



Appendix D1: Abbreviations

Abbreviations

ABC	Ambient Background Concentrations
ACL	Added Contaminant Limits
AC	Asbestos Cement
ACM	Asbestos-Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AHD	Australian Height Datum
As	Arsenic
ASL	Asbestos Health Screening Levels
ASS	Acid Sulfate Soil
AST	Above Ground Storage Tank
BA	Building Application
Bgl	Below Ground Level
BH	Borehole
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLM	Contaminated Land Management
CMP	Construction Management Plan
COC	Chain of Custody Documentation
Cr	Chromium
CSM	Conceptual Site Model
CT	Contamination Threshold
Cu	Copper
DA	Development Application
DBYD	Dial Before You Dig
DQI	Data Quality Indicators
DQOs	Data Quality Objective
DSI	Detailed Site Investigation
EAC	Ecological Assessment Criteria
EC	Electrical Conductivity
EILs	Ecological Investigation Levels
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FR	Field Rinsate
GAI	General Approvals of Immobilisation
GSW	General Solid Waste
HILs	Health Based Investigation Level
HM	Heavy Metals
HMTV	Hardness Modified Trigger Values
HSLs	Health Screening Level
HW	Hazardous Waste
ISO	International Organisation of Standardisation
JK	Jeffery and Katauskas
LCS	Lab Control Spike
LNAPL	Light Non-Aqueous Phase Liquid
MGA	Map Grid of Australia
MW	Monitoring Well

Abbreviations

NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PCC	Potential Contaminants of Concern
PID	Photo-ionisation Detector
PQL	Practical Quantitation Limit
PSI	Preliminary Site Investigation
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
RL	Reduced Level
RPD	Relative Percentage Difference
RSW	Restricted Solid Waste
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SAS	Site Audit Statement
SAR	Site Audit Report
SCC	Specific Contamination Concentration
SD	Standard Deviation
SIX	Six Maps
SPT	Hardness Modified Trigger Values
sVOC	Semi-Volatile Organic Compounds
SWL	Standard Water Level
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TS	Trip Spike
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compounds
VOCC	Volatile Organic Chlorinated Compound
WA	Western Australia
WHS	Workplace, Health and Safety
Zn	Zinc



Appendix D2: SAC Explanatory Notes

SAC EXPLANATORY NOTES

A brief summary of the SAC applicable to this investigation is presented below. Reference should be made to the NEPM 2013 for further information.

1. Health Investigation Levels (HILs) - Soil

The NEPM 2013 includes Health Based Investigation Levels (HILs) for a range of contaminants based on the risk of exposure, duration of exposure, toxicity and land use (availability). The HILs are scientifically based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from exposure to contaminants (Tier 1 or 'screening stage').

The HILs are generally applicable to the top 3m of the soil profile for low-density residential land use. However, site specific conditions should determine the applicability of the HILs to soils below this depth for other land uses.

The HILs are divided into four categories outlined in the following table:

Table 1.1: HILs Categories – Soil

Category/Column	Land Use
HIL A	Residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake, no poultry); also includes children's day-care centres, preschools and primary schools.
HIL B	Residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats.
HIL C	Public open spaces like parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. Does not include undeveloped public open spaces such as urban bushland and reserves.
HIL D	Commercial/Industrial includes premises such as shops, offices, factories and industrial sites.

Where the proposed land use includes more than one land use category (for example a mixed-use development including residential/retail/commercial land uses) the exposure setting of the most 'sensitive' ground floor site use is considered to be the most appropriate.

2. Interim Soil Vapour HILs for Volatile Organic Chlorinated Compounds (VOCCs)

The NEPM 2013 includes interim soil vapour HILs for selected VOCCs [see Table 1A(2) of Schedule B (1), NEPM 2013] to assess the vapour inhalation/intrusion pathway. The interim guidelines provide Tier 1 guidance for health risks for soil contamination sources and

groundwater plumes associated with VOCCs. These values may be applied for general site assessments and sub-slab environments for evaluation of potential health risks for the 0-1m sub-slab profile. The VOCCs HILs for residential A and B (see landuse in Table 1.1 above) land uses are combined.

3. Health Screening Levels (HSLs) for Petroleum Compounds

The NEPM 2013 has adopted the HSLs for total petroleum hydrocarbon (TPH) compounds developed by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). The HSLs have been derived based on the recommended total recoverable hydrocarbons (TRH) analytical method which includes BTEX compounds and naphthalene.

HSLs have been derived for soil, groundwater and soil vapour and apply to exposure to petroleum hydrocarbons through the dominant vapour inhalation exposure pathway only. HSLs are applicable to the ground floor land use only.

HSLs are derived by taking into account multiple factors (referred to as the 'multiple lines of evidence approach') which are summarised in the table below.

Table 1.2: Multiple Factors Governing Site Specific HSLs

Factor	Description
Land use	HIL A to HIL D outlined in Table 1.1. The HSLs for Residential A and B land uses are combined. HSLs are applicable to the ground floor land use only.
Soil Type	<p>The below classification is based on the soil texture classification in Table A1 of the standard AS1726:</p> <ul style="list-style-type: none"> <u>Sand</u> – Coarse grained soil; <u>Silt</u> – Fine grained soil – silts and clays (liquid limit <50%); and <u>Clay</u> – Fine grained soil – silts and clays (liquid limit >50%). <p>Where there is reasonable doubt, a more conservative approach should be adopted or laboratory testing for particle size should be undertaken.</p>
Soil Depth (mBGL) ¹	<p>The soil depth range is outlined below:</p> <ul style="list-style-type: none"> 0m to <1m; 1m to <2m; 2m to <4m; and >4m (4m+).
Groundwater (mBGL) ¹	<p>Presence of moisture/groundwater is an important factor. The depth of occurrence, land use (outlined above) and soil type (outlined above) should be taken into account. The depth of occurrence is outlined below:</p> <ul style="list-style-type: none"> 2m to <4m;

Factor	Description
	<ul style="list-style-type: none"> • 4m to <8m; and • >8m (8m+).
Soil Vapour (mBGL) ¹	<p>Presence of soil vapour, depth of occurrence, land use (outlined above) and soil type (outlined above) should be taken into account. The depth of occurrence is outlined below:</p> <ul style="list-style-type: none"> • 0m to <1m; • 1m to <2m; • 2m to <4m; • 4m to <8m; and • >8m (8m+). <p>Soil vapour measurements can provide a more accurate representation of vapour risk. This is preferred where contaminated groundwater is present at less than 2m below ground or basement levels.</p>
Contaminants	<p>BTEX, Naphthalene and TPH fractions F1-F4:</p> <ul style="list-style-type: none"> • F1: C₆ – C₁₀. The BTEX concentration must be subtracted to obtain F1 value; • F2: >C₁₀ – C₁₆. The naphthalene concentration must be subtracted to obtain the F2 value; • F3: >C₁₆ – C₃₄; and • F4: >C₃₄. <p>The F3 and F4 fractions are non-volatile and therefore not of concern for vapour intrusion. Exposure to these compounds can occur via direct contact. Reference should be made to the NEPM 2013 in the event direct contact can occur.</p>
Bio-degradation	<p>Account for bio-degradation due to the presence of oxygen:</p> <ul style="list-style-type: none"> • Concentration of oxygen greater than >5% in soil vapour at a depth of 1m below the surface immediately adjacent to the concrete slab; • Maximum slab width of less than 15m, with oxygen access on both sides. A distance of 7-8m from the exposed soil at the slab boundary is considered the maximum lateral under-slab penetration of oxygen; • Provided the above conditions are met, the following bio-degradation factors can be applied: <ul style="list-style-type: none"> ➤ Factor of x10 for depths to source of 2 to <4m; and ➤ Factor of x100 for depths to source of 4m+ where the vapour source strength is 100mg/L (100,000mg/m³) or less. • Bio-degradation is not applicable for depths less than 2m; and

Factor	Description
	<ul style="list-style-type: none"> • Not applicable to ecological receptors; and • Reference should also be made to management limits.
Other Factors	<p>Consideration should also be given to the following:</p> <ul style="list-style-type: none"> • Check the status and condition of the slab for the presence of cracks and deterioration. This can act as a preferential pathway; • Potential for direct contact to workers; and • The soil saturation concentration of a contaminant occurs when the pore water is at its solubility limit and soil vapour is at the maximum. When the HSLs exceed this limit, the vapour in soil or above the groundwater cannot result in an unacceptable vapour risk and is denoted as NL (not limited) in the HSLs tables.

Note:

mBGL – meters below ground level

a) Limitations of HSLs

A site specific approach of direct intervention should be development in the following cases:

- Identified contamination has an atypical petroleum composition;
- Groundwater contaminated with petroleum hydrocarbons is present at less than 2m below ground or basement surface;
- Contaminated groundwater or LNAPL is entering or in contact with a basement or building foundations;
- The impacted soil source thickness is > 2m;
- A preferential migration pathway is present that could connect a vapour source to a building; and
- Hydrocarbon odour is present in buildings or utilities which indicate a preferential migratory pathway and an immediate human health risk.

b) Silica Gel Clean-Up

Soil samples are initially analysed for TRH without a preliminary silica gel clean-up of the sample. Consequently the TRH result may include other compounds such as phthalates, humic acids, fatty acids and sterols (if present).

Silica gel clean-up should remove these other compounds and result in a more accurate result for petroleum hydrocarbons. If undertaken these results have been referred to as TPH_{sgel} within this report.

4. Ecological Assessment Criteria (EAC)

The NEPM 2013 includes a methodology for developing site specific EAC for the protection of terrestrial ecosystems from site contamination. The EAC provide the basis for a Tier 1 site assessment of ecological risk. The factors to take into account for deriving site specific EAC are outlined in the following table:

Table 1.3: Factors for Deriving Site Specific EAC

Factor	Description
Land Use Setting	<p>The EAC are applicable for the following generic land use settings based on protection of ecological significance:</p> <ul style="list-style-type: none"> • Areas of ecological significance (99% protection); • Urban residential areas and public open space (80% protection); and • Commercial/Industrial land use (60% protection).
Application Depth	<p>The EAC are applicable to the top 2m of soil at the finished surface/ground level which corresponds to the root zone and habitation zone of many species.</p>
Ecological Investigation Levels (EILs)	<p>EILs are derived for the following contaminants:</p> <ul style="list-style-type: none"> • <u>Aged contaminants</u> (> 2 years): Chromium III (CrIII), Copper (Cu), Lead (Pb), Nickel (Ni) and Zinc (Zn). The methodology for deriving site specific EILs for aged contaminants are outlined in below; and • <u>Other contaminants</u> with published EILs: Arsenic (As), DDT (pesticide) and Naphthalene (a PAH compound). <p>EILs for fresh contaminants (i.e. present for less than 2 years) should be specifically derived for the site as outlined in NEPM 2013.</p>
Ecological Screening Levels (ESLs)	<p>ESLs apply to TRH fractions F1-F4 (see Table 1.2); BTEX and Benzo(a)pyrene (a PAH compound).</p>

a) Ecological Investigation Levels (EILs)

The NEPM 2013 provides generic EILs for Arsenic, DDT and Naphthalene that are applicable to all soils as a total soil contaminant concentration. The EILs for the remaining aged contaminants (Cr III, Cu, Ni, Pb and Zn) are derived using the following methodology:

Table 1.4: Steps for Deriving Site Specific EILs

Step	Description
<u>Step 1</u> – Soil Property	<p>Analyse the soil samples for the following:</p> <ul style="list-style-type: none"> • CEC (cmol_c/kg) to determine EILs for Cu, Ni and Zn; • pH (to determine EILs for Cu); and • Clay content (% clay) (to determine the EIL for CrIII).
<u>Step 2</u> – Establish Added Contaminant Limits (ACLs)	<p>The ACL is the added concentration of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required. The ACL take into account the biological availability of the elements in various soils.</p> <p>For establishing the site specific ACLs, consideration should be given</p>

Step	Description
	<p>to the soil parameters outlined in Step 1. The ACL for Cu may be determined by pH or CEC. The lower of the determined value should be selected for the EIL calculation.</p> <p>The ACL for Pb is taken directly from the published data.</p>
Step 3 – Calculate the Ambient Background Concentration (ABC)	<p>The ABC takes into account the naturally occurring background levels and contaminant levels introduced by anthropogenic activity like emissions from vehicles etc. The NEPM 2013 provides the following methods for calculating the ABC:</p> <ul style="list-style-type: none"> • Method 1: The preferred method is to measure the ABC at an appropriate reference site where there is a high naturally occurring background; • Method 2: Obtain ABC from the urban metal level studies undertaken by Olszowy et al. (1995) or Hamon et al. (2004). The ABC in this method varies based on the contaminant and the soil iron and/or manganese concentrations; and • Method 3: ABCs for individual suburbs which high and low traffic areas for NSW are available for CrIII, Cu, Pb, Ni and Zn from Olszowy et al. (1995) (see NEPM 2013 Schedule B5b).
Step 4 – Calculate the EIL	<p>EIL is calculated by summing the ACL and ABC:</p> <p>EIL = ACL + ABC</p>

b) Ecological Screening Levels (ESLs) for Petroleum Compounds

Similar to the HSLs outlined above, the NEPM 2013 has adopted the ESLs for TPH compounds developed by the Canadian Council of the Ministers of the Environment (CCME) in the publication *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in soil* (CCME 2008²⁵). Site specific ESLs are derived based on fresh contamination and should not be applied directly to the assessment of sediments. The following factors apply:

Table 1.5: Multiple Factors for Site Specific ESLs

Factor	Description
Land Use Setting and Application Depth	Refer to Table 1.1.
Soil Type	<ul style="list-style-type: none"> • Fine Grained – includes clays and silts; and • Coarse Grained – sands and gravels.
Contaminants	<p>BTEX, Benzo(a)pyrene and TPH fractions F1-F4:</p> <ul style="list-style-type: none"> • F1: C₆ – C₁₀. The BTEX concentration must be subtracted to

²⁵ CCME, (2008), *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in soil* (referred to as CWS PHC)

Factor	Description
	<p>obtain F1 value;</p> <ul style="list-style-type: none"> F2: $> C_{10} - C_{16}$. The naphthalene concentration must be subtracted to obtain the F2 value; F3: $> C_{16} - C_{34}$; and F4: $> C_{34}$. <p>The ESLs for F1 and F2 is of moderate reliability.</p>

5. Management Limits for Petroleum Hydrocarbons

The NEPM 2013 has adopted the physical and aesthetic management limits outlined in the CWS PHC publication. These limits are applied after considering the relevant HSLs and ESLs for adverse effects of TPH contamination including: presence of free phase (LNAPL); fire hazards; explosive hazards; effects on buried infrastructure; and aesthetic considerations.

These limits are relevant for operating sites where significant sub-slab leakage of petroleum compounds has occurred and when decommissioning industrial and commercial sites.

6. Asbestos in Soil

The NEPM 2013 includes guidelines for the assessment of asbestos in soil. Asbestos is identified to occur as:

- ACM (asbestos containing material);
- Bonded ACM – e.g. fibro frags $> 7\text{mm}$ (identified during site inspection/sampling);
- Fibrous Asbestos (FA) – friable materials e.g. insulation products, weathered fibro that can be crushed by hand pressure, crumbled, woven materials etc (identified during site inspection/sampling); and
- Asbestos Fines (AF) – free fibres, fibre bundles, fibro frags $< 7\text{mm}$ (considered friable), generally only identified by laboratory.

The guidelines recommend undertaking a preliminary site investigation (PSI) if the site history or site inspection indicates the possibility or occurrence of potential asbestos contamination. In the event a detailed site investigation (DSI) is required, the NEPM 2013 recommends using the Western Australian (WA) Asbestos Guidelines 2009²⁶.

a) Criteria for PSI

EIS has adopted the 'presence/absence' method for the PSI in accordance with AS4964-2004²⁷. If asbestos is present, the status of the asbestos material (friable or bonded/non-friable) is further considered due to the implications associated with site remediation and/or management. The presence of asbestos may require a DSI as outlined below.

²⁶ WA Department of Health, (2009), *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. Published May 2009 (referred to as Western Australian Asbestos Guidelines 2009)

²⁷ Australian Standard 4964, (2004), *Method for the Qualitative Identification of Asbestos in Bulk Samples*. (referred to as AS4964)

b) Criteria for DSI

The Western Australian Asbestos Guidelines 2009 prescribe a site investigative model for a DSI. The WA guidelines are based on various studies but generally use the Dutch guidelines with a conservation factor of 10. The asbestos health screening levels (HSLs) adopted by NEPM 2013 is outlined in the table below:

Table 1.6: ASLs for DSI

Form of Asbestos	HSLs (w/w)			
	Residential A ¹	Residential B ²	Recreational C ³	Commercial / Industrial D ⁴
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF ⁵ (Friable)	0.001%			
All forms	No Visible Asbestos at the Surface			

Notes:

1 to 4 – Refer to the landuse categories for HILs outlined in Table 1.1

5 – The guideline value only applies for analysis quantified by gravimetric procedures (see Section 4.10 of NEPM 2013). This is not applicable to free fibres.

The following considerations should be made for determining asbestos concentrations in soil:

- The occurrence of asbestos at the surface should be recorded on a grid system of 10m x 10m;
- Non-impacted soils should be excluded from the calculations to avoid dilution effects;
- Separate determination should be made for each stratum/unit of fill or soil;
- Averaging or using statistical procedures is not appropriate;
- Sub-surface samples obtained from boreholes and/or trenches, the calculation should be carried out per sample; and
- A weight-of-evidence approach is recommended for determining whether the exceedances are of concern.

The amount of asbestos in ACM for a measured/estimated amount of soil is expressed as a % weight for weight (%w/w). This can be estimated using the following expression:

$$\% \frac{w}{w} \text{ asbestos in soil} = \frac{\% \text{ asbestos content} \times \text{bonded ACM (kg)}}{\text{soil volume (L)} \times \text{soil density } \left(\frac{\text{kg}}{\text{L}}\right)}$$

The % asbestos content within bonded ACM is estimated to be 15% by enHealth (2005). Soil density for sandy soils is approximately 1.65kg/L.

c) Limitation of adopting the Western Australian Asbestos Guidelines 2009

The following limitations have been identified for using the WA asbestos guidelines:

- The guidelines assume that the asbestos contamination is confined to the top 10cm of the soil profile;
- The guidelines are applicable to sandy soils which are the predominant soil type encountered in WA;

- The sampling methodology recommended in the guideline (wet soil, raking, tilling) may not be adequate in clayey and silty conditions;
- The presence of asbestos below the HSLs may still pose a risk to site receptors which will require remediation or management; and
- The sampling density recommend in the guideline (2 x NSW EPA density) may not be achievable for sites which are less than 500m³ in area.

7. Waste Classification Criteria for Off-Site Disposal of Soil

Any material excavated for the proposed development will require a waste classification for off-site disposal in accordance with the Waste Classification Guidelines 2009.

Soils are classed into the following categories based on the chemical contaminant criteria outlined in the guidelines:

Table 1.7: Waste Categories

Category	Description
General Solid Waste (non-putrescible) (GSW)	<ul style="list-style-type: none"> • If $SCC \leq CT1$ then TCLP not needed to classify the soil as GSW • If $TCLP \leq TCLP1$ and $SCC \leq SCC1$ then treat as GSW
Restricted Solid Waste (non-putrescible) (RSW)	<ul style="list-style-type: none"> • If $SCC \leq CT2$ then TCLP not needed to classify the soil as RSW • If $TCLP \leq TCLP2$ and $SCC \leq SCC2$ then treat as RSW
Hazardous Waste (HW)	<ul style="list-style-type: none"> • If $SCC > CT2$ then TCLP not needed to classify the soil as HW • If $TCLP > TCLP2$ and/or $SCC > SCC2$ then treat as HW
Excavated Natural Material (ENM)	The criteria to classify material as ENM are outlined in The Excavated Natural Material Exemption (2012 ²⁸).
Virgin Excavated Natural Material (VENM)	<p>Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following:</p> <ul style="list-style-type: none"> • that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • that does not contain sulfidic ores or other waste; and • includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

Note:

²⁸ Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clase 51 and 51A, The excavated natural material exemption, 2012 (ENM exemption 2012)

SCC – Specific Contaminant Concentration

CT – Contaminant Threshold

TCLP – Toxicity Characteristics Leaching Procedure

a) General Approvals of Immobilisation (GAI)

Significant amounts of waste ash and gravely slag were available in the late nineteenth and early twentieth century as a result of the use of coal for industrial and domestic heating purposes. Widespread use of ash/slag waste (either as ash or mixed with other soil and waste materials) as fill material was common in the suburbs of Sydney at this time.

To account for the presence of ash and slag, the NSW EPA has published the following:

Table 1.8: GAIs

Approval Number	Waste Stream	Contaminants	Waste Assessment Requirements
1999/05 ²⁹	Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated material	B(a)P and PAHs	The SCC limits for PAHs and B(a)P outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to the leachable concentration (TCLP) value of B(a)P alone. Disposal restrictions apply for material classified under this GAI.
2009/07 ³⁰	Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials	Beryllium, Chromium (VI), lead, nickel, PAHs and B(a)P	The SCC limits for these contaminants outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to their leachable concentrations (TCLP) values alone.

Note:

SCC – Specific Contaminant Concentration

TCLP – Toxicity Characteristics Leaching Procedure

B(a)P - Benzo(a)pyrene

PAHs – Polycyclic Aromatic Hydrocarbons

8. Groundwater Investigation Levels (GILs)

The appropriate settings for current and potential uses of groundwater should be identified for establishing the GILs. Contaminated groundwater may pose a risk to receptors at the point of extraction or as a result of discharge into the receiving environment and groundwater resources.

²⁹ http://www.environment.nsw.gov.au/resources/waste/GenImmobApp_1999-05_Ash_ACNEM_or_CCNEM.pdf (GAI 1999/05)

³⁰ http://www.environment.nsw.gov.au/resources/waste/2009-07_Metallurgical_furnace_slag.pdf (GAI 2009/07)

The assessment should be designed to consider the risk of groundwater contamination to all potential on site and off site receptors.

In assessing groundwater contamination, NEPM 2013 has adopted the framework outlined in the National Water Quality Management Strategy which includes the following guidelines:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (AWQG) (2000). This includes a framework for developing guidelines for aquifer assessment. The guidelines provide water quality parameters for aquatic ecosystems (fresh and marine waters), industrial, agricultural, recreational and irrigation uses;
- Australian Drinking Water Guidelines (ADWG) (2011). Includes the Australian Drinking Water Guidelines used to assess drinking water quality; and
- Guidelines for Managing Risk in Recreational Water (GMRRW) (NHMRC 2008).

The NEPM 2013 has adopted HSLs for the assessment of petroleum hydrocarbons in groundwater.

The presence of elevated contaminants above the GILs triggers further investigation to assess the source(s) and the extent of the contamination. Guidance on the remediation and management of contaminated groundwater is outlined in *NSW DECCW Guidelines for the Assessment and Management of Groundwater Contamination (2007³¹)*.

a) Hardness Modified Trigger Values (HMTVs)

Water hardness can affect the bioavailability of metals/metalloids in fresh water. Consequently, Section 3.4.3.2 of the ANZECC 2000 guidelines includes algorithms to derive hardness modified trigger values (HMTVs) for metals/metalloid concentrations in fresh water.

³¹ NSW DECCW, (2007), *Guidelines for the Assessment and Management of Groundwater Contamination*. (referred to as Groundwater Contamination Guidelines 2007)



Appendix D3: NEPM 2013 Guideline Values

6 Tabulated investigation and screening levels

ROUNDING APPLIED TO INVESTIGATION AND SCREENING LEVELS

Tables 1A (HILs and interim HILs)

Rounded to 1 or 2 significant figures (see Schedule B7 Appendix C for details)

Tables 1A (HSLs) and 1B (EILs and ESLs) rounding rules

< 1	to nearest 0.1
1–<10	to nearest whole number
1–< 100	to nearest 5
100–<1,000	to nearest 10
1,000–<10,000	to nearest 100
≥10,000	to nearest 1,000

Numbers ending in '5' are rounded up, for example:

0.05 rounded to 0.1
1.5 rounded to 2
115 rounded to 120

Table 1A(1) Health investigation levels for soil contaminants

Chemical	Health-based investigation levels (mg/kg)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial/ industrial ¹ D
Metals and Inorganics				
Arsenic ²	100	500	300	3 000
Beryllium	60	90	90	500
Boron	4500	40 000	20 000	300 000
Cadmium	20	150	90	900
Chromium (VI)	100	500	300	3600
Cobalt	100	600	300	4000
Copper	6000	30 000	17 000	240 000
Lead ³	300	1200	600	1 500
Manganese	3800	14 000	19 000	60 000
Mercury (inorganic) ⁵	40	120	80	730
Methyl mercury ⁴	10	30	13	180
Nickel	400	1200	1200	6 000
Selenium	200	1400	700	10 000
Zinc	7400	60 000	30 000	400 000
Cyanide (free)	250	300	240	1 500
Polycyclic Aromatic Hydrocarbons (PAHs)				
Carcinogenic PAHs (as BaP TEQ) ⁶	3	4	3	40
Total PAHs ⁷	300	400	300	4000
Phenols				
Phenol	3000	45 000	40 000	240 000
Pentachlorophenol	100	130	120	660
Cresols	400	4 700	4 000	25 000
Organochlorine Pesticides				
DDT+DDE+DDD	240	600	400	3600
Aldrin and dieldrin	6	10	10	45
Chlordane	50	90	70	530
Endosulfan	270	400	340	2000
Endrin	10	20	20	100
Heptachlor	6	10	10	50
HCB	10	15	10	80
Methoxychlor	300	500	400	2500
Mirex	10	20	20	100
Toxaphene	20	30	30	160
Herbicides				
2,4,5-T	600	900	800	5000
2,4-D	900	1600	1300	9000
MCPA	600	900	800	5000

Chemical	Health-based investigation levels (mg/kg)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial/ industrial ¹ D
MCPB	600	900	800	5000
Mecoprop	600	900	800	5000
Picloram	4500	6600	5700	35000
Other Pesticides				
Atrazine	320	470	400	2500
Chlorpyrifos	160	340	250	2000
Bifenthrin	600	840	730	4500
Other Organics				
PCBs ⁸	1	1	1	7
PBDE Flame Retardants (Br1–Br9)	1	2	2	10

Notes:

- (1) Generic land uses are described in detail in Schedule B7 Section 3

HIL A – Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

HIL B – Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.

HIL D – Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

- (2) Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).
- (3) Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
- (4) Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis should be considered.
- (5) Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,
- (6) Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

Where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk.

- (7) Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.
- (8) PCBs: HIL relates to non-dioxin-like PCBs only. Where a PCB source is known, or suspected, to be present at a site, a site-specific assessment of exposure to all PCBs (including dioxin-like PCBs) should be undertaken.

Table 1A(2) Interim soil vapour health investigation levels for volatile organic chlorinated compounds

Chemical	Interim soil vapour HIL (mg/m ³)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial / Industrial ¹ D
TCE	0.02	0.02	0.4	0.08
1,1,1-TCA	60	60	1200	230
PCE	2	2	40	8
cis-1,2-dichloroethene	0.08	0.08	2	0.3
Vinyl chloride	0.03	0.03	0.5	0.1

Notes:

1. Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7, though secondary school buildings should be assessed using residential 'A/B' for vapour intrusion purposes.
2. Interim HILs for VOCCs are conservative soil vapour concentrations that can be adopted for the purpose of screening sites where further investigation is required on a site-specific basis. They are based on the potential for vapour intrusion using an indoor air-to-soil vapour attenuation factor of 0.1 and an outdoor air-to-soil vapour attenuation factor of 0.05.
3. Application of the interim HILs is based on a measurement of shallow (to 1 m depth) soil vapour (or deeper where the values are to be applied to a future building with a basement) or sub-slab soil vapour.
4. The applicability of the interim HILs needs to be further considered when used for other building types such as homes with a crawl-space and no slab, which may require site-specific assessment.
5. Use of the interim HILs requires comparison with data that has been collected using appropriate methods and meets appropriate data quality requirements.
6. Oral and dermal exposure should be considered on a site-specific basis where direct contact exposure is likely to occur.

Table 1A(3) Soil HSLs for vapour intrusion (mg/kg)

	HSL A & HSL B Low - high density residential				HSL C recreational / open space				HSL D Commercial / Industrial				
CHEMICAL	0 m to <1 m	1 m to <2 m	2 m to <4m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	Soil saturation concentrati on (C_{sat})
SAND													
Toluene	160	220	310	540	NL	NL	NL	NL	NL	NL	NL	NL	560
Ethylbenzene	55	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	64
Xylenes	40	60	95	170	NL	NL	NL	NL	230	NL	NL	NL	300
Naphthalene	3	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	9
Benzene	0.5	0.5	0.5	0.5	NL	NL	NL	NL	3	3	3	3	360
F1⁽⁹⁾	45	70	110	200	NL	NL	NL	NL	260	370	630	NL	950
F2⁽¹⁰⁾	110	240	440	NL	NL	NL	NL	NL	NL	NL	NL	NL	560
SILT													
Toluene	390	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	640
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	69
Xylenes	95	210	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330

	HSL A & HSL B Low – high density residential				HSL C recreational / open space				HSL D Commercial / Industrial				
Naphthalene	4	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.6	0.7	1	2	NL	NL	NL	NL	4	4	6	10	440
F1⁽⁹⁾	40	65	100	190	NL	NL	NL	NL	250	360	590	NL	910
F2⁽¹⁰⁾	230	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	570
CLAY													
Toluene	480	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	630
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	68
Xylenes	110	310	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330
Naphthalene	5	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.7	1	2	3	NL	NL	NL	NL	4	6	9	20	430
F1⁽⁹⁾	50	90	150	290	NL	NL	NL	NL	310	480	NL	NL	850
F2⁽¹⁰⁾	280	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	560

Notes:

- (1) Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used.
- (2) The key limitations of the HSLs should be referred to prior to application and are presented in Friebe and Nadebaum (2011b and 2011d).
- (3) Detailed assumptions in the derivation of the HSLs and information on how to apply the HSLs are presented in Friebe and Nadebaum (2011a and 2011b).
- (4) Soil HSLs for vapour inhalation incorporate an adjustment factor of 10 applied to the vapour phase partitioning to reflect the differences observed between theoretical estimates of soil vapour partitioning and field measurements. Refer Friebe & Nadebaum (2011a) for further information.
- (5) The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as ‘not limiting’ or ‘NL’.

- (6) The HSLs for TPH C₆-C₁₀ in sandy soil are based on a finite source that depletes in less than seven years, and therefore consideration has been given to use of sub-chronic toxicity values. The >C₈-C₁₀ aliphatic toxicity has been adjusted to represent sub-chronic exposure, resulting in higher HSLs than if based on chronic toxicity. For further information refer to Section 8.2 and Appendix J in Friebe and Nadebaum (2011a).
- (7) The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.
- (8) For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
- (9) To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
- (10) To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

Table 1A(4) Groundwater HSLs for vapour intrusion (mg/L)

	HSL A & HSL B Low - high density residential			HSL C recreational / open space			HSL D Commercial / industrial			
CHEMICAL	2 m to <4 m	4 m to <8 m	8 m+	2 m to <4 m	4 m to <8 m	8 m+	2 m to <4 m	4 m to <8 m	8 m+	Solubility limit
SAND										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	0.8	0.8	0.9	NL	NL	NL	5	5	5	59
F1 ⁽⁷⁾	1	1	1	NL	NL	NL	6	6	7	9.0
F2 ⁽⁸⁾	1	1	1	NL	NL	NL	NL	NL	NL	3.0
SILT										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17

	HSL A & HSL B Low - high density residential			HSL C recreational / open space			HSL D Commercial / industrial			
Benzene	4	5	5	NL	NL	NL	30	30	30	59
F1⁽⁷⁾	6	6	6	NL	NL	NL	NL	NL	NL	9.0
F2⁽⁸⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0
CLAY										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	5	5	5	NL	NL	NL	30	30	35	59
F1⁽⁷⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	9.0
F2⁽⁸⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0

Notes:

- (1) Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used,
- (2) The key limitations of the HSLs are presented in Friebel and Nadebaum (2011d) and should be referred to prior to application.
- (3) Detailed assumptions in the derivation of the HSLs and information on the application of the HSLs are presented in Friebel and Nadebaum (2011a and 2011b).
- (4) The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
- (5) The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly, the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.

- (6) For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
- (7) To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
- (8) To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

Table 1A(5) Soil vapour HSLs for vapour intrusion (mg/m³)

CHEMICAL	HSL A & HSL B Low - high density residential					HSL C recreational / open space					HSL D Commercial / Industrial				
	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+
SAND															
Toluene	1300	3800	7300	15 000	29 000	NL	NL	NL	NL	NL	4800	16 000	39 000	84 000	NL
Ethylbenzene	330	1100	2200	4300	8700	NL	NL	NL	NL	NL	1300	4600	11 000	25 000	53 000
Xylenes	220	750	1500	3000	6100	NL	NL	NL	NL	NL	840	3,200	8000	18 000	37 000
Naphthalene	0.8	3	6	10	25	410	NL	NL	NL	NL	3	15	35	75	150
Benzene	1	3	6	10	20	360	2400	4700	9500	19 000	4	10	30	65	130
F1 ⁽⁸⁾	180	640	1,300	2600	5300	86 000	NL	NL	NL	NL	680	2800	7000	15 000	32 000
F2 ⁽⁹⁾	130	560	1200	2400	4800	NL	NL	NL	NL	NL	500	2400	NL	NL	NL
SILT															
Toluene	1400	14 000	32 000	69 000	140 000	NL	NL	NL	NL	NL	5700	63 000	NL	NL	NL
Ethylbenzene	380	4200	9700	21 000	43 000	NL	NL	NL	NL	NL	1500	19 000	54 000	NL	NL
Xylenes	260	2900	6800	15 000	30 000	NL	NL	NL	NL	NL	1000	13 000	38 000	NL	NL
Naphthalene	0.9	10	25	60	120	NL	NL	NL	NL	NL	4	50	150	350	750
Benzene	1	10	25	55	110	1800	12 000	24 000	48 000	97 000	4	50	140	320	670
F1 ⁽⁸⁾	210	2600	6000	13 000	26 000	NL	NL	NL	NL	NL	850	11 000	33 000	77 000	160 000

	HSL A & HSL B Low – high density residential					HSL C recreational / open space					HSL D Commercial / Industrial				
F2⁽⁹⁾	160	2300	5400	NL	NL	NL	NL	NL	NL	NL	670	NL	NL	NL	NL
CLAY															
Toluene	1600	23 000	53 000	110 000	NL	NL	NL	NL	NL	NL	6500	100 000	NL	NL	NL
Ethylbenzene	420	6800	16 000	35 000	NL	NL	NL	NL	NL	NL	1800	31 000	NL	NL	NL
Xylenes	280	4800	11 000	24 000	50 000	NL	NL	NL	NL	NL	1200	21 000	NL	NL	NL
Naphthalene	1	20	45	95	200	NL	NL	NL	NL	NL	4	85	240	560	1200
Benzene	1	15	40	90	180	3000	20 000	40 000	81 000	160 000	5	80	230	530	1100
F1⁽⁸⁾	230	4200	9900	21 000	44 000	NL	NL	NL	NL	NL	1000	19 000	55 000	130 000	270 000
F2⁽⁹⁾	180	3,800	NL	NL	NL	NL	NL	NL	NL	NL	800	NL	NL	NL	NL

1. Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used.
2. The key limitations of the HSLs should be referred to prior to application and are presented in Friebel and Nadebaum (2011b and 2011d).
3. Detailed assumptions in the derivation of the HSLs and information on how to apply the HSLs are presented in Friebel and Nadebaum (2011a and 2011b).
4. The maximum possible soil vapour concentrations have been calculated based on vapour pressures of the pure chemicals. Where soil vapour HSLs exceed these values a soil-specific source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
5. Soil vapour HSLs should be compared with measurements taken as laterally close as possible to the soil or groundwater sources of vapour (i.e. within or above vapour sources). Consideration is required of where the sample is taken, the current condition of the site and the likely future condition of the site. Shallow gas measurements in open space (less than 1 m below ground surface) may be subject to influences of weather conditions and moisture.
6. The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly, the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.
7. For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
8. To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.

9. To obtain F2 subtract naphthalene from the $>C_{10}$ - C_{16} fraction.

Table 1B(1) Soil-specific added contaminant limits for aged zinc in soil

Zn added contaminant limits (ACL, mg added contaminant/kg)						
Areas of ecological significance						
<i>pH^a</i>	<i>CEC^b (cmol_c/kg)</i>					
	<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
<i>4.0</i>	15	20	20	20	20	20
<i>4.5</i>	20	25	25	25	25	25
<i>5.0</i>	30	40	40	40	40	40
<i>5.5</i>	40	60	60	60	60	60
<i>6.0</i>	50	90	90	90	90	90
<i>6.5</i>	50	90	130	130	130	130
<i>7.0</i>	50	90	150	190	190	190
<i>7.5</i>	50	90	150	210	260	280
Urban residential/public open space¹						
<i>pH^a</i>	<i>CEC^b (cmol_c/kg)</i>					
	<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
<i>4.0</i>	70	85	85	85	85	85
<i>4.5</i>	100	120	120	120	120	120
<i>5.0</i>	130	180	180	180	180	180
<i>5.5</i>	180	270	270	270	270	270
<i>6.0</i>	230	400	400	400	400	400
<i>6.5</i>	230	400	590	590	590	590
<i>7.0</i>	230	400	700	880	880	880
<i>7.5</i>	230	400	700	960	1200	1300
Commercial/industrial						
<i>pH^a</i>	<i>CEC^b (cmol_c/kg)</i>					
	<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
<i>4.0</i>	110	130	130	130	130	130
<i>4.5</i>	150	190	190	190	190	190
<i>5.0</i>	210	290	290	290	290	290
<i>5.5</i>	280	420	420	420	420	420
<i>6.0</i>	360	620	620	620	620	620
<i>6.5</i>	360	620	920	920	920	920
<i>7.0</i>	360	620	1100	1400	1400	1400
<i>7.5</i>	360	620	1100	1500	1900	2000

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.

2. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.

3. The EIL is calculated from summing the ACL and the ABC.

a = pH measured using the CaCl₂ method (Rayment & Higginson 1992).

b = CEC measured using the silver thiourea method (Chabra et al. 1972).

Table 1B(2) Soil-specific added contaminant limits for aged copper in soils

Cu added contaminant limits (ACL, mg added contaminant/kg)					
Areas of ecological significance					
<i>CEC (cmol_e/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
30	65	70	70	75	80
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
20	45	65	90	190	270
Urban residential/public open space¹					
<i>CEC (cmol_e/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
95	190	210	220	220	230
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
60	130	190	280	560	800
Commercial/industrial					
<i>CEC (cmol_e/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
140	280	300	320	330	340
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
85	190	280	400	830	1200

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. The lower of the CEC or the pH-based ACLs for the land use and soil conditions is the ACL to be used.
3. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
4. The EIL is calculated from summing the ACL and the ABC.

a = CEC measured using the silver thiourea method (Chabra et al. 1972).

b = pH measured using the CaCl₂ method (Rayment & Higginson 1992).

Table 1B(3) Soil-specific added contaminant limits for aged chromium III and nickel in soil

CHEMICAL	Clay content (% clay)	Added contaminant limits (mg added contaminant/kg) for various land uses		
		Areas of ecological significance	Urban residential and public open space	Commercial and industrial
Chromium III	1	60	190	310
	2.5	80	250	420
	5	100	320	530
	≥10	130	400	660
Nickel	CEC ^a (cmol _e /kg)	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
	5	5	30	55
	10	30	170	290
	20	45	270	460
	30	60	350	600
	40	70	420	730
	60	95	560	960

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
 2. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
 3. The EIL is calculated from summing the ACL and the ABC.
- a = CEC measured using the silver thiourea method (Chabra et al. 1972).

Table 1B(4) Generic added contaminant limits for lead in soils irrespective of their physicochemical properties

	Pb added contaminant limit (ACL, mg added contaminant/kg) for various land uses		
CHEMICAL	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
Lead	470	1100	1800

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. Aged values are applicable to lead contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3. The EIL is calculated from summing the ACL and the ABC.

Table 1B(5) Generic EILs for aged As, fresh DDT and fresh naphthalene in soils irrespective of their physicochemical properties

CHEMICAL	Ecological Investigation Levels (mg total contaminant/kg)		
	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
Arsenic ²	40	100	160
DDT ³	3	180	640
Naphthalene ³	10	170	370

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3. Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
4. Insufficient data was available to calculate ACLs for As, DDT and naphthalene. The EIL should be taken directly from Table 1B(5).

Table 1B(6) ESLs for TPH fractions F1 – F4, BTEX and benzo(a)pyrene in soil

CHEMICAL	Soil texture	ESLs (mg/kg dry soil)		
		Areas of ecological significance	Urban residential and public open space	Commercial and industrial
F1 C ₆ -C ₁₀	<i>Coarse/ Fine</i>	125*	180*	215*
F2 >C ₁₀ -C ₁₆		25*	120*	170*
F3 >C ₁₆ -C ₃₄	<i>Coarse</i>	-	300	1700
	<i>Fine</i>	-	1300	2500
F4 >C ₃₄ -C ₄₀	<i>Coarse</i>	-	2800	3300
	<i>Fine</i>	-	5600	6600
Benzene	<i>Coarse</i>	10	50	75
	<i>Fine</i>	10	65	95
Toluene	<i>Coarse</i>	10	85	135
	<i>Fine</i>	65	105	135
Ethylbenzene	<i>Coarse</i>	1.5	70	165
	<i>Fine</i>	40	125	185
Xylenes	<i>Coarse</i>	10	105	180
	<i>Fine</i>	1.6	45	95
Benzo(a)pyrene	<i>Coarse</i>	0.7	0.7	0.7
	<i>Fine</i>	0.7	0.7	0.7

Notes:

- (1) ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.
- (2) ‘-’ indicates that insufficient data was available to derive a value.
- (3) To obtain F1, subtract the sum of BTEX concentrations from C₆-C₁₀ fraction and subtract naphthalene from >C₁₀-C₁₆ to obtain F2.

Table 1 B(7) Management Limits for TPH fractions F1–F4 in soil

TPH fraction	Soil texture	Management Limits ¹ (mg/kg dry soil)	
		Residential, parkland and public open space	Commercial and industrial
F1² C ₆ - C ₁₀	<i>Coarse</i>	700	700
	<i>Fine</i>	800	800
F2² >C ₁₀ -C ₁₆	<i>Coarse</i>	1000	1000
	<i>Fine</i>	1000	1000
F3 >C ₁₆ -C ₃₄	<i>Coarse</i>	2500	3500
	<i>Fine</i>	3500	5000
F4 >C ₃₄ -C ₄₀	<i>Coarse</i>	10 000	10 000
	<i>Fine</i>	10 000	10 000

¹ Management limits are applied after consideration of relevant ESLs and HSLs

² Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

Table 1C Groundwater Investigation Levels (GILs)

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Metals and Metalloids			
Aluminium, Al pH>6.5	55	-	-
Antimony	-	-	0.003
Arsenic	24 as As(III) 13 as As(V)	-	0.01
Barium	-	-	2
Beryllium	-	-	0.06
Boron	370 ^C	-	4
Cadmium H	0.2	0.7 ^D	0.002
Chromium, Cr (III) H	-	27	-
Chromium, Cr (VI)	1 ^C	4.4	0.05
Cobalt	-	1	-
Copper H	1.4	1.3	2
Iron, (Total)	-	-	-
Lead H	3.4	4.4	0.01
Manganese	1900 ^C	-	0.5
Mercury (Total)	0.06 ^D	0.1 ^D	0.001
Molybdenum	-	-	0.05
Nickel H	11	7	0.02
Selenium (Total)	5 ^D	-	0.01
Silver	0.05	1.4	0.1
Tributyl tin (as Sn)	-	0.006 ^C	-
Tributyl tin oxide	-	-	0.001
Uranium	-	-	0.017
Vanadium	-	100	-
Zinc H	8 ^C	15 ^C	-
Non-metallic Inorganics			
Ammonia ^E (as NH ₃ -N at pH 8)	900 ^C	910	-
Bromate	-	-	0.02
Chloride	-	-	-
Cyanide (as un-ionised Cn)	7	4	0.08
Fluoride	-	-	1.5
Hydrogen sulphide (un-ionised H ₂ S measured as S)	1	-	-
Iodide	-	-	0.5

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Nitrate (as NO ₃)	refer to guideline	refer to guideline	50
Nitrite (as NO ₂)	refer to guideline	refer to guideline	3
Nitrogen	refer to guideline	refer to guideline	-
Phosphorus	refer to guideline	refer to guideline	-
Sulphate (as SO ₄)	-	-	500
Organic alcohols/other organics			
Ethanol	1400	-	-
Ethylenediamine tetra-acetic acid (EDTA)	-	-	0.25
Formaldehyde	-	-	0.5
Nitrilotriacetic acid	-	-	0.2
Anilines			
Aniline	8	-	-
2,4-Dichloroaniline	7	-	-
3,4-Dichloroaniline	3	150	-
Chlorinated Alkanes			
Dichloromethane	-	-	0.004
Trichloromethane (chloroform)	-	-	0.003
Trihalomethanes (total)	-	-	0.25
Tetrachloromethane (carbon tetrachloride)	-	-	0.003
1,2-Dichloroethane	-	-	0.003
1,1,2-Trichloroethane	6500	1900	-
Hexachloroethane	290 ^D	-	-
Chlorinated Alkenes			
Chloroethene (vinyl chloride)	-	-	0.0003
1,1-Dichloroethene	-	-	0.03
1,2-Dichloroethene	-	-	0.06
Tetrachloroethene (PCE) (Perchloroethene)	-	-	0.05
Chlorinated Benzenes			
Chlorobenzene	-	-	0.3
1,2- Dichlorobenzene	160	-	1.5
1,3- Dichlorobenzene	260	-	-

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
1,4- Dichlorobenzene	60	-	0.04
1,2,3- Trichlorobenzene	3 ^D	-	0.03 for individual or total trichlorobenzenes
1,2,4- Trichlorobenzene	85 ^D	20 ^D	
1,3,5-Trichlorobenzene	-	-	
Polychlorinated Biphenyls (PCBs)			
Aroclor 1242	0.3 ^D	-	-
Aroclor 1254	0.01 ^D	-	-
Other Chlorinated Compounds			
Epichlorohydrin	-	-	0.1
Hexachlorobutadiene	-	-	0.0007
Monochloramine	-	-	3
Monocyclic Aromatic Hydrocarbons			
Benzene	950	500 ^C	0.001
Toluene	-	-	0.8
Ethylbenzene	-	-	0.3
Xylenes	350 (as o-xylene) 200 (as p-xylene)	-	0.6
Styrene (Vinyl benzene)	-	-	0.03
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	16	50 ^C	-
Benzo[a]pyrene	-	-	0.00001
Phenols			
Phenol	320	400	-
2-Chlorophenol	340 ^C	-	0.3
4-Chlorophenol	220	-	-
2,4-Dichlorophenol	120	-	0.2
2,4,6-Trichlorophenol	3 ^D	-	0.02
2,3,4,6-Tetrachlorophenol	10 ^D	-	-
Pentachlorophenol	3.6 ^D	11 ^D	0.01
2,4-Dinitrophenol	45	-	-
Phthalates			
Dimethylphthalate	3700	-	-
Diethylphthalate	1000	-	-
Dibutylphthalate	10 ^D	-	-
Di(2-ethylhexyl) phthalate	-	-	0.01

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Pesticides			
Acephate	-	-	0.008
Aldicarb	-	-	0.004
Aldrin plus Dieldrin	-	-	0.0003
Ametryn	-	-	0.07
Amitraz	-	-	0.009
Amitrole	-	-	0.0009
Asulam	-	-	0.07
Atrazine	13	-	0.02
Azinphos-methyl	-	-	0.03
Benomyl	-	-	0.09
Bentazone	-	-	0.4
Bioresmethrin	-	-	0.1
Bromacil	-	-	0.4
Bromoxynil	-	-	0.01
Captan	-	-	0.4
Carbaryl	-	-	0.03
Carbendazim (Thiophanate-methyl)	-	-	0.09
Carbofuran	0.06	-	0.01
Carboxin	-	-	0.3
Carfentrazone-ethyl	-	-	0.1
Chlorantraniliprole	-	-	6
Chlordane	0.03 ^D	-	0.002
Chlorfenvinphos	-	-	0.002
Chlorothalonil	-	-	0.05
Chlorpyrifos	0.01 ^D	0.009 ^D	0.01
Chlorsulfuron	-	-	0.2
Clopyralid	-	-	2
Cyfluthrin, Beta-cyfluthrin	-	-	0.05
Cypermethrin isomers	-	-	0.2
Cyprodinil	-	-	0.09
1,3-Dichloropropene	-	-	0.1
2,2-DPA	-	-	0.5
2,4-D [2,4-dichlorophenoxy acetic acid]	280	-	0.03
DDT	0.006 ^D	-	0.009
Deltramethrin	-	-	0.04

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Diazinon	0.01	-	0.004
Dicamba	-	-	0.1
Dichloroprop	-	-	0.1
Dichlorvos	-	-	0.005
Dicofol	-	-	0.004
Diclofop-methyl	-	-	0.005
Dieldrin plus Aldrin	-	-	0.0003
Diiflubenzuron	-	-	0.07
Dimethoate	0.15	-	0.007
Diquat	1.4	-	0.007
Disulfoton	-	-	0.004
Diuron	-	-	0.02
Endosulfan	0.03 ^D	0.005 ^D	0.02
Endothal	-	-	0.1
Endrin	0.01 ^D	0.004 ^D	-
EPTC	-	-	0.3
Esfenvalerate	-	-	0.03
Ethion	-	-	0.004
Ethoprophos	-	-	0.001
Etridiazole	-	-	0.1
Fenamiphos	-	-	0.0005
Fenarimol	-	-	0.04
Fenitrothion	0.2	-	0.007
Fenthion	-	-	0.007
Fenvalerate	-	-	0.06
Fipronil	-	-	0.0007
Flamprop-methyl	-	-	0.004
Fluometuron	-	-	0.07
Fluproponate	-	-	0.009
Glyphosate	370	-	1
Haloxifop	-	-	0.001
Heptachlor	0.01 ^D	-	-
Heptachlor epoxide	-	-	0.0003
Hexazinone	-	-	0.4
Imazapyr	-	-	9
Iprodione	-	-	0.1
Lindane (γ-HCH)	0.2	-	0.01

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Malathion	0.05	-	0.07
Mancozeb (as ETU, ethylene thiourea)	-	-	0.009
MCPA	-	-	0.04
Metaldehyde	-	-	0.02
Metham (as methylisothiocyanate, MITC)	-	-	0.001
Methidathion	-	-	0.006
Methiocarb	-	-	0.007
Methomyl	3.5	-	0.02
Methyl bromide	-	-	0.001
Metiram (as ETU, ethylene thiourea)	-	-	0.009
Metolachlor/s–Metolachlor	-	-	0.30
Metribuzin	-	-	0.07
Metsulfuron-methyl	-	-	0.04
Mevinphos	-	-	0.006
Molinate	3.4	-	0.004
Napropamide	-	-	0.4
Nicarbazin	-	-	1
Norflurazon	-	-	0.05
Omethoate	-	-	0.001
Oryzalin	-	-	0.4
Oxamyl	-	-	0.007
Paraquat	-	-	0.02
Parathion	0.004 ^C	-	0.02
Parathion methyl	-	-	0.0007
Pebulate	-	-	0.03
Pendimethalin	-	-	0.4
Pentachlorophenol	-	-	0.01
Permethrin	-	-	0.2
Picloram	-	-	0.30
Piperonyl butoxide	-	-	0.6
Pirimicarb	-	-	0.007
Pirimiphos methyl	-	-	0.09
Polihexanide	-	-	0.7
Profenofos	-	-	0.0003

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Propachlor	-	-	0.07
Propanil	-	-	0.7
Propargite	-	-	0.007
Proparazine	-	-	0.05
Propiconazole	-	-	0.1
Propyzamide	-	-	0.07
Pyrasulfatole	-	-	0.04
Pyrazophos	-	-	0.02
Pyroxsulam	-	-	4
Quintozene	-	-	0.03
Simazine	3.2	-	0.02
Spirotetramat	-	-	0.2
Sulprofos	-	-	0.01
2,4,5-T	36	-	0.1
Tebuthiuron	2.2	-	-
Temephos	-	0.05 ^D	0.4
Terbacil	-	-	0.2
Terbufos	-	-	0.0009
Terbuthylazine	-	-	0.01
Terbutryn	-	-	0.4
Thiobencarb	2.8	-	0.04
Thiometon	-	-	0.004
Thiram	0.01	-	0.007
Toltrazuril	-	-	0.004
Toxafene	0.1 ^D	-	-
Triadimefon	-	-	0.09
Trichlorfon	-	-	0.007
Triclopyr	-	-	0.02
Trifluralin	2.6 ^D	-	0.09
Vernolate	-	-	0.04
Surfactants			
Linear alkylbenzene sulfonates (LAS)	280	-	-
Alcohol ethoxylated sulfate (AES)	650	-	-
Alcohol ethoxylated surfactants (AE)	140	-	-

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)

- A Investigation levels apply to typical slightly-moderately disturbed systems. See ANZECC & ARMCANZ (2000) for guidance on applying these levels to different ecosystem conditions.
- B Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2011).
- C Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance.
- D Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZECC & ARMCANZ (2000) for further guidance.
- E For changes in GIL with pH refer to ANZECC & ARMCANZ (2000) for further guidance.
- H Values have been calculated using a hardness of 30 mg/L CaCO₃ refer to ANZECC & ARMCANZ (2000) for further guidance on recalculating for site-specific hardness.



Appendix D4: Sampling Protocols and QA/QC Definitions

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

1. Prepare a test pit/borehole log or for stockpile sampling made a note of the sample description.
2. Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
3. Ensure all sampling equipment has been decontaminated prior to use.
4. Remove any surface debris from the immediate area of the sampling location.
5. Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
6. Collect samples for asbestos analysis and place in a zip-lock plastic bag.
7. Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
8. Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
9. Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993³².
10. Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
11. Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
12. Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

1. All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc.
2. Equipment and materials required for the decontamination procedure is outlined below:
 - Phosphate free detergent (Decon 90);
 - Potable water;
 - Stiff brushes; and
 - Plastic sheets.
3. Ensure the decontamination materials are clean prior to proceeding with the decontamination.
4. Fill both buckets with clean potable water and add phosphate free detergent to one bucket.

³² Standards Australia, (1993), *Geotechnical Site Investigations*. (AS1726-1993)

5. In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
6. Rinse sampling equipment in the bucket containing potable water.
7. Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes that equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

1. After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
2. Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should be observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
3. Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
4. Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques. Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
 - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
 - Filter paper for Micropore filtration system;
 - Bucket with volume increments;
 - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
 - Bucket with volume increments;
 - Flow cell;
 - pH/EC/Eh/T meters;
 - Plastic drums used for transportation of purged water;
 - Esky and ice;
 - Nitrile gloves;
 - Distilled water (for cleaning);
 - Electronic dip meter;
 - Low flow pump pack and associated tubing; and
 - Groundwater sampling forms.
5. If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.

6. Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
7. Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
8. Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
9. During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
10. All measurements are recorded on specific data sheets.
11. Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
12. All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
13. Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

1. All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
2. The following equipment and materials are required for the decontamination procedure:
 - Phosphate free detergent;
 - Potable water;
 - Distilled water; and
 - Plastic Sheets or bulk bags (plastic bags).
3. Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
4. Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
5. Flush pump head with distilled water.
6. Change water and detergent solution after each sampling location.
7. Rinse sampling equipment in the bucket containing distilled water.
8. Place cleaned equipment on clean plastic sheets.
9. If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned



QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994³³) methods and those described in *Environmental Sampling and Analysis, A Practical Guide*, (H. Keith 1991³⁴).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations. *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit"* Keith 1991.

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handling and analysis protocols and use of proper chain-of-custody and documentation procedures.

³³ US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. (US EPA SW-846)

³⁴ Keith., H, (1991), *Environmental Sampling and Analysis, A Practical Guide*.



Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel;
- Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Concentration of Spike Added}} \times 100$$

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$



Appendix E: Field Work Documents



Appendix E1: Groundwater Monitoring Sheets



Groundwater Sampling Report

Client:	SOUWEST DEVELOPMENT	Job No.:	E27284KB		
Project:	PROPOSED SUB-DIVISION	Well No.:	MW 8		
Location:	OFF STATION STREET, MENANGLE, NSW	Depth (m):	4.0m		
WELL DETAILS					
<input type="checkbox"/> Gatic Cover		<input checked="" type="checkbox"/> Standpipe	<input type="checkbox"/> PVC Pipe		
MONITORING WELL SAMPLING DETAILS					
Method:	BAILER	SWL (m):	4.45		
Date:	18/3/14	Time:	09:48		
Undertaken By:	JDC	STICKUP (m):	0.62		
FIELD MEASUREMENTS					
Volume Removed (L)	Temp (°C)	pH	EC (S/m)	DO (mg/L)	Eh (mV)
0		—	—	—	—
Comments: Bull in paddock removed cap. Dry.					
Tested By:	JDC	Remarks:			
Date Tested:	18/3/14	- SWL is an abbreviation for standing water level			
Checked By:	VB	- EC is electrical conductivity			
Date:	6/5/14	- DO is dissolved oxygen			
		- Eh is redox potential			

Groundwater Sampling Report

Client:	SOUWEST DEVELOPMENT	Job No.:	E27284KB		
Project:	PROPOSED SUB-DIVISION	Well No.:	MW 9		
Location:	OFF STATION STREET, MENANGLE, NSW	Depth (m):	3.2		
WELL DETAILS					
<input type="checkbox"/> Gatic Cover		<input checked="" type="checkbox"/> Standpipe	<input type="checkbox"/> PVC Pipe		
MONITORING WELL SAMPLING DETAILS					
Method:	Bailer	SWL (m):	2.97		
Date:	18/3/14	Time:	10:35		
Undertaken By:	JDC	STICKUP (m):	0.66		
FIELD MEASUREMENTS					
Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
3.5	22.8	7.00	8011	3.4	112.8
Comments: Turbid Dup GIB1.					
Tested By:	JDC	Remarks:			
Date Tested:	18/3/14	- SWL is an abbreviation for standing water level			
Checked By:	VB	- EC is electrical conductivity			
Date:	6/5/14	- DO is dissolved oxygen			
		- Eh is redox potential			



Groundwater Sampling Report

Client:	SOUWEST DEVELOPMENT	Job No.:	E27284KB		
Project:	PROPOSED SUB-DIVISION	Well No.:	MW15		
Location:	OFF STATION STREET, MENANGLE, NSW	Depth (m):	45.80		
WELL DETAILS					
<input type="checkbox"/> Gatic Cover		<input checked="" type="checkbox"/> Standpipe			
		<input type="checkbox"/> PVC Pipe			
MONITORING WELL SAMPLING DETAILS					
Method:	BAILER	SWL (m):	5.27		
Date:	18/3/14	Time:	11:15		
Undertaken By:	JDC	STICKUP (m):	0.63		
FIELD MEASUREMENTS					
Volume Removed (L)	Temp (°C)	pH	EC (S/m)	DO (mg/L)	Eh (mV)
1.8	22.3	7.12	8110	4.1	86.9
Comments: Turbid					
Tested By:	JDC	Remarks:			
Date Tested:	18/3/14	- SWL is an abbreviation for standing water level			
Checked By:	VB	- EC is electrical conductivity			
Date:	6/5/14	- DO is dissolved oxygen			
		- Eh is redox potential			

Groundwater Sampling Report

Client:	SOUWEST DEVELOPMENT	Job No.:	E27284KB		
Project:	PROPOSED SUB-DIVISION	Well No.:	MW1		
Location:	OFF STATION STREET, MENANGLE, NSW	Depth (m):	3.5m		
WELL DETAILS					
<input type="checkbox"/> Gatic Cover		<input checked="" type="checkbox"/> Standpipe			
		<input type="checkbox"/> PVC Pipe			
MONITORING WELL SAMPLING DETAILS					
Method:	Bailer ✓	SWL (m):	3.74		
Date:	18/3/14	Time:	12:20		
Undertaken By:	JDC	STICKUP (m):	0.62		
FIELD MEASUREMENTS					
Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
1.5	22.3	7.20	4285	4.8	67.0
Comments: Turbid, cattle removed cap.					
Tested By:	JDC	Remarks:			
Date Tested:	18/3/14	- SWL is an abbreviation for standing water level			
Checked By:	VB	- EC is electrical conductivity			
Date:	6/5/14	- DO is dissolved oxygen			
		- Eh is redox potential			



Appendix E2: Field Calibration Record



Calibration and Service Report – PID

Company: Environmental Investigation Services
Contact: Katie McGrath
Address: Rear 115 Wicks Road
 MACQUARIE PARK, NSW 2113
Phone: 02 9888 5000
Fax: 02 9888 5004
Email: kmcgrath@jkggroup.net.au

Manufacturer: RAE Systems
Instrument: MiniRAE 2000
Model: PGM-7600
Configuration: VOC
Wireless: -
Network ID: -
Unit ID: -
Details: -

Serial #: 110-006735
Asset #: EIS1
Part #: 002
Sold: -
Last Cal: 7/05/2013
Job #: AES.024101
Cal Spec: Standard
Order #: #

Item	Test	Pass/Fail	Comments	Part Code	S/W
Battery	NiCd, NiMH, Dry cell, Li Ion	✓	SN: 170N2W0093		
Charger	Charger, Power supply	✓			
	Cradle	✓			
Pump	Flow	✓	> 450 ml/min		
Filter	Filter, fitting, etc	x	Fitted new filter	002-3022-010	1
Alarms	Audible, visual, vibration	✓			
Display	Operation	✓			
Switches	Operation	✓			
PCB	Operation	✓			
Connectors	Condition	✓			
Firmware	Version	✓	V 2.0		
Datalogger	Operation	✓			
Monitor Housing	Condition	✓			
Case	Condition/Type	✓			
Sensors					
PID	Lamp	✓			
PID	Sensor	x	Moisture sensitive	023-0301-000	1
THP	Sensor	✓			
				Calibration	1
				Labour	0.5

Engineer's Report

Replaced moisture sensitive PID sensor. Service and calibration.

Calibration Certificate

Sensor	Type	Serial No	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6ev	021689	Isobutylene	100ppm	S21306		0	100

Calibrated/Repaired by:

Bill Knobel

Date:

7 November 2013

Next Due:

7 May 2014

Melbourne- Head Office: Unit 3 266 Bolton Street ELTHAM VIC 3095 T: +(613) 9431 3500 F: +(613) 9431 3577
Sydney - Office : S14 Lvl 2 6-8 Holden Street ASHFIELD NSW 2131 T: +(612) 9716 5966 F: +(612) 9716 5988
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AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – PID

Company: Environmental Investigation Services
Contact: Brendan Page
Address: Rear
115 Wicks Road
MACQUARIE PARK, NSW 2113
Phone: 02 9888 5000
Fax: 02 9888 5004
Email: bpape@ikgroup.net.au

Manufacturer: RAE Systems
Instrument: MiniRAE 2000
Model: PGM-7600
Configuration: VOC

Wireless: -
Network ID: -
Unit ID: -
Details: pumped

Serial #: 110-901778
Asset #: EIS 2A
Part #: -
Sold:

Last Cal: 14/08/2013
Job #: **AES.025126**
Cal Spec: VOC
Order #: PO EIS PID 2A

Item	Test	Pass/Fail	Comments	Part Code	S/W
Battery	NiCd, NiMH, Dry cell, Li Ion	✓	NiMH SN: 170H3W0341		
Charger	Charger, Power supply	✓			
	Cradle	✓			
Pump	Flow	✓	>400 ml/min		
Filter	Filter, fitting, etc	✓			
Alarms	Audible, visual, vibration	✓			
Display	Operation	✓			
Switches	Operation	✓			
PCB	Operation	✓			
Connectors	Condition	✓			
Firmware	Version	✓			
Datalogger	Operation	✓			
Monitor Housing	Condition	✓			
Case	Condition/Type	✓			
Sensors					
	PID Lamp	✓			
	PID Sensor	✓			
	THP Sensor	✓			
				Calibration	1
Engineer's Report Service and calibration					

Calibration Certificate

Sensor	Type	Serial No	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6ev	1062P110030	Isobutylene	100 ppm	S21306		0	100

Calibrated/Repaired by:

Bill Knobel

Date:

28 February 2014

Next Due:

28 August 2014

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