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KG/RT:jlb
Project 36500.02
8 December 2009

APP Corporation
Level 6
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Attn: Mr Owen Bernie

Dear Sirs

DRAFT

REVIEW OF LAND CAPABILITY STUDY
MENANGLE PARK URBAN RELEASE AREA
MENANGLE PARK

1. INTRODUCTION

Douglas Partners Pty Ltd (DP) was commissioned by APP Corporation in October 2009 to review the status of the Land Capability Study undertaken in 2004 by DP. The purpose of the review is to assess the applicability of the 2004 report with regard to the current status of the project to identify key and outstanding issued that need to be addressed and any statutory or best practice changes that have occurred since 2004.

The Land Capability Study provided an overall evaluation of the proposed Menangle Park Urban Release Areas identified by NSW Government and Campbelltown City Council for potential rezoning and urban development. The objectives of the 2004 assessment were to provide preliminary evaluations from a planning perspective, and included:

- General risks associated with soil erosion and instability with respect to the various 'precincts' in the area;
- General soil salinity issues over various portions of the land;
- Potential or actual acid sulphate soils over the area, and
- The potential for soil contamination over various precincts of the site.

At the time of the 2004 study limited information regarding the proposed development was provided. A draft revised structure plan (02/12/2009 issue 4) is now available (see attached) from the client. The current review was thus undertaken on the basis of this revised structure plan.

No other detailed design/works plan of the proposed development is available at this stage.

2. SITE DESCRIPTION

The site is located approximately 6 km to the south west of Campbelltown, and covers an area of approximately 920 hectares. The site is bounded to the west and south by the Nepean River and to the east by the Hume Highway and Menangle Road. The eastern part of the site comprises broad rolling hills with gentle to moderate slopes (3-15%), passing to the west into a gently sloping to flat alluvial terrace (0-5%) adjacent to the Nepean River. The rolling hills in the north and eastern part of the site are underlain by the Bringelly Shale and Ashfield Shale of the Triassic Wianamatta Group. The flat-lying areas to the west are underlain by Quaternary "low level" alluvial deposits of the Nepean River Valley. Tertiary "high level" alluvial deposits are preserved in the central part of the site, between the Hume Highway and the Main Southern Railway.

3. SCOPE OF WORK

Based on the agreed scope of works, the 2004 investigation comprised the following elements:

I. Review of background information including previous investigations, available Council records, aerial photographs, salinity and acid sulphate soil risk maps, and anecdotal evidence;

II. Scoping study of the site comprising a site inspection to identify potential zones of concern for sample collection with regard to contamination and salinity;

III. Preparation of a proposed sampling location plan for approval by APP prior to intrusive sampling;

IV. Services search in liaison with the client including dial-before-you-dig and agreement on sample locations;

V. Excavation and logging of 100 test pits across the site to a maximum depth of 3 m using a backhoe;

VI. Collection of soil/fill samples from near surface from an additional 100 locations across the site for the purposes of the salinity investigation;

VII. Electromagnetic (EM) profiling using a Geonics EM31 Ground Conductivity Meter mounted on a 4WD Quad bike, with a nominal grid spacing of 400 by 750 metres; Calibration of measurements of apparent conductivity (ECa) by correlation with and scaling against values of soil conductivity (ECe) derived from soil measurements ($EC_{1:5}$) across the site; Production of an apparent salinity map for the site by gridding and contouring the scaled data set;

VIII. Collection of soil and fill samples from each test pit for contaminant analysis; Sample collection from the surface (0-0.5 m) and at 1.0 m intervals in fill until test bore completion, including 10% replicate samples and one equipment wash blank (rinsate) per day for QA/QC purposes; Duplication of each jar sample by means of a replicated bag sample for field PID analysis, with the PID suitably calibrated each day;

IX. Decontamination of sampling equipment between sampling events using appropriate protocols;

X. Screening of all replicate samples for volatile organic compounds using a Photoionisation Detector (PID);

XI. Analysis of selected soil/fill samples (plus 10% QA/QC samples) for various combinations of a range of common contaminants; Analysis of at least one sample from each location, including the appropriate number of field duplicate (QA/QC) samples (10%) and a further trip blank and trip spike for each batch of soil samples. Analytes included:
   - Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) (119 samples);
   - Total Recoverable Hydrocarbons (TRH) (34 samples);
   - Benzene, Toluene, Ethylbenzene, Xylene (BTEX) (34 samples);
   - Polycyclic Aromatic Hydrocarbons (PAH) (34 samples);
   - Organochlorine/Organophosphate pesticides (OC/OP) (45 samples);
   - pH (1:5) (74 samples);
   - EC (1:5) (74 samples); and
   - POCAS (Acid sulphate soil potential) analyses were NOT undertaken, as the potential for acid sulphate soils on the site is extremely low.

XII. Storage of remaining soil samples (those not sent for contaminant analysis) for a period of one month pending the need for additional chemical testing and evaluation;

XIII. Provision of monthly progress reports indicating activities completed and schedule for following month;

XIV. Preparation of constraints maps indicating areas of soil contamination risk, soil salinity risk, erosion and sedimentation hazards, acid sulphate soil risk and areas suitable for urban development;

XV. Preparation of a technical report outlining the scope of work, study methodology, background, field work, strategic context, assessment of constraints and opportunities, conclusions and recommendations regarding management and mitigation issues; and

XVI. Preparation of an outline Soil and Water Management Plan (SWMP) for inclusion in the DCP documentation, addressing management procedures and development criteria for application to future subdivision within Menangle Park.

4. FINDINGS AND RECOMMENDATIONS OF THE STUDY

4.1 Soil Erosion Potential

The rate and severity of soil erosion is dependent on a number of factors including the soil type, topography, rainfall, organic content of the soil, and vegetation cover. The susceptibility of soils to erosion depends on the dispersivity and sodicity of the soils. The dispersivity and sodicity of soils in the Menagle Park Release area were assessed by carrying out the following laboratory tests - Emerson Class Test (measure of soil dispersion); and Exchangable Sodium Percentage (measure of soil sodicity). On the basis of Emerson Class Numbers, soils classify as non-dispersive to highly dispersive.

Values of Exchangeable Sodium Percent (ESP) indicate non-sodic to highly sodic conditions. High sodicity and moderate to high dispersivity were identified in samples from both Blacktown

and Theresa Park soil landscapes and are associated with test pit locations in valleys and on mid to lower slopes formed on Wianamatta shales.

On a regional scale, soils of the Blacktown, Theresa Park, and Luddenham soil landscapes are of typically moderate erodibility (K values of 0.024–0.039). The more sodic or saline soils of the Blacktown soil landscape can have high erodibility and the erosion hazard for this landscape is estimated as moderate to very high with calculated soil losses from newly developed areas of up to 70 t/ha in the first 12 months (Hazelton and Tille, 1990). The soil erosion hazard for the Luddenham soil landscape is moderate to extreme for non-concentrated flows, with a calculated soil loss for the first 12 months after urban development of up to 135 t/ha for topsoil and up to 100 t/ha for exposed subsoil. The soil erosion hazard for the alluvial Theresa Park soil landscape is estimated as moderate to high for non-concentrated flow and very high for concentrated flow. Calculated soil losses in the first 12 months of urban development are up to 15 t/ha for topsoil and 25 t/ha for exposed subsoil (Hazelton and Tille, 1990). Using an alternative method based on the Revised Universal Soil Loss Equation (assuming a typical site slope length of 30 metres and gradient of 10%), indicate soil loss from disturbed areas with little or no soil cover of approximately 130 t/ha/yr.

4.2 Slope Instability

Thick residual soil profiles of the Blacktown and Luddenham soil landscapes can be prone to slope instability due to slumping and soil creep, particularly on steep south-facing slopes underlain by shale. The high clay content of these soils results in poor drainage, and therefore reduced cohesion during periods of high rainfall or where natural drainage has been disturbed by development. Instability due to slumping is typically associated with thick soils and slopes in excess of 11-20º (or greater than a 20% gradient; Fell, 1985).

The majority of naturally occurring slopes in the site have a gradient of less than 15%, and therefore slope instability is considered to be unlikely. Based on the current land use, the consequences to property of a landslip would likely be minor, and the overall landslide risk over the majority of the Menangle Park release is therefore considered to be low to very low. An area surrounding a prominent hill in the south east of the site, adjacent to the Hume Highway (MGA 293200 mE, 6223000 mN) has south-facing slopes in excess of 15%. Although no signs of slope instability were noted, future slope instability through earth slide or flow is considered possible, and the area represents a low to moderate instability risk. It should also be noted, that any existing or future excavations on the site that produce slopes with steeper gradients, or that alter the natural drainage, may be prone to instability.

Both soil landscapes are considered to have high capability for urban development provided adequate provisions are made for foundation design, flooding, soil erosion/sedimentation and slope stability on a site basis.

4.3 Soil Salinity

An apparent salinity map of the Menangle Park site was developed by calibrating EM31 conductivity measurements against soil salinity measurements and gridding the calibrated data. The apparent salinity contour map indicates that generally non-saline conditions prevail in the central and western parts of the site underlain by Tertiary and Quaternary alluvial deposits and slightly to moderately saline conditions are associated with the more elevated areas to the north and south that are underlain by Wianamatta Group shale (following the salinity classification of

Richards, 1954). The highest apparent salinity values (equating to moderately saline conditions) tend to occur in drainage areas within the Blacktown and Luddenham soil landscapes and are therefore consistent with the locations of known salinity indicators on the site and with the spatial distribution of salinity risk areas (DIPNR, 2003). Buildings, pavements and vegetation in these areas may be prone to salt related damage, and a number of management options are recommended.

4.4 Acid Sulphate Soil Risk

Acid sulphate soils are typically associated with low-lying coastal areas, including estuarine flood plains, rivers and creeks. The location and elevation of the site (> 60 m asl) are such that the risk of acid sulphate soil may be considered negligible. An assessment of soil samples collected across the site revealed no potential or actual acid sulphate soil material.

4.5 Soil Aggressivity to Buried Structures

Seventeen soil samples from the Menangle Park Release area were analysed for chloride, sulphate, and pH and compared to the exposure classification for concrete piles, based on Australia Standard AS 2159-1995. Laboratory results indicate that soil conditions are likely to be non aggressive to moderately aggressive towards concrete structures and non aggressive to mildly aggressive towards iron and steel.

4.6 Soil Contamination

Potential for soil contamination on the site has been assessed in a preliminary assessment by DP. The assessment comprised a site inspection, review of land use history at the site, and laboratory analysis of soil samples collected from test pits.

Based on available information, potential contaminants could arise on the site from a number of sources including:-

- Contaminated filling used to raise or form the site platforms;
- Landfilling of waste material;
- Application of pesticides;
- Storage of chemicals;
- Movement of contaminated groundwater beneath the site;
- Asbestos in filling materials, soil or sediments;
- Septic tanks; and
- Other contaminants on the site.

Several areas were highlighted as having a moderate potential for contamination based on current or past land use and/ or anecdotal evidence. Where possible test pits were located within or adjacent to these areas to assess contamination levels. The areas of potential contamination noted during the site investigation included-

- The old fireworks factory site, Lot 59, DP 10718 Cummins Rd, Menangle Park (Drawing 16). Soil at the site contains asbestos cement sheet fragments from the demolition of site buildings, and it is understood that waste products associated with fireworks manufacturing were buried on the site. A detailed contaminated site assessment and a remediation action

plan have been prepared by Charlie Furr of Consulting Earth Scientists, and remediation is currently underway. At the time of the 2004 assessment the site was the subject of a site audit, and was not covered by the assessment;

- Lot D, DP 19853, a former farm shed, thought to have asbestos sheet roofing (Drawing 16). This site is in the vicinity of a possible heritage area (refer references to 'Portion 2' in Casey and Lowe Non-Indigenous Heritage Study taken from Menangle Park project web site dated December 2003, pages 62, 63, 74 and 75). Remediation of the site is to be undertaken by Landcom following further advice from APP/Council on any additional heritage work required as part of LES/LEP. The site is contained within a secure paddock;
- Areas of cut and fill associated with Sydney Gas extraction plants, pipes and gas flares adjacent to the Nepean River;
- Refuelling station, sand stockpiles, and disturbed ground associated with sand mining operations adjacent to the Nepean River;
- Various properties used for agricultural purposes; possible contaminants include pesticides; fuels, asbestos, uncontrolled landfill;
- Pindone bait has been laid for rabbits on at least one site on Cummins Rd, Menangle Park; and
- Glenlee Olive Estate.

Given that the site could be developed for residential purposes with accessible soils, the recommended guideline levels adopted in the 2004 assessment were the lower of Health based investigation levels for residential sites with access to soil, including cultivation of home-grown produce, and the more stringent provisional phytotoxicity based investigation levels (NEPC, 1999).

In summary, based on the limited sampling undertaken in this study, there is no evidence for significant widespread or diffuse contamination across the site. Low levels of aliphatic (chain) hydrocarbons and polycyclic aromatic hydrocarbons were detected in three samples associated with disturbed ground or imported fill, indicative of local minor contamination, but the observed concentrations were well below the relevant guideline levels. Similarly, a marginal exceedance of the Provisional Phytotoxicity –based Investigation Levels (PPILs) for arsenic was detected in one sample. The detected arsenic value (22mg/kg) was within the range of natural background levels for arsenic and the exceedance was considered to probably represent natural background levels.

It should be noted that more localised contamination may occur due to past and present activities conducted at specific sites. It is recommended that site specific evaluation should be undertaken at the time of development. For sites that are identified to have an elevated potential for contamination, more detailed, site specific assessment should be conducted at the time of development. One such site, the old fireworks factory site on Cummins Road is the subject of a site audit, and was reportedly being remediated in 2004. Subject to the outcome of the site audit it is envisaged that the site would have been rendered suitable for its planned use.

4.7 Land Use Implications

On the basis of an initial assessment of soil erosion and sedimentation hazards, and slope stability, it is considered that urban or rural-residential development is generally feasible over

most of the site that is outside flood prone areas. However the study also highlights some areas that may have issues related to soil salinity, soil erodibility, slope stability, and contamination.

Zones of moderate soil erosion and slope stability risk are restricted to the steeper slopes in the south west of the site, and any excavated areas that expose the soil and/ or create steep embankments. Management strategies for building in areas of low to moderate slope stability and soil erosion risk are outlined in a preliminary Soil and Water Management Plan, developed as part of the 2004 assessment.

Areas of slight salinity risk occur along drainage lines and lower breaks of slope in hill areas formed on the Wianamatta Group. Groundwater investigations on an adjacent site have identified saline groundwater at shallow levels in these areas indicating that saline conditions may be exacerbated by fluctuating groundwater levels or deep excavations. Saline soil and groundwater can cause significant degradation of buildings and pavements, and will ultimately reduce the lifespan of these structures and add significantly to infrastructure maintenance costs. It is recommended that urban development be avoided these areas, or that appropriate salinity management strategies be implemented.

The preliminary contamination assessment has found that contaminant levels across the site were generally low and do not indicate signs of restriction on development of the site. It is however anticipated that more localised areas of contamination may occur that are related to past activities such as uncontrolled tipping and filling, chemical storage and disposal, pesticide use, and disposal of material containing asbestos. It is suggested that further investigations may be required to determine the nature and extent of contamination on a site by site basis.

5. STATUTORY GUIDELINES AND LEGISLATIVE REQUIREMENTS

Land capability studies are subject to statutory guidelines and some relevant legislation. No significant variations in legislation have occurred since 2004 when the report was produced although a number of guidelines/references have since been issued/updated. Relevant comments in the various areas are reviewed below.

a) Salinity – Reference to the Department of Infrastructure Planning and Natural Resources (DIPNR), now part of the Department of Environment, Climate Change and Water (DECCW) map entitled “Salinity Potential in Western Sydney 2002” provides an indication of the potential risk associated with various sites. A document entitled “Site Investigations for Urban Salinity” (Department of Land and Water Conservation, 2002) remains the most relevant guideline for investigations.

b) Acid sulphate soils – Reference to the regional *Acid Sulphate Soils Risk Map* Edition 2 (DLWC, 1997) and the relevant guidelines relating to the Acid Sulphate Stone, including *Acid Sulfate Soils Manual 1998* (Acid Sulphate Soil Management Advisory Committee [ASSMAC], Wollongbar, NSW, Australia) indicates that the probability of ASS occurrence is low.

c) Environmental/soil contamination – Guidelines adopted in the 2004 assessment were the National Environmental Protection Council (1999) for a range of site uses including PPILs, residential, parks/recreational and industrial/commercial. Other guidelines included the NSW EPA (1994) Guidelines for Assessing Service Stations Sites. Both guidelines are still relevant. The only major new relevant reference in this regard is the

revised NSW EPA (2006) Guidelines for the NSW Site Auditor's Scheme Edition 2 (2006). The updated guidelines contain clarification of various items pertaining to the role of the Auditor and specific site evaluation processes, however these have not materially impacted the study or the conclusions presented above.

d) Environmental/groundwater – While no groundwater investigation was conducted as part of the previous investigation, the relevant groundwater criteria remain the ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality Trigger Values for toxicants in marine water with a 95% level of protection.

e) Environmental/Soil and Management Plan – Managing Urban Stormwater: Soils and Construction (1988) remains the relevant guideline in this regard.

6. BEST PRACTICE

The approach and methodologies employed for the 2004 study were considered best practice and are still considered best practice. However, the extent to which individual methods were applied was sometimes limited by the strategic rather than specific nature of the study (ie the absence of specific development concepts) and by the budgetary constraints imposed in this preliminary study.

Our experience with this and subsequent large-area studies indicates that best practice should involve more detailed evaluation of higher risk sites eg. assessment using a higher density of ground conductivity measurements (ie closer spacings of electromagnetic profiles) in preliminary studies, to avoid duplication or difficult in-fill of data closer to development stage. Similarly, more detailed contamination investigations should be undertaken on areas identified to have an elevated potential for contamination or sites having a higher potential for prior uncontrolled filling.

Future best practice investigations should improve the basic data density by additional electromagnetic profiling and/or test pitting, according to the current development concepts. Further consideration should also be given to groundwater studies, tailored to the development concepts.

7. SUMMARY AND RECOMMENDATIONS

Various recommendations were provided in Section 8 pertaining to the range of issues identified and investigated at the site. In particular, the following areas were highlighted:

- **Salinity** – various management strategies were recommended including road/pavement construction techniques, excavation in lower slope areas, use of specific building and landscaping methods, drainage and building and construction techniques. These strategies should be fine-tuned and made site-specific when detailed development plans are available for the various development precincts;
- **Hydrogeological assessment** is recommended to determine the potential impact of proposed cut/fill activities on groundwater levels and soil salinity. In addition, groundwater investigation needs to be included in the future works as part of the contamination assessment works;

- **Contamination** - further assessment is recommended on a site-by-site basis prior to the development of each land parcel or site, a preliminary contamination assessment comprising a site inspection and review of previous land uses should be undertaken, hopefully when the site development plan is better defined. If no potential contaminants or potentially contaminating land-use is identified, then further action may not be required. If potential contamination is identified, then further assessment may be required. This would normally involve soil and/or groundwater sampling and analysis to determine the nature and extent of contamination at the site. Any asbestos material identified would have to be removed or otherwise remediated using appropriate procedures; and any uncontrolled fill or waste material would need to be assessed, and depending on the nature of the fill or waste material, be removed or otherwise remediated using appropriate procedures.
- **Development on Hill Slopes** – the areas with moderately steep slopes in the south east part of the site represent a low to moderate landslide risk and therefore lower housing density has been recommended in steeper areas; and
- **Soil and Water Management Plan** – following development consent a detailed Soil and Water Management Plan should be developed in accordance with Managing Urban Stormwater: Soils and Construction (1988).

It is noted that at the time of the preliminary investigation and this review, it is understood that detailed development plans have not been compiled for the site and therefore have not been provided to DP. DP notes that a re-assessment of the Land Capability Study and determination of the range of additional work required should be undertaken when a more detailed development strategy has been constructed for the site. In particular, increased density of electromagnetic profiling for salinity assessment (eg. 100 m x 100 m spacings in selected areas), preliminary contamination assessments and groundwater investigation should be undertaken in areas identified for specific development. These can be conducted on a site by site basis according to the proposed development schedule.

Regardless of the detailed development, a number of areas of additional investigation are recommended in the report. These recommendations are still considered to be relevant for the site.

Yours faithfully
DOUGLAS PARTNERS PTY LTD

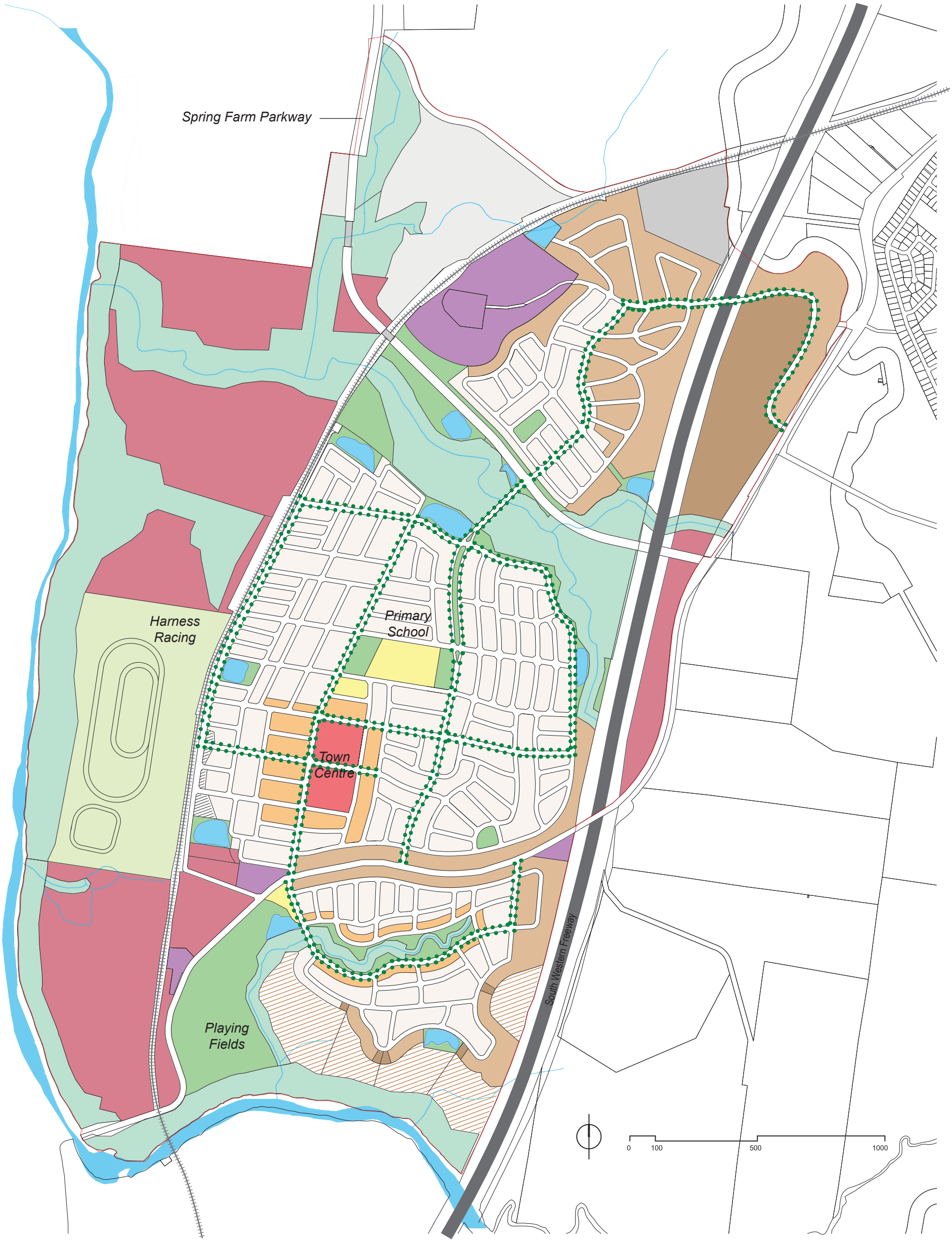
Reviewed by:

Kate Graham
Environmental Scientist

Ronnie Tong
Principal

J Lean
Principal Geophysicist

Attachment: Structure Plan



350 - 390 sqm lots
540 - 700 sqm lots
1000 - 1500 sqm lots
2000+ sqm lots
Private Open Space

Town Centre
Community Use
Open Space
Riparian
Private Recreation

Rural
Heritage
Employment
Transgrid
Collector Roads

menanglepark

See Visual Scale	Urbis	Menangle Park
09 12 01 Structure Plan.indd	02/12/2009 ISSUE 4	DRAFT Revised Structure Plan

PROJECT PARTNERS

campbelltown city council

LANDCOM

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Geotechnics • Environment • Groundwater

Integrated Practical Solutions

REPORT ON LAND CAPABILITY STUDY

THE MENANGLE PARK URBAN RELEASE AREA

Prepared for
CAMPBELLTOWN CITY COUNCIL AND LANDCOM

Project 36500
August 2004

Douglas Partners
Geotechnics • Environment • Groundwater

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Project 36500
August 2004

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DOUGLAS PARTNERS 40 1963-2003

EXECUTIVE SUMMARY

Douglas Partners Pty Ltd carried out a Land Capability Study of the Menangle Park Urban Release Area. The area is to be developed by Campbelltown City Council and Landcom. The objective of the study is to evaluate the suitability of the site for urban development with regard to the potential for soil contamination, the presence of potential or actual acid sulphate soils, as well as salinity and soil erosion/instability risks.

The site is located approximately 6 km southwest of Campbelltown and covers an area of approximately 920 hectares. The site is bounded to the west and south by the Nepean River and to the east by the Hume Highway and Menangle Road. The eastern part of the site comprises broad rolling hills with gentle to moderate slopes (3 - 15%), passing to the west into a gently sloping to flat alluvial terrace (0 - 5%) adjacent to the Nepean River. The rolling hills in the north and eastern part of the site are underlain by the Bringelly Shale and Ashfield Shale of the Triassic age Wianamatta Group. The flat-lying areas to the west are underlain by Quaternary "low level" alluvial deposits of the Nepean River Valley. Tertiary "high level" alluvial deposits are preserved in the central part of the site, between the Hume Highway and the Main Southern Railway.

Soil landscapes over the site broadly reflect the underlying geology and topography, with the Blacktown, Theresa Park, and Luddenham Soil Landscapes of Hazelton and Tille (1990) being dominant. Thick residual soil profiles of the Blacktown and Luddenham Soil Landscapes can be prone to slope instability due to slumping and soil creep, particularly on steep south-facing slopes underlain by shale. However, given that the majority of naturally occurring slopes in the site have a gradient of less than 15%, the risk of slope instability is considered low to very low. An area surrounding a prominent hill in the south east of the site, adjacent to the Hume Highway has slopes in excess of 15%, and is therefore considered to represent a low to moderate instability risk. Soils of the Blacktown, Theresa Park and Luddenham Soil Landscapes are of typically moderate erodibility, with calculated potential soil loss for the first 12 months after urban development of up to 135 t/ha for soils on moderate slopes.

Soil salinity across the site was investigated using a Geonics EM31 Ground Conductivity Meter combined with soil salinity measurements. An apparent salinity image of the Menangle Park site indicates that generally non-saline conditions prevail in the central and western parts of the site underlain by Tertiary and Quaternary alluvial deposits, and slightly to

moderately saline conditions are associated with the more elevated areas to the north and south that are underlain by shales of the Wianamatta Group. The highest apparent salinity values tend to occur in drainage areas (tributaries) within the Blacktown and Luddenham Soil Landscapes, and are therefore consistent with the locations of known salinity indicators on the site and the spatial distribution of salinity risk areas (DIPNR, 2003). It should be noted that the current study provides a broad, regional scale salinity evaluation over the subject site and is for planning purposes only. Local and temporal variations in salinity are possible due to site specific conditions. As a result, buildings, pavements and vegetation in areas assigned with higher salinity values may be prone to salt related damage, and a range of management options have been recommended. Site specific assessment will be required at the time of site development to verify the actual salinity of an individual site. In particular, it is recommended that a hydrogeological assessment be undertaken to determine the potential impact of proposed cut/fill activities on groundwater levels and soil salinity.

The location and elevation of the site (> 60 m asl) are such that the risk of acid sulphate soil may be considered negligible.

A preliminary contamination assessment was undertaken that involved excavation of 74 test pits to a maximum depth of 3 m, and analysis of 119 samples (including 10% QA/QC) for a range of contaminants. Low levels of aliphatic (chain) and polycyclic aromatic hydrocarbons were detected in three samples associated with disturbed ground or imported fill, indicative of local minor contamination, but the observed concentrations were well below relevant guideline levels. It is also possible that localised contamination may occur in relation to specific previous or current site usage, including uncontrolled tipping and filling, chemical storage and disposal, pesticide use and disposal of material containing asbestos. It is recommended that site specific evaluation should be undertaken at the time of development. For sites that are identified to have an elevated potential for contamination, more detailed, site specific assessment will be required at the time of development. One known contaminated site, the old fireworks factory site on Cummins Road, is the subject of a site audit and is currently being remediated.

On the basis of an initial assessment of soil erosion hazards, slope stability, salinity and contamination it is considered that urban or rural-residential development is generally feasible over most of the site that is outside flood prone areas, provided that appropriate salinity and soil and water management measures are adopted.

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REPORT ON
LAND CAPABILITY STUDY OF
THE MENANGLE PARK URBAN RELEASE AREA

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1. INTRODUCTION

Douglas Partners Pty Ltd has carried out a Land Capability Study of the Menangle Park Urban Release Area to be developed by Campbelltown City Council and Landcom. The area has been identified by the NSW Government and Campbelltown City Council for potential rezoning and urban development. Campbelltown City Council requires that the area be investigated to determine its suitability for urban development with regard to the potential for soil contamination, the presence of potential or actual acid sulphate soils, and salinity and soil erosion risks.

The objectives of this land capability assessment are therefore to provide preliminary evaluations, from a planning perspective, of the following:

- Risks associated with soil erosion and instability;
- Soil salinity issues;
- Identification of potential or actual acid sulphate soils; and
- The potential for soil contamination at the site.

2. SCOPE OF WORK

Based on the proposed scope of works an investigation was carried out as part of the land capability study, comprising the following elements:

1. Review of background information including previous investigations, available Council records, aerial photographs, salinity and acid sulphate soil risk maps and anecdotal evidence;
2. Scoping study of the site comprising a site inspection to identify potential zones of concern for sample collection with regard to contamination and salinity;
3. Preparation of a proposed sampling location plan for approval by APP prior to intrusive sampling;
4. Services search in liaison with the client including dial-before-you-dig and agreement on sample locations;
5. Excavation and logging of 100 test pits across the site to a maximum depth of 3 m using a backhoe;
6. Collection of soil/fill samples from near surface from an additional 100 locations across the site for the purposes of the salinity investigation;
7. Electromagnetic (EM) profiling using a Geonics EM31 Ground Conductivity Meter mounted on a 4WD Quad bike, with a nominal grid spacing of 400 by 750 metres; Calibration of measurements of apparent conductivity (ECa) by correlation with and scaling against values of soil conductivity (ECe) derived from soil measurements ($EC_{1:5}$) across the site; Production of an apparent salinity map for the site by interpolation and gridding of the scaled data set;
8. Collection of soil and fill samples from each test pit for contaminant analysis; Sample collection from the surface (0-0.5 m) and at 1.0 m intervals in fill until test bore completion, including 10% replicate samples. Duplication of each jar sample by means of a replicated bag sample for field PID analysis, with the PID calibrated daily;
9. Decontamination of sampling equipment between sampling events using appropriate protocols;
10. Screening of all replicate samples for volatile organic compounds using a Photoionisation Detector (PID);

11. Analysis of selected soil/fill samples (plus 10% QA/QC samples) for various combinations of a range of common contaminants and other soil parameters; Analysis of at least one sample from each location, including the appropriate number of field duplicate (QA/QC) samples (10%). Analytes included:

    - Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc) (119 samples);
    - Total Recoverable Hydrocarbons (TRH) (34 samples);
    - Benzene, Toluene, Ethylbenzene, Xylene (BTEX) (34 samples);
    - Polycyclic Aromatic Hydrocarbons (PAH) (34 samples);
    - Organochlorine/Organophosphate pesticides (OC/OP) (45 samples);
    - pH (1:5) (74 samples);
    - EC (1:5) (74 samples); and
    - POCAS (Acid sulphate soil potential) analyses were NOT undertaken, as the potential for acid sulphate soils on the site is extremely low;
    - Soil parameters (aggressivity, dispersivity).

12. Storage of remaining soil samples (those not sent for contaminant analysis) for a period of one month pending the need for additional chemical testing and evaluation;

13. Provision of monthly progress reports indicating activities completed and schedule for following month;

14. Preparation of constraints maps indicating areas of soil contamination risk, soil salinity risk, erosion and sedimentation hazards, acid sulphate soil risk and areas suitable for urban development;

15. Preparation of a technical report outlining the scope of work, study methodology, background, field work, strategic context, assessment of constraints and opportunities, conclusions and recommendations regarding management and mitigation issues; and

16. Preparation of an outline Soil and Water Management Plan (SWMP) for inclusion in the DCP documentation (Section 8.4), addressing management procedures and development criteria for application to future subdivision within Menangle Park.

Field work commenced in December 2003 and preliminary results have been presented progressively, followed by a draft report. This document represents the final report detailing

the findings of the study and is accompanied by technical notes and results within Appendices A to F.

3. SITE CONDITIONS AND HISTORY

3.1 Site Identification

The site is located approximately 6 km southwest of Campbelltown and covers an area of approximately 920 hectares. The site is bounded to the west and south by the Nepean River and to the east by the Hume Highway and Menangle Road (Drawing 1, Appendix A).

3.2 Site Conditions

The eastern part of the site comprises broad rolling hills with gentle to moderate slopes (3 - 15%), passing to the west into a gently sloping to flat alluvial terrace (0 - 5%) adjacent to the Nepean River (Drawing 2). Two tributaries flow east across the northern part of the site towards the Nepean River and three minor tributaries enter the Nepean River in the south and southwest of the site.

3.3 Site History

Land-use has been dominated by rural activities since European settlement, including cattle and sheep grazing, dairy farming and crop cultivation. Industrial land-use occurs locally and includes coal processing, sand mining, and natural gas extraction. It is understood that a fireworks factory operated over one part of the site from 1956. The Menangle Park racecourse, located to the west of the Menangle Park Railway platform and township, has been in use since the 1870s. The village of Menangle Park represents an area of low density urban development adjacent to the railway station that was subdivided in the 1920s. A detailed account of the history of Menangle Park is included in a report prepared by Terry Kass (Nov, 2003).

4. GEOLOGY, REGIONAL SOIL LANDSCAPES AND GROUNDWATER

4.1 Geology

The site can be broadly divided into three geological units. The rolling hills in the north and eastern part of the site are underlain by the Bringelly Shale and Ashfield Shale of the Triassic age Wianamatta Group (Sherwin and Holmes, 1986; Drawing 3). The flat-lying areas to the west are dominated by Quaternary "low level" alluvial deposits of the Nepean River Valley. Tertiary "high level" alluvial deposits are preserved in the central part of the site, between the Hume Highway and the Main Southern Railway.

The Ashfield Shale occurs in an area south of Menangle Road, and is dominated by dark grey to black siltstone and laminite. The Ashfield Shale is overlain by the Bringelly Shale which occurs mainly to the north of Menangle Road and comprises bedded claystone, siltstone, laminite, and sandstone, with minor occurrences of carbonaceous claystone and siltstone. Shale and siltstone in both the Bringelly Shale and Ashfield Shale are mostly composed of quartz, clay minerals and siderite. Clay minerals are mostly kaolinite, with varying amounts of more expandable material associated with mixed layered illite-smectite clays. The Bringelly Shale contains a higher proportion of more expandable illite-smectite clays than the Ashfield Shale (Sherwin and Holmes, 1986).

Quaternary alluvial deposits of the Nepean River are mainly derived from weathering of Permian and Triassic bedrock and comprise typically grey-brown medium grained quartz sand with layers of silt and humic clay. Charcoal particles are abundant in some horizons. The Tertiary high level alluvial deposits are preserved as a valley-fill at an elevation of between 80 m and 100 m above sea level (asl), overlying weathered shales of the Wianamatta Group. In the Menangle Park area, the deposits were (at least in part) the result of aeolian deposition and comprise white to orange/brown sand and clayey sand with a maximum thickness of 9 m. A geological investigation of the Tertiary alluvium deposits in the Menangle Park area found the sands to be suitable for use as mortar, fill and concrete aggregate (Ray, 1981).

4.2 Regional Soil Landscapes

Soil landscapes over the site broadly reflect the underlying geology and topography, with the Blacktown, Theresa Park, and Luddenham Soil Landscapes of Hazelton and Tille (1990) being dominant (Drawing 4).

The Blacktown Soil Landscape is a residual soil group associated with the gently undulating slopes and broad rounded crests and ridges on the Wianamatta Group in the eastern part of the site. The unit comprises up to four soil horizons that range from shallow red-brown hard-setting sandy clay soils on crests and upper slopes to deep brown to yellow sand and clay soils overlying grey plastic mottled clay on mid- to lower slopes. These soils are typically of low fertility, are moderately reactive and have a generally low wet bearing strength.

The Luddenham Soil Landscape is an erosional soil landscape, commonly associated with steeper slopes, ridges and crests on shales of the Wianamatta Group. Soils typically comprise shallow (< 100 cm) brown podsolic soils and massive earthy clays on crests and ridges, to moderately deep (70 – 150 cm) red podsolic soils on upper slopes.

The Theresa Park Soil Landscape is a fluvial unit associated with Tertiary and Quaternary flood plains and terraces of the Nepean River. Soil types include brown sandy loam, reddish-brown sandy clay, and light clay. Fluvial bedding is sometimes evident, and their sand-rich nature is reflected in typically higher permeability and low available water holding capacity. These soils can be prone to waterlogging, erosion, hardsetting surfaces and are generally of low fertility.

4.3 Groundwater

A detailed groundwater study was not undertaken in the site area as part of this study. However, a groundwater investigation was recently undertaken in the Camden South area adjacent to the Menangle Park site, which has a similar hydrogeological setting (AWT, 2001). The study indicated that there were two distinct groundwater settings in that area:

1) groundwater within Wianamatta Group shale; and

2) groundwater within unconsolidated Quaternary deposits of the Nepean River flood plain.

Groundwater flow in unconsolidated Quaternary deposits is likely to be by porous flow in sandy horizons. Shales of the Wianamatta Group on the other hand have a very low intrinsic permeability, and groundwater flow is likely to be dominated by fracture flow.

Water levels in the hill areas underlain by shale are typically shallow (2 - 3 m below ground level), and groundwater is brackish to saline (total dissolved solids (TDS) of 4000 - 5000 mg/L), with the dominant ions being sodium and chloride. The water is generally unsuitable for livestock or irrigation. Elsewhere in the Western Sydney area, bores sunk in Wianamatta Group have typically low yields (< 1 L/s) and produce hard, saline water. Old (1942) reported TDS values of up to 31, 750 mg/l in groundwater derived from Wianamatta Group in the Sydney region. The water table on the flood plain is deeper (8 - 9 m below ground level) and groundwater is typically fresh (TDS < 500 mg/L), dominated by sodium and bicarbonate ions.

A search of groundwater bore data through the Department of Infrastructure Planning and natural Resources (DIPNR) shows 35 registered bores within a 5 km radius of Menangle Park, only three of which lie within the study area. These three bores, completed in 1966, are located to the west of the Menangle Park Village in the vicinity of the race track, in an area largely underlain by Quaternary alluvial soils. Summary drill logs for those bores indicate between 19 and 22 metres of unconsolidated alluvial sediments overlying shale bedrock. Standing water levels ranged between 2.4 and 6.0 m below the ground surface at the time of construction. No water quality data are available for those bores. Results of the groundwater bore search, including bores outside the site, but within 5 km of Menangle Park are included in Appendix F.

Historical accounts of the farmland area south of Menangle Road formally occupied by Thomas Vardy (in the mid-1800s) refer to several springs in that area (see Non-Indigenous Heritage Study). The springs are likely due to shallow groundwater discharge from above a low permeability shale or sandstone unit towards the top of the Ashfield Shale. These springs occur within an area underlain by shales of the Wianamatta Group known to contain typically saline groundwater and are therefore expected to yield brackish to saline water. This is consistent with a recent study by GHD (2003) that recorded brackish to saline water in a stream that feeds into the dam at 293000 mE, 6223250 mN (MGA).

The shallow water table and saline groundwater associated with the areas underlain by shale are a concern with regard to salinity issues on the site. If the water table rises, or the surface level is lowered by excavation, saline groundwater can come into contact with plant root systems and infrastructure with the potential to cause extensive damage to buildings, pavements, vegetation and associated ecosystems. Given that the last 2 to 3 years have been characterised by below average rainfall conditions, future increases in groundwater levels due to increased rainfall are considered likely and subsequent salinity problems associated with saline groundwater seeps and capillary rise are considered possible. Salinity potential and management options are discussed further below.

5. METHODS AND FIELD OBSERVATIONS

5.1 Field Sampling Procedures

In total 74 test pits were excavated using a backhoe for the purpose of soil profile logging and sample collection. Test pit locations were selected in order to obtain as even a coverage across the site as possible within the constraints of site accessibility and Aboriginal Heritage sensitivity. Forty one of the test pits were excavated to 1 m and the remaining 33 test pits were excavated to 3 m below the surface or prior refusal. Soil samples were collected at nominal depths of 0.5 m, 1.0 m, 1.5 m, 3.0 m and at test bore termination. Test pit locations are shown in Drawing 5 and listed with MGA coordinates in Table B1 (Appendix B).

Samples were collected using stainless steel hand tools. Environmental sampling was undertaken by an experienced and qualified environmental scientist, and performed according to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on DP chain of custody sheets, and the general sampling procedure comprised:

- Decontaminating all sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to collecting each sample;

- Transferring samples into laboratory-prepared glass jars (soil) or glass and plastic containers (water), and capping immediately;
- Labelling sample containers with individual and unique identification, including project number and sample number;
- Collecting an additional replicate set of soil samples in sealed plastic bags for visual identification and records purposes;
- Collecting 10% replicate samples;
- Placing the samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Transporting the replicate bag samples to the DP laboratory under ambient conditions for storage.

Samples were analysed at the NATA accredited Société Générale de Surveillance (SGS) laboratory.

5.1.1 QA/QC and Sampling Plan

In essence the objective of the QA/QC plan is to ensure that the sampling and analytical programme complies with project requirements which call for accuracy, precision and repeatability in both field and laboratory work such that the results achieved enable statistical evaluation of results based on sampling density and distribution.

As a standard practice, DP obtain field duplicates at 10% of all sampling undertaken and submit field QA samples for analysis as required in the specification. Accordingly, DP have submitted appropriate numbers of field replicates to the analytical laboratory and these have been included in the total number of samples to be analysed for the programme. [Note: In view of the consistent results obtained from all replicate pairs which result in acceptable RPD values in all cases it is considered that analysis of trip blank and rinsate are not required.]

All samples were delivered to the NATA laboratory within the required holding times for the analytes. Sample were placed in pre-cleaned glass jars certified and supplied by the laboratory specifically for the project.

In addition, the analytical laboratory conducts rigorous internal QA/QC programmes to ensure analytical precision, accuracy and repeatability. As a matter of routine the following QC samples are analysed by the laboratory in each analytical run:

5.1.2 Reagent Blanks

A reagent blank sample is prepared and analysed at the beginning of every analytical run involving preparation/extraction/digestion procedures. One reagent blank is analysed after every 20 samples following calibration of the analytical apparatus.

5.1.3 Spike/Recovery

Spike/recovery samples are prepared by adding a known amount of a particular analyte or analytes prior to analysis, and then treated in exactly the same manner as all other samples. When insufficient sample is available to prepare a spiked sample, another known soil may be used. One spiked sample is prepared after each 20 samples.

5.1.4 Duplicate

A second portion of the sample being analysed which is treated the same as the other samples in the batch is analysed as a laboratory duplicate. Frequency is one per 15 samples.

5.1.5 Control Standards

A standard prepared to be within the analytical range of the run which is not part of the calibration procedure. One control standard is included in each run, immediately after the calibration procedure to check validity.

5.1.6 Additional QC Samples

A calibration standard and blank are run after every 10 samples to check ongoing equipment calibration validity.

5.1.7 Surrogate

Comprises an analogue of the analyte group being determined which is added prior to extraction. The recovery is determined as part of the analysis.

5.1.8 Internal Standards

An analogue of the analyte group being determined which is added after extraction and prior to analysis. The recovery is determined as part of the analysis, the ratio of the response to expected result is used to correct the analytical result.

5.1.9 Relative Percent Difference

A measure of the consistency of results is derived by the calculation of relative percentage differences (RPDs) for replicate samples. Generally, an RPD of ±30% is considered acceptable by the EPA, however, certain exceptions apply. RPDs were calculated using the heavy metal concentrations (other contaminants were below detection for most samples) for replicate samples and their respective original samples (Table B3, Appendix 2). In all cases RPDs are less than 30%.

5.2 Field Work Observations

Test pits excavated on the south side of Menangle Road, i.e. in the southern region of the site (refer to Test Pit Reports 4, 5, 9, 10, 14, 15, 20, 21, 103, 104, 108, 111), generally encountered a topsoil layer 0.1 - 0.3 m thick, overlying a sandy layer (including silty sandy clay, clayey sand, and sandy clay). Filling was observed at one location, Test Pit 16, which was 0.4 m thick and consisted of silty sandy clay with gravel, cobbles, tiles and slag. The observed geology was consistent with the extent of Quaternary deposits of quartz and lithic fluvial sand, silt, and clay, as shown on the Sydney 1:100 000 Geological Series Sheet.

Test pits excavated in the central region of the site (refer to Test Pit Reports 18, 23, 25, 27, 28, 31, 32, 33, 34, 35, 36, 39, 40, 43, 50, 100, 101, 102, 112, 113) typically encountered silty clay, and silty sand. Test Pits 18, 23, 25, 27, 28, 31, 35, 39, 43, 50, 100, 102, 113 generally encountered a 0.2 - 0.3 m thick topsoil layer overlying silty clay. Filling was observed at one location, Test Pit 28, which was 2.5 m thick and consisted of silty clayey sand and sandy clay with gravel, tiles, plastic pipe and metal fragments. Test Pits 24, 32, 33, 34, 36, 39, 40, 50, 101, 112 generally encountered a 0.1 - 0.5 m thick topsoil layer overlying clayey sand. The observed geology was consistent with the extent of Bringelly and Ashfield Shale of the Wianamatta Group, and high level alluvial deposits, as shown on the Sydney 1:100 000 Geological Series Sheet.

Test pits excavated in the southwest region of the site (refer to Test Pit Reports 11, 16, 22, 29, 47, 87, 106, 109, 110, 116) generally encountered a 0.15 - 0.4 m thick topsoil layer overlying silty clay, ranging from 0.5 - 1.2 m thick. A very low to low strength grey siltstone with some ironstone banding was often encountered below the silty clay. The observed geology was consistent with the extent of Bringelly and Ashfield Shale of the Wianamatta Group, as shown on the Sydney 1:100 000 Geological Series Sheet.

Test pits excavated in the northeast region of the site (refer to Test Pit Reports 59-61, 63, 64, 70-74, 79-83, 86, 88-99, 105, 107, 115) generally encountered a 0.15 - 0.8 m thick topsoil layer overlying silty clay. Low to medium strength sandstone boulders were encountered in Test Pits 81 and 98. The observed geology was consistent with the extent of Bringelly and Ashfield Shale of the Wianamatta Group, as shown on the Sydney 1:100 000 Geological Series Sheet.

The depth to groundwater was inferred from some of the test pits situated on the southern side of Menangle Road. Soil samples exhibiting a wet texture were observed from 0.7 - 2.0 m.

Representative photographs of test pits are included in Appendix C (Plates 1 – 9) and details of the conditions encountered are presented in the test bore report sheets included in Appendix D, together with notes defining classification methods and descriptive terms.

5.3 Electromagnetic Survey

5.3.1 Rationale

In view of the substantial size of the investigation area (920 ha), salinity assessment by soil sampling alone would not be effective as it would be difficult to identify, extrapolate or adequately assess trends in salinity resulting from geological or geomorphological features (possibly narrow) such as geological boundaries, palaeochannels or present drainage systems.

A “continuous” measurement system was required which would intersect expected westerly trends of palaeochannels and present drainage systems, other trends and boundaries of other features which may impact on the salinity assessment. An electromagnetic (EM) survey method was chosen for this purpose, allowing rapid “continuous” measurement of

apparent ground conductivity. Such methods have gained widespread use and acceptance as components of salinity studies and are referred to extensively in recent publications (e.g. Spies and Woodgate, 2004).

The EM survey results, upon calibration with salinity data obtained from soil sampling, provide the basis of an apparent salinity map over the study area. Initially, principal survey lines were proposed running north-south at 200 m spacings, with east-west tie lines at 750 m spacings. At the request of the Project Principal, taking into consideration that the objective of the assessment was to provide an outline evaluation for planning purposes, the principal line spacing was revised to 400 m. This spacing was considered the maximum spacing capable of interpolation and mapping of trends and features for the purposes of the investigation.

5.3.2 Ground Conductivity Profiling

Ground conductivity profiling is an EM survey method which employs a transmitter coil above the ground surface to generate an electromagnetic field and induce subsurface current flow in electrically conductive materials. A receiver coil measures the secondary EM field generated by the ground current and the strength of this secondary field, measured in the frequency domain, is converted to an apparent ground conductivity. Apparent ground conductivity is variously referred to as ground conductivity, terrain conductivity, bulk conductivity or bulk electrical conductivity and is designated herein as ECa.

This apparent conductivity is a response to all electrically conductive materials within the depth of investigation and footprint of the EM system, and does not discriminate between sources such as saline soil, groundwater, clays and other conductive minerals, and buried metallic objects. However it has been estimated (Baden Williams in Spies and Woodgate, 2004) that in 75 - 90% of cases in Australia, apparent conductivity anomalies can be explained by the presence of soluble salts. Apparent conductivity can therefore be considered, in the majority of cases, a good indicator of soil salinity.

5.3.3 EM System Employed

For this investigation, the following equipment was employed:

- Geonics EM31 Ground Conductivity Meter with digital output;

- Fugro Omnistar Differential Global Positioning System (DGPS);
- Psion data logger; and
- 4WD quad bike.

The EM31 was mounted 1 m above ground surface in a non-conductive frame cantilevered 0.5 m from the side of the quad bike (similar to the configuration shown in Plate 10, Appendix C). The system was operated in the vertical dipole (horizontal coil) mode with a coil separation of 4 m, for a depth of investigation of up to 6 m. In this configuration approximately 50% of the system response arises within a depth of 3 m below the coils (i.e. from material at depths of up to 2 m below ground surface). Other EM systems and configurations can be employed for greater near-surface resolution, however a system with 50% response to material within 2 m of surface was considered highly appropriate given excavation for proposed urban development is likely to extend to those depths.

Psion software controlled the EM31 measurements and logged apparent conductivities at 1 second intervals together with MGA94 coordinates of the measurement locations, as the bike proceeded along the survey lines. Raw GPS data as well as differential correction data, were received by satellite at a combined antenna mounted on the quad bike near the centre of the EM31 coils. On completion of each half day of profiling, data were uploaded from the Psion data logger to a laptop for subsequent processing.

In the central eastern part of the investigation area, both north and south of a tree-lined watercourse, many small farm paddocks were encountered, the gates to which were often locked. In this area the quad bike system could not be employed and the EM31 was hand carried along a single north-south profile linking previous quad bike profiles. Positioning was achieved with a hand carried Garmin 12 GPS receiver, and both apparent conductivities and MGA station coordinates were logged to a field book for subsequent processing.

5.3.4 Quad Bike Effects

The radiation pattern of the EM31 transmitter coil is not completely unidirectional, and secondary fields will be generated in close adjacent conductors as well as subsurface conductors. The metallic mass of the quad bike therefore has an effect on the apparent ground conductivity reading. To determine the magnitude of this effect, data were acquired on a series of trial profiles obtained in the absence of the bike, with the bike present and with the bike present and the motor running. Results are presented in Drawing 6.

Profiles in the absence of the bike were highly repeatable and profiles in the presence of the bike were also highly repeatable, however, a steep gradient in apparent conductivity was produced within a distance of 2 m from the side of the bike. The non-conductive mounting system for the EM31 is constructed with an adjustable cantilever distance and was fixed for the investigation at a distance of 0.5 m, leading to an apparent conductivity contribution (bike effect) of 20 milliSiemens/m (mS/m) or 0.2 deciSiemens/m (dS/m). Reduced effects could have been obtained at greater cantilever distances, however 0.5 m was maintained for optimum physical stability and minimum total vehicle width for passing through the numerous gates throughout the investigation area. At this cantilever distance, a correction of -20 mS/m was applicable to all apparent conductivities obtained from the quad bike.

5.3.5 Data Processing and Map Compilation

Raw field data were regularly uploaded to a laptop in ASCII file format. Files were then opened as spreadsheets in Excel, for initial graphical display of DGPS coordinates (plan of data point locations) and EM31 profiles (ECa versus distance along line). Macros were run to enable line detection and calculation of average station spacings and line lengths. During the 3 day investigation, 23 000 data points were obtained on 55 profiles totalling 46.5 line kilometres, with an average station spacing of 2.0 m. These data are available in digital format on request.

Drawings 7 and 8 show, respectively, one of the ECa profiles obtained from the quad bike and the only ECa profile obtained on foot. The latter profile shows smoothly varying raw data, with a conductivity anomaly (80 - 90 mS/m high) between chainages 460 m and 560 m, unrelated to the wire strand fences shown. The former profile shows similar anomalies with a superimposed noise envelope of ±5 mS/m (±0.05 dS/m) due to bumping and vertical movement of the quad bike and EM31 coils. Although this noise envelope is of small amplitude, all data were filtered with a 5-point running average prior to further processing.

Filtered ECa data were expressed in dS/m for consistency of units with salinities (ECe) calculated from $EC_{1:5}$ measurements on test pit soil samples. Both ECa and ECe data sets were then opened in the MapInfo/Vertical Mapper GIS environment for spatial analysis and display in conjunction with digital basemaps provided by Council. Basemaps included cadastral, airphoto and surface levels, georeferenced in the AGD94/MGA94 coordinate system.

Drawing 9 shows the soil sample locations annotated with test pit numbers and salinities (dS/m), together with a colour spectral image of salinity produced by interpolation and gridding of the relatively widely spaced ECe data. The maximum ECe value of 4.23 dS/m is represented by the red end of the spectrum and relative salinity highs are visible as green to orange zones (1 - 4 dS/m) within a generally dark blue to light blue background (<1 dS/m).

Drawing 10 shows the EM31 profiles (track of the quad bike). The exact overlay of the bike track on roads and narrow tracks visible on the basemap and airphoto demonstrates the ±1 m accuracy of the (un-edited) DGPS data.

Using interpolation and gridding methods identical to those used in construction of the soil sample ECe image, ECa data were also processed and displayed as a colour image in Drawing 10. The maximum ECa value of 184 mS/m is at the red end of the spectrum and relative conductivity highs are visible as green to red zones (75 - 184 mS/m) within a generally dark blue to light blue background (< 75 mS/m).

Resulting images (Drawings 9 and 10) showed very similar patterns and trends such as:

- uniformly low salinities and conductivities from the Hume Highway west through the Menangle Park village and further west and northwest across the Nepean River floodplain area; and
- local relative salinity and conductivity highs southeast of the village, northeast of the village and north of the railway.

The similarity in salinity and conductivity distributions of Drawings 9 and 10 and the lack of linear trends indicated that conductivities were not responding to palaeochannels, geological boundaries or other deep features that would typically give false indications of soil salinity. As a result, it was considered valid to use the much higher along-line density and greater spatial extent of ECa data to represent the soil salinities within the investigation area.

To obtain the best estimate of the true absolute values of soil salinities represented by the data, ECe values calculated for the soil samples were plotted against filtered ECa values, for the conductivity measurement point closest to each sample location. The resulting correlation plot (Drawing 11) shows a general correlation between salinity and conductivity,

with a scale factor of 1.4279 applicable to the ECa values to estimate ECe. The scatter in the correlation plot is considered due to the diverse "sample" volumes, since ECe values are obtained from single, small soil samples and ECa values are bulk measurements over a subsurface volume, effectively integrating numerous soil samples, potentially of various types and textural factors. In addition, the proximity of samples to conductivity profiles varied from 0 to 315 m for plotted points.

The general correlation was considered sufficient to allow scaling of all ECa values to apparent salinities (ECe estimates), without any changes in the patterns or trends common to both raw data sets. Re-scaled and gridded apparent salinities were first displayed as a colour image (Drawing 12) with spectral divisions selected to best demonstrate the salinity distribution as percentiles of the total ECe data set. It can be seen from this drawing that 75% of the data obtained has been inferred to have a salinity less than 0.88 dS/m. Areas of inferred higher salinity (25% of the data set with ECe of 0.88 - 3.42 dS/m) lie southeast and northeast of the Menangle Park village.

Next, the same data were displayed with spectral divisions and contours representing changes in apparent salinity of 1.0 dS/m, to best demonstrate absolute values of apparent salinity and the extent of salinity classes (Drawing 13). The highest apparent salinities are shown in yellow and orange on Drawing 13 and correspond to slightly saline soils (2 - 4 dS/m) as defined by DIPNR.

Finally, in Drawing 14 the 1 dS/m and 2 dS/m contours were separated from the apparent salinity image for direct overlay on the basemap and clear demonstration of the limited areal extent of the inferred slightly saline soils (within the 2 dS/m closed contours). These closed contours exactly overlie the areas of highest conductivities on all images derived from the EM31 profile data and correspond generally to the areas where highest salinities were measured from test pit samples. The samples should be viewed as providing additional data "off line" from the EM profiles and the two data sets should be considered jointly in planning decisions where the extent of slightly to moderately saline soils is critical.

6. LABORATORY TESTING

6.1 Soil Properties

A total of 17 soil samples were analysed for a range of physical and chemical properties to assess potential soil agressivity towards steel and concrete structures, sodicity, dispersibility, and erosion potential. Soil samples were analysed at the NATA accredited SGS laboratory for soil extract pH (1:5), Chloride (Cl 1:5), Sulphate (SO_4 1:5), Exchangeable Sodium Percentage (ESP), and Emerson Class Number (ECN). Soil test results are summarised in Table 1 and a full list of analytical results are listed in Appendix E.

Soil salinity was assessed by determining the electrical conductivity on a 1:5 soil-water extract (EC 1:5 test) for 73 soil samples collected from test pits at a depth of 0.5 metres. These values were then used to calculate an estimated ECe value, using a conversion factor based on textural properties of the soil sample. Laboratory test results for soil salinity, including calculated ECe values are listed in Table 2. The results were used as a direct indication of soil conductivity (and therefore salinity) levels across the site, and to supplement and calibrate apparent soil conductivity data determined in the Electromagnetic Survey. Results are discussed and interpreted in Section 7.

It should be noted that preliminary salinity calculations and mapping were based on an assumption of a uniform silty sand soil type with a textural factor of 14. Final salinity calculations presented herein use logged soil descriptions and corresponding textural factors from 7.5 to 17, with an overall reduction in average calculated salinities.

Table 1 – Results of Laboratory Testing – Physical and Chemical Properties

Test Pit	Depth (m)	Location (GDA 94)		Soil Landscape	Soil Type	pH[1]	Cl[1]	SO4[1]	CEC[2]	ESP[3]	Sodicity[4]	ECN[5]	Dispersibility[6]
		MGA_mE	MGA_mN				mg/kg	mg/kg	meq/100g	%			
4	0.5	292734	6222732	Blacktown	SILTY CLAY	4.8	6	48	21.5	1.3	Non-Sodic	5	Slight
10	0.5	293156	6222892	Blacktown	SILTY CLAY AND SHALE	6.0	10	4.2	12.7	1	Non-Sodic	5	Slight
14	0.5	292633	6223112	Blacktown	SILTY CLAY	5.1	32	29	7.8	**10.7**	**Highly Sodic**	**3**	**Moderate**
23	0.5	292404	6223825	Blacktown	SILTY GRAVEL	6.1	3.2	9.6	4.4	5	Marginally Sodic	N/A	N/A
33	0.5	293097	6224217	Blacktown	SAND	5.7	5.9	4.2	3.6	1.8	Non-Sodic	N/A	N/A
39	0.5	292300	6224516	Blacktown	SILTY SAND	6.4	36	4	1.4	3	Non-Sodic	N/A	N/A
74	0.5	294241	6225265	Blacktown	SILTY CLAY	5.5	570	8.4	26.6	**10.1**	**Highly Sodic**	7	Negligible
83	0.5	292908	6226239	Blacktown	SILTY CLAY	7.0	11	12	30	3	Non-Sodic	5	Slight
88	0.5	292948	6225094	Theresa Park	SILTY CLAY	7.4	260	53	18.6	**14.5**	**Highly Sodic**	**2**	**High**
89	0.5	292809	6225543	Theresa Park	SILTY SAND	5.7	1.5	5.5	2.8	3.1	Non-Sodic	N/A	N/A
92	0.5	293459	6225474	Blacktown	SILTY CLAY	5.6	95	16	25.3	**17.4**	**Highly Sodic**	7	Negligible
99	0.5	293752	6226080	Blacktown	SILTY CLAY	6.2	15	19	29.7	1.5	Non-Sodic	5	Slight
100	0.5	293176	6223915	Blacktown	GRAVELLY SANDY CLAY	6.1	3.2	22	5.3	**21**	**Highly Sodic**	5	Slight
106	0.5	291472	6223632	Theresa Park	GRAVELLY CLAYEY SAND	5.9	2.5	23	7.8	1	Non-Sodic	N/A	N/A
112	0.5	292756	6224811	Blacktown	SILTY SAND	7.0	1.6	2	2.1	2	Non-Sodic	N/A	N/A
113	0.5	293742	6224109	Blacktown	SILTY CLAY	8.2	88	74	31.3	5.7	Marginally Sodic	8	Non-dispersive
116	0.5	292143	6224981	Theresa Park	SAND	5.3	43	2.3	1.8	3.7	Non-Sodic	N/A	N/A

NOTES:
1. Determined on a 1:5 soil:water extract.
2. Cation Exchange capacity
3. Exchangeable Sodium Percent
4. Sodicity Class from Pope and Abbott (1989)
5. Emmerson Class Number
6. Dispersibility from Charman (1978)

Table 2. Electrical Conductivity (Salinity) of Soil Samples

Test Pit	Sample Depth (m)	Location (GDA 94)		EC(1:5) (dS/m)	Soil Factor	ECe[1] (dS/m)	Salinity Class[2]
		MGA mE	MGA mN				
4	0.5	292734	6222732	0.031	8.5	**0.26**	**Non-saline**
5	0.5	293086	6222721	0.036	7	**0.25**	**Non-saline**
9	0.5	292541	6222886	0.046	7	**0.32**	**Non-saline**
10	0.5	293156	6222892	0.033	9	**0.30**	**Non-saline**
11	0.5	291374	6223339	0.018	14	**0.25**	**Non-saline**
14	0.5	292633	6223112	0.046	7	**0.32**	**Non-saline**
15	0.5	293067	6223165	0.140	8.5	**1.19**	**Non-saline**
16	0.5	291557	6223831	0.097	7	**0.68**	**Non-saline**
18	0.5	292424	6223568	0.054	8.5	**0.46**	**Non-saline**
20	0.5	293120	6223475	0.038	8.5	**0.32**	**Non-saline**
21	0.5	293313	6223349	0.120	8.5	**1.02**	**Non-saline**
22	0.5	291936	6223905	0.023	14	**0.32**	**Non-saline**
23	0.5	292404	6223825	0.021	14	**0.29**	**Non-saline**
24	0.5	292522	6223687	0.031	14	**0.43**	**Non-saline**
25	0.5	292616	6223854	0.065	8.5	**0.55**	**Non-saline**
27	0.5	293387	6223831	0.034	8.5	**0.29**	**Non-saline**
28	0.5	292411	6223541	0.120	7	**0.84**	**Non-saline**
29	0.5	291771	6224413	0.023	17	**0.39**	**Non-saline**
31	0.5	292259	6224200	0.032	14	**0.45**	**Non-saline**
33	0.5	293097	6224217	0.034	14	**0.48**	**Non-saline**
34	0.5	293313	6224719	0.015	14	**0.21**	**Non-saline**
35	0.5	293385	6224039	0.042	8.5	**0.36**	**Non-saline**
36	0.5	293479	6224235	0.006	14	**0.08**	**Non-saline**
39	0.5	292300	6224516	0.011	14	**0.15**	**Non-saline**
40	0.5	292557	6224398	0.009	14	**0.12**	**Non-saline**
43	0.5	293890	6224584	0.120	14	**1.68**	**Non-saline**
47	0.5	291972	6225020	0.003	17	**0.05**	**Non-saline**
50	0.5	292492	6224941	0.007	14	**0.09**	**Non-saline**
59	0.5	293121	6225314	0.034	8.5	**0.29**	**Non-saline**
60	0.5	293479	6225314	0.100	8.5	**0.85**	**Non-saline**
61	0.5	293875	6225314	0.054	8.5	**0.46**	**Non-saline**
63	0.5	292885	6225452	0.058	8.5	**0.49**	**Non-saline**
64	0.5	293250	6225516	0.070	8.5	**0.60**	**Non-saline**
70	0.5	293028	6225512	0.049	8.5	**0.42**	**Non-saline**
71	0.5	293479	6225692	0.046	8.5	**0.39**	**Non-saline**
72	0.5	293638	6225553	0.110	8.5	**0.94**	**Non-saline**
73	0.5	293875	6225692	0.041	8.5	**0.35**	**Non-saline**

Notes:

1. ECe calculated from EC(1:5) using soil multiplier factor based on textural characteristics (after Abbott, 1990)
2. Soil salinity class, after Richards (1954)

Table 2 Continued - Electrical Conductivity (Salinity) of Soil Samples

Test Pit	Sample Depth (m)	Location (GDA 94)		EC(1:5) (dS/m)	Soil Factor	ECe[1] (dS/m)	Salinity Class[2]
		MGA mE	MGA mN				
74	0.5	294241	6225265	0.470	9	**4.23**	**Moderately Saline**
79	0.5	293126	6226011	0.100	8.5	**0.85**	**Non-saline**
80	0.5	293468	6226049	0.110	8.5	**0.94**	**Non-saline**
81	0.5	293672	6225902	0.049	8.5	**0.42**	**Non-saline**
82	0.5	293890	6226058	0.110	14	**1.54**	**Non-saline**
83	0.5	292908	6226239	0.048	14	**0.67**	**Non-saline**
86	0.5	293111	6226376	0.051	8.5	**0.43**	**Non-saline**
87	0.5	291522	6223317	0.030	7	**0.21**	**Non-saline**
88	0.5	292948	6225094	0.210	8.5	**1.79**	**Non-saline**
89	0.5	292809	6225543	0.012	8.5	**0.10**	**Non-saline**
90	0.5	293687	6225301	0.057	9	**0.51**	**Non-saline**
91	0.5	293726	6225425	0.072	8.5	**0.61**	**Non-saline**
92	0.5	293459	6225474	0.310	8.5	**2.64**	**Slightly Saline**
93	0.5	293879	6225861	0.036	14	**0.50**	**Non-saline**
94	0.5	293450	6226250	0.290	7	**2.03**	**Slightly Saline**
95	0.5	293101	6226495	0.130	8.5	**1.11**	**Non-saline**
96	0.5	292866	6226684	0.042	8.5	**0.36**	**Non-saline**
97	0.5	294307	6225603	0.060	8.5	**0.51**	**Non-saline**
98	0.5	294400	6226099	0.050	8.5	**0.43**	**Non-saline**
99	0.5	293752	6226080	0.030	9	**0.27**	**Non-saline**
100	0.5	293176	6223915	0.023	8.5	**0.20**	**Non-saline**
101	0.5	292926	6223971	0.014	14	**0.20**	**Non-saline**
102	0.5	292862	6223698	0.048	8.5	**0.41**	**Non-saline**
103	0.5	293241	6223164	0.065	8.5	**0.55**	**Non-saline**
104	0.5	292902	6222857	0.082	8.5	**0.70**	**Non-saline**
105	0.5	293039	6222582	0.076	14	**1.06**	**Non-saline**
106	0.5	291472	6223632	0.015	14	**0.21**	**Non-saline**
107	0.5	293176	6226225	0.091	7	**0.64**	**Non-saline**
108	0.5	292918	6223034	0.110	8.5	**0.94**	**Non-saline**
109	0.5	291561	6222598	0.039	8.5	**0.33**	**Non-saline**
110	0.5	291496	6224084	0.016	14	**0.22**	**Non-saline**
111	0.5	292773	6223236	0.160	8.5	**1.36**	**Non-saline**
112	0.5	292756	6224811	0.016	14	**0.22**	**Non-saline**
113	0.5	293742	6224109	0.260	14	**3.64**	**Slightly Saline**
115	0.5	293298	6226467	0.032	8.5	**0.27**	**Non-saline**
116	0.5	292143	6224981	0.009	17	**0.16**	**Non-saline**

Notes:

1. ECe calculated from EC(1:5) using soil multiplier factor based on textural characteristics (after Abbott, 1990)
2. Soil salinity class, after Richards (1954)

6.2 Soil Contaminants

Soil samples were collected from 74 test pits excavated to a maximum depth of 3 m. Samples were analysed at a NATA accredited laboratory for a range of inorganic and organic contaminants, including heavy metals, total petroleum hydrocarbons (TPH), mono- and polycyclic aromatic hydrocarbons (BTEX, PAH), organochloride and organophosphate pesticides, and phenols. Details of sampling and laboratory QA/QC protocols are listed in Section 5.1.1. A list of samples and analytical schedule is shown in Table B2 (Appendix B). Laboratory results are summarised in Tables 3 and 4 and a full list of analytical results are listed in Appendix E. Replicate sample analyses and calculated Relative Percentage Difference (RPD) values are listed in Table B3.

Table 3 - Summary of Laboratory Results for Metals in Soil Samples

Analyte	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
No. of samples	105	105	105	105	105	105	105	105
QA/QC samples	14	14	14	14	14	14	14	14
Summary of Results (mg/kg)								
Maximum	**22**	**<0.5**	**29**	**45**	**37**	**0.63**	**26**	**180**
Minimum	<3	<0.5	0.8	<0.5	<2	<0.05	0.6	2
Mean (Arith.)[1]	**4.6**	**N/A All <PQL**	**14.1**	**17.4**	**9.2**	**0.04**	**11.4**	**38.7**
Std. Dev.	4.1	N/A	5.8	10.8	5.8	0.08	6.3	28.3
95% UCL[2]	**5.3**	**N/A**	**15.0**	**19.1**	**10.2**	**0.05**	**12.4**	**43.3**
Guideline Investigation levels (mg/kg)[3]								
Provisional Phytotoxicity	**20**	**3**	**400**	**100**	600	**1**	**60**	**200**
Residential with soil access	100	20	120000	1000	**300**	15	600	7000
Residential with Min soil access	400	80	480000	4000	1200	60	2400	28000
Parks and Recreational	200	40	240000	2000	600	30	600	14000
Commercial/Industrial	500	100	600000	5000	1500	75	3000	35000

Notes:
1. Arithmetic mean calculated from all analyses (n = 105), with the value of zero applied to analyses below PQL (Practical quantification limit)
2. The 95% upper confidence level, determined using procedure D of the Contaminated Sites Sampling Design Guidelines (NSW EP, 1995)
3. National Environmental Protection Council (1999), recommended guideline levels are shaded and bold

Table 4 - Summary of Laboratory Results for Organic Contaminants in Soil Samples

Analyte:	Total TPH (C6 – 9)	Total TPH (C10 – 36)	Total BTEX	Benzo (a) pyrene	Total PAH	OP Pesti cides	OC Pesti cides	Phenols
No of samples	34	34	34	34	34	45	45	34
QA/QC samples	4	4	4	4	4	10	10	4
Summary of Results (mg/kg)								
Maximum	**<20**	**400**	**<0.5**	0.1	1.1	**<0.1**	**<0.1**	**<0.5**
Minimum	<20	<20	<0.5	<0.05	<0.1	<0.1	<0.1	<0.5
Mean (Arith.)	**N/A All <PQL**	**N/A**	**N/A All <PQL**	**N/A**	**N/A**	**N/A All <PQL**	**N/A All <PQL**	**N/A All <PQL**
Guideline Investigation levels (mg/kg)								
Sensitive Use[1]	65	1000	N/A[4]	1	20	-	-	-
Provisional Phytotoxicity[2]	-	-	-	-	-	-	-	70
HIL[3]						N/A[5]		

Notes:

1. Guidelines for Assessing Service Station Sites, NSW EPA, 1994
2. National Environmental Protection Council (1999)
3. Health-based Investigation Levels, National Environmental Protection Council (1999)
4. Human health-based protection levels for BTEX compounds are: Benzene 1 mg/kg; Toluene, 130 kg/mg; Ethyl benzene, 50 mg/kg; Total Xylenes, 25 mg/kg; Guidelines for Assessing Service Station Sites, NSW EPA, 1994
5. Health-based investigation levels for selected organophosphate pesticides are: Aldrin + Dieldrin, 10 mg/kg; Chlordane, 50 mg/kg; DDT + DDD + DDE, 200 mg/kg; Heptachlor, 10 mg/kg; Standard Residential sites with garden and accessible soil, National Environmental Protection Council (1999)

7. INTERPRETATION AND DISCUSSION

7.1 Soil Erosion Potential

Soil erosion is the disintegration and transport of soil materials primarily due to action by wind or water. Soil erosion is a natural process but can be accelerated by human activities such as removal of vegetation and earthworks for urban development. The rate and severity of soil erosion is dependent on a number of factors including the soil type, topography, rainfall, organic content of the soil and vegetation cover. The susceptibility of soils to erosion depends on the dispersivity and sodicity of the soils. The dispersivity and sodicity of soils in the Menangle Park Release area were assessed by carrying out the following laboratory tests:

- Emerson Class Test (measure of soil dispersion); and
- Exchangeable Sodium Percentage (measure of soil sodicity).

Laboratory results of these tests are shown in Table 1 (Section 6.1). Emerson Class Tests classify soils into eight categories. With Class 1 being very highly dispersive and Class 8 being non-dispersive. Soils of Emerson Class 1 to 4 should be treated with caution when used in construction. On the basis of Emerson Class Numbers, soils classify as non-dispersive to highly dispersive.

Sodicity is a measure of the exchangeable sodium in the soil. High levels of exchangeable sodium can adversely affect soil structures and crop production and are also associated with high soil dispersion and erodability. Values of Exchangeable Sodium Percent (ESP) indicate non- to highly sodic conditions. High sodicity and moderate to high dispersivity were identified in samples from both Blacktown and Theresa Park Soil Landscapes and are associated with test pit locations in valleys and on mid to lower slopes formed on shale of the Wianamatta Group.

On a regional scale, soils of the Blacktown, Theresa Park, and Luddenham Soil Landscapes are of typically moderate erodibility (K values of 0.024 – 0.039). The more sodic or saline soils of the Blacktown Soil Landscape can have high erodibility and the erosion hazard for this landscape is estimated as moderate to very high with calculated soil losses from newly developed areas of up to 70 t/ha in the first 12 months (Hazelton and Tille, 1990). The soil erosion hazard for the Luddenham Soil Landscape is moderate to extreme for non-

concentrated flows, with a calculated soil loss for the first 12 months after urban development of up to 135 t/ha for topsoil and up to 100 t/ha for exposed subsoil. The soil erosion hazard for the alluvial Theresa Park Soil Landscape is estimated as moderate to high for non-concentrated flow and very high for concentrated flow. Calculated soil losses in the first 12 months of urban development are up to 15 t/ha for topsoil and 25 t/ha for exposed subsoil (Hazelton and Tille, 1990). Key soil properties relevant to the development of a Soil and Water Management Plan, for soil landscapes on the Menangle Park site are summarised in Table 5. Preliminary calculations based on the Revised Universal Soil Loss Equation, assuming a typical site slope length of 30 metres and gradient of 10%, indicate soil loss from disturbed areas with little or no soil cover of approximately 130 t/ha/yr.

Table 5 - Summary of Soil Properties for Soil Landscapes Surrounding Menangle Park

Soil Landscape[1]	Common Constraints[2]	Subsoils: USCS	K-factor[3]	Typical Slope Gradient Range	Soil Type[4]	Effect of Constraints on Earthworks for Urban Development[5]
Blacktown	Poorly drained soils; low permeability; low fertility; localised plastic subsoils with moderate volume expansion; moderate erosion hazard potential.	CL	0.038	0–5%	Type D	Low (0–250 t/ha/yr)
Luddenham	Moderately expansive; low wet strength; locally impermeable and highly plastic clays; moderate to high soil erosion potential on steeper slopes; potential for mass movement.	CL	0.038	5–20%	Type D	Low (0–250 t/ha/yr)
Theresa Park	Localised flooding; seasonal waterlogging; very high soil erosion hazard; low fertility; low available water holding capacity; hard setting surfaces.	Variable	0.039	0–10%	Type F	Low to Extreme (0–3750 t/ha/yr)
Hawkesbury	High soil erosion; high mass movement hazard; steep slopes and rock outcrops; shallow stony, highly permeable soils with low fertility	SM SC CL	0.024 0.033	>25%	Type C Type D Type F	High (501–750 t/ha/yr)

Notes:

1. Soil Landscapes are those of Hazelton and Tille (1990)
2. Common constraints for urban development and agriculture summarised from Hazelton and Tille (1990), and Managing Urban Stormwater: Soils and Construction Manual, NSW Dept. of Housing, 3rd Ed, November 1998
3. The K-Factor, or soil erodibility factor is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. Generally the K-factor ranges from 0.005 (very low) to 0.075 (extreme), and values over 0.04 are considered to represent high erodibility
4. Soil texture group as defined in Managing Urban Stormwater: Soils and Construction Manual, NSW Dept. of Housing, 3rd Ed, November 1998
5. Soil loss classes are based on calculated potential loss for exposed soils, adapted from Morse and Rosewell (1996). The groupings assume that a soil loss of 37.5 tonnes/ha per fortnight (975 t/ha/yr) can be managed adequately using conventional erosion and sediment control techniques

7.2 Slope Instability

Thick residual soil profiles of the Blacktown and Luddenham Soil Landscapes can be prone to slope instability due to slumping and soil creep, particularly on steep south-facing slopes underlain by shale. The high clay content of these soils results in poor drainage and therefore reduced cohesion during periods of high rainfall or where natural drainage has been disturbed by development. Instability due to slumping is typically associated with thick soils and slopes in excess of 11 - 20º (or greater than a 20% gradient; Fell, 1985).

The majority of naturally occurring slopes in the site have a gradient of less than 15% and therefore slope instability is considered to be unlikely. Based on the current land use, the consequences to property of a landslip would likely be minor, and the overall landslide risk over the majority of the Menangle Park release is therefore considered to be low to very low. An area surrounding a prominent hill in the south east of the site, adjacent to the Hume Highway (MGA 293200 mE, 6223000 mN), has south-facing slopes in excess of 15%. Although no signs of slope instability were noted, future slope instability through earth slide or flow is considered possible and the area represents a low to moderate instability risk. It should also be noted that any existing or future excavations on the site that produce slopes with steeper gradients, or that alter the natural drainage, may be prone to instability.

Both soil landscapes are considered to have high capability for urban development provided adequate provisions are made for foundation design, flooding and soil erosion/sedimentation and slope stability on a site basis.

7.3 Soil Salinity

Soil salinity is the accumulation of soluble salts in the soil, surface waters or near surface groundwater which can lead to serious land degradation, damage to building and paving materials, or a decline in water quality. In the Western Sydney area, salinity is generally associated with areas underlain by shales of the Wianamatta Group (which contain abundant connate salt) but can also occur in Quaternary and Tertiary sediments.

Reference to the Salinity Potential in Western Sydney 1:100,000 sheet (DIPNR, 2003), indicates that the site has a moderate to high salinity potential. This implies that within the Menangle Park Site area, any high soil and groundwater salinity or associated indicators (scalds, salt tolerant vegetation) are likely to be associated with drainage systems and converging slopes within the Blacktown and Theresa Park Soil Landscapes.

Initial walk over assessments have identified several indicators of salinity including salt tolerant species and saline scalds in drainage areas, and evidence of minor salt damage to some buildings on the site (GHD, 2002). Salinity investigations in this study have involved a review of existing information and an electromagnetic survey combined with soil salinity measurements to identify areas of relatively high salinity. Absolute values of salinity however have been found (after detailed soil texture corrections) to indicate generally non- to slightly saline soil conditions across the site, despite the moderate to high salinity potential indicated by the DIPNR map.

Measurements of soil conductivity (from EC 1:5 measurements on 73 soil samples) are listed in Table 2. Calculated ECe values for all soil samples define a log-normal distribution with most samples being classified as non-saline (0 – 2 dS/m). Three samples are classified as slightly saline (2 – 4 dS/m; see Drawing 15) and one sample is classified as moderately saline (4 – 8 dS/m; test pit 74). In general, non-saline conditions and low ECe values are observed in soils associated with alluvial deposits, and more elevated values (including slightly to moderately saline samples) are observed in areas underlain by shale, consistent with results from the EM31 survey, discussed below. Salinity profile measurements were not conducted in this study, however, a groundwater and soil investigation conducted in the Camden South area, adjacent to Menangle Park showed that soil salinity generally increased with depth (AWT, 2001). The study concluded that the elevated salinity of subsoil in that area is likely due to shallow saline groundwater in the areas underlain by shale.

An apparent salinity map of the Menangle Park site was developed by calibrating EM31 conductivity measurements against soil salinity measurements and gridding the calibrated data (Drawing 13). The apparent salinity image and contours indicate (following the salinity classification of Richards, 1954) that:

- generally non-saline conditions prevail in the central and western parts of the site underlain by Tertiary and Quaternary alluvial deposits; and

- slightly to moderately saline conditions are associated with some drainage lines within the more elevated areas to the north and south that are underlain by shales of the Wianamatta Group.

The highest apparent salinity values (equating to slightly to moderately saline conditions) tend to occur in drainage areas within the Blacktown and Luddenham Soil Landscapes. Their locations are therefore generally consistent with known salinity indicators on the site. Buildings, pavements and vegetation in these areas may therefore be prone to salt related damage and a range of management options are recommended in the following section.

7.4 Acid Sulphate Soil Risk

Acid sulphate soils are typically associated with low-lying coastal areas, including estuarine flood plains, rivers and creeks. The location and elevation of the site (> 60 m asl) are such that the risk of acid sulphate soil may be considered negligible. An assessment of soil samples collected across the site revealed no potential or actual acid sulphate soil material.

7.5 Soil Aggressivity to Buried Structures

Chemical conditions in soil and groundwater can lead to corrosion and/or disintegration of buried concrete and steel structures and structural weakening over time. Soil and groundwater with high sulphate contents can be aggressive towards concrete structures, whereas high chloride and acidic conditions can be aggressive towards steel reinforcing material.

Seventeen soil samples from the Menangle Park Release area were analysed for chloride, sulphate, and pH, and results are shown in Table 1 (Section 6.1). The exposure classification for concrete piles, based on Australia Standard AS 2159-1995, is shown in Table 6 below. Laboratory results indicate that soil conditions are likely to be non aggressive to moderately aggressive towards concrete structures and non aggressive to mildly aggressive towards iron and steel.

Table 6. Aggressivity classification for concrete piles (AS 2159-1995)

Sulphate (as SO_3)[1]		pH	Chloride in water (ppm)	Soil Conditions[2]	
In Soil (%)	In Groundwater (ppm)			A	B
<0.2	<300	>6.5	<2000	Non-Aggressive	Non-Aggressive
0.2 – 0.5	300 – 1000	5 – 6	2000 – 6000	Mild	Non-Aggressive
0.5 – 1.0	1000 – 2500	4.5 – 5	6000 – 12000	Moderate	Mild
1.0 – 2.0	2500 – 5000	4 – 4.5	12000 – 30000	Severe	Moderate
>2.0	>5000	<4	>30000	Very Severe	Severe

Notes:
1. Approximately 100 ppm SO_4 = 80 ppm SO_3
2. Soil Conditions; A = high permeability soils that are below groundwater; B = low permeability soils, or all soils above groundwater.

7.6 Soil Contamination

Potential and actual soil contamination on the site has been evaluated in a preliminary assessment by DP. The assessment comprised a site inspection, review of land use history at the site and laboratory analysis of soil samples collected from test pits. In the context of a land capability assessment, the preliminary assessment undertaken in this study was done in accordance with the guiding principals of SEPP 55. It should be note however that further site specific contamination investigations may be required for individual lots prior to their development, depending on individual site characteristics and land-use history.

7.6.1 Potential for Contamination

Based on available information, potential contaminants could arise on the site from a number of sources including:

- Contaminated filling used to raise or form the site platforms;
- Landfilling of waste material;
- Application of pesticides;
- Storage of chemicals;
- Movement of contaminated groundwater beneath the site;
- Asbestos in filling materials, soil or sediments;
- Septic tanks; and
- Other contaminants on the site.

Several areas were highlighted as having a moderate potential for contamination based on current or past land use and/or anecdotal evidence. Where possible test pits were located within or adjacent to these areas to assess contamination levels. The areas of potential contamination noted during the site investigation included:

- The old fireworks factory site, Lot 59, DP 10718 Cummins Rd, Menangle Park (Drawing 16). Soil at the site contains asbestos cement sheet fragments from the demolition of site buildings and it is understood that waste products associated with fireworks manufacturing were buried on the site. A detailed contaminated site assessment and a remediation action plan have been prepared by Charlie Furr of Consulting Earth Scientists. It is understood that the contaminated area coincides with a sand extraction area and that remediation is likely to be addressed as part of the sand extraction process prior to development. The site is currently the subject of a site audit and is not covered by the current assessment;
- Lot D, DP 19853, a former farm shed, thought to have asbestos sheet roofing (Drawing 16). This site is in the vicinity of a possible heritage area (refer references to 'Portion 2' in Casey and Lowe Non-Indigenous Heritage Study taken from Menangle Park project web site dated December 2003, pages 62, 63, 74 and 75). Remediation of the site is to be undertaken by Landcom following further advice from APP/Council on any additional heritage work required as part of LES/LEP. The site is contained within a secure paddock;
- Areas of cut and fill associated with Sydney Gas extraction plants, pipes and gas flares adjacent to the Nepean River;
- Refuelling station, sand stockpiles, and disturbed ground associated with sand mining operations adjacent to the Nepean River;
- Various properties used for agricultural purposes; possible pesticides; fuels, uncontrolled landfill;
- Pindone bait has been laid for rabbits on at least one site on Cummins Road, Menangle Park; and
- Glenlee Olive Estate.

7.6.2 Site Assessment Criteria

Given that the site may be developed for residential purposes with accessible soils, the recommended guideline levels are the lower of Health based investigation levels for residential sites with access to soil, including cultivation of home-grown produce and the provisional phytotoxicity based investigation levels (NEPC, 1999).

7.6.3 Interpretation of Laboratory Results

A total of 119 soil samples were analysed for selected heavy metals, including 14 duplicate samples for QA/QC purposes. All samples except sample 91/1.5 were found to contain heavy metal concentrations below the adopted guideline levels. Sample 91/1.5 showed marginally elevated levels of arsenic (22 mg/kg) compared to the adopted guideline level (20 mg/kg; provisional phytotoxicity based investigation levels). However, it is noted that the mean and upper 95% confidence limit values for all arsenic analyses are well below the guideline level and all analyses fall within the range of natural background levels of arsenic in soil. The exceedance in sample 91/1.5 is therefore considered to represent locally elevated background levels and not indicative of significant contamination on the site. Levels of most metals vary across the site, with higher levels observed in soils underlain by shale (Blacktown Soil Landscape) and generally lower background levels associated with soils developed on alluvial deposits (Theresa Park Soil Landscape).

A total of 34 samples were analysed for total petroleum hydrocarbons (TPH) and monocyclic aromatic hydrocarbons (BTEX compounds), including 4 duplicate samples for QA/QC purposes. Levels of these compounds were found to be below their respective practical quantification limits (PQL) in all samples except the level of TPH in sample 87/0.5. Sample 87/0.5 was collected from a test pit located in an area of disturbed ground near sand mining operations in the south west of the site and was found to contain slightly elevated levels of petroleum hydrocarbons (260 mg/kg C_{15}–C_{28}, 140 mg/kg C_{29} – C_{36}). These levels are however below the relevant guideline levels (1000 mg/kg C_{10}–C_{40}; Guidelines for Assessing Service Station Sites, NSW EPA, 1994).

Polycyclic Aromatic Hydrocarbons were found to be below practical quantification limits (PQL) in all samples except 28/0.5 and 43/0.5. These samples showed trace amounts of a number of PAH's including benzo(a)pyrene and pyrene but at concentrations well below the relevant guideline levels. Forty five samples were analysed for Organophosphate and

Organochloride pesticides including 10 samples for QA/QC and 34 samples were analysed for Phenolic compounds, including 4 for QA/QC. Organophosphate and Organochloride pesticides and Phenols were found to be below the practical quantification limits (PQL) in all samples.

In summary, based on the limited sampling undertaken in this study, there is no evidence for significant widespread or diffuse contamination across the site. Low levels of aliphatic (chain) and polycyclic aromatic hydrocarbons were detected in three samples associated with disturbed ground or imported fill, indicative of local minor contamination but the observed concentrations were well below the relevant guideline levels.

It should be noted that more localised contamination may occur due to past and present activities conducted at a specific site. It is recommended that site specific evaluation should be undertaken at the time of development. For sites that are identified to have an elevated potential for contamination, more detailed, site specific assessment should be conducted at the time of development. One such site, the old fireworks factory site on Cummins Road is the subject of a site audit and is currently being remediated.

7.7 Land Use Implications

On the basis of an initial assessment of soil erosion and sedimentation hazards and slope stability, it is considered that urban or rural-residential development is generally feasible over most of the site that is outside flood prone areas. However, the study also highlights some areas that may have issues related to soil salinity, soil erodibility, slope stability and contamination.

Zones of moderate soil erosion and low to moderate slope instability risk are restricted to the steeper slopes in the south west of the site and any excavated areas that expose the soil and/or create steep embankments. Management strategies for building in areas of low to moderate slope stability and soil erosion risk are outlined in the Soil and Water Management Plan (Section 8.4).

Areas of slight salinity risk occur along drainage lines and lower breaks of slope in hill areas formed on the Wianamatta Group. Groundwater investigations on an adjacent site have

identified saline groundwater at shallow levels in these areas indicating that saline conditions may be exacerbated by fluctuating groundwater levels or deep excavations. Saline soil and groundwater can cause significant degradation of buildings and pavements and will ultimately reduce the lifespan of these structures and add significantly to infrastructure maintenance costs. It is recommended that urban development be avoided in these areas if possible, or that appropriate salinity management strategies be implemented.

It is anticipated that localised areas of contamination may occur that are related to past activities such as uncontrolled tipping and filling, chemical storage and disposal, pesticide use, and disposal of material containing asbestos. It is suggested that further investigations may be required to determine the nature and extent of contamination on a site by site basis.

8. MANAGEMENT MEASURES/CONTROLS

8.1 Salinity

The electromagnetic survey carried out as part of this assessment combined with field observations indicate that approximately 90% of the site has non-saline soils and that approximately 10% of the site has slightly saline soils or (rarely) moderately saline soils. The areas of slight salinity include drainages and lower breaks of slope in hill areas formed on shales of the Wianamatta Group. Because of the potential for increased salinities with elevated groundwater levels, it is recommended that urban development be avoided in these areas. However, if these areas are to be developed, appropriate verification assessment should be undertaken to verify the site specific salinity and if required, site specific management measures should be adopted, including the following:

- The use of appropriate road and pavement construction techniques, including the use of sulphate resistant cement and adequate coverage of reinforcing materials;
- Avoid excavation particularly in lower slope areas. Where possible raise road embankments and use adequate drainage;
- The use of appropriate building and landscaping methods including use of damp proof courses in buildings, salt resistant bricks, and sulphate resistant cement;

- Adequate drainage on each building site. Excavation should be minimised and imported fill should be non-saline;
- Building and road construction should be undertaken in accordance with the Building Code of Australia and appropriate Building Standards related to control of moisture and salinity (e.g. AS1547-2000, AS2159, AS4419, AS3798, AS3360, AS3700, AS2870, AS3600); and
- In particular, it is recommended that a hydrogeological assessment be undertaken to determine the potential impact of proposed cut/fill activities on groundwater levels and soil salinity.

8.2 Contamination

A preliminary contamination assessment has found that contaminant levels across the site are generally low and do not restrict development of the site for residential purposes. However, it is possible that localised contamination occurs in relation to specific previous site usage, including uncontrolled tipping and filling, chemical storage and disposal, pesticide use and disposal of material containing asbestos. It is suggested that further assessment be undertaken on a site by site basis as indicated below:

- Prior to the development of each land parcel or site, a preliminary contamination assessment comprising a site inspection and review of previous land uses should be undertaken. If no potential contaminants or potentially contaminating landuse is identified, then further action may not be required;
- If potential contamination is identified, further assessment may be required. This would normally involve soil and/or groundwater sampling and analysis to determine the nature and extent of contamination at the site;
- Any asbestos material identified would have to be removed or otherwise remediated using appropriate procedures; and
- Any uncontrolled fill or waste material would need to be assessed and (depending on the nature of the fill or waste material) removed or otherwise remediated using appropriate procedures.

8.3 Development on Hill Slopes

Slopes on most of the site area are typically gentle to moderately inclined and do not significantly restrict urban development. One possible exception is an area with moderately steep slopes in the south east part of the site, adjacent to the Hume Highway. Those slopes are considered to represent a low to moderate landslide risk. We suggest a lower housing density in the steeper areas to allow for larger building envelopes and that any engineering and building works be undertaken in accordance with good hillside engineering practice. It is noted that the proposed housing density for the steeper areas is already low (2 to 15 dwellings per hectare), and further modifications to the development plan will therefore most likely not be required.

8.4 Soil and Water Management Plan

Soil and water management is an integral part of the development process and should adopt a preventative rather than a reactive approach to the site limitations, such that the work can proceed without undue pollution of receiving streams.

The main issues affecting development of the Menangle Park Release area are:

- areas of slight to moderate salinity associated with valleys and lower breaks of slope in areas underlain by shales of the Wianamatta Group; and
- moderately dispersive soils resulting in a moderate to high potential for erosion of exposed soils.

Once development consent is obtained, a detailed soil and water management plan (SWMP) developed in accordance with Managing Urban Stormwater: Soils and Construction (1988) will be required and will be incorporated into the engineering design of the development methods for the purpose of:

- minimising water pollution due to erosion of soils or the development of saline conditions;
- reducing or managing salinity to provide acceptable conditions for building and revegetation works;
- minimisation of soil erosion during and after construction;
- maximising the re-use of materials on site;

- ensuring that buildings and infrastructure are within areas of acceptable risk of instability (for both property and life).

The following provides a conceptual SWMP with the objectives of controlling site works:

General Instructions: These conditions include methods to ensure compliance with the SWMP, specifically:

- the SWMP will be read with the engineering plans and site specific instructions issued in relation to the development;
- contractors will ensure that all soil and water management works are undertaken as instructed in the specification and constructed in accordance with Managing Urban Stormwater: Soils and Construction (1988);
- all subcontractors will be informed by the Superintendent of their responsibilities in minimising the potential for soil erosion and pollution of downslope areas.

Land Disturbance: These conditions provide methods to minimise soil erosion, the exposure of potentially or known saline subsoils and direction of overland drainage into areas of potential slope instability, specifically:

- the erosion hazard will be kept as low as possible by limiting of construction area size at any one time and clearly defining the area by barrier fencing upslope and sediment fencing downslope (to be installed before the commencement of construction activities);
- access areas will be clearly defined and limited in size while being considerate of the needs of efficient work areas. All site workers will clearly recognise these boundaries;
- the prohibition of entry into areas outside physical works except for essential management works;
- restriction of work in creek lines during periods of rainfall, with programming of works in these areas to be within periods of anticipated lower rainfall;
- the programming of development roadworks and major excavations to minimise the time of soil exposure and to coincide with periods of anticipated lower rainfall;

- placement of topsoils and subsoils in separate stockpiles (where required) with appropriate sediment fencing and dimensions selected to minimise the surface area of soils exposed to rainfall and hence erosion and leaching of saline materials;
- the creation of larger lots on steeper slope sections to permit the more sensitive development of the individual site;
- orientation of access roads and services to minimise the requirements of excavation and possible retaining structures;
- where excavation of filling of batters is required, the construction of these at a low as practical gradient with a maximum 3:1 (H:V) in the clay soil profiles;
- the placement of excavated soils in filled areas in the sequence of excavation (i.e. to place potentially saline or sodic subsoils below a capping of non-saline material);
- during windy conditions, large, unprotected areas will be kept moist by sprinkling with water to keep dust under control. In the event that water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind;
- the inclusion of techniques such as spray coating or a secured protective turf overlay on cut and fill batters to minimise erosion;
- the maximisation and/or replacement of native tree cover and deep-rooted plants, particularly in areas of known or potential slope instability;
- where vegetation cover is not adequate to control erosion, the improvement of soil resistance to erosion by the addition of lime and gypsum (the proportion to be determined by site specific testing);
- maintenance including watering of lands established with grass cover until an effective cover has been established. Where there has been inadequate vegetation establishment, further application of seed should be carried out. During establishment, trafficking of the treated areas should be minimised;
- the design of stormwater drainage including lined catch drains at the crest of cut slopes, stormwater pipes and dissipators as required to minimise concentrated runoff and to provide controlled discharge of the collected runoff.

Pollution Control: These conditions provide measures to protect downstream areas for water-borne pollution, specifically:

- the installation of sediment fences to contain the coarser sediment fraction as near as possible to their source;
- ensuring that stockpiles are not located within hazard areas including areas of likely high velocity flow such as waterways, paved areas and driveways;
- the installation of sediment basins downslope of areas to be disturbed, with the design based upon a design storm event;
- the inclusion of one or more pegs in the floor of the sediment basins to indicate the level at which design capacity occurs and when collected sediment will be removed;
- disposal of trapped materials from sediment basins to locations where further erosion and consequent pollution to downslope lands and waterways will not occur;
- the treatment of collected waters by gypsum and settling of flocculated particles before any discharge occurs (unless the design storm event is exceeded);
- the removal of sediment basins (where not required as part of the on-going site management) only after the lands they are protecting are stabilised.

Site Inspection and Maintenance: These conditions provide for self and external auditing of the performance of construction and pollution protection measures, together with appropriate maintenance of erosion and sedimentation structures, specifically:

- a self auditing program against an established checklist to be completed by the site manager at least weekly, immediately before site closure and immediately following rainfall events in excess of 5 mm in any one 24 hour period. The audit should include the recording of the condition of temporary sediment and water control devices, any maintenance requirements for these structures, volumes and disposal sites of material removed from sediment retention systems. A copy of the audit should be provided to the project superintendent.
- provision for periodic inspection of records and site conditions by an external, suitably qualified person, for oversight of soil and water management works. The person will be responsible for ensuring that the SWMP is being implemented correctly, repairs are being undertaken as required and modifications to the SWMP are made if and when

necessary. A short written report will be provided at appropriate intervals and will confirm that the works have been carried out according to the approved plans.

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Stuart Brown
Hydrogeologist

Ronnie Tong
Principal

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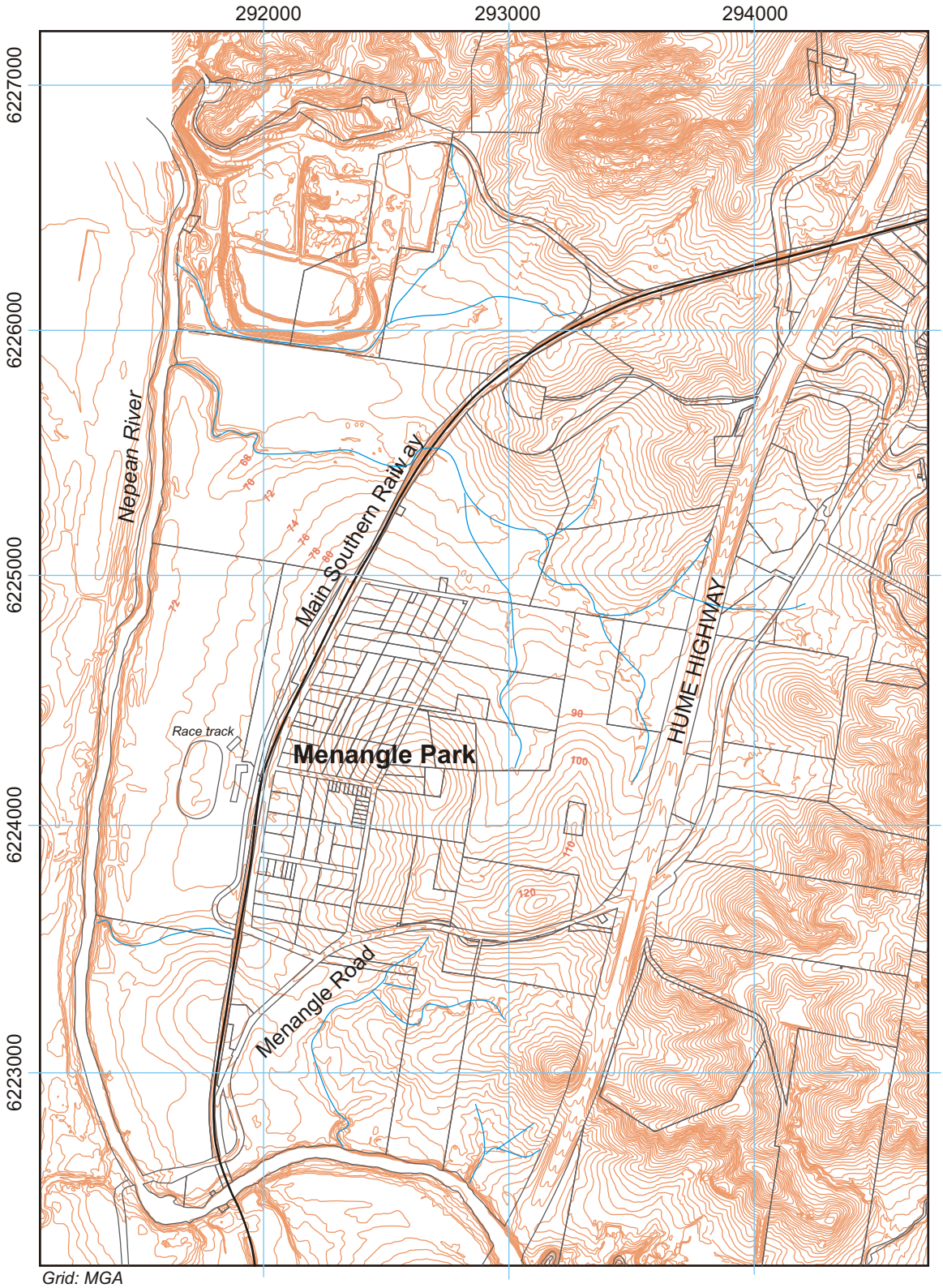
Principal

Grahame Wilson
Principal

APPENDIX A
Drawings



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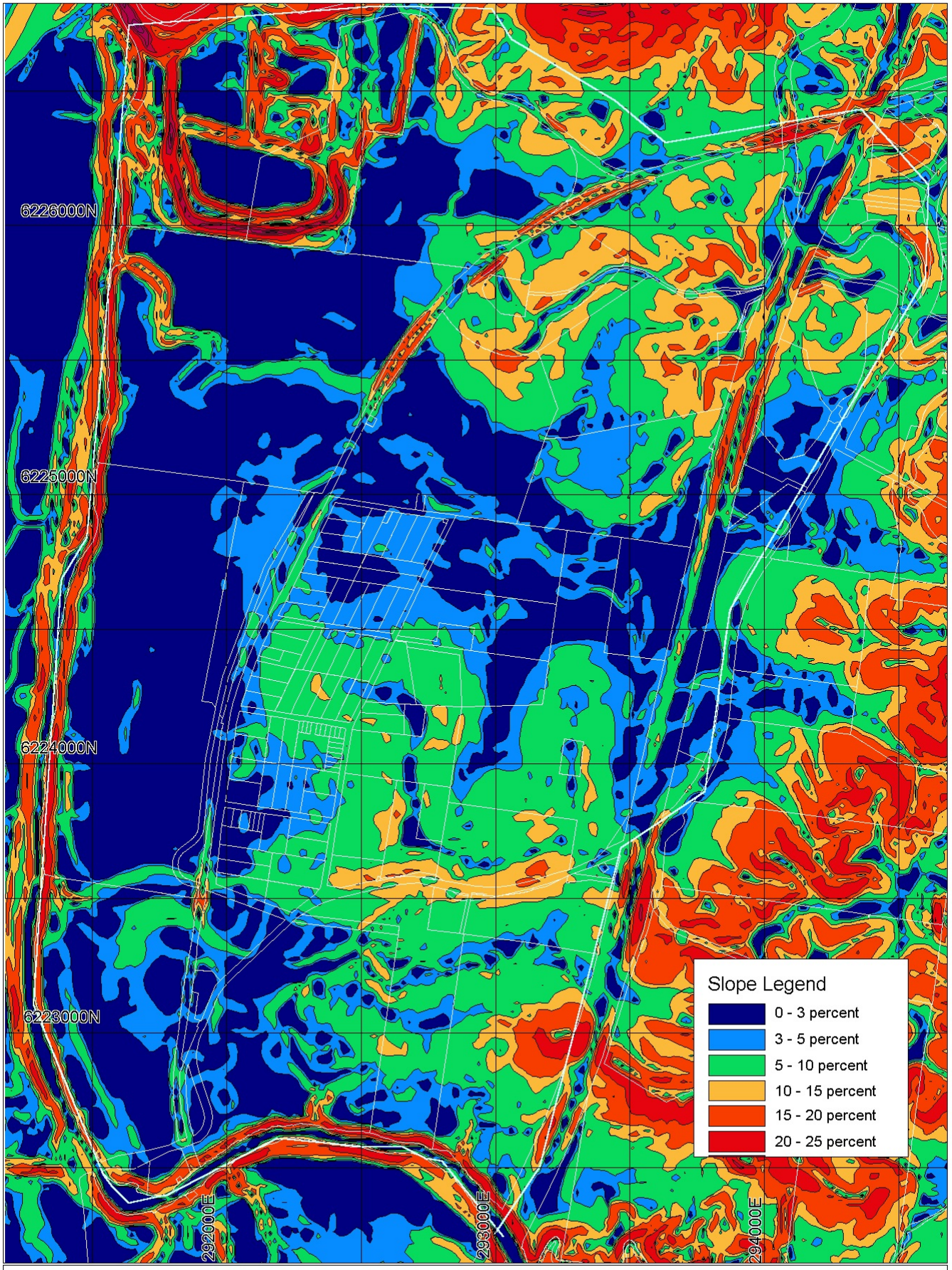
Sydney, Newcastle, Brisbane, Woolongong, Campbelltown
Melbourne, Perth, Wyong, Townsville, Cairns, Darwin

Title: **Location Map**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 1**
Approved by:		**Date: August 2004**	



Menangle Park Land Capability Assessment
March 2004
Project: 36500

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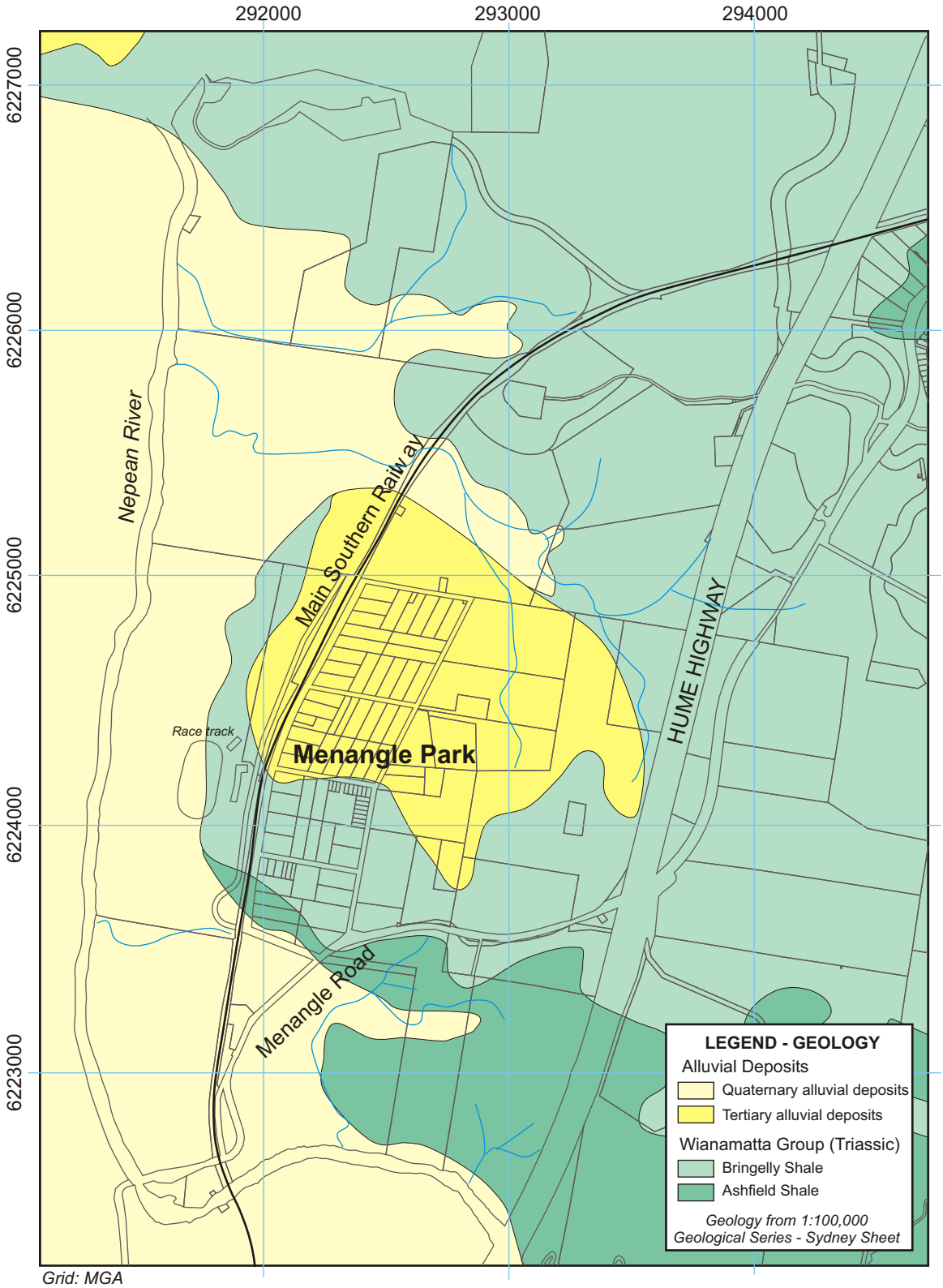
Drawing 2: Contours of slope gradient



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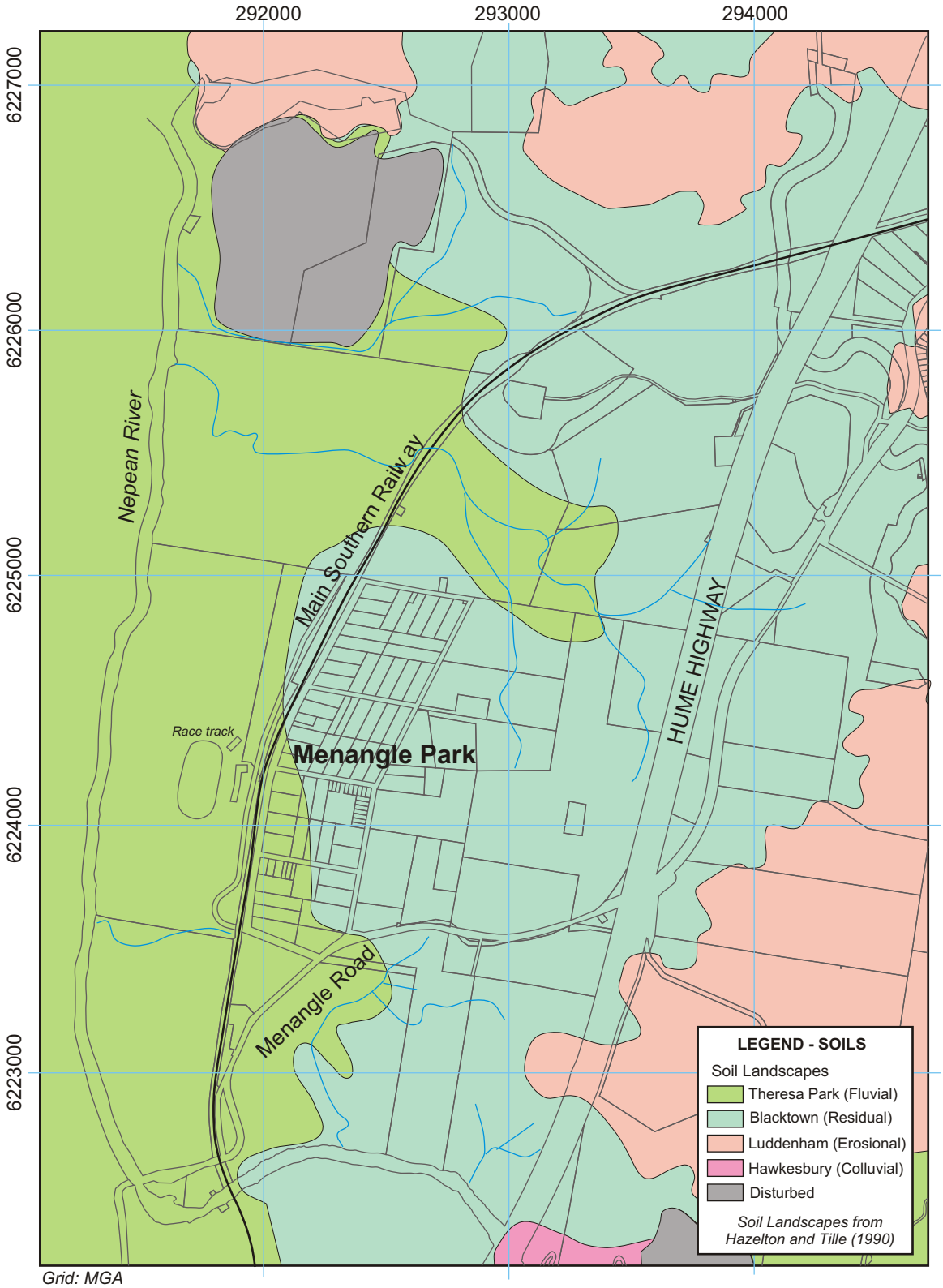
Title: **Geology**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 3**
Approved by:		**Date: August 2004**	



Grid: MGA

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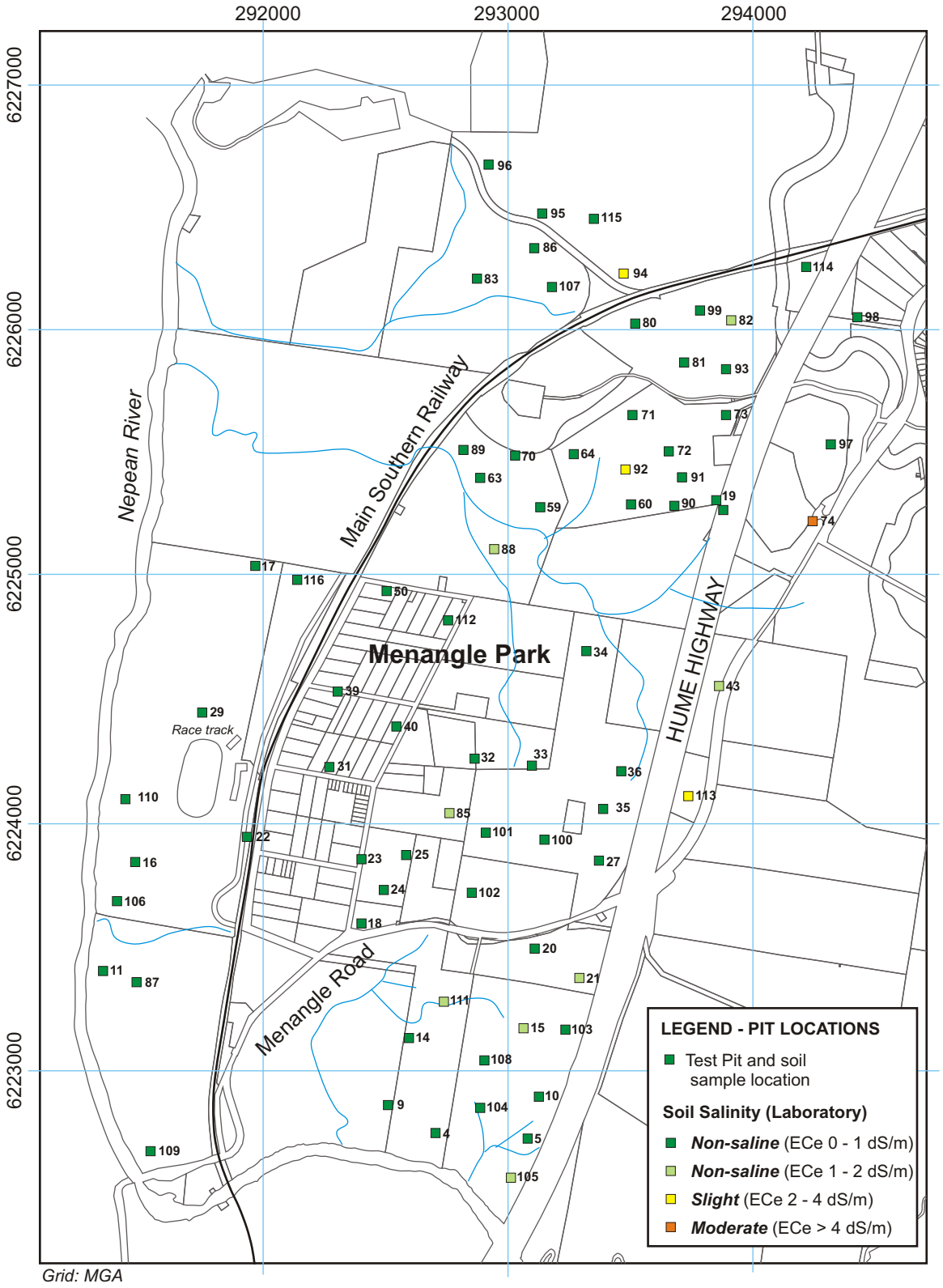
Title: **Soil Landscapes**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Figure 4**
Approved by:		**Date: August 2004**	



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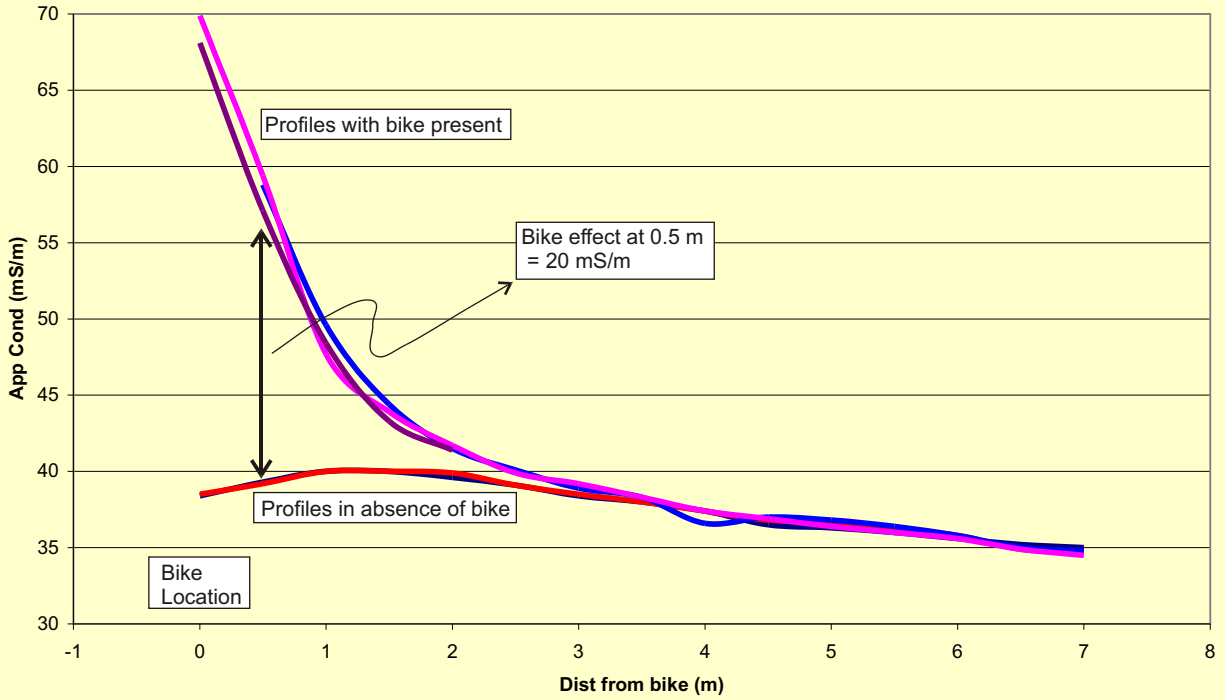
Title: **Test pit locations and soil salinity from laboratory tests** (samples taken at 0.5 m depth)
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 5**
Approved by:		**Date: August 2004**	

DETERMINATION OF THE EFFECT OF THE QUAD BIKE ON THE APPARENT CONDUCTIVITY



Title:	**Effect of quad bike on EM31 apparent conductivities Land capability Study Menangle Park**		**Douglas Partners** Geotechnics · Environment · Groundwater
Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: N/A**	**Project Number: 36500**	**Drawing 6**
Approved by:		**Date: August 2004**	

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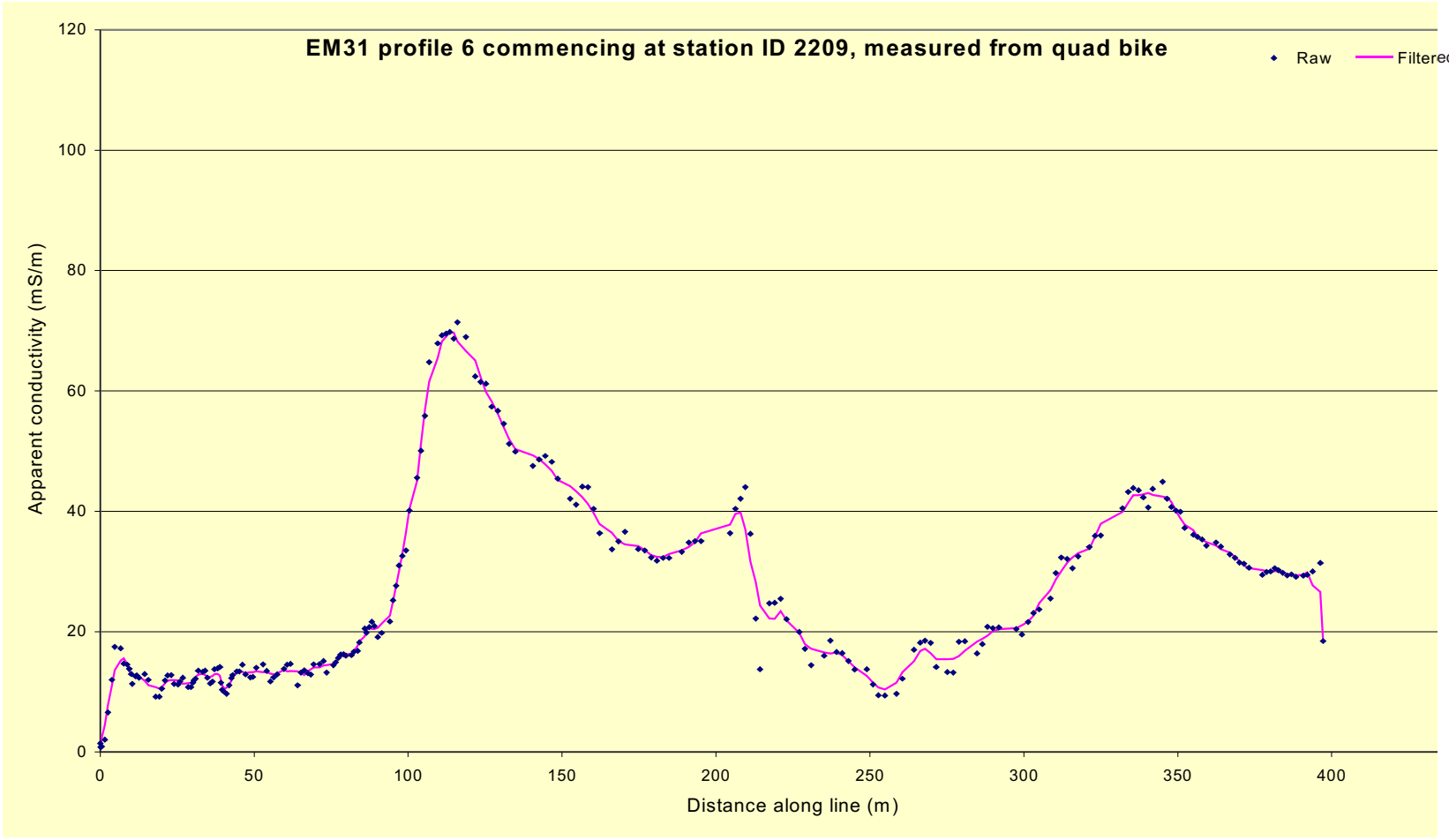

Title: EM31 profile 6 commencing at station ID 2209, measured on quad bike Land capability Study Menangle Park			Douglas Partners Geotechnics · Environment · Groundwater
Client: Campbelltown City Council / Landcom			**Office:** Sydney
Drawn by: SJB	**Scale:** N/A	**Project Number:** 36500	**Drawing** 7
Approved by:		**Date:** August 2004	

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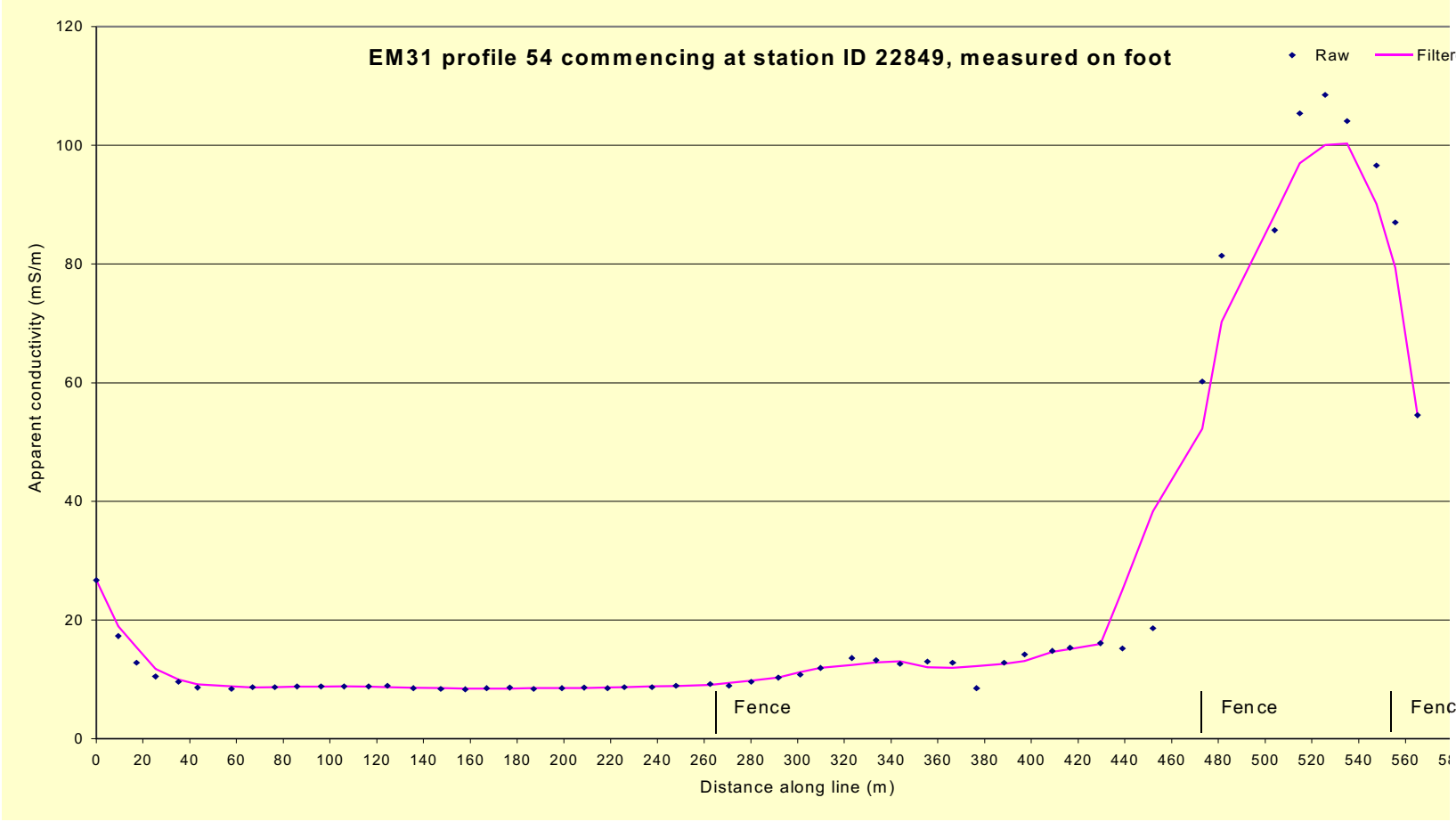
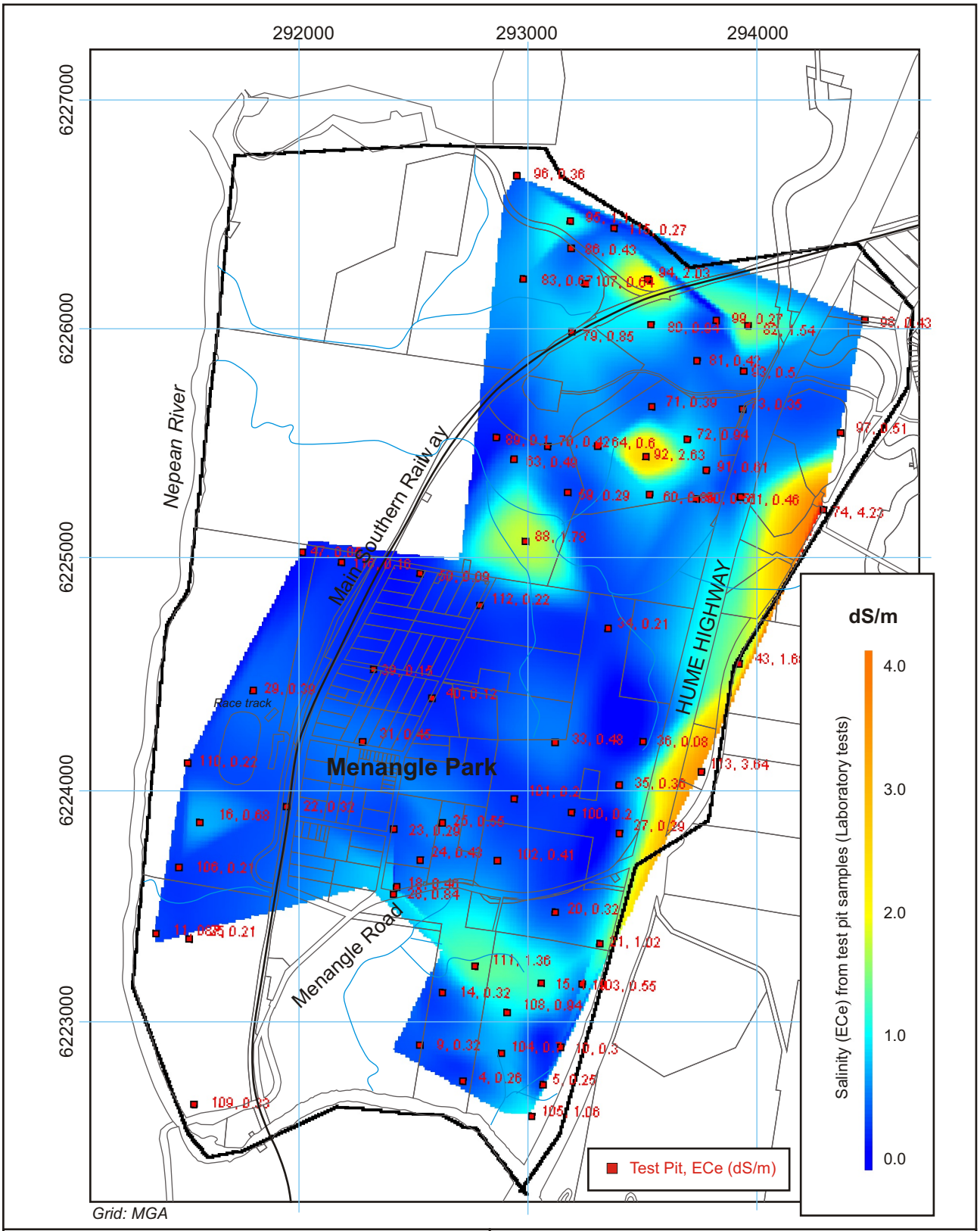


Title:	**Em31 Profile 54 commencing at station ID 22849, on foot Land capability Study Menangle Park**		**Douglas Partners** Geotechnics · Environment · Groundwater
Client: Campbelltown City Council / Landcom		**Office: Sydney**	*Sydney, Newcastle, Brisbane, Woolongong, Campbelltown* *Melbourne, Perth, Wyong, Townsville, Cairns, Darwin*
Drawn by: SJB	**Scale: N/A**	**Project Number: 36500**	**Drawing 8**
Approved by:		**Date: August 2004**	



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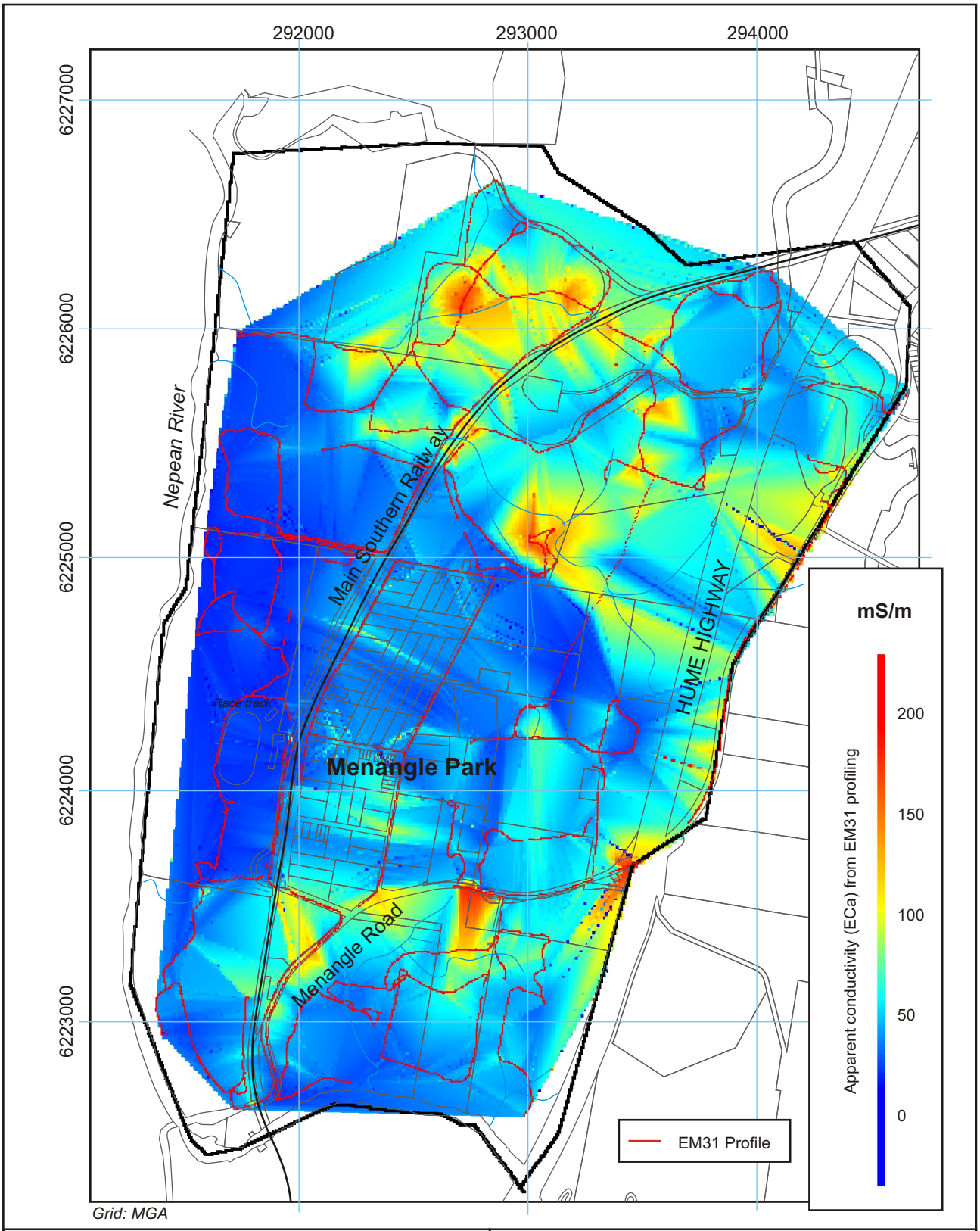
Title: **Salinity distribution from laboratory analysis of test pit samples**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 9**
Approved by:		**Date: August 2004**	



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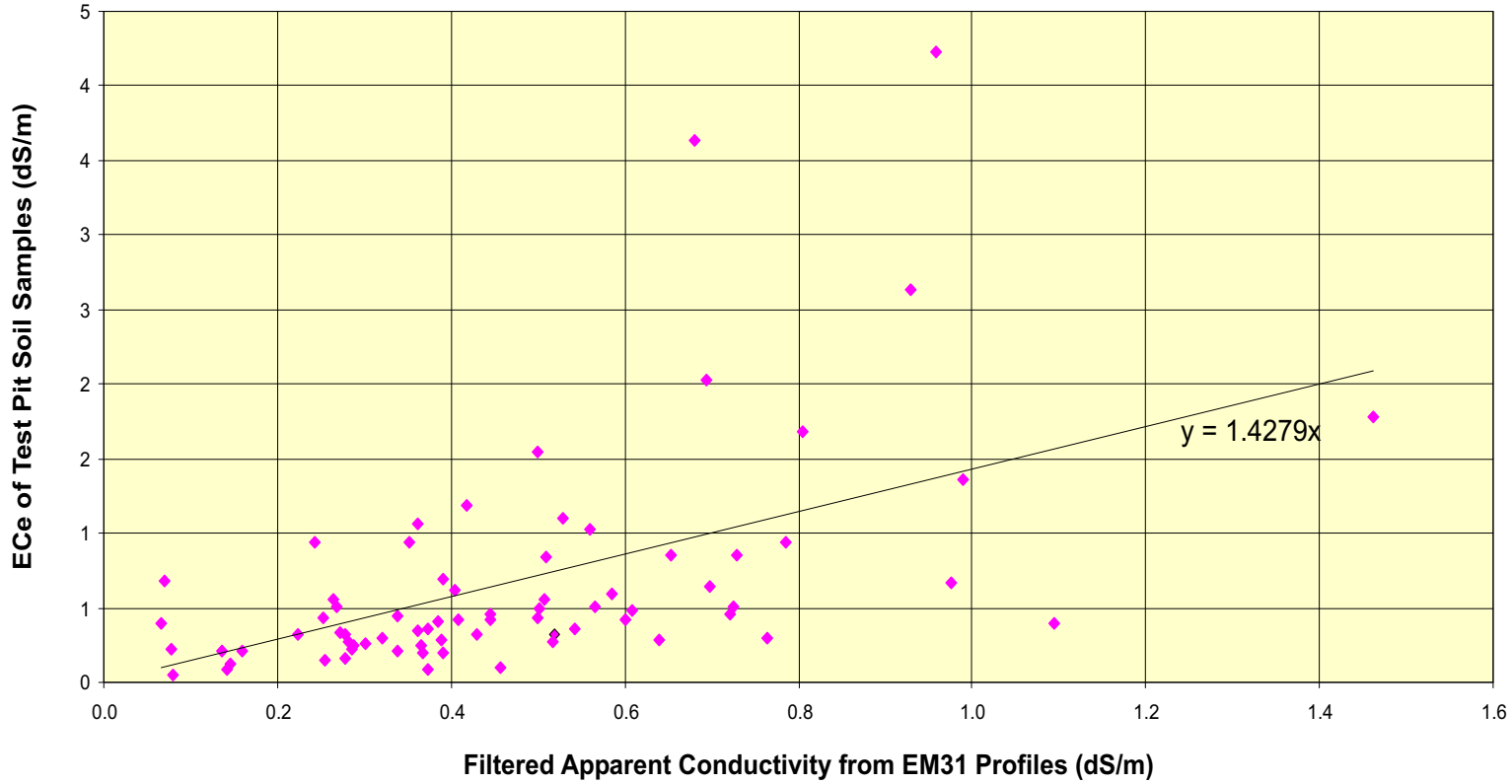
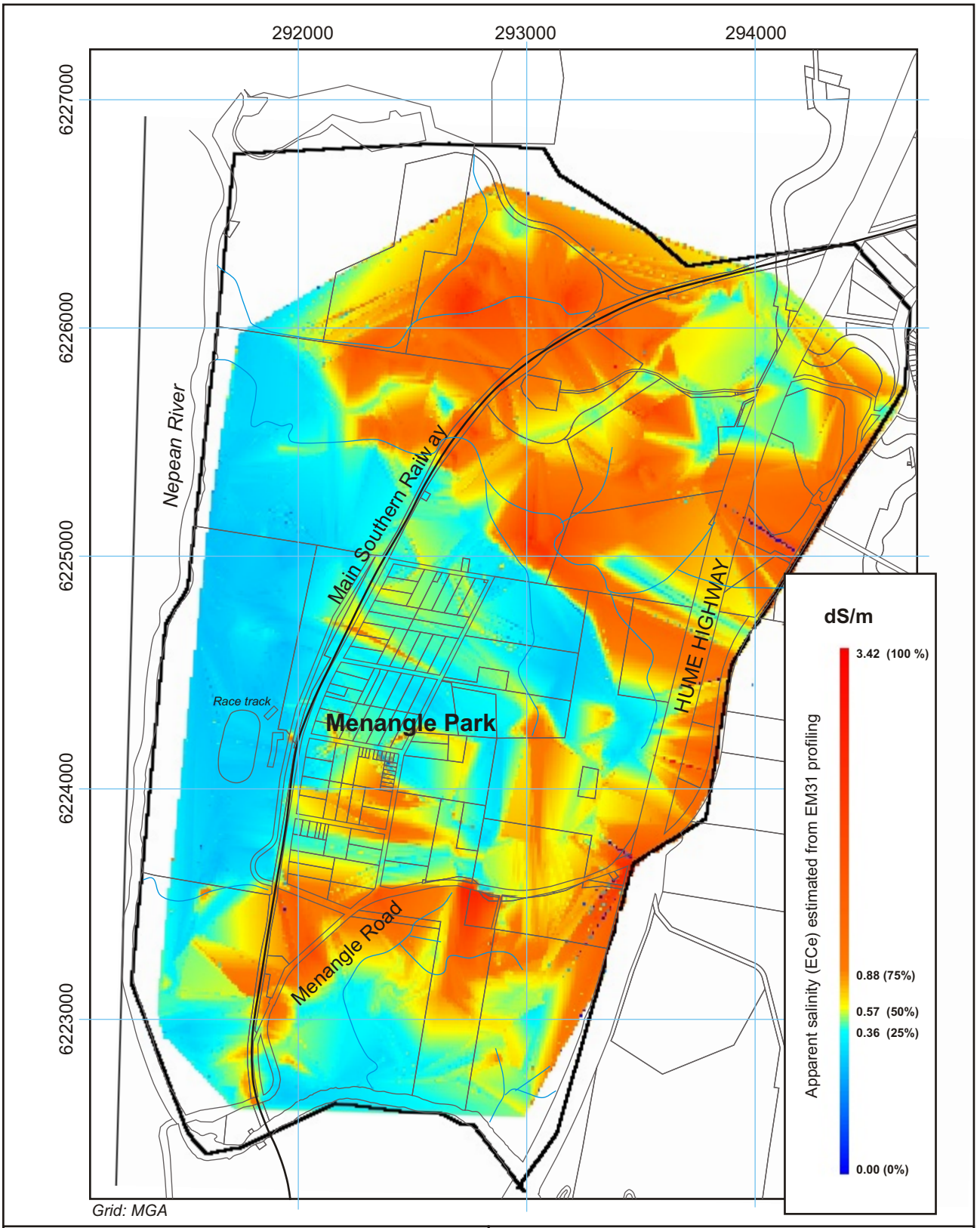
Title: **Apparent conductivity distribution from EM31 profiling**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 10**
Approved by:		**Date: August 2004**	

Correlation of Soil Salinities with Apparent Conductivities
(Proximity of test pits to EM31 profiles 0-315m; All soil types)



Title: Correlation of Soil Salinities with Apparent Conductivities Land capability Study Menangle Park				Douglas Partners Geotechnics · Environment · Groundwater
Client: Campbelltown City Council / Landcom			**Office:** Sydney	*Sydney, Newcastle, Brisbane, Woolongong, Campbelltown* *Melbourne, Perth, Wyong, Townsville, Cairns, Darwin*
Drawn by: SJB	**Scale:** N/A	**Project Number:** 36500	**Drawing** 11	
Approved by:		**Date:** August 2004		



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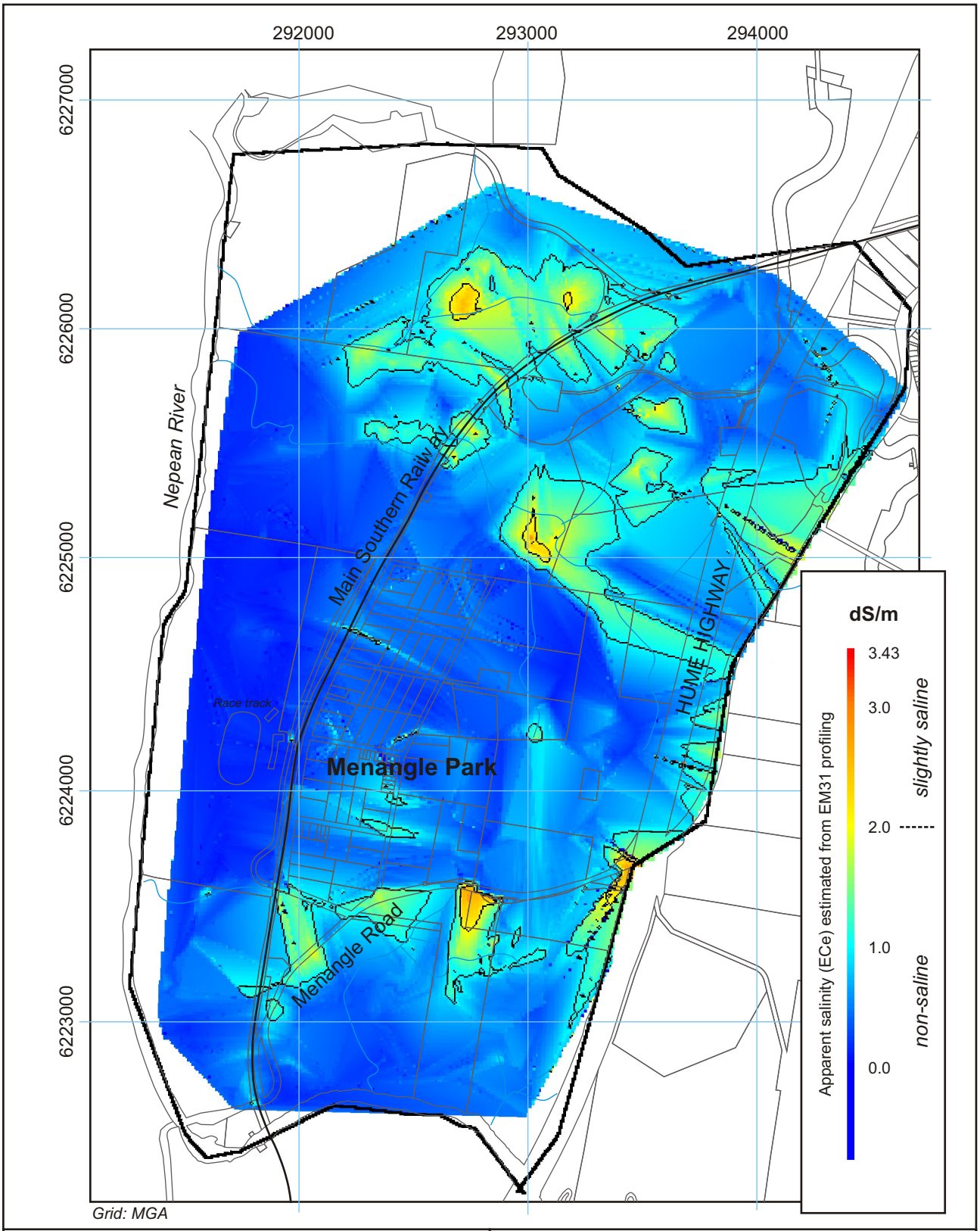
Melbourne, Perth, Wyong, Townsville, Cairns, Darwin

Title: **Apparent salinity distribution from EM31 profiling, showing percentile levels**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 12**
Approved by:		**Date: August 2004**	



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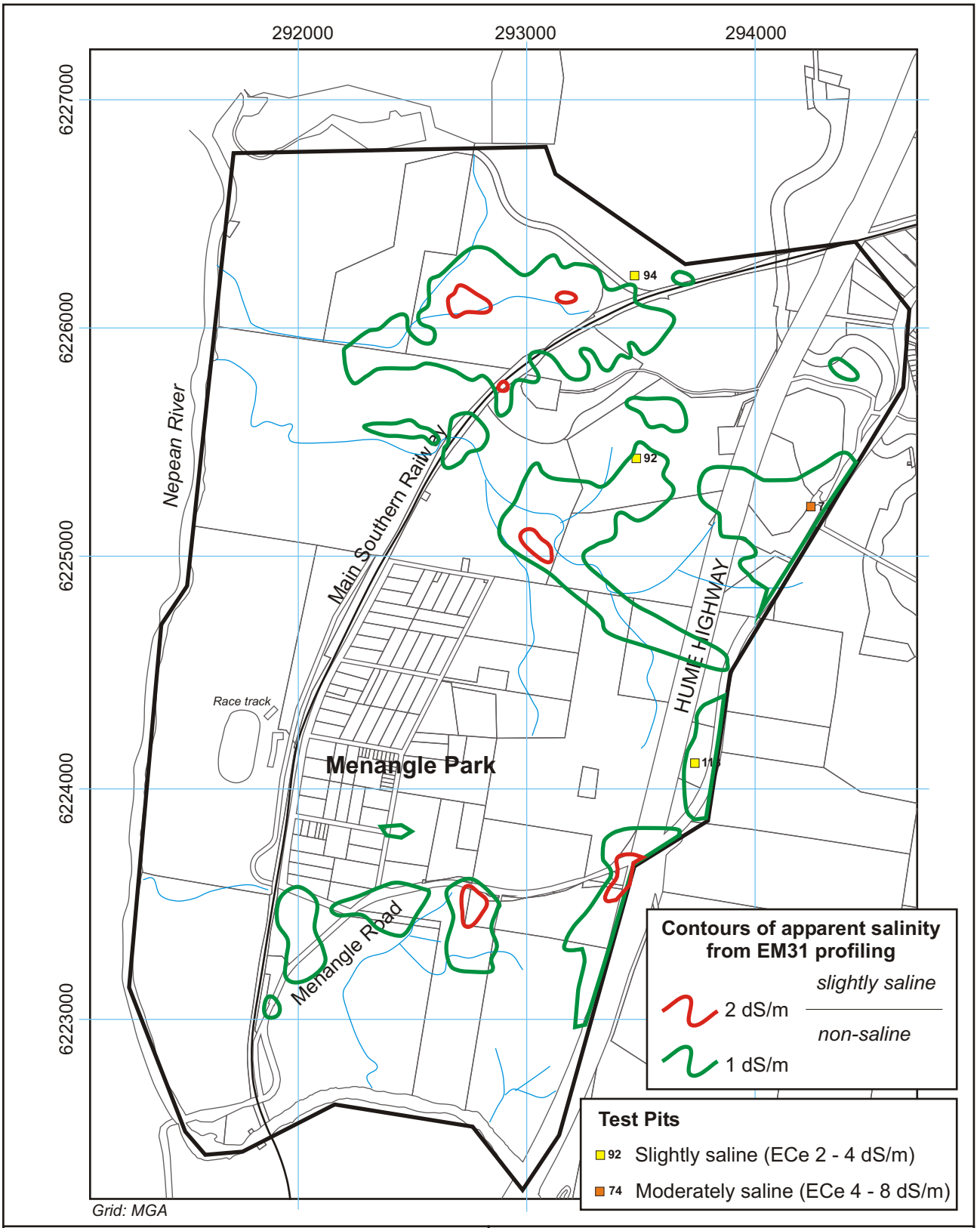
Title: **Apparent salinity distribution from EM31 profiling, showing salinity classes**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 13**
Approved by:		**Date: August 2004**	



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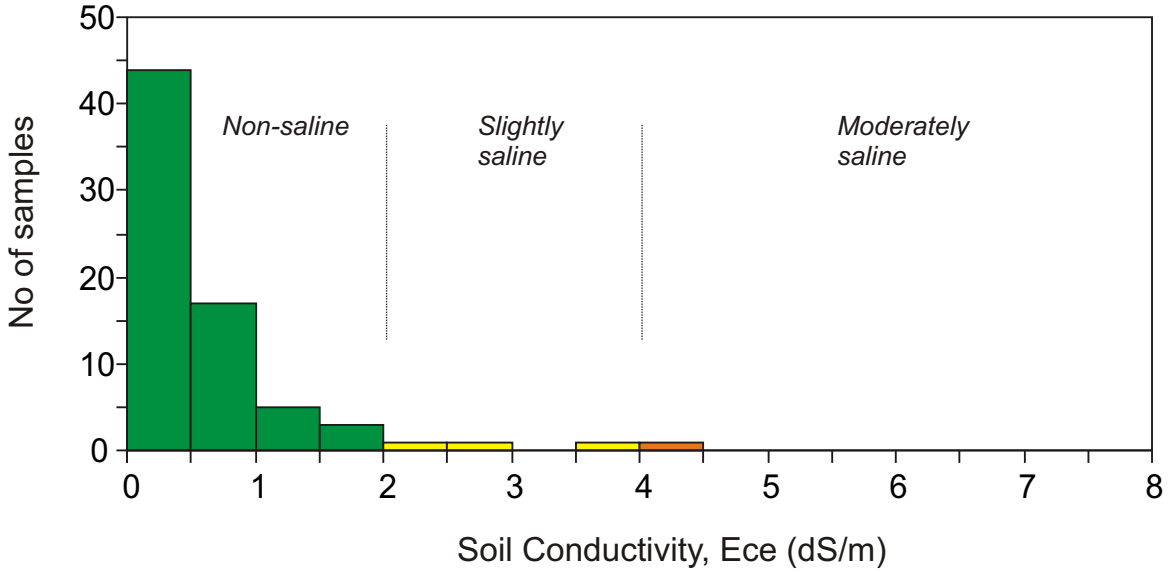
Title: **Apparent salinity contours from EM31 profiling, showing salinity classes**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 14**
Approved by:		**Date: August 2004**	



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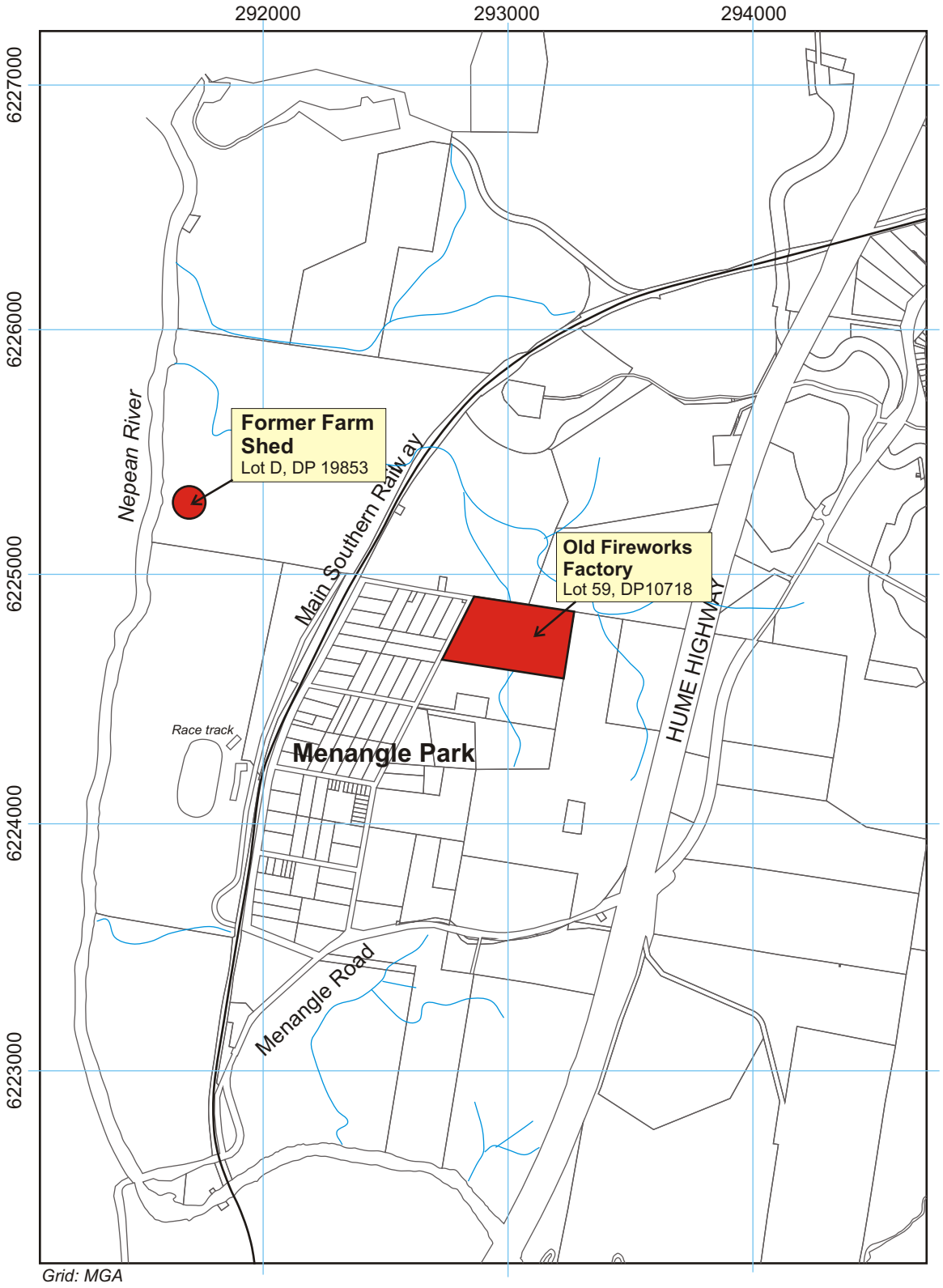
Title: **Frequency histogram of soil conductivity from laboratory EC (1:5) measurements**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: N/A**	**Project Number: 36500**	**Drawing 15**
Approved by:		**Date: August 2004**	



Douglas Partners
Geotechnics · Environment · Groundwater

Sydney, Newcastle, Brisbane, Woolongong, Campbelltown
Melbourne, Perth, Wyong, Townsville, Cairns, Darwin

Title: **Location of known contaminated sites**
Land Capability Study
Menangle Park

Client: Campbelltown City Council / Landcom			**Office: Sydney**
Drawn by: SJB	**Scale: 1:25,000 (A4)**	**Project Number: 36500**	**Drawing 16**
Approved by:		**Date: August 2004**	

APPENDIX B
Tables

Table B1. Test Pit Locations

	Grid Reference:*		
Test Pit	**MGA_mE**	**MGA_mN**	**Notes**
4	292734	6222732	
5	293086	6222721	
9	292541	6222886	
10	293156	6222892	
11	291374	6223339	Located near quarry, possible fill
14	292633	6223112	
15	293067	6223165	
16	291557	6223831	Fill, near gas tank
18	292424	6223568	
19	293852	6225336	
20	293120	6223475	Near Road, possible agricultural area
21	293313	6223349	
22	291936	6223905	
23	292404	6223825	
24	292522	6223687	Horses, sheds, agricultural area
25	292616	6223854	Horses, agricultural area
27	293387	6223831	
28	292411	6223541	Next to gas pipeline, fill area
29	291771	6224413	Next to sand quarry, fill area
31	292259	6224200	
32	292876	6224251	Near farm house, agricultural
33	293097	6224217	
34	293313	6224719	Near farm house, agricultural
35	293385	6224039	
36	293479	6224235	
39	292300	6224516	In township
40	292557	6224398	
43	293890	6224584	Along gas line and highway
47	291972	6225020	
50	292492	6224941	
59	293121	6225314	Agricultural
60	293479	6225314	Agricultural
61	293875	6225314	Next to Hume Highway
63	292885	6225452	Agricultural
64	293250	6225516	
70	293028	6225512	Next to tree farm
71	293479	6225692	
72	293638	6225553	Agricultural
73	293875	6225692	
74	294241	6225265	Along gas line
79	293126	6226011	Gravel road next to railway (tunnel)
80	293468	6226049	Down slope from railway; old shed
81	293672	6225902	
82	293890	6226058	
83	292908	6226239	Agricultural
85	292778	6224020	
86	293111	6226376	
87	291522	6223317	Near landfill and quarry
88	292948	6225094	

Table B1. Test Pit Locations

	Grid Reference:*		
Test Pit	**MGA_mE**	**MGA_mN**	**Notes**
89	292809	6225543	
90	293687	6225301	Near property boundary
91	293726	6225425	
92	293459	6225474	
93	293879	6225861	
94	293450	6226250	Next to botanical garden
95	293101	6226495	
96	292866	6226684	Between railway and botanical garden
97	294307	6225603	Between Menangle Rd and Hume Hway, Agricultural
98	294400	6226099	Between Menangle Rd and Hume Hway, Agricultural
99	293752	6226080	
100	293176	6223915	
101	292926	6223971	
102	292862	6223698	
103	293241	6223164	
104	292902	6222857	
105	293039	6222582	
106	291472	6223632	Next to quarry
107	293176	6226225	
108	292918	6223034	
109	291561	6222598	
110	291496	6224084	Next to quarry; fill
111	292773	6223236	
112	292756	6224811	
113	293742	6224109	Along gas line and highway
114	294202	6226314	
115	293298	6226467	Near boundary of Botanical garden
116	292143	6224981	Next to petrol station

* MGA Zone 56

Table B2. List of Soil Samples																			
			Grid Reference (1):			*Soil Properties:*							*Contaminants:*						
Sample	**Test Pit**	**Depth**	**MGA_mE**	**MGA_mN**	**SGS Lab Ref**	**EC(1:5)**	**Cl**	**SO4**	**pH**	**ESP**	**CEC**	**ECN**	**HM**	**TPH**	**PAH**	**BTEX**	**Phenol**	**OCP**	**OPP**
04/0.5	4	0.5	292734	6222732	26723-1	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
05/0.5	5	0.5	293086	6222721	26723-3	Ö							Ö					Ö	Ö
05/1.5	5	1.5	293086	6222721	26723-112								Ö						
05/2.5	5	2.5	293086	6222721	26723-113								Ö						
09/0.5	9	0.5	292541	6222886	26723-4	Ö							Ö					Ö	Ö
10/0.5	10	0.5	293156	6222892	26723-5	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
11/0.5	11	0.5	291374	6223339	26723-6	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
11/1.5	11	1.5	291374	6223339	26723-92								Ö						
11/3.0	11	3	291374	6223339	26723-93								Ö						
14/0.5	14	0.5	292633	6223112	26723-7	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
15/0.5	15	0.5	293067	6223165	26723-86	Ö							Ö						
15/2.5	15	2.5	293067	6223165	26723-102								Ö						
16/0.5	16	0.5	291557	6223831	26723-8	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
16/1.5	16	1.5	291557	6223831	26723-90								Ö						
16/3.0	16	3	291557	6223831	26723-91								Ö						
18/0.5	18	0.5	292424	6223568	26723-9	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
20/0.5	20	0.5	293120	6223475	26723-10	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
21/1.2	21	1.2	293313	6223349	26723-11	Ö							Ö						
22/0.5	22	0.5	291936	6223905	26723-12	Ö							Ö						
24/0.5	24	0.5	292522	6223687	26723-13	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
25/0.5	25	0.5	292616	6223854	26723-14	Ö							Ö					Ö	Ö
27/0.5	27	0.5	293387	6223831	26723-15	Ö							Ö						
28/0.5	28	0.5	292411	6223541	26723-16	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
28/1.5	28	1.5	292411	6223541	26723-88								Ö						
28/3.0	28	3	292411	6223541	26723-89								Ö						
29/0.5	29	0.5	291771	6224413	26723-17	Ö							Ö	Ö	Ö	Ö	Ö		
29/1.0	29	1	291771	6224413	26723-94								Ö						
31/0.5	31	0.5	292259	6224200	26723-18	Ö							Ö						
32/0.5	32	0.5	292876	6224251	26723-19	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
33/0.5	33	0.5	293097	6224217	26723-20	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö					Ö	Ö
34/0.5	34	0.5	293313	6224719	26723-23	Ö							Ö					Ö	Ö
35/0.5	35	0.5	293385	6224039	26723-25	Ö							Ö						
36/0.5	36	0.5	293479	6224235	26723-26	Ö							Ö						
39/0.5	39	0.5	292300	6224516	26723-27	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö		
39/1.5	39	1.5	292300	6224516	26723-115								Ö						
39/3.0	39	3	292300	6224516	26723-116								Ö						
40/0.5	40	0.5	292557	6224398	26723-29	Ö							Ö	Ö	Ö	Ö	Ö		
43/0.5	43	0.5	293890	6224584	26723-30	Ö							Ö	Ö	Ö	Ö	Ö		

Table B2. List of Soil Samples																			
			Grid Reference (1):			*Soil Properties:*							*Contaminants:*						
Sample	**Test Pit**	**Depth**	**MGA_mE**	**MGA_mN**	**SGS Lab Ref**	**EC(1:5)**	**Cl**	**SO4**	**pH**	**ESP**	**CEC**	**ECN**	**HM**	**TPH**	**PAH**	**BTEX**	**Phenol**	**OCP**	**OPP**
47/0.5	47	0.5	291972	6225020	26723-31	Ö							Ö						
47/1.0	47	1	291972	6225020	26723-100								Ö	Ö	Ö	Ö	Ö		
50/0.5	50	0.5	292492	6224941	26723-32	Ö							Ö						
59/0.5	59	0.5	293121	6225314	26723-33	Ö							Ö					Ö	Ö
60/0.5	60	0.5	293479	6225314	26723-35	Ö							Ö						
61/0.5	61	0.5	293875	6225314	26723-37	Ö							Ö	Ö	Ö	Ö	Ö		
63/0.5	63	0.5	292885	6225452	26723-38	Ö							Ö					Ö	Ö
63/1.5	63	1.5	292885	6225452	26723-108								Ö						
63/3.0	63	3	292885	6225452	26723-109								Ö						
64/0.5	64	0.5	293250	6225516	26723-39	Ö							Ö						
70/0.5	70	0.5	293028	6225512	26723-40	Ö							Ö					Ö	Ö
71/0.5	71	0.5	293479	6225692	26723-41	Ö							Ö						
72/0.5	72	0.5	293638	6225553	26723-42	Ö							Ö					Ö	Ö
73/0.5	73	0.5	293875	6225692	26723-44	Ö							Ö						
74/0.5	74	0.5	294241	6225265	26723-45	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö		
79/0.5	79	0.5	293126	6226011	26723-46	Ö							Ö	Ö	Ö	Ö	Ö		
80/0.5	80	0.5	293468	6226049	26723-47	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
81/0.5	81	0.5	293672	6225902	26723-49	Ö							Ö						
82/0.5	82	0.5	293890	6226058	26723-50	Ö							Ö						
83/0.5	83	0.5	292908	6226239	26723-52	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö					Ö	Ö
83/1.5	83	1.5	292908	6226239	26723-114								Ö						
83/3.0	83	3	292908	6226239	26723-119								Ö						
86/0.5	86	0.5	293111	6226376	26723-53	Ö							Ö					Ö	Ö
87/0.5	87	0.5	291522	6223317	26723-54	Ö							Ö	Ö	Ö	Ö	Ö		
87/1.0	87	1	291522	6223317	26723-97								Ö	Ö	Ö	Ö	Ö		
88/0.5	88	0.5	292948	6225094	26723-55	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
88/1.5	88	1.5	292948	6225094	26723-117								Ö						
88/3.0	88	3	292948	6225094	26723-118								Ö						
89/0.5	89	0.5	292809	6225543	26723-56	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö		
90/0.5	90	0.5	293687	6225301	26723-57	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
91/0.5	91	0.5	293726	6225425	26723-58	Ö							Ö					Ö	Ö
91/1.5	91	1.5	293726	6225425	26723-110								Ö						
91/2.0	91	2	293726	6225425	26723-111								Ö						
92/0.5	92	0.5	293459	6225474	26723-59	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö					Ö	Ö
93/0.5	93	0.5	293879	6225861	26723-60	Ö							Ö					Ö	Ö
94/0.5	94	0.5	293450	6226250	26723-61	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
95/0.5	95	0.5	293101	6226495	26723-63	Ö							Ö					Ö	Ö
95/1.5	95	1.5	293101	6226495	26723-106								Ö						

Table B2. List of Soil Samples																			
			Grid Reference (1):			*Soil Properties:*							*Contaminants:*						
Sample	**Test Pit**	**Depth**	**MGA_mE**	**MGA_mN**	**SGS Lab Ref**	**EC(1:5)**	**Cl**	**SO4**	**pH**	**ESP**	**CEC**	**ECN**	**HM**	**TPH**	**PAH**	**BTEX**	**Phenol**	**OCP**	**OPP**
95/3.0	95	3	293101	6226495	26723-107								Ö						
96/0.5	96	0.5	292866	6226684	26723-64	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
97/0.5	97	0.5	294307	6225603	26723-65	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
98/0.5	98	0.5	294400	6226099	26723-66	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
98/1.5	98	1.5	294400	6226099	26723-104								Ö						
98/1.75	98	1.75	294400	6226099	26723-105								Ö						
99/0.5	99	0.5	293752	6226080	26723-67	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö						
100/0.5	100	0.5	293176	6223915	26723-68	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö					Ö	Ö
100/1.0	100	1	293176	6223915	26723-103								Ö						
101/0.5	101	0.5	292926	6223971	26723-69	Ö							Ö					Ö	Ö
102/0.5	102	0.5	292862	6223698	26723-70	Ö							Ö					Ö	Ö
103/0.5	103	0.5	293241	6223164	26723-71	Ö							Ö	Ö	Ö	Ö	Ö	Ö	Ö
104/0.5	104	0.5	292902	6222857	26723-72	Ö							Ö					Ö	Ö
105/0.5	105	0.5	293039	6222582	26723-74	Ö							Ö						
106/0.5	106	0.5	291472	6223632	26723-75	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
106/1.0	106	1	291472	6223632	26723-96								Ö						
107/0.5	107	0.5	293176	6226225	26723-77	Ö							Ö						
108/0.5	108	0.5	292918	6223034	26723-79	Ö							Ö						
108/1.5	108	1.5	292918	6223034	26723-101								Ö						
109/0.5	109	0.5	291561	6222598	26723-87	Ö							Ö	Ö	Ö	Ö	Ö		
110/0.5	110	0.5	291496	6224084	26723-80	Ö							Ö	Ö	Ö	Ö	Ö		
110/1.0	110	1	291496	6224084	26723-95								Ö						
111/0.5	111	0.5	292773	6223236	26723-81	Ö							Ö					Ö	Ö
112/0.5	112	0.5	292756	6224811	26723-82	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
113/0.5	113	0.5	293742	6224109	26723-83	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö		
115/0.5	115	0.5	293298	6226467	26723-84	Ö							Ö					Ö	Ö
116/0.5	116	0.5	292143	6224981	26723-85	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö		
116/1.5	116	1.5	292143	6224981	26723-98								Ö						
116/3.0	116	3	292143	6224981	26723-99								Ö						
Replicate Samples																			
Z3	4	0.5	292734	6222732	26723-2								Ö						
Z4	104	0.5	292902	6222857	26723-73								Ö					Ö	Ö
Z5	20	1.5	293120	6223475	26723-21								Ö	Ö	Ö	Ö	Ö	Ö	Ö
Z6	106	0.5	291472	6223632	26723-76								Ö	Ö	Ö	Ö	Ö	Ö	Ö
Z7	107	0.5	293176	6226225	26723-78								Ö						
Z8	94	0.5	293450	6226250	26723-62								Ö					Ö	Ö
Z9	80	0.5	293468	6226049	26723-48								Ö	Ö	Ö	Ö	Ö	Ö	Ö

Table B2. List of Soil Samples																			
			Grid Reference (1):			*Soil Properties:*							*Contaminants:*						
Sample	**Test Pit**	**Depth**	**MGA_mE**	**MGA_mN**	**SGS Lab Ref**	**EC(1:5)**	**Cl**	**SO4**	**pH**	**ESP**	**CEC**	**ECN**	**HM**	**TPH**	**PAH**	**BTEX**	**Phenol**	**OCP**	**OPP**
Z10	82	0.5	293890	6226058	26723-51								Ö						
Z12	72	0.5	293638	6225553	26723-43								Ö					Ö	Ö
Z13	59	0.5	293121	6225314	26723-34								Ö					Ö	Ö
Z14	60	0.5	293479	6225314	26723-36								Ö					Ö	Ö
Z15	39	0.5	292300	6224516	26723-28								Ö	Ö	Ö	Ö	Ö		
Z17	34	0.5	293313	6224719	26723-24								Ö						
Z18	25	0.5	292616	6223854	26723-22								Ö					Ö	Ö
					Total Samples Analysed:	**73**	**17**	**17**	**17**	**17**	**17**	**17**	**119**	**34**	**34**	**34**	**34**	**45**	**45**
Notes:	1. MGA Zone 56																		
	EC(1:5) = Electrical conductivity, Cl = Chloride (soluble 1:5), SO4 = Sulphate (soluble 1:5), ESP = Exchangable Sodium Potential, CEC = Cation Exchange Capacity, ECN = Emerson Class Number																		
	HM = Heavy Metals, TPH = Total Petroleum Hydrocarbons, PAH = Polycyclic Aromatic Hydrocarbons, BTEX = Benzene, Toluene, Ethyl Benzene, Xylene																		
	Phenol = total phenolic compounds, OCP = Oganochloride Pesticides, OPP = Organophosphate Pesticides																		

Table B3. Replicate Sample Analysis: Relative Percentage Difference (RPD)											
				Arsenic	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Mercury**	**Nickel**	**Zinc**
Sample/Replicate	**Test Pit**	**Depth**	**Lab Ref**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
04/0.5	4	0.5	26723-1	7	<0.5	16	16	14	<0.05	12	34
Z3	4	0.5	26723-2	7	<0.5	16	18	14	<0.05	11	32
			Difference:	0	N/A	0	-2	0	N/A	1	2
			Rel. % Difference:	**0.0%**	**N/A**	**0.0%**	**-11.1%**	**0.0%**	**N/A**	**8.3%**	**5.9%**
104/0.5	104	0.5	26723-72	6	<0.5	20	24	17	<0.05	22	46
Z4	104	0.5	26723-73	6	<0.5	20	22	16	<0.05	20	42
			Difference:	0	N/A	0	2	1	N/A	2	4
			Rel. % Difference:	**0.0%**	**N/A**	**0.0%**	**8.3%**	**5.9%**	**N/A**	**9.1%**	**8.7%**
20/1.5	20	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Z5	20	1.5	26723-21	3	<0.5	8	39	15	<0.05	11	73
			Difference:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Rel. % Difference:	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
106/0.5	106	0.5	26723-75	<3	<0.5	17	5	8	<0.05	8	14
Z6	106	0.5	26723-76	<3	<0.5	15	5	8	<0.05	7	12
			Difference:	N/A	N/A	2	0	0	N/A	1	2
			Rel. % Difference:	**N/A**	**N/A**	**11.8%**	**0.0%**	**0.0%**	**N/A**	**12.5%**	**14.3%**
107/0.5	107	0.5	26723-77	7	<0.5	21	26	5	<0.05	17	54
Z7	107	0.5	26723-78	5	<0.5	18	23	4	<0.05	15	48
			Difference:	2	N/A	3	3	1	N/A	2	6
			Rel. % Difference:	**28.6%**	**N/A**	**14.3%**	**11.5%**	**20.0%**	**N/A**	**11.8%**	**11.1%**
94/0.5	94	0.5	26723-61	6	<0.5	21	31	10	0.06	18	52
Z8	94	0.5	26723-62	7	<0.5	21	32	10	<0.05	20	55
			Difference:	-1	N/A	0	-1	0	N/A	-2	-3
			Rel. % Difference:	**-14.3%**	**N/A**	**0.0%**	**-3.1%**	**0.0%**	**N/A**	**-10.0%**	**-5.5%**
80/0.5	80	0.5	26723-47	4	<0.5	17	25	10	0.05	16	74
Z9	80	0.5	26723-48	5	<0.5	16	24	9	<0.05	16	71
			Difference:	-1	N/A	1	1	1	N/A	0	3
			Rel. % Difference:	**-20.0%**	**N/A**	**5.9%**	**4.0%**	**10.0%**	**N/A**	**0.0%**	**4.1%**

Table B3. Replicate Sample Analysis: Relative Percentage Difference (RPD)											
				Arsenic	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Mercury**	**Nickel**	**Zinc**
Sample/Replicate	**Test Pit**	**Depth**	**Lab Ref**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
82/0.5	82	0.5	26723-50	10	<0.5	15	19	7	0.08	14	44
Z10	82	0.5	26723-51	11	<0.5	18	22	6	0.06	16	48
			Difference:	-1	N/A	-3	-3	1	0.02	-2	-4
			Rel. % Difference:	**-9.1%**	**N/A**	**-16.7%**	**-13.6%**	**14.3%**	**25.0%**	**-12.5%**	**-8.3%**
72/0.5	72	0.5	26723-42	10	<0.5	15	21	8	<0.05	16	54
Z12	72	0.5	26723-43	8	<0.5	15	20	7	0.07	15	54
			Difference:	2	N/A	0	1	1	N/A	1	0
			Rel. % Difference:	**20.0%**	**N/A**	**0.0%**	**4.8%**	**12.5%**	**N/A**	**6.3%**	**0.0%**
59/0.5	59	0.5	26723-33	4	<0.5	12	10	5	0.08	9	20
Z13	59	0.5	26723-34	4	<0.5	15	14	5	0.1	11	25
			Difference:	0	N/A	-3	-4	0	-0.02	-2	-5
			Rel. % Difference:	**0.0%**	**N/A**	**-20.0%**	**-28.6%**	**0.0%**	**-20.0%**	**-18.2%**	**-20.0%**
60/0.5	60	0.5	26723-35	5	<0.5	15	20	7	0.06	10	33
Z14	60	0.5	26723-36	6	<0.5	15	20	8	0.08	10	35
			Difference:	-1	N/A	0	0	-1	-0.02	0	-2
			Rel. % Difference:	**-16.7%**	**N/A**	**0.0%**	**0.0%**	**-12.5%**	**-25.0%**	**0.0%**	**-5.7%**
39/0.5	39	0.5	26723-27	<3	<0.5	4	3	3	<0.05	3	4
Z15	39	0.5	26723-28	<3	<0.5	4	4	3	<0.05	4	5
			Difference:	N/A	N/A	0	-1	0	N/A	-1	-1
			Rel. % Difference:	**N/A**	**N/A**	**0.0%**	**-25.0%**	**0.0%**	**N/A**	**-25.0%**	**-20.0%**
34/0.5	34	0.5	26723-23	4	<0.5	11	5	7	<0.05	6	13
Z17	34	0.5	26723-24	3	<0.5	10	5	7	<0.05	6	13
			Difference:	1	N/A	1	0	0	N/A	0	0
			Rel. % Difference:	**25.0%**	**N/A**	**9.1%**	**0.0%**	**0.0%**	**N/A**	**0.0%**	**0.0%**
25/0.5	25	0.5	26723-14	9	<0.5	14	23	14	<0.05	18	51
Z18	25	0.5	26723-22	9	<0.5	14	22	13	<0.05	17	49
			Difference:	0	N/A	0	1	1	N/A	1	2
			Rel. % Difference:	**0.0%**	**N/A**	**0.0%**	**4.3%**	**7.1%**	**N/A**	**5.6%**	**3.9%**

APPENDIX C
Photographic Plates

Test Pit 4

Test Pit 10

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 1

Test Pit 14

Test Pit 23

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 2

Test Pit 83

Test Pit 88

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 3

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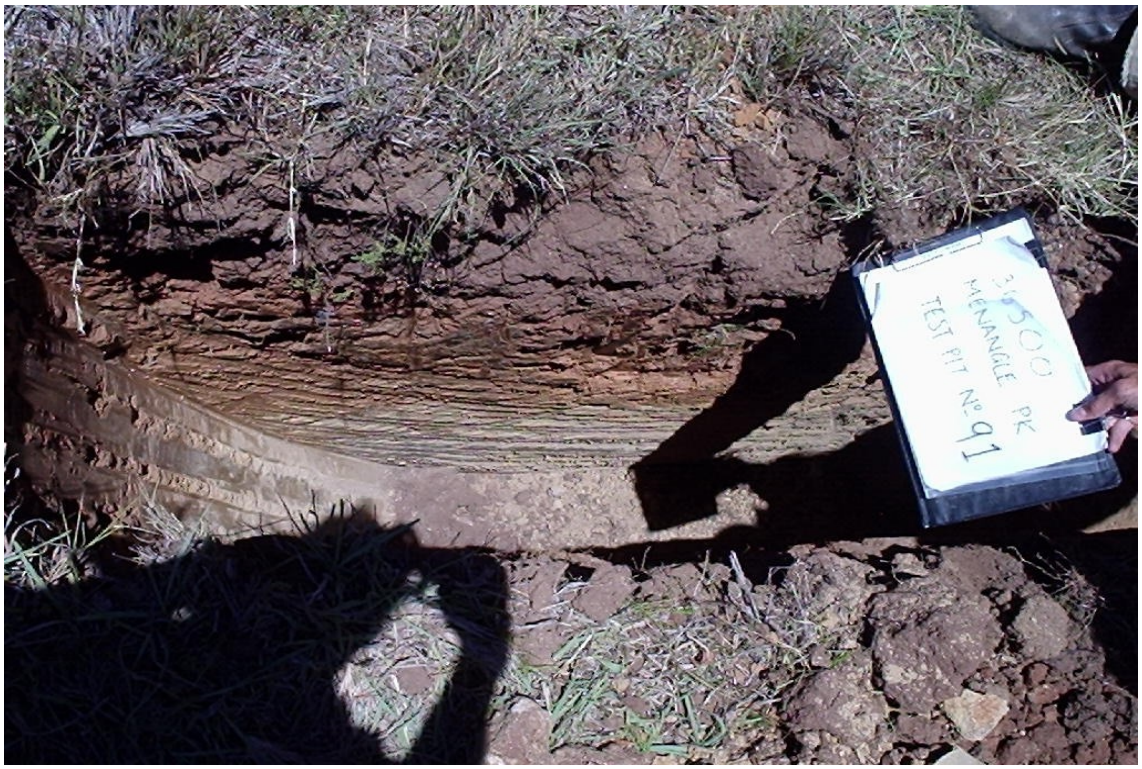
Test Pit 89



Test Pit 91

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 4

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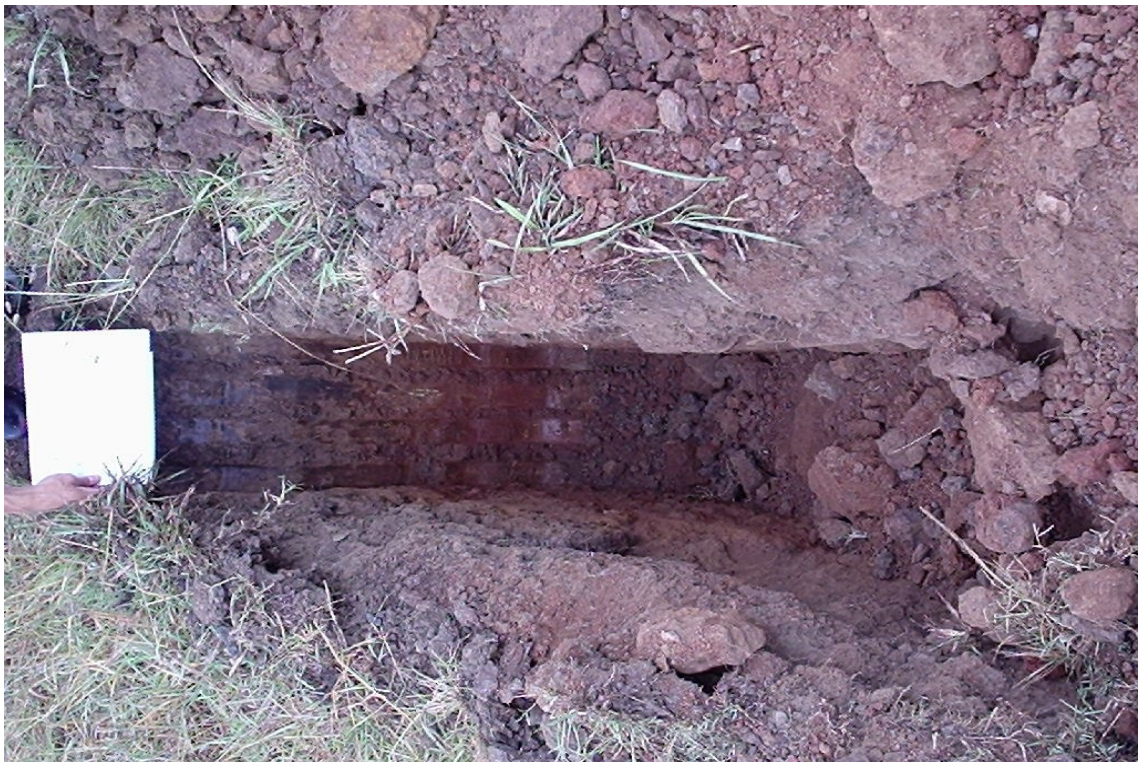
Test Pit 95

Test Pit 99

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 5



Test Pit 104

Test Pit 106

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 6

Test Pit 110

Test Pit 112

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 7

Test Pit 113

Test Pit 115

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 8

Test Pit 116

LAND CAPABILITY STUDY MENANGLE PARK	PROJECT 36500	AUGUST 2004	PLATE 9

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Rapid electromagnetic profiling system similar to that used by Douglas Partners at Menangle Park which comprised quad bike, Geonics EM31 Ground Conductivity Meter, Fugro Omnistar DGPS and Psion data logger.

Land Capability Study Menangle Park	PROJECT 36500	August 2004	PLATE 10

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APPENDIX D
Test Pit Logs

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NOTES RELATING TO THIS REPORT

Introduction

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

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Undrained Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q_c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

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

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil 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 are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow

sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling — the hole is 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.

Rotary Mud Drilling — similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling — a continuous core sample is obtained using a diamond-tipped core barrel, usually 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining 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 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm 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 150 mm of say 4, 6 and 7

  as 4, 6, 7
  N = 13

- In the case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm

  as 15, 30/40 mm.

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

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone — abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35 mm diameter rod with a cone-tipped end 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 friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical 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 20 mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises: —

- 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 in percent.

There are two scales available for measurement of cone resistance. The lower scale (0—5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main scale (0—50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%—2% are commonly encountered in sands and very soft clays rising to 4%—10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:—

q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:—

q_c = (12 to 18) c_u

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on

soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150 mm increments of penetration. Normally, there is a depth limitation of 1.2 m but this may be extended in certain conditions by the use of extension rods.

Two relatively similar tests are used.

- Perth sand penetrometer — a 16 mm diameter flat-ended rod is driven with a 9 kg hammer, dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
- Cone penetrometer (sometimes known as the Scala Penetrometer) — a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ratio have been published by various Road Authorities.

Laboratory Testing

Laboratory testing is 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.

Bore Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems;

- In low permeability soils, ground water although present, 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. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or 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 a perched water table.

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 condition, 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 depend partly on bore spacing and sampling frequency
- changes in policy or interpretation of policy by statutory authorities
- the actions of contractors responding to commercial pressures.

If these occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

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 than 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.

Site Inspection

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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DESCRIPTION AND CLASSIFICATION OF ROCKS FOR ENGINEERING PURPOSES

DEGREE OF WEATHERING

Term	Symbol	Definition
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining or discolouration of the rock substance usually by limonite has taken place. The colour of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh Stained	Fs	Rock substance unaffected by weathering, but showing limonite staining along joints.
Fresh	Fr	Rock substance unaffected by weathering.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index ($I_{S(50)}$) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by Australian Standard 4133.4.1 - 1993.

Term	Symbol	Field Guide*	Point Load Index $I_{S(50)}$ MPa	Approx Unconfined Compressive Strength q_u ** MPa
Extremely low	EL	Easily remoulded by hand to a material with soil properties	<0.03	< 0.6
Very low	VL	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; too hard to cut a triaxial sample by hand. SPT will refuse. Pieces up to 3 cm thick can be broken by finger pressure.	0.03-0.1	0.6-2
Low	L	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long 40 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.	0.1-0.3	2-6
Medium	M	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.	0.3-1.0	6-20
High	H	Can be slightly scratched with a knife. A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow, rock rings under hammer.	1 - 3	20-60
Very high	VH	Cannot be scratched with a knife. Hand specimen breaks with pick after more than one blow, rock rings under hammer.	3 - 10	60-200
Extremely high	EH	Specimen requires many blows with geological pick to break through intact material, rock rings under hammer.	>10	> 200

Note that these terms refer to strength of rock material and not to the strength of the rock mass, which may be considerably weaker due to rock defects.

* The field guide assessment of rock strength may be used for preliminary assessment or when point load testing is not able to be done.

** The approximate unconfined compressive strength (q_u) shown in the table is based on an assumed ratio to the point load index of 20:1. This ratio may vary widely.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly laminated	<6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	>2 m

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks. The orientation of rock defects is measured as an angle relative to a plane perpendicular to the core axis. Note that where possible, recordings of the actual defect spacing or range of spacings is preferred to the general terms given below.

Term	Description
Fragmented	The core consists mainly of fragments with dimensions less than 20 mm.
Highly Fractured	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured	Core lengths are mainly 40 mm - 200 mm with occasional shorter and longer sections.
Slightly Fractured	Core lengths are generally 200 mm - 1000 mm with occasional shorter and longer sections.
Unbroken	The core does not contain any fracture.

ROCK QUALITY DESIGNATION (RQD)

This is defined as the ratio of sound (i.e. low strength or better) core in lengths of greater than 100 mm to the total length of the core, expressed in percent. If the core is broken by handling or by the drilling process (i.e. the fracture surfaces are fresh, irregular breaks rather than joint surfaces) the fresh broken pieces are fitted together and counted as one piece.

SEDIMENTARY ROCK TYPES

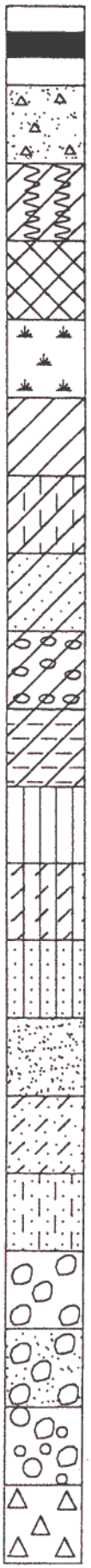
This classification system provides a standardised terminology for the engineering description of sandstone and shales, particularly in the Sydney area, but the terms and definitions may be used elsewhere when applicable.

Rock Type	Definition
Conglomerate	More than 50% of the rock consists of gravel-sized (greater than 2 mm) fragments
Sandstone:	More than 50% of the rock consists of sand-sized (0.06 to 2 mm) grains
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06 mm) granular particles and the rock is not laminated.
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated.
Shale:	More than 50% of the rock consists of silt or clay-sized particles and the rock is laminated.

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, eg. clayey sandstone, sandy shale.

GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

SILT

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

GRAVEL

SANDY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK

BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

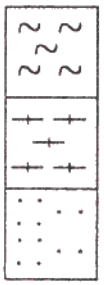
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

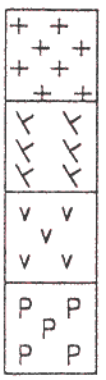


SLATE, PHYLLITE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



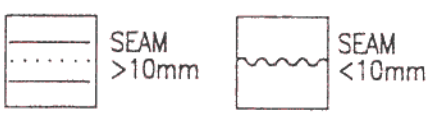
GRANITE

DOLERITE, BASALT

TUFF

PORPHYRY

SEAMS



SEAM >10mm

SEAM <10mm

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 4
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - dark brown sandy silty clay with rootlets			
	SILTY CLAY - red brown and grey brown silty clay	A*	0.5	<1
0.7	SILTSTONE - low to very low strength, grey siltstone with low to medium strength orange ironstone bands. Wet			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z3 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 5
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	<1
0.8	SILTSTONE - very low strength with low strength bands, grey and green grey siltstone	A	1.5	<1
2.0	SILTSTONE - low strength with very low strength bands, grey siltstone. Some medium strength red brown ironstone bands. Wet			
2.5	TEST PIT DISCONTINUED AT 2.5m - refusal on hard rock	A	2.5	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 9
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown and red brown silty clay with rootlets			
0.4	SILTY CLAY - grey and orange brown silty clay. Moist to wet	A	0.5	<1
1		A	1.5	<1
1.6	SILTSTONE - low strength, light grey siltstone with medium strength orange brown ironstone bands. Wet	A	1.7	<1
1.7	TEST PIT DISCONTINUED AT 1.7m - refusal			
2				
3				
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 10
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay with rootlets			
	SILTSTONE - extremely low to very low strength, grey brown siltstone. Some low to medium strength bands. Moist to wet	A	0.5	<1
1		A	1.5	<1
2.0	TEST PIT DISCONTINUED AT 2.0m	A	2.0	<1
2				
3				
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 11
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - dark brown silty clayey sand with some rootlets			
	SILTY SAND - dark brown silty sand with some clay	A	0.5	<1
1				
		A	1.5	<1
2				
3				
3.0		A	3.0	<1
	TEST PIT DISCONTINUED AT 3.0m			
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 14
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets. Moist	A	0.5	<1
0.8	SILTSTONE - low to very low strength, grey siltstone with low to medium strength orange brown ironstone bands. Moist			
1.4	SILTSTONE - low to medium strength, grey siltstone with medium strength red brown ironstone bands. Moist	A	1.5	<1
1.8	TEST PIT DISCONTINUED AT 1.8m - refusal due to hard material	A	1.8	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 15
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	<1
0.9	SILTSTONE - extremely low to very low strength, grey and orange brown siltstone. Some ironstone bands	A	1.5	<1
1.6	SILTSTONE - very low strength, grey siltstone with low strength red brown ironstone bands			
2.5	TEST PIT DISCONTINUED AT 2.5m	A	2.5	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 16
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - dark brown silty clayey sand with some rootlets			
	FILLING - dark orange brown silty sandy clay filling. Gravel and cobble size sandstone and tiles. Trace of slag	A	0.5	36
0.8	SANDY CLAY - light yellow brown and light grey sandy clay. Some patches of red brown ironstone, (possible filling 2.00-2.5m). Ironstone bands increasing with depth	A	1.5	41
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	37

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: POSSIBLE FILLING DOWN TO 2.0-2.5m. AREA HAD BEEN PREVIOUSLY SCOURED & REFILLED

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 18
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAY - brown silty clay with rootlets			
0.5	SILTY CLAY - yellow and orange brown silty clay with rootlets	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 20
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.3	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	<1
0.9	SILTSTONE - very low to low strength, grey siltstone. Some low to medium strength orange brown ironstone bands			
1.5	TEST PIT DISCONTINUED AT 1.5m - refusal	A*	1.5	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z5 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 21
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.3	SILTY CLAY - red and orange brown silty clay with some rootlets	A	0.5	<1
0.8	SILTSTONE - low to medium strength, grey siltstone. Some medium strength, orange brown ironstone bands. Moist to wet			
1.2	TEST PIT DISCONTINUED AT 1.2m - refusal	A	1.2	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 22
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.1	TOPSOIL - red brown silty clayey sand			
	SILTY CLAYEY SAND - red and orange brown silty clayey sand	A	0.5	<1
1.1	SILTY CLAYEY SAND - light brown silty clayey sand	A	1.5	<1
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 23
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets and trace of sand			
	SILTY CLAY - white brown silty clay, with trace of sand. Some rootlets	A	0.5	<1
0.6	SILTY CLAY - red and orange brown silty clay, with trace of sand			
1		A	1.0	<1
1.5	TEST PIT DISCONTINUED AT 1.5m			
2				
3				
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 24
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clayey sand with rootlets			
0.3	SILTY CLAYEY SAND - red brown silty clayey sand	A	0.5	<1
0.8	SILTY CLAYEY SAND - orange brown silty clayey sand			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 25
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.3	SILTY CLAY - red brown silty clay	A*	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z18 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 27
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - orange brown silty clay	A	0.5	<1
0.8	SILTY CLAY - red brown silty clay with dark grey zones			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 28
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0	FILLING - dark brown silty clayey sand filling. Gravel size sandstone and black fragments (possibly slag)	A	0.5	13
1.2	FILLING - dark grey and green grey sandy clay filling mixed with dark brown clayey sand. Some tile and plastic pipe fragments and metal pieces	A	1.5	25
2.5	CLAYEY SAND - dark red brown clayey sand, with some fine black fragments			
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	12
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 29
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.3	TOPSOIL - dark brown clayey silt with some gravel size fragments			
	SAND - light brown then orange brown sand, with trace of silty clay	A	0.5	30
1.0	TEST PIT DISCONTINUED AT 1.0m	A*	1.0	23

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z1 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 31
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown sandy silty clay			
	SANDY SILTY CLAY - red brown sandy silty clay	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 32
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clayey sand with rootlets			
0.4	SILTY CLAYEY SAND - red brown silty clayey sand	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 33
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - grey brown silty clayey sand with rootlets			
0.5	SILTY CLAYEY SAND - white brown silty clayey sand	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 34
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL			
	SILTY CLAYEY SAND - red and orange brown silty clayey sand	A*	0.5	<1
0.6	SILTY CLAYEY SAND - yellow and orange brown silty clayey sand			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z17 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 35
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.3	SILTY CLAY - red brown silty clay, with minor yellow brown zones	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 36
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAYEY SAND - dark red brown silty clayey sand with rootlets	A	0.5	<1
0.6	SILTY CLAYEY SAND - orange brown silty clayey sand			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 39
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown clayey sand, dry			
0.4	CLAYEY SAND - brown clayey sand	A*	0.5	<1
0.75	SILTY CLAY - grey, red and orange brown silty clay with trace of sand	A	1.5	<1
1.8	SILTY CLAY - grey, red and orange silty clay with some ironstone bands			
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z15 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 40
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty sand			
0.5	SILTY SAND - orange brown silty sand	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 43
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	FILLING - brown silty clay with some gravel and possibly slag. Rootlets	A	0.5	<1
0.65	SILTY CLAY - red brown silty clay with minor black zones (possibly carbonaceous)	A	1.0	<1
1.2	TEST PIT DISCONTINUED AT 1.2m			

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 47
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SAND - light yellow brown sand	A	0.5	24
0.6	CLAYEY SAND - orange brown clayey sand			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	11

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 50
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - grey brown silty clayey sand			
0.2	SILTY SAND - light grey silty sand	A	0.5	<1
0.8	SILTY SAND - yellow brown silty sand			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 59
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.4	SILTY CLAY - orange brown silty clay, with trace of sand	A*	0.5	<1
0.7	SILTY CLAY - red brown and grey silty clay			
1.3	SILTY CLAY - grey silty clay with some red brown ironstone patches	A	1.5	<1
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z13 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 60
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - orange and red brown silty clay	A*	0.5	<1
0.6	SILTY CLAY - orange brown silty clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z14 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 61
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay			
	SILTY CLAY - dark orange brown silty clay with minor black spots (possibly carbonaceous) and occasional gravel size ironstone fragments	A	0.5	5
1.5	SILTY CLAY - yellow brown silty clay	A	1.5	32
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	27

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 63
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay, with some rootlets	A	0.5	<1
1				
		A	1.5	<1
1.7	SILTY CLAY - grey orange and red brown silty clay			
2				
3				
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 64
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - yellow brown silty clay	A	0.5	<1
0.9	SILTY CLAY - red and yellow brown silty clay with minor black zones and trace of sand	A	1.5	<1
2.7	SILTY CLAY - yellow brown silty clay with minor black zones and a trace of sand			
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 70
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.4	SILTY CLAY - grey brown silty clay	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 71
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - yellow brown silty clay with some black zones (possibly carbonaceous)	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 72
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A*	0.5	<1
0.8	SILTY CLAY - yellow brown silty clay with trace of sand. Low strength sandstone boulders	A	1.5	<1
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z12 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 73
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAY - dark brown silty clay with rootlets	A	0.5	<1
0.8	SILTY CLAY - orange brown silty clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 74
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.0	TOPSOIL - brown silty clay with rootlets			
0.2	SILTY CLAY - red brown silty clay with trace of sand and some rootlets	A	0.5	<1
1.2	SILTY CLAY - orange brown silty clay	A*	1.5	<1
2.0	SILTY CLAY - brown mottled dark grey silty clay			
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	1
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z11 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 79
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clay with rootlets and carbonaceous material	A	0.1	37
0.5	CLAY - brown grey clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	41

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 80
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clay with rootlets			
0.5	SILTY CLAY - orange brown silty clay with some rootlets	A*	0.5	1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z9 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 81
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAY - dark red brown silty clay with rootlets	A	0.5	3
0.8	SILTY CLAY - yellow brown silty clay			
1.5	SANDSTONE - low to medium strength, light yellow brown fine to medium grained sandstone (possibly boulders)	A	1.5	1
1.6	TEST PIT DISCONTINUED AT 1.6m - refusal due to possible sandstone boulders	A	1.6	2

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 82
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAY - brown silty clay with trace of sand. Some sandstone boulders and cobbles	A*	0.5	1
0.7	SANDY SILTY CLAY - orange brown sandy silty clay. Some sandstone cobbles and boulders. Moist			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	11

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z10 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 83
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.3	TOPSOIL - dark brown silty clay with rootlets			
	SILTY CLAY - yellow brown silty clay with some rootlets. Some black zones (possibly carbonaceous)	A	0.5	<1
1.1	SILTY CLAY - grey and red brown silty clay. Wet	A	1.5	<1
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 86
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.0	TOPSOIL - brown silty clay with rootlets			
0.3	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	55
1.2	SILTY CLAY - yellow and red brown silty clay	A	1.5	
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	40

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 87
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clayey sand. Black staining due to hydrocarbons (petrol?) at surface	A	0.5	32
0.9	SILTY SANDY CLAY - orange brown silty sandy clay	A*	1.0	3
1.0	TEST PIT DISCONTINUED AT 1.0m			

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z2 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 88
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets	A	0.5	<1
0.6	SILTY CLAY - grey and orange brown silty clay. Some minor gravel fragments	A	1.5	<1
2.4	SILTY CLAY - grey and orange brown silty clay	A	3.0	<1
3.0	TEST PIT DISCONTINUED AT 3.0m			

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 89
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - white brown silty sandy clay with rootlets	A	0.5	<1
0.8	SILTY CLAY - red brown silty clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	25

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 90
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - orange and red brown silty clay	A	0.5	3
0.6	SILTY CLAY - orange brown silty clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	27

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 91
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clay with rootlets			
0.4	SILTY CLAY - orange brown silty clay	A	0.5	<1
0.9	SILTY CLAY - yellow brown silty clay with trace of sand. Some very low to low strength sandstone cobbles and boulders	A	1.5	<1
2.0	TEST PIT DISCONTINUED AT 2.0m - refusal due to sandstone boulders	A	2.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 92
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown white silty clay with trace of sand. Rootlets			
0.4	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 93
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SANDY SILTY CLAY - red brown sandy silty clay with low to medium strength sandstone (laminite) fragments (gravel to cobble size)	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 94
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - orange brown silty clay with some rootlets. Moist	A*	0.5	1
0.7	SILTY CLAY - yellow brown silty clay. Moist to wet			
		A	1.5	3
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	18

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z8 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 95
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - yellow brown and dark grey silty clay with some rootlets. Wet	A	0.5	
1				
		A	1.5	47
2				
3.0		A	3.0	14
3	TEST PIT DISCONTINUED AT 3.0m			
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 96
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE:
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with rootlets			
0.3	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	
0.7	SILTY CLAY - yellow brown silty clay. Wet			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	33

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 97
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay, some grey patches	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 98
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 08 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	<1
1.2	SILTY CLAY - yellow brown silty clay	A	1.5	<1
1.7				
1.75	SANDSTONE - low strength sandstone (possibly boulders)	A	1.75	<1
	TEST PIT DISCONTINUED AT 1.75m - refusal due to sandstone boulders			

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 99
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with trace of sand. Some rootlets and sandstone cobbles	A	0.5	1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 100
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SILTY CLAY - brown silty clay with rootlets	A	0.5	1
0.8	SILTY CLAY - red brown silty clay			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	6

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 101
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.1	TOPSOIL - brown clayey sand			
	CLAYEY SAND - grey and orange brown clayey sand	A	0.5	1
1.5	TEST PIT DISCONTINUED AT 1.5m - refusal	A	1.5	22

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 102
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets	A	0.5	23
0.6				
0.65	SILTY CLAY - red brown silty clay with sandstone boulders	A	0.65	19
	TEST PIT DISCONTINUED AT 0.65m - refusal due to sandstone boulders			
1				
2				
3				
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 103
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.15	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets. Moist	A	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 104
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - dark brown silty clay with rootlets			
0.2	SILTY CLAY - red brown silty clay	A*	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z4 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 105
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SANDY CLAY - orange brown sandy clay with sandstone boulders and cobbles	A	0.5	<1
0.8	SANDY CLAY - light grey and orange sandy clay			
1.2	TEST PIT DISCONTINUED AT 1.2m - refusal due to hard rock	A	1.2	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 106
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.1	TOPSOIL - brown silty clayey sand			
	SILTY CLAYEY SAND - red brown silty clayey sand with pieces of charcoal	A*	0.5	<1
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z5 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 107
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown silty clay with some rootlets. Moist	A*	0.5	29
0.8	SILTY CLAY - yellow and red brown silty clay with some rootlets. Moist to wet			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	3

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z7 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 108
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clay with rootlets			
	SILTY CLAY - red brown and grey silty clay	A	0.5	<1
0.8	SILTSTONE - very low to low strength, grey siltstone with low to medium strength, orange brown ironstone bands. Moist			
1		A	1.5	<1
1.7	TEST PIT DISCONTINUED AT 1.7m	A	1.7	<1
2				
3				
4				

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

Douglas Partners
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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 109

PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04

LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing: Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - dark brown silty clayey sand with some roots	D	0.0	
	SILTY SAND - dark brown silty sand, with some clay, humid	D	0.5	
1.0	TEST PIT DISCONTINUED AT 1.0m	D	1.0	

RIG: BACKHOE
LOGGED: CCK

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 110
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clayey sand			
0.3	CLAYEY SAND - red brown clayey sand	A	0.5	5
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	11

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 111
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 06 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	TOPSOIL - brown silty clay with large pieces of asphalt near or at the surface. Some rootlets			
0.3	SILTY CLAY - red brown silty clay with some rootlets. Moist to wet	A	0.5	<1
0.8	SILTY CLAY - yellow brown and grey silty clay. Wet			
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 112
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - brown silty clayey sand			
0.5	SILTY CLAYEY SAND - light brown silty clayey sand with rootlets	A	0.5	<1
1.0	SILTY CLAYEY SAND - orange brown silty clayey sand	A	1.0	<1
	TEST PIT DISCONTINUED AT 1.0m			

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 113
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 09 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	FILLING - brown silty clay with some gravel and rootlets	A	0.5	<1
0.7	SILTY CLAY - red brown silty clay with some rootlets			
1.0	TEST PIT DISCONTINUED AT 1.0m	A*	1.0	<1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: A* INDICATES FIELD REPLICATE SAMPLE Z16 TAKEN

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

Douglas Partners
Geotechnics · Environment · Groundwater

TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 115
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 07 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
0.2	TOPSOIL - dark brown silty clay with rootlets			
	SILTY CLAY - orange brown silty clay with some rootlets	A	0.5	21
1.0	TEST PIT DISCONTINUED AT 1.0m	A	1.0	1

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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TEST PIT REPORT

CLIENT: CAMPBELLTOWN CITY COUNCIL
PROJECT No: 36500
PIT No: 116
PROJECT: LAND CAPABILITY STUDY
SURFACE LEVEL: --
DATE: 05 Jan 04
LOCATION: MENANGLE PARK
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & Testing		
		Type	Depth (m)	Results Headspace PID (ppm)
	SAND - brown sand with trace of silt	A	0.5	8
0.8	SAND - light yellow brown sand			
1.2	SILTY CLAYEY SAND - orange brown and light grey silty clayey sand. Some red brown ironstone patches	A	1.5	20
3.0	TEST PIT DISCONTINUED AT 3.0m	A	3.0	40

RIG: BACKHOE
LOGGED: WOODLEY

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
B	Bulk sample	PID	Photo Ionisation Detector
D	Disturbed sample	U_x	Tube sample (x mm dia.)
M	Moisture content (%)	Wp	Plastic limit

CHECKED
Initials:
Date:

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APPENDIX E
Laboratory Results

5 August 2004

TEST REPORT

Douglas Partners Pty Ltd
96 Hermitage Road
WEST RYDE
NSW 2114

Your Reference: 36500, Menangle Park
Report Number: 26723

Attention: Chris Kline

Dear Chris
The following samples were received from you on the date indicated.

Samples:	Qty.	119 Soils
Date of Receipt of Samples:		09/01/04
Date of Receipt of Instructions:		13/01/04
Date Preliminary Report Faxed:		23/01/04

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

Tania Notaras
Manager – Sydney

Jacinta Hurst
Operations Manager

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Botany Industrial Park Gate 3, Denison Street, Matraville 2036 NSW Australia
t +61 (0)2 9666 1426 f +61 (0)2 9666 1364 url www.sgs.com

SGS Ref	Sample ID	TRH C6 - C9 P&T	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Surrogate
---	---	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
26723-6	11/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	78
26723-8	16/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	75
26723-9	18/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	75
26723-10	20/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	72
26723-13	24/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	73
26723-16	28/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	75
26723-17	29/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	75
26723-21	Z5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	66
26723-27	39/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	74
26723-28	Z15	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	76
26723-29	40/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	72
26723-30	43/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	76
26723-31	47/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	78
26723-37	61/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	60
26723-45	74/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	77
26723-46	79/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	70
26723-47	80/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	74
26723-48	Z9	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	68
26723-54	87/0.5	<20	<20	260	140	<0.50	<0.50	<0.50	<1.5	75
26723-56	89/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	68
26723-57	90/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	71
26723-61	94/0.5	<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	80

SGS Ref	Sample ID		TRH C6 - C9 P&T	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Surrogate
26723-64	96/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	74
26723-65	97/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	77
26723-66	98/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	85
26723-71	103/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	72
26723-75	106/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	93
26723-76	Z6		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	79
26723-80	110/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	86
26723-82	112/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	89
26723-83	113/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	84
26723-85	116/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	95
26723-87	109/0.5		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	86
26723-97	87/1.0		<20	<20	<50	<50	<0.50	<0.50	<0.50	<1.5	86

SGS Ref	Sample ID	HCB	alpha-BHC	gamma-BHC(Lindane)	Heptachlor	Aldrin	beta-BHC	delta-BHC	Heptachlor Epoxide	o,p'-DDE	alpha-Endosulfan	trans-Chlordane	cis-Chlordane	trans-Nonachlor	p,p'-DDE	Dieldrin
---	---	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
26723-3	5/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-4	9/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-6	11/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-8	16/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-10	20/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-13	24/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-14	25/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-16	28/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-19	23/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-21	Z5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-22	Z18	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-23	34/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-24	Z17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-33	59/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-34	Z13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-35	60/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-36	Z14	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-38	63/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-40	70/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

SGS Ref	Sample ID	HCB	alpha-BHC	gamma-BHC(Lindane)	Heptachlor	Aldrin	beta-BHC	delta-BHC	Heptachlor Epoxide	o,p'-DDE	alpha-Endosulfan	trans-Chlordane	cis-Chlordane	trans-Nonachlor	p,p'-DDE	Dieldrin
26723-42	72/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-43	Z12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-47	80/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-48	Z9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-52	83/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-53	86/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-57	90/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-58	91/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-59	92/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-60	93/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-61	94/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-62	Z8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-63	95/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-64	96/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-65	97/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-66	98/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-68	100/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-69	101/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-70	102/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-71	103/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-72	104/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-73	Z4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

SGS Ref	Sample ID	HCB	alpha-BHC	gamma-BHC(Lindane)	Heptachlor	Aldrin	beta-BHC	delta-BHC	Heptachlor Epoxide	o,p'-DDE	alpha-Endosulfan	trans-Chlordane	cis-Chlordane	trans-Nonachlor	p,p'-DDE	Dieldrin
26723-75	106/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-76	Z6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-81	111/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
26723-84	115/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

SGS Ref	Sample ID	Endrin	o,p'-DDD	o,p'-DDT	beta-Endosulfan	p,p'-DDD	p,p'-DDT	Endosulfan Sulphate	Endrin Aldehyde	Methoxychlor	Endrin Ketone	Surrogate
---	---	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
26723-3	5/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	81
26723-4	9/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	98
26723-6	11/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	103
26723-8	16/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	99
26723-10	20/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	108
26723-13	24/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	72
26723-14	25/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	99
26723-16	28/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	102
26723-19	23/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	70

SGS Ref	Sample ID	Endrin	o,p'-DDD	o,p'-DDT	beta-Endosulfan	p,p'-DDD	p,p'-DDT	Endosulfan Sulphate	Endrin Aldehyde	Methoxychlor	Endrin Ketone	Surrogate
26723-21	Z5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	90
26723-22	Z18	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	96
26723-23	34/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	94
26723-24	Z17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	97
26723-33	59/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	94
26723-34	Z13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	98
26723-35	60/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	123
26723-36	Z14	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	100
26723-38	63/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	88
26723-40	70/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	92
26723-42	72/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	93
26723-43	Z12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	95
26723-47	80/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	94
26723-48	Z9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	105
26723-52	83/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	64
26723-53	86/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	99
26723-57	90/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	69
26723-58	91/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	64
26723-59	92/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	80
26723-60	93/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	93
26723-61	94/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	60
26723-62	Z8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	77
26723-63	95/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	96
26723-64	96/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	65

SGS Ref	Sample ID	Endrin	o,p'-DDD	o,p'-DDT	beta-Endosulfan	p,p'-DDD	p,p'-DDT	Endosulfan Sulphate	Endrin Aldehyde	Methoxychlor	Endrin Ketone	Surrogate
26723-65	97/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	102
26723-66	98/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	102
26723-68	100/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	71
26723-69	101/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	103
26723-70	102/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	99
26723-71	103/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	100
26723-72	104/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	71
26723-73	Z4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	97
26723-75	106/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	98
26723-76	Z6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	97
26723-81	111/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	97
26723-84	115/0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	105

SGS Ref	Sample ID	Chlorpyrifos	Fenitrothion	Bromofos Ethyl	Ethion	Surrogate
---	---	mg/kg	mg/kg	mg/kg	mg/kg	%
26723-3	5/0.5	<0.10	<0.10	<0.10	<0.10	81
26723-4	9/0.5	<0.10	<0.10	<0.10	<0.10	98
26723-6	11/0.5	<0.10	<0.10	<0.10	<0.10	103
26723-8	16/0.5	<0.10	<0.10	<0.10	<0.10	99
26723-10	20/0.5	<0.10	<0.10	<0.10	<0.10	108
26723-13	24/0.5	<0.10	<0.10	<0.10	<0.10	72
26723-14	25/0.5	<0.10	<0.10	<0.10	<0.10	99
26723-16	28/0.5	<0.10	<0.10	<0.10	<0.10	102
26723-19	23/0.5	<0.10	<0.10	<0.10	<0.10	70
26723-21	Z5	<0.10	<0.10	<0.10	<0.10	90
26723-22	Z18	<0.10	<0.10	<0.10	<0.10	96
26723-23	34/0.5	<0.10	<0.10	<0.10	<0.10	94
26723-24	Z17	<0.10	<0.10	<0.10	<0.10	97
26723-33	59/0.5	<0.10	<0.10	<0.10	<0.10	94
26723-34	Z13	<0.10	<0.10	<0.10	<0.10	98
26723-35	60/0.5	<0.10	<0.10	<0.10	<0.10	123
26723-36	Z14	<0.10	<0.10	<0.10	<0.10	100
26723-38	63/0.5	<0.10	<0.10	<0.10	<0.10	88
26723-40	70/0.5	<0.10	<0.10	<0.10	<0.10	92
26723-42	72/0.5	<0.10	<0.10	<0.10	<0.10	93
26723-43	Z12	<0.10	<0.10	<0.10	<0.10	95
26723-47	80/0.5	<0.10	<0.10	<0.10	<0.10	94

SGS Ref	Sample ID	Chlorpyrifos	Fenitrothion	Bromofos Ethyl	Ethion	Surrogate
26723-48	Z9	<0.10	<0.10	<0.10	<0.10	105
26723-52	83/0.5	<0.10	<0.10	<0.10	<0.10	64
26723-53	86/0.5	<0.10	<0.10	<0.10	<0.10	99
26723-57	90/0.5	<0.10	<0.10	<0.10	<0.10	69
26723-58	91/0.5	<0.10	<0.10	<0.10	<0.10	64
26723-59	92/0.5	<0.10	<0.10	<0.10	<0.10	80
26723-60	93/0.5	<0.10	<0.10	<0.10	<0.10	93
26723-61	94/0.5	<0.10	<0.10	<0.10	<0.10	60
26723-62	Z8	<0.10	<0.10	<0.10	<0.10	77
26723-63	95/0.5	<0.10	<0.10	<0.10	<0.10	96
26723-64	96/0.5	<0.10	<0.10	<0.10	<0.10	65
26723-65	97/0.5	<0.10	<0.10	<0.10	<0.10	105
26723-66	98/0.5	<0.10	<0.10	<0.10	<0.10	105
26723-68	100/0.5	<0.10	<0.10	<0.10	<0.10	71
26723-69	101/0.5	<0.10	<0.10	<0.10	<0.10	103
26723-70	102/0.5	<0.10	<0.10	<0.10	<0.10	99
26723-71	103/0.5	<0.10	<0.10	<0.10	<0.10	100
26723-72	104/0.5	<0.10	<0.10	<0.10	<0.10	71
26723-73	Z4	<0.10	<0.10	<0.10	<0.10	97
26723-75	106/0.5	<0.10	<0.10	<0.10	<0.10	98
26723-76	Z6	<0.10	<0.10	<0.10	<0.10	97
26723-81	111/0.5	<0.10	<0.10	<0.10	<0.10	97
26723-84	115/0.5	<0.10	<0.10	<0.10	<0.10	105

SGS Ref	Sample ID	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b,k]fluoranthene	Benzo[a]pyrene	Indeno[123-cd]pyrene	Dibenzo[ah]anthracene	Benzo[ghi]perylene
---	---	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
26723-6	11/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-8	16/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-9	18/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-10	20/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-13	24/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-16	28/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.2	0.1	0.1	<0.1	0.1
26723-17	29/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-21	Z5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-27	39/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-28	Z15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-29	40/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-30	43/0.5	<0.1	0.1	<0.1	<0.1	0.1	<0.1	0.2	0.2	<0.1	0.1	<0.2	0.1	0.1	<0.1	0.2
26723-31	47/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-37	61/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-45	74/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-46	79/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-47	80/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-48	Z9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-54	87/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1

SGS Ref	Sample ID	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b,k]fluoranthene	Benzo[a]pyrene	Indeno[123-cd]pyrene	Dibenzo[ah]anthracene	Benzo[ghi]perylene
26723-56	89/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-57	90/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-61	94/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-64	96/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-65	97/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-66	98/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-71	103/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-75	106/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-76	Z6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-80	110/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-82	112/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-83	113/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-85	116/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-87	109/0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
26723-97	87/1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1

SGS Ref	Sample ID		Total +ve PAH's	Surrogate
---	---		mg/kg	%
26723-6	11/0.5		0.00	105
26723-8	16/0.5		0.00	99
26723-9	18/0.5		0.00	100
26723-10	20/0.5		0.00	103
26723-13	24/0.5		0.00	101
26723-16	28/0.5		0.50	103
26723-17	29/0.5		0.00	102
26723-21	Z5		0.00	105
26723-27	39/0.5		0.00	102
26723-28	Z15		0.00	101
26723-29	40/0.5		0.00	104
26723-30	43/0.5		1.1	102
26723-31	47/0.5		0.00	103
26723-37	61/0.5		0.00	104
26723-45	74/0.5		0.00	95
26723-46	79/0.5		0.00	84
26723-47	80/0.5		0.00	100
26723-48	Z9		0.00	105
26723-54	87/0.5		0.00	106
26723-56	89/0.5		0.00	107
26723-57	90/0.5		0.00	112
26723-61	94/0.5		0.00	101
26723-64	96/0.5		0.00	105
26723-65	97/0.5		0.00	116

SGS Ref	Sample ID		Total +ve PAH's	Surrogate
26723-66	98/0.5		0.00	88
26723-71	103/0.5		0.00	112
26723-75	106/0.5		0.00	113
26723-76	Z6		0.00	113
26723-80	110/0.5		0.00	115
26723-82	112/0.5		0.00	112
26723-83	113/0.5		0.00	104
26723-85	116/0.5		0.00	118
26723-87	109/0.5		0.00	108
26723-97	87/1.0		0.00	111

SGS Ref	Sample ID		Total Phenolics (as Phenol)	Electrical Conductivity 1:5 soil:water
---	---		mg/kg	µS/cm
26723-1	4/0.5		[NA]	31
26723-3	5/0.5		[NA]	36
26723-4	9/0.5		[NA]	46
26723-5	10/0.5		[NA]	33
26723-6	11/0.5		<0.50	18
26723-7	14/0.5		[NA]	46
26723-8	16/0.5		<0.50	97
26723-9	18/0.5		<0.50	54
26723-10	20/0.5		<0.50	38
26723-11	21/1.2		[NA]	120
26723-12	22/0.5		[NA]	23
26723-13	24/0.5		<0.50	31
26723-14	25/0.5		[NA]	65
26723-15	27/0.5		[NA]	34
26723-16	28/0.5		<0.50	120
26723-17	29/0.5		<0.50	23
26723-18	31/0.5		[NA]	32

SGS Ref	Sample ID	Total Phenolics (as Phenol)	Electrical Conductivity 1:5 soil:water
26723-19	23/0.5	[NA]	21
26723-20	33/0.5	[NA]	34
26723-21	Z5	<0.50	[NA]
26723-23	34/0.5	[NA]	15
26723-25	35/0.5	[NA]	42
26723-26	36/0.5	[NA]	5.8
26723-27	39/0.5	<0.50	11
26723-28	Z15	<0.50	[NA]
26723-29	40/0.5	<0.50	8.8
26723-30	43/0.5	<0.50	120
26723-31	47/0.5	<0.50	3.2
26723-32	50/0.5	[NA]	6.5
26723-33	59/0.5	[NA]	34
26723-35	60/0.5	[NA]	100
26723-37	61/0.5	<0.50	54
26723-38	63/0.5	[NA]	58
26723-39	64/0.5	[NA]	70
26723-40	70/0.5	[NA]	49
26723-41	71/0.5	[NA]	46

SGS Ref	Sample ID	Total Phenolics (as Phenol)	Electrical Conductivity 1:5 soil:water
26723-42	72/0.5	[NA]	110
26723-44	73/0.5	[NA]	41
26723-45	74/0.5	<0.50	470
26723-46	79/0.5	<0.50	100
26723-47	80/0.5	<0.50	110
26723-48	Z9	<0.50	[NA]
26723-49	81/0.5	[NA]	49
26723-50	82/0.5	[NA]	110
26723-52	83/0.5	[NA]	48
26723-53	86/0.5	[NA]	51
26723-54	87/0.5	<0.50	30
26723-55	88/0.5	[NA]	210
26723-56	89/0.5	<0.50	12
26723-57	90/0.5	<0.50	57
26723-58	91/0.5	[NA]	72
26723-59	92/0.5	[NA]	310
26723-60	93/0.5	[NA]	36
26723-61	94/0.5	<0.50	290
26723-63	95/0.5	[NA]	130

SGS Ref	Sample ID	Total Phenolics (as Phenol)	Electrical Conductivity 1:5 soil:water
26723-64	96/0.5	<0.50	42
26723-65	97/0.5	<0.50	60
26723-66	98/0.5	<0.50	50
26723-67	99/0.5	[NA]	30
26723-68	100/0.5	[NA]	23
26723-69	101/0.5	[NA]	14
26723-70	102/0.5	[NA]	48
26723-71	103/0.5	<0.50	65
26723-72	104/0.5	[NA]	82
26723-74	105/0.5	[NA]	76
26723-75	106/0.5	<0.50	15
26723-76	Z6	<0.50	[NA]
26723-77	107/0.5	[NA]	91
26723-79	108/0.5	[NA]	110
26723-80	110/0.5	<0.50	16
26723-81	111/0.5	[NA]	160
26723-82	112/0.5	<0.50	16
26723-83	113/0.5	<0.50	260
26723-84	115/0.5	[NA]	32

SGS Ref	Sample ID	Total Phenolics (as Phenol)	Electrical Conductivity 1:5 soil:water
26723-85	116/0.5	<0.50	9.2
26723-86	15/0.5	[NA]	140
26723-87	109/0.5	<0.50	39
26723-97	87/1.0	<0.50	[NA]

SGS Ref	Sample ID		Moisture
---	---		%
26723-3	5/0.5		15
26723-4	9/0.5		16
26723-6	11/0.5		10
26723-8	16/0.5		5.5
26723-9	18/0.5		6.0
26723-10	20/0.5		14
26723-13	24/0.5		4.3
26723-14	25/0.5		8.1
26723-16	28/0.5		14
26723-17	29/0.5		6.3
26723-19	23/0.5		1.7
26723-21	Z5		13
26723-22	Z18		8.7
26723-23	34/0.5		5.7
26723-24	Z17		5.8
26723-27	39/0.5		11
26723-28	Z15		1.0
26723-29	40/0.5		2.1
26723-30	43/0.5		6.8
26723-31	47/0.5		2.8
26723-33	59/0.5		9.9
26723-34	Z13		17
26723-35	60/0.5		12
26723-36	Z14		11
26723-37	61/0.5		15
26723-38	63/0.5		12

SGS Ref	Sample ID		Moisture
26723-40	70/0.5		12
26723-42	72/0.5		12
26723-43	Z12		12
26723-45	74/0.5		13
26723-46	79/0.5		16
26723-47	80/0.5		10
26723-48	Z9		23
26723-52	83/0.5		18
26723-53	86/0.5		22
26723-54	87/0.5		8.8
26723-56	89/0.5		3.6
26723-57	90/0.5		11
26723-58	91/0.5		10
26723-59	92/0.5		13
26723-60	93/0.5		20
26723-61	94/0.5		11
26723-62	Z8		13
26723-63	95/0.5		12
26723-64	96/0.5		12
26723-65	97/0.5		13
26723-66	98/0.5		13
26723-68	100/0.5		5.2
26723-69	101/0.5		1.2
26723-70	102/0.5		12
26723-71	103/0.5		13
26723-72	104/0.5		14
26723-73	Z4		12
26723-75	106/0.5		7.5
26723-76	Z6		6.6
26723-80	110/0.5		7.0

SGS Ref	Sample ID	Moisture
26723-81	111/0.5	11
26723-82	112/0.5	5.5
26723-83	113/0.5	13
26723-84	115/0.5	12
26723-85	116/0.5	2.5
26723-87	109/0.5	4.5
26723-97	87/1.0	14

Method ID	Methodology Summary
SEO-017	BTEX/TRH C6-C9 - Determination by Purge and Trap Gas Chromatography with Flame Ionisation Detection (FID) and Photo Ionisation Detection (PID). The surrogate spike used is ααα-trifluorotoluene.
SEO-020	TRH - Determination of Total Recoverable Hydrocarbons by gas chromatography following extraction with DCM/Acetone for solids and DCM for liquids.
SEO-005	OC/OP/PCB - Determination of a suite of Organchlorine Pesticides, Chlorinated Organo-phosphorus Pesticides and Polychlorinated Biphenyls (PCB's) by sonication extraction using dichloromethane for waters or acetone / hexane for soils followed by Gas Chromatographic separation with Electron Capture Detection (GC /ECD). The surrogate spike used is 2,4,5,6-Tetrachloro-m-xylene.
SEO-030	PAHs by GC/MS - Determination of Polynuclear Aromatic Hydrocarbons (PAH's) by Gas Chromatography / Mass Spectrometry following extraction with dichloromethane or dichloromethane/acetone. The surrogate spike used is p-Terphenyl-d14.
SEI-065	Total Phenolics - determined colorimetrically following steam stripping of the sample. Based on APHA 20th ED, 5530-D.
SEI-010	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED.
SEP-001	Air Dry - Cover air drying at 40 C, moisture content at 103 C - 105 C, wet slurrying, compositing and preparation of a 1:5 soil suspension.

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
Arsenic	mg/kg	3	SEM-010	<3	26723-1	7 || 7 || RPD: 0	26723-2	94 || 95 || RPD: 1
Cadmium	mg/kg	0.5	SEM-010	<0.5	26723-1	<0.5 || <0.5	26723-2	94 || 94 || RPD: 0
Chromium	mg/kg	0.5	SEM-010	<0.5	26723-1	16 || 16 || RPD: 0	26723-2	92 || 93 || RPD: 1
Copper	mg/kg	0.5	SEM-010	<0.5	26723-1	16 || 15 || RPD: 6	26723-2	91 || 92 || RPD: 1
Lead	mg/kg	2	SEM-010	<2	26723-1	14 || 14 || RPD: 0	26723-2	87 || 86 || RPD: 1
Mercury	mg/kg	0.05	SEM-005	<0.05	26723-1	<0.05 || <0.05	26723-2	94 || 94 || RPD: 0
Nickel	mg/kg	0.2	SEM-010	<0.2	26723-1	12 || 12 || RPD: 0	26723-2	92 || 92 || RPD: 0
Zinc	mg/kg	0.5	SEM-010	<0.5	26723-1	34 || 32 || RPD: 6	26723-2	98 || 98 || RPD: 0
QUALITY CONTROL TRH/BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
TRH C_6 - C_9 P&T	mg/kg	20	SEO-017	<20	26723-6	<20 || <20	26723-10	69 || 75 || RPD: 8
TRH C_{10} - C_{14}	mg/kg	20	SEO-020	<20	26723-6	<20 || <20	26723-10	125 || 109 || RPD: 14
TRH C_{15} - C_{28}	mg/kg	50	SEO-020	<50	26723-6	<50 || <50	26723-10	120 || 106 || RPD: 12
TRH C_{29} - C_{36}	mg/kg	50	SEO-020	<50	26723-6	<50 || <50	26723-10	124 || 103 || RPD: 19
Benzene	mg/kg	0.5	SEO-017	<0.50	26723-6	<0.50 || <0.50	26723-10	70 || 75 || RPD: 7
Toluene	mg/kg	0.5	SEO-017	<0.50	26723-6	<0.50 || <0.50	26723-10	77 || 91 || RPD: 17
Ethylbenzene	mg/kg	0.5	SEO-017	<0.50	26723-6	<0.50 || <0.50	26723-10	76 || 87 || RPD: 13
Total Xylenes	mg/kg	1.5	SEO-017	<1.5	26723-6	<1.5 || <1.5	26723-10	78 || 88 || RPD: 12
Surrogate	%		SEO-017	[NT]	26723-6	78 || 68 || RPD: 14	26723-10	78 || 79 || RPD: 1

QUALITY CONTROL OC Pesticides in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+% RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
HCB	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
alpha-BHC	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
gamma-BHC(Lindane)	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Heptachlor	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	109 || 120 || RPD: 10
Aldrin	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	104 || 105 || RPD: 1
beta-BHC	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
delta-BHC	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	97 || 110 || RPD: 13
Heptachlor Epoxide	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
o,p'-DDE	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
alpha-Endosulfan	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
trans-Chlordane	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
cis-Chlordane	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
trans-Nonachlor	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
p,p'-DDE	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Dieldrin	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	93 || 106 || RPD: 13
Endrin	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
o,p'-DDD	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
o,p'-DDT	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
beta-Endosulfan	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
p,p'-DDD	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
p,p'-DDT	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	102 || 106 || RPD: 4
Endosulfan Sulphate	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	94 || 106 || RPD: 12
Endrin Aldehyde	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Methoxychlor	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]

QUALITY CONTROL OC Pesticides in Soil	**UNITS**	**PQL**	**METHOD**	**Blank**	**Duplicate Sm#**	**Duplicate Base+Duplicate+% RPD**	**Spike Sm#**	**Matrix Spike % Recovery Duplicate+% RPD**
Endrin Ketone	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Surrogate	%		SEO-005	[NT]	26723-4	98 || 94 || RPD: 4	26723-3	124 || 100 || RPD: 21
QUALITY CONTROL OP Pesticides in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
Chlorpyrifos	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	93 || 106 || RPD: 13
Fenitrothion	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Bromofos Ethyl	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Ethion	mg/kg	0.1	SEO-005	<0.10	26723-4	<0.10 || <0.10	26723-3	[NT]
Surrogate	%		SEO-005	[NT]	26723-4	98 || 94 || RPD: 4	26723-3	124 || 100 || RPD: 21
QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
Naphthalene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	95 || 93 || RPD: 2
Acenaphthylene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	84 || 82 || RPD: 2
Acenaphthene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	103 || 102 || RPD: 1
Fluorene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]
Phenanthrene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	111 || 110 || RPD: 1
Anthracene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	120 || 118 || RPD: 2
Fluoranthene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	125 || 122 || RPD: 2
Pyrene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	125 || 122 || RPD: 2
Benzo[*a*]anthracene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]
Chrysene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]
Benzo[*b,k*]fluoranthene	mg/kg	0.20	SEO-030	<0.2	26723-6	<0.2 || <0.2	26723-17	[NT]
Benzo[*a*]pyrene	mg/kg	0.050	SEO-030	<0.05	26723-6	<0.05 || <0.05	26723-17	93 || 90 || RPD: 3
Indeno[*123-cd*]pyrene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]

QUALITY CONTROL PAHs in Soil	**UNITS**	**PQL**	**METHOD**	**Blank**	**Duplicate Sm#**	**Duplicate Base+Duplicate+% RPD**	**Spike Sm#**	**Matrix Spike % Recovery Duplicate+% RPD**
Dibenzo[*ah*]anthracene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]
Benzo[*ghi*]perylene	mg/kg	0.10	SEO-030	<0.1	26723-6	<0.1 || <0.1	26723-17	[NT]
Total +ve PAH's	mg/kg	0	SEO-030	0.00	26723-6	0.00 || 0.00	26723-17	[NT]
Surrogate	%		SEO-030	[NT]	26723-6	105 || 106 || RPD: 1	26723-17	108 || 107 || RPD: 1

QUALITY CONTROL CN, Phenolics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+% RPD
Total Phenolics (as Phenol)	mg/kg	0.5	SEI-065	<0.50	26723-6	<0.50 || <0.50	Batch	86 || 88 || RPD: 2
Electrical Conductivity 1:5 soil: water	µS/cm	1	SEI-010	<1.0	26723-6	18 || [N/T]	Batch	-

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base+Duplicate+%RPD
Moisture	%		SEP-001	[NT]	26723-4	16 || 16 || RPD: 0

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Arsenic	mg/kg	26723-21	3 || 3 || RPD: 0	26723-22	95 || 95 || RPD: 0
Cadmium	mg/kg	26723-21	<0.5 || <0.5	26723-22	92 || 93 || RPD: 1
Chromium	mg/kg	26723-21	8 || 8 || RPD: 0	26723-22	88 || 89 || RPD: 1
Copper	mg/kg	26723-21	39 || 41 || RPD: 5	26723-22	90 || 91 || RPD: 1
Lead	mg/kg	26723-21	15 || 16 || RPD: 6	26723-22	85 || 86 || RPD: 1
Mercury	mg/kg	26723-21	<0.05 || <0.05	26723-22	92 || 92 || RPD: 0
Nickel	mg/kg	26723-21	11 || 12 || RPD: 9	26723-22	88 || 88 || RPD: 0
Zinc	mg/kg	26723-21	73 || 76 || RPD: 4	26723-22	93 || 94 || RPD: 1

QUALITY CONTROL **TRH/BTEX in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
TRH C_6 - C_9 P&T	mg/kg	26723-82	<20 || <20	26723-80	87 || 88 || RPD: 1
TRH C_{10} - C_{14}	mg/kg	26723-82	<20 || <20	26723-80	100 || 103 || RPD: 3
TRH C_{15} - C_{28}	mg/kg	26723-82	<50 || <50	26723-80	95 || 99 || RPD: 4
TRH C_{29} - C_{36}	mg/kg	26723-82	<50 || <50	26723-80	92 || 95 || RPD: 3
Benzene	mg/kg	26723-82	<0.50 || <0.50	26723-80	86 || 88 || RPD: 2
Toluene	mg/kg	26723-82	<0.50 || <0.50	26723-80	94 || 112 || RPD: 17
Ethylbenzene	mg/kg	26723-82	<0.50 || <0.50	26723-80	94 || 105 || RPD: 11
Total Xylenes	mg/kg	26723-82	<1.5 || <1.5	26723-80	97 || 106 || RPD: 9
Surrogate	%	26723-82	89 || 87 || RPD: 2	26723-80	91 || 95 || RPD: 4
QUALITY CONTROL OC Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
HCB	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
alpha-BHC	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
gamma-BHC(Lindane)	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Heptachlor	mg/kg	26723-69	<0.10 || <0.10	26723-69	118 || 127 || RPD: 7
Aldrin	mg/kg	26723-69	<0.10 || <0.10	26723-69	107 || 103 || RPD: 4
beta-BHC	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
delta-BHC	mg/kg	26723-69	<0.10 || <0.10	26723-69	109 || 109 || RPD: 0
Heptachlor Epoxide	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
o,p'-DDE	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
alpha-Endosulfan	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]

QUALITY CONTROL OC Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:% RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
trans-Chlordane	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
cis-Chlordane	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
trans-Nonachlor	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
p,p'-DDE	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Dieldrin	mg/kg	26723-69	<0.10 || <0.10	26723-69	109 || 106 || RPD: 3
Endrin	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
o,p'-DDD	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
o,p'-DDT	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
beta-Endosulfan	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
p,p'-DDD	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
p,p'-DDT	mg/kg	26723-69	<0.10 || <0.10	26723-69	113 || 117 || RPD: 3
Endosulfan Sulphate	mg/kg	26723-69	<0.10 || <0.10	26723-69	113 || 113 || RPD: 0
Endrin Aldehyde	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Methoxychlor	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Endrin Ketone	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Surrogate	%	26723-69	103 || 99 || RPD: 4	26723-69	81 || 117 || RPD: 36

QUALITY CONTROL **OP Pesticides in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
Chlorpyrifos	mg/kg	26723-69	<0.10 || <0.10	26723-69	108 || 101 || RPD: 7
Fenitrothion	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Bromofos Ethyl	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Ethion	mg/kg	26723-69	<0.10 || <0.10	26723-69	[NT]
Surrogate	%	26723-69	103 || 99 || RPD: 4	26723-69	81 || 117 || RPD: 36
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Naphthalene	mg/kg	26723-82	<0.1 || <0.1	26723-82	93 || 92 || RPD: 1
Acenaphthylene	mg/kg	26723-82	<0.1 || <0.1	26723-82	76 || 79 || RPD: 4
Acenaphthene	mg/kg	26723-82	<0.1 || <0.1	26723-82	97 || 102 || RPD: 5
Fluorene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]
Phenanthrene	mg/kg	26723-82	<0.1 || <0.1	26723-82	106 || 108 || RPD: 2
Anthracene	mg/kg	26723-82	<0.1 || <0.1	26723-82	112 || 116 || RPD: 4
Fluoranthene	mg/kg	26723-82	<0.1 || <0.1	26723-82	109 || 113 || RPD: 4
Pyrene	mg/kg	26723-82	<0.1 || <0.1	26723-82	116 || 121 || RPD: 4
Benzo[*a*]anthracene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]
Chrysene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]
Benzo[*b,k*]fluoranthene	mg/kg	26723-82	<0.2 || <0.2	26723-82	[NT]
Benzo[*a*]pyrene	mg/kg	26723-82	<0.05 || <0.05	26723-82	83 || 84 || RPD: 1
Indeno[*123-cd*]pyrene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]
Dibenzo[*ah*]anthracene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]

QUALITY CONTROL **PAHs in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
Benzo[*ghi*]perylene	mg/kg	26723-82	<0.1 || <0.1	26723-82	[NT]
Total +ve PAH's	mg/kg	26723-82	0.00 || 0.00	26723-82	[NT]
Surrogate	%	26723-82	112 || 111 || RPD: 1	26723-82	98 || 99 || RPD: 1
QUALITY CONTROL CN, Phenolics	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD		
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]		
Electrical Conductivity 1:5 soil :water	µS/cm	26723-1	31 || 32 || RPD: 3		
QUALITY CONTROL Moisture	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD		
Moisture	%	26723-6	10 || 10 || RPD: 0		
QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Arsenic	mg/kg	26723-41	3 || <3	26723-42	93 || 93 || RPD: 0
Cadmium	mg/kg	26723-41	<0.5 || <0.5	26723-42	95 || 94 || RPD: 1
Chromium	mg/kg	26723-41	13 || 13 || RPD: 0	26723-42	92 || 91 || RPD: 1
Copper	mg/kg	26723-41	14 || 14 || RPD: 0	26723-42	92 || 92 || RPD: 0
Lead	mg/kg	26723-41	9 || 9 || RPD: 0	26723-42	86 || 86 || RPD: 0
Mercury	mg/kg	26723-41	<0.05 || [N/T]	26723-42	[NT]
Nickel	mg/kg	26723-41	12 || 12 || RPD: 0	26723-42	88 || 88 || RPD: 0
Zinc	mg/kg	26723-41	32 || 32 || RPD: 0	26723-42	92 || 91 || RPD: 1

QUALITY CONTROL OC Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:% RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
HCB	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
alpha-BHC	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
gamma-BHC(Lindane)	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Heptachlor	mg/kg	26723-76	<0.10 || <0.10	26723-76	139 || 136 || RPD: 2
Aldrin	mg/kg	26723-76	<0.10 || <0.10	26723-76	106 || 105 || RPD: 1
beta-BHC	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
delta-BHC	mg/kg	26723-76	<0.10 || <0.10	26723-76	114 || 111 || RPD: 3
Heptachlor Epoxide	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
o,p'-DDE	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
alpha-Endosulfan	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
trans-Chlordane	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
cis-Chlordane	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
trans-Nonachlor	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
p,p'-DDE	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Dieldrin	mg/kg	26723-76	<0.10 || <0.10	26723-76	109 || 107 || RPD: 2
Endrin	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
o,p'-DDD	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
o,p'-DDT	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
beta-Endosulfan	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
p,p'-DDD	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
p,p'-DDT	mg/kg	26723-76	<0.10 || <0.10	26723-76	126 || 121 || RPD: 4

QUALITY CONTROL **OC Pesticides in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
Endosulfan Sulphate	mg/kg	26723-76	<0.10 || <0.10	26723-76	114 || 112 || RPD: 2
Endrin Aldehyde	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Methoxychlor	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Endrin Ketone	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Surrogate	%	26723-76	97 || 107 || RPD: 10	26723-76	120 || 118 || RPD: 2
QUALITY CONTROL OP Pesticides in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Chlorpyrifos	mg/kg	26723-76	<0.10 || <0.10	26723-76	103 || 102 || RPD: 1
Fenitrothion	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Bromofos Ethyl	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Ethion	mg/kg	26723-76	<0.10 || <0.10	26723-76	[NT]
Surrogate	%	26723-76	97 || 107 || RPD: 10	26723-76	120 || 118 || RPD: 2
QUALITY CONTROL CN, Phenolics	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD		
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]		
Electrical Conductivity 1:5 soil :water	µS/cm	26723-23	15 || 17 || RPD: 12		

QUALITY CONTROL Moisture	**UNITS**	**Dup. Sm#**	**Duplicate Base:Duplicate:% RPD**
Moisture	%	26723-69	1.2 || 1.2 || RPD: 0

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Arsenic	mg/kg	26723-61	6 || 6 || RPD: 0	26723-62	89 || 90 || RPD: 1
Cadmium	mg/kg	26723-61	<0.5 || <0.5	26723-62	91 || 91 || RPD: 0
Chromium	mg/kg	26723-61	21 || 20 || RPD: 5	26723-62	87 || 87 || RPD: 0
Copper	mg/kg	26723-61	31 || 31 || RPD: 0	26723-62	87 || 86 || RPD: 1
Lead	mg/kg	26723-61	10 || 9 || RPD: 11	26723-62	81 || 82 || RPD: 1
Mercury	mg/kg	26723-61	0.06 || <0.05	26723-62	77 || 78 || RPD: 1
Nickel	mg/kg	26723-61	18 || 18 || RPD: 0	26723-62	84 || 85 || RPD: 1
Zinc	mg/kg	26723-61	52 || 52 || RPD: 0	26723-62	87 || 87 || RPD: 0

QUALITY CONTROL CN, Phenolics	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD
Total Phenolics (as Phenol)	mg/kg	26723-28	<0.50 || <0.50
Electrical Conductivity 1:5 soil :water	µS/cm	[NT]	[NT]

QUALITY CONTROL Moisture	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD
Moisture	%	26723-82	5.5 || 5.5 || RPD: 0

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Arsenic	mg/kg	26723-81	6 || 6 || RPD: 0	26723-82	97 || 97 || RPD: 0

QUALITY CONTROL **Acid Extractable Metals in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
Cadmium	mg/kg	26723-81	<0.5 || <0.5	26723-82	96 || 96 || RPD: 0
Chromium	mg/kg	26723-81	11 || 12 || RPD: 9	26723-82	91 || 92 || RPD: 1
Copper	mg/kg	26723-81	19 || 20 || RPD: 5	26723-82	91 || 91 || RPD: 0
Lead	mg/kg	26723-81	17 || 18 || RPD: 6	26723-82	94 || 93 || RPD: 1
Mercury	mg/kg	26723-81	<0.05 || <0.05	26723-82	95 || 101 || RPD: 6
Nickel	mg/kg	26723-81	20 || 21 || RPD: 5	26723-82	93 || 93 || RPD: 0
Zinc	mg/kg	26723-81	51 || 51 || RPD: 0	26723-82	96 || 96 || RPD: 0

QUALITY CONTROL CN, Phenolics	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]
Electrical Conductivity 1:5 soil :water	µS/cm	26723-41	46 || 42 || RPD: 9

QUALITY CONTROL Acid Extractable Metals in Soil	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD	Spike Sm#	Matrix Spike % Recovery Duplicate+%RPD
Arsenic	mg/kg	26723-101	12 || 11 || RPD: 9	26723-102	91 || 92 || RPD: 1
Cadmium	mg/kg	26723-101	<0.5 || <0.5	26723-102	91 || 92 || RPD: 1
Chromium	mg/kg	26723-101	10 || 9 || RPD: 11	26723-102	88 || 88 || RPD: 0
Copper	mg/kg	26723-101	37 || 35 || RPD: 6	26723-102	89 || 89 || RPD: 0
Lead	mg/kg	26723-101	28 || 27 || RPD: 4	26723-102	84 || 84 || RPD: 0
Mercury	mg/kg	26723-101	0.07 || 0.07 || RPD: 0	26723-102	92 || 94 || RPD: 2
Nickel	mg/kg	26723-101	17 || 16 || RPD: 6	26723-102	86 || 86 || RPD: 0

QUALITY CONTROL **Acid Extractable Metals in Soil**	**UNITS**	**Dup. Sm#**	**Duplicate** **Base:Duplicate:% RPD**	**Spike Sm#**	**Matrix Spike % Recovery** **Duplicate+%RPD**
Zinc	mg/kg	26723-101	83 || 77 || RPD: 8	26723-102	92 || 91 || RPD: 1

QUALITY CONTROL CN, Phenolics	UNITS	Dup. Sm#	Duplicate Base:Duplicate:%RPD
Electrical Conductivity 1:5 soil :water	µS/cm	26723-61	290 || 290 || RPD: 0

Result Codes

[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Registration
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

The methods detailed in this report have been validated. Analysis and QA/QC is in accordance with Schedule B(3) NEPM Guideline on Laboratory Analysis of Potentially Contaminated Soils - 1999.

Date Organics extraction commenced: 19/01/04

NATA Accreditation No. 4361

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.

Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 20 samples.

Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.

Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.

Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.

Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Mrangle Dock
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 1 of 22/11

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics: As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics: Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECI 1:5	TCLP	Notes
4/0.5	S	1	✓	✓	✓	✓	✓	✓	✓	✓					✓		
23	S	2	✓	✓	✓	✓	✓	✓	✓	✓							
5/0.5	S	3	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	SGS	
9/0.5	S	4	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	COC Received 13/1	
10/0.5	S	5	✓	✓	✓	✓	✓	✓	✓	✓					✓	By Aileen	
11/0.5	S	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Time	
14/0.5	S	7	✓	✓	✓	✓	✓	✓	✓	✓					✓	Samples Intact	○
16/0.5	S	8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Ice/Coole Pack	○
18/0.5	S	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Comments	26723
20/0.5	S	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
21/0.5	S	11	✓	✓	✓	✓	✓	✓	✓	✓					✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: 12/1/4
Total number of samples in container: Lots
Results required by: Standard
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature: Aile
Date: 13/1 COC Lab Ref: 26723

Send results to:
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Fax:

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Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 2 of 2 11

To: SGS Environmental Services
Bolany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics					TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECLI: S		
22/0.5	S	12	✓	✓	✓	✓	✓	✓	✓	✓					✓		
24/0.5	S	13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
25/0.5	S	14	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
27/0.5	S	15	✓	✓	✓	✓	✓	✓	✓	✓					✓		
28/0.5	S	16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
29/0.5	S	17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
31/0.5	S	18	✓	✓	✓	✓	✓	✓	✓	✓					✓		
32/0.5	S	19	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
33/0.5	S	20	✓	✓	✓	✓	✓	✓	✓	✓							
25	S	21	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
218	S	22	✓	✓	✓	✓	✓	✓	✓	✓			✓				
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: 12/1/04
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 19/1/04 Lab Ref: 26723

Send results to:
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CHAIN OF CUSTODY DESPATCH SHEET

Douglas Partners
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Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 5 of 6/12 11

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gale 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics					TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECI 1:5		
34/0.5	S	23	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
217	S	24	✓	✓	✓	✓	✓	✓	✓	✓			✓				
35/0.5	S	25	✓	✓	✓	✓	✓	✓	✓	✓					✓		
36/0.5	S	26	✓	✓	✓	✓	✓	✓	✓	✓					✓		
39/0.5	S	27	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
215	S	28	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
40/0.5	S	29	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
43/0.5	S	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
47/0.5	S	31	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
50/0.5		32	✓	✓	✓	✓	✓	✓	✓	✓					✓		
59/0.5		33	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
PQL(S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5*	*	*	*		-	
PQL(W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05*	*	*	*		-	

PQL = practical quantitation limit. *As per Laboratory Method Detection Limit

Date relinquished: 12/1/04
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 13/1/04 Lab Ref: 21723

Send results to:
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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 4 of 5 11

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECI 1:5	TCLP	Notes
Z13	S	34	✓	✓	✓	✓	✓	✓	✓	✓			✓				
60/0.5	S	35	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
Z14	S	36	✓	✓	✓	✓	✓	✓	✓	✓			✓				
61/0.5	S	37	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
63/0.5	S	38	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
64/0.5	S	39	✓	✓	✓	✓	✓	✓	✓	✓					✓		
70/0.5	S	40	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
71/0.5	S	41	✓	✓	✓	✓	✓	✓	✓	✓					✓		
72/0.5	S	42	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
Z12		43	✓	✓	✓	✓	✓	✓	✓	✓			✓				
73/0.5	S	44	✓	✓	✓	✓	✓	✓	✓	✓					✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 13/1/04 Lab Ref: 26723

Send results to:
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Fax:

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CHAIN OF CUSTODY DESPATCH SHEET

Douglas Partners
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Project Name: Menangle Park
Project No: 36.500
Project Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 5 of 87 ice

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample	Sample Type S-soil W-water	Lab ID	Inorganics								Organics					TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECI 1:5		
74/0.5	S	45	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
79/0.5	S	46	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
80/0.5	S	47	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
29	S	48	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
81/0.5	S	49	✓	✓	✓	✓	✓	✓	✓	✓					✓		
82/0.5	S	50	✓	✓	✓	✓	✓	✓	✓	✓					✓		
210	S	51	✓	✓	✓	✓	✓	✓	✓	✓							
83/0.5	S	52	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
86/0.5	S	53	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
87/0.5	S	54	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
88/0.5	S	55	✓	✓	✓	✓	✓	✓	✓	✓					✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature: AdL
Date: 13/1/04 Lab Ref: 26723

Send results to:
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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 6 of 11

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample	Sample Type S-soil W-water	Lab ID	Inorganics As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other EIC 1:5	TCLP	Notes
89/0.5	S	56	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
90/0.5	S	57	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
91/0.5	S	58	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
92/0.5	S	59	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
93/0.5	S	60	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
94/0.5	S	61	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Z8	S	62	✓	✓	✓	✓	✓	✓	✓	✓			✓				
95/0.5	S	63	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
96/0.5	S	64	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
97/0.5	S	65	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
98/0.5	S	66	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit. *As per Laboratory Method Detection Limit

Date relinquished: ....
Total number of samples in container: ....
Results required by: ....
Relinquished by: ....
Signature: ....

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature: Allie
Date: 13/1/04 Lab Ref: 26723

Send results to:
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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
Project Contact Person: Chris Kline 2 of 11
Laboratory Storage: esky / fridge / shelved (circle)

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample	Sample Type S-soil W-water	Lab ID	Inorganics As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ ~~PCBs~~	PAHs	Other ECI 1:5	TCLP	Notes
99/0.5	S	67	✓	✓	✓	✓	✓	✓	✓	✓					✓		
100/0.5	S	68	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
101/0.5	S	69	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
102/0.5	S	70	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
103/0.5	S	71	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
104/0.5	S	72	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		
Z4	S	73	✓	✓	✓	✓	✓	✓	✓	✓			✓				
105/0.5	S	74	✓	✓	✓	✓	✓	✓	✓	✓					✓		
106/0.5	S	75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Z6	S	76	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
107/0.5	S	77	✓	✓	✓	✓	✓	✓	✓	✓					✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit. *As per Laboratory Method Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature: AHi
Date: 13/1/04 Lab Ref: 26723

Send results to:
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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) ..... 11 of 11

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Nolaras

Sample	Sample Type S-soil W-water	Lab ID	Inorganics As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other EC1:5	TCLP	Notes
27	S	78	✓	✓	✓	✓	✓	✓	✓								
108/0.5	S	79	✓	✓	✓	✓	✓	✓	✓						✓		
110/0.5	S	80	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
111/0.5	S	81	✓	✓	✓	✓	✓	✓	✓				✓		✓		
112/0.5	S	82	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
113/0.5	S	83	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
115/0.5	S	84	✓	✓	✓	✓	✓	✓	✓				✓		✓		
116/0.5	S	85	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
5/0.5	S	86	✓	✓	✓	✓	✓	✓	✓						✓		
9/0.5	S	87	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
~~23/0.5~~	~~S~~		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: .....
Total number of samples in container: .....
Results required by: .....
Relinquished by: .....
Signature: .....

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature: AK
Date: 13/11/04 Lab Ref: 26723

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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36580
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 9.1.04

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics					TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other		
28/1.5		88	✓	✓	✓	✓	✓	✓	✓	✓							
28/3.0		89	✓	✓	✓	✓	✓	✓	✓	✓							
16/1.5		90	✓	✓	✓	✓	✓	✓	✓	✓							
16/3.0		91	✓	✓	✓	✓	✓	✓	✓	✓							
11/1.5		92	✓	✓	✓	✓	✓	✓	✓	✓							
11/3.0		93	✓	✓	✓	✓	✓	✓	✓	✓							
29/1.0		94	✓	✓	✓	✓	✓	✓	✓	✓							
110/1.0		95	✓	✓	✓	✓	✓	✓	✓	✓							
106/1.0		96	✓	✓	✓	✓	✓	✓	✓	✓							
87/1.0		97	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
116/1.5		98	✓	✓	✓	✓	✓	✓	✓	✓							
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 13/1/04 Lab Ref: 26723

Send results to:
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Address:

Fax:

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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36509
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 10 of 11

To: SGS Environmental Services
Bolany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Nolaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics					TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other		
116/3.0	S	99	✓	✓	✓	✓	✓	✓	✓	✓							
47/1.0	S	100	✓	✓	✓	✓	✓	✓	✓	✓							
108/1.5	S	101	✓	✓	✓	✓	✓	✓	✓	✓							
~~108/3.0~~ 115/2.5	S	102	✓	✓	✓	✓	✓	✓	✓	✓							
100/1.0	S	103	✓	✓	✓	✓	✓	✓	✓	✓							
98/1.5	S	104	✓	✓	✓	✓	✓	✓	✓	✓							
98/1.75	S	105	✓	✓	✓	✓	✓	✓	✓	✓							
95/1.5	S	106	✓	✓	✓	✓	✓	✓	✓	✓							
95/3.0	S	107	✓	✓	✓	✓	✓	✓	✓	✓							
63/1.5	S	108	✓	✓	✓	✓	✓	✓	✓	✓							
63/3.0	S	109	✓	✓	✓	✓	✓	✓	✓	✓							
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method
*Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 13/1/04 Lab Ref: 26723

Send results to:
Douglas Partners Pty Ltd
Address:

Fax:

Douglas Partners
Geotechnics - Environment - Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Menangle Park
Project No: 36500
DP Contact Person: Chris Kline
Prior Storage: esky / fridge / shelved (circle) 10 oC on ice

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Organics Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other	TCLP	Notes
91/1.5	S	110	✓	✓	✓	✓	✓	✓	✓	✓							
91/2.0	S	111	✓	✓	✓	✓	✓	✓	✓	✓							
5/1.5	S	112	✓	✓	✓	✓	✓	✓	✓	✓							
5/2.5	S	113	✓	✓	✓	✓	✓	✓	✓	✓							
83/1.5	S	114	✓	✓	✓	✓	✓	✓	✓	✓							
~~23/1.0~~	S		✓	✓	✓	✓	✓	✓	✓	✓							
39/1.5	S	115	✓	✓	✓	✓	✓	✓	✓	✓							
39/3.0	S	116	✓	✓	✓	✓	✓	✓	✓	✓							
88/1.5	S	117	✓	✓	✓	✓	✓	✓	✓	✓							
88/3.0	S	118	✓	✓	✓	✓	✓	✓	✓	✓							
83/3.0	S	119	✓	✓	✓	✓	✓	✓	✓	✓							
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit. *As per Laboratory Method
* Detection Limit

Date relinquished:
Total number of samples in container:
Results required by:
Relinquished by:
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 13/1/04 Lab Ref: 26723

Send results to:
Douglas Partners Pty Ltd
Address:

Fax:

5 August 2004 **TEST REPORT**

Douglas Partners Pty Ltd
96 Hermitage Road
WEST RYDE
NSW 2114

Your Reference: 36500, Menangle Park
Report Number: 29051

Attention: Stuart Brown

Dear Stuart
The following samples were received from you on the date indicated.

Samples: Qty.	17 Soils
Date of Receipt of Samples:	17/05/04
Date of Receipt of Instructions:	17/05/04
Date Preliminary Report Faxed:	Not Issued

These samples were analysed in accordance with your written instructions.
A copy of the instructions is attached with the analytical report.

The results and associated quality control are contained in the following pages of this report. Unless otherwise stated, solid samples are expressed on a dry weight basis (moisture has been supplied for your information only), air and liquid samples as received.

Should you have any queries regarding this report please contact the undersigned.

Yours faithfully
SGS ENVIRONMENTAL SERVICES

Tania Notaras
Manager – Sydney

Jacinta Hurst
Operations Manager

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Botany Industrial Park Gate 3, Denison Street, Matraville 2036 NSW Australia
t +61 (0)2 9666 1426 f +61 (0)2 9666 1364 url www.sgs.com

Exchangeable Sodium Percent Our Reference: Your Reference	UNITS --- ---	29051-1 4/0.5	29051-2 10/0.5	29051-3 14/0.5	29051-4 23/0.5	29051-5 33/0.5
K	mg/kg	95	130	160	35	35
Ca	mg/kg	3,520	2,035	275	480	535
Mg	mg/kg	420	250	625	215	95
Na	mg/kg	65	30	190	50	15
Cation Exchange Capacity*	meq/100g	21.5	12.7	7.8	4.4	3.6
ESP	%	1.3	1.0	10.7	5.0	1.8

Exchangeable Sodium Percent Our Reference: Your Reference	UNITS --- ---	29051-6 39/0.5	29051-7 74/0.5	29051-8 83/0.5	29051-9 88/0.5	29051-10 89/0.5
K	mg/kg	15	105	125	170	50
Ca	mg/kg	155	2,010	3,300	1,480	340
Mg	mg/kg	70	1,650	1,490	980	110
Na	mg/kg	10	620	210	620	20
Cation Exchange Capacity*	meq/100g	1.4	26.6	30.0	18.6	2.8
ESP	%	3.0	10.1	3.0	14.5	3.1

Exchangeable Sodium Percent Our Reference: Your Reference	UNITS --- ---	29051-11 92/0.5	29051-12 99/0.5	29051-13 100/0.5	29051-14 106/0.5	29051-15 112/0.5
K	mg/kg	115	115	115	80	25
Ca	mg/kg	1,090	4,250	530	925	335
Mg	mg/kg	1,845	945	270	355	45
Na	mg/kg	1,015	100	25	10	10
Cation Exchange Capacity*	meq/100g	25.3	29.7	5.3	7.8	2.1
ESP	%	17.4	1.5	2.1	<1.0	2.0

Exchangeable Sodium Percent Our Reference: Your Reference	UNITS --- ---	29051-16 113/0.5	29051-17 116/0.5
K	mg/kg	170	40
Ca	mg/kg	3,610	220
Mg	mg/kg	1,350	60
Na	mg/kg	410	15
Cation Exchange Capacity*	meq/100g	31.3	1.8
ESP	%	5.7	3.7

Method ID	Methodology Summary
Ext-003	Analysis subcontracted to SGS Environmental Perth.

QUALITY CONTROL Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Chloride, Cl* 1:5 soil: water	mg/kg	0.5	SEI-038	<0.50	29051-12	15 || 15 || RPD: 0	Batch	103 || [N/T]
Sulphate, SO4* 1:5 soil :water	mg/kg	2	SEI-038	<2.0	29051-12	19 || 18 || RPD: 5	Batch	101 || [N/T]
pH 1:5 soil:water	pH Units		SEI-001	[NT]	29051-12	6.2 || 6.2 || RPD: 0	Batch	[NT]

QUALITY CONTROL Exchangeable Sodium Percent	UNITS	PQL	METHOD	Blank
K	mg/kg	10	Ext-003	[NT]
Ca	mg/kg	10	Ext-003	[NT]
Mg	mg/kg	10	Ext-003	[NT]
Na	mg/kg	10	Ext-003	[NT]
Cation Exchange Capacity*	meq/ 100g	1	Ext-003	[NT]
ESP	%	1	Ext-003	[NT]

Result Codes

[INS]	:	Insufficient Sample for this test	[HBG]	:	Results not Reported due to High Background Interference
[NR]	:	Not Requested	*	:	Not part of NATA Registration
[NT]	:	Not tested	[N/A]	:	Not Applicable

Result Comments

K,Ca,Mg,Na,CEC & ESP analysed by SGS Perth Agricultural report no. AG6123.
Date Organics extraction commenced: N/A
NATA Accreditation No. 2562
Note: Test results are not corrected for recovery (excluding Dioxins/Furans and PAH in XAD and PUF).
The methods detailed in this report have been validated. Analysis and QA/QC is in accordance with Schedule B(3) NEPM Guideline on Laboratory Analysis of Potentially Contaminated Soils - 1999.

Quality Control Protocol

Reagent Blank: Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. For larger projects, a reagent blank is prepared and analysed with every 20 samples.
Duplicate: A separate portion of a sample being analysed which is treated the same as the other samples in the batch. A duplicate is prepared at least every 20 samples.
Matrix Spike Duplicates: Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water (or Milli-Q water) may be used. A duplicate spiked sample is prepared at least every 20 samples.
Surrogate Spike: Added to all samples requiring analysis for organics (where relevant) prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments.
Control Standards: Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity.
Additional QC Samples: A calibration standard and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: MENANGLE PARK
Project No: 36500
DP Contact Person: STUART BROWN
Prior Storage: ~~esky / fridge~~ / shelved (circle)

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics				ESP/CEC Cl⁻ $SO_4^=$ pH (1:5)	TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs	Other		
4/0.5	S	1													✓		
10/0.5		2													✓		
14/0.5		3													✓		
23/0.5		4													✓		
33/0.5		5													✓		
39/0.5		6													✓		
74/0.5		7													✓		
83/0.5		8													✓		
88/0.5		9													✓		
89/0.5		10													✓		
92/0.5	↓	11													✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		-	
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*		-	

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: 17/5/04
Total number of samples in container: 17
Results required by:
Relinquished by: SJB
Signature:

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 17-5-04 Lab Ref: 29051

Send results to:
Douglas Partners Pty Ltd
Address:

Fax:

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: MENANGE PARK
Project No: 36500
DP Contact Person: STUART BROWN
Prior Storage: ~~esky / fridge~~ (shelved) (circle)

To: SGS Environmental Services
Botany Technical Centre, Orica Industrial Park
Gate 3, Denison Street, MATRAVILLE NSW 2036
Ph: 9666 1426 Fax: 9666 1364
Attn: Attn: Tania Notaras

Sample ID	Sample Type S-soil W-water	Lab ID	Inorganics								Organics				ESP/CEC Other Chloride Sulphate PH (1:5)	TCLP	Notes
			As	Cd	Cr	Cu	Pb	Hg	Zn	Ni	Total / GS/MS Phenol	BTEX/ TPH	OCs/ OPs/ PCBs	PAHs			
99/0.5	S	12													✓		
100/0.5		13													✓		
106/0.5		14													✓		
112/0.5		15													✓		
113/0.5		16													✓		
116/0.5		17													✓		
PQL (S)	mg/kg		0.05	1	5	3	5	0.01	5		0.5/*	*	*	*		17	5, 04
PQL (W)	mg/L		0.001	0.01	0.05	0.03	0.05	0.0005	0.01		0.05/*	*	*	*			

PQL = practical quantitation limit, *As per Laboratory Method Detection Limit

Date relinquished: 17/5/04
Total number of samples in container: 17
Results required by:
Relinquished by: SJB
Signature: SJBrown

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 17-5-04 Lab Ref: 29051

Send results to:
Douglas Partners Pty Ltd
Address:
Fax:
29051

FPM - ENVID/Form COC 02

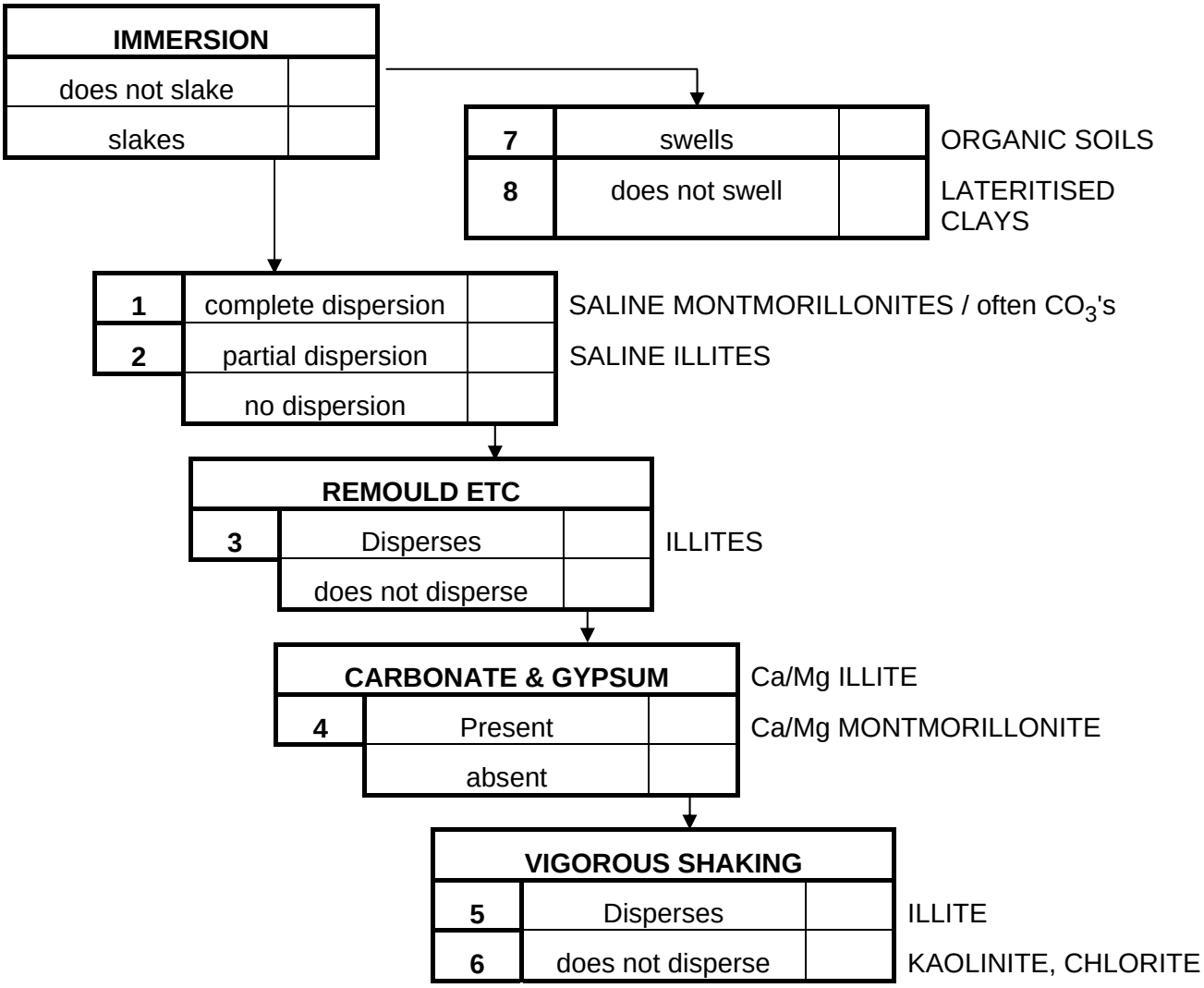
Rev1/November 2003

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 116 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION SAND – Grey brown medium grained sand.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

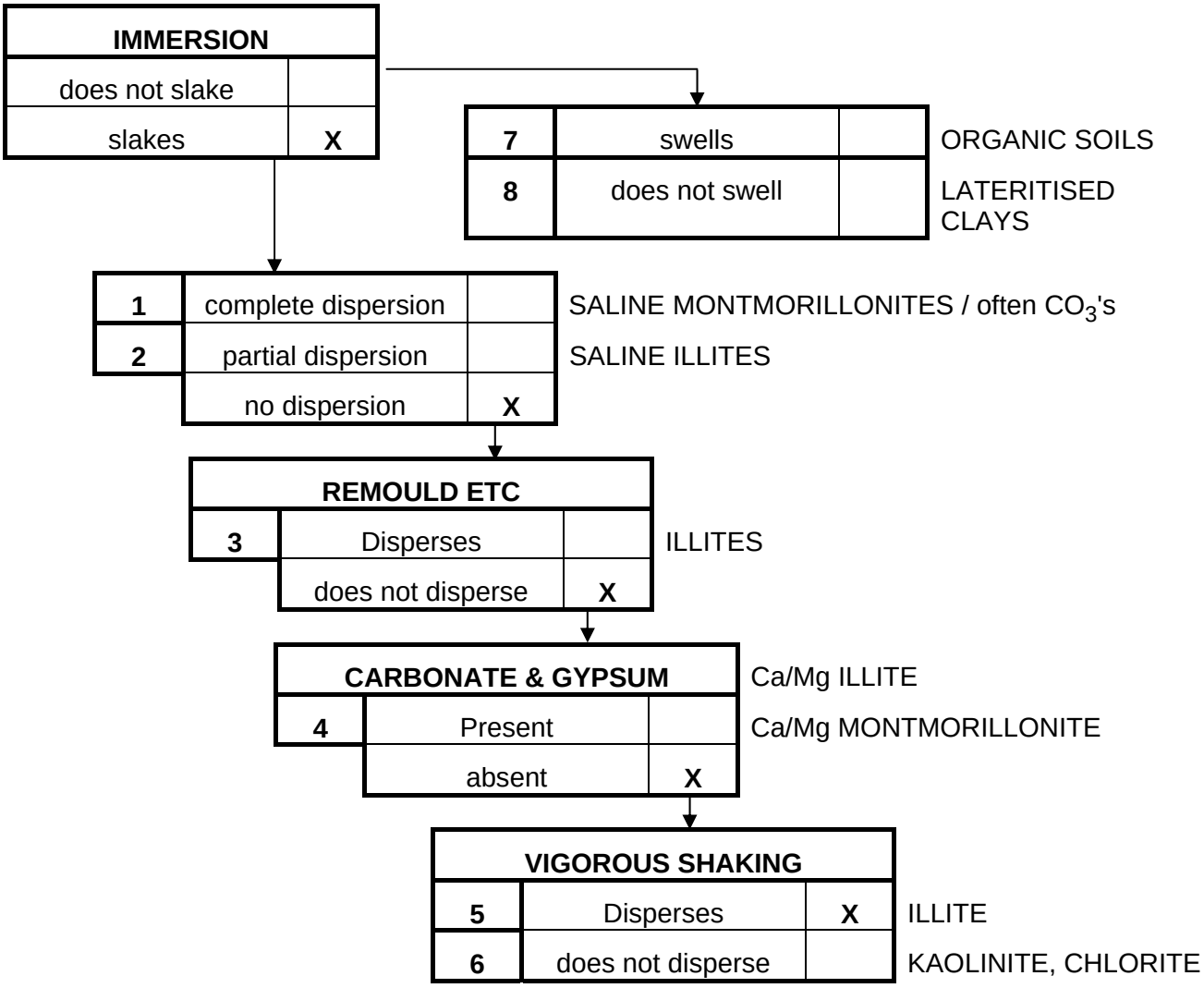
REPORT NO. S04-189Q **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 10 **DEPTH:** 0.5



EMERSON CLASS NUMBER **5**

SAMPLE DESCRIPTION SILTY CLAY AND SHALE - Brown silty clay and dark grey shale.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

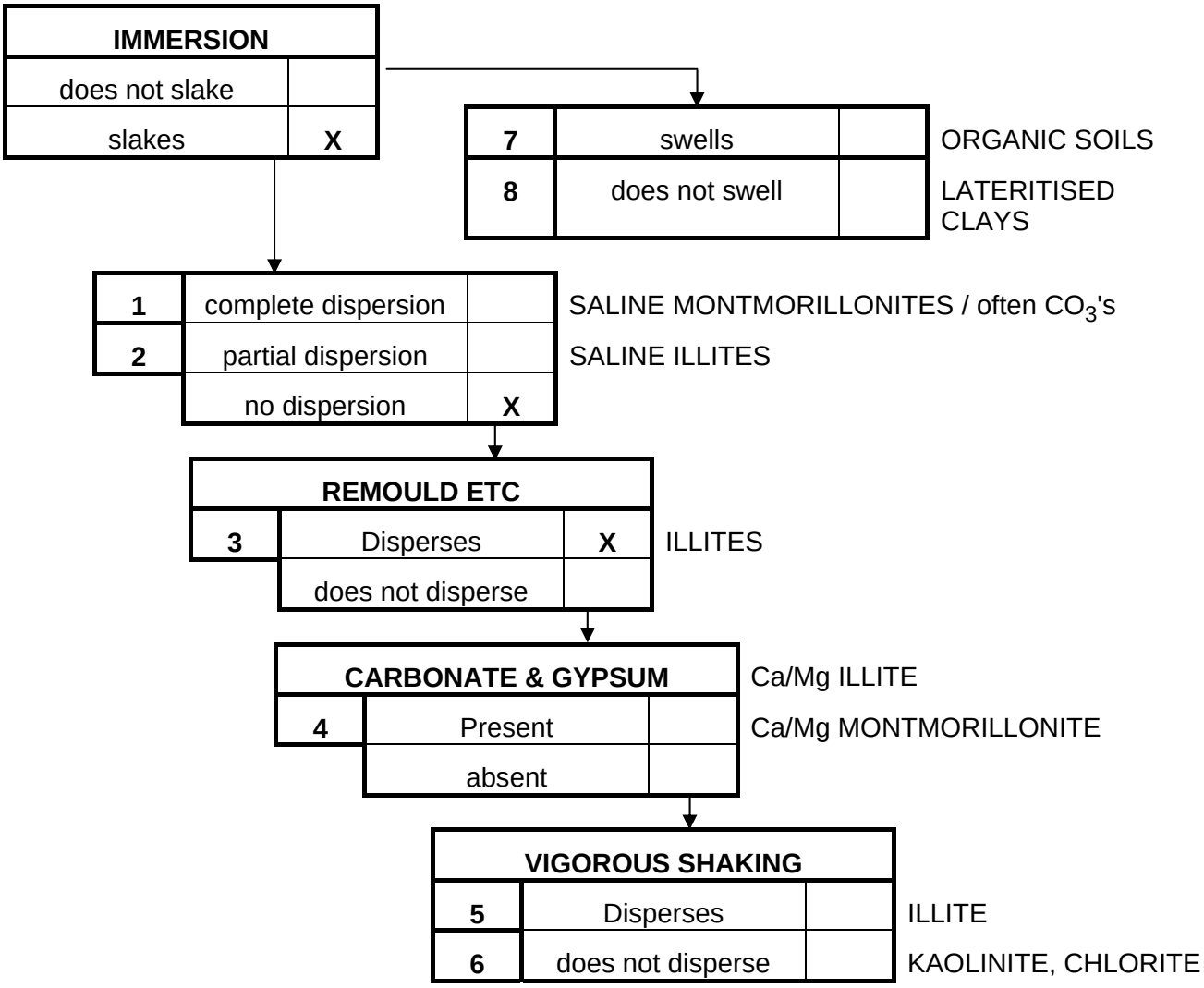
REPORT NO. S04-189B **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 14 **DEPTH:** 0.5



EMERSON CLASS NUMBER **3**

SAMPLE DESCRIPTION SILTY CLAY – Grey mottled brown silty clay with a trace of organics.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

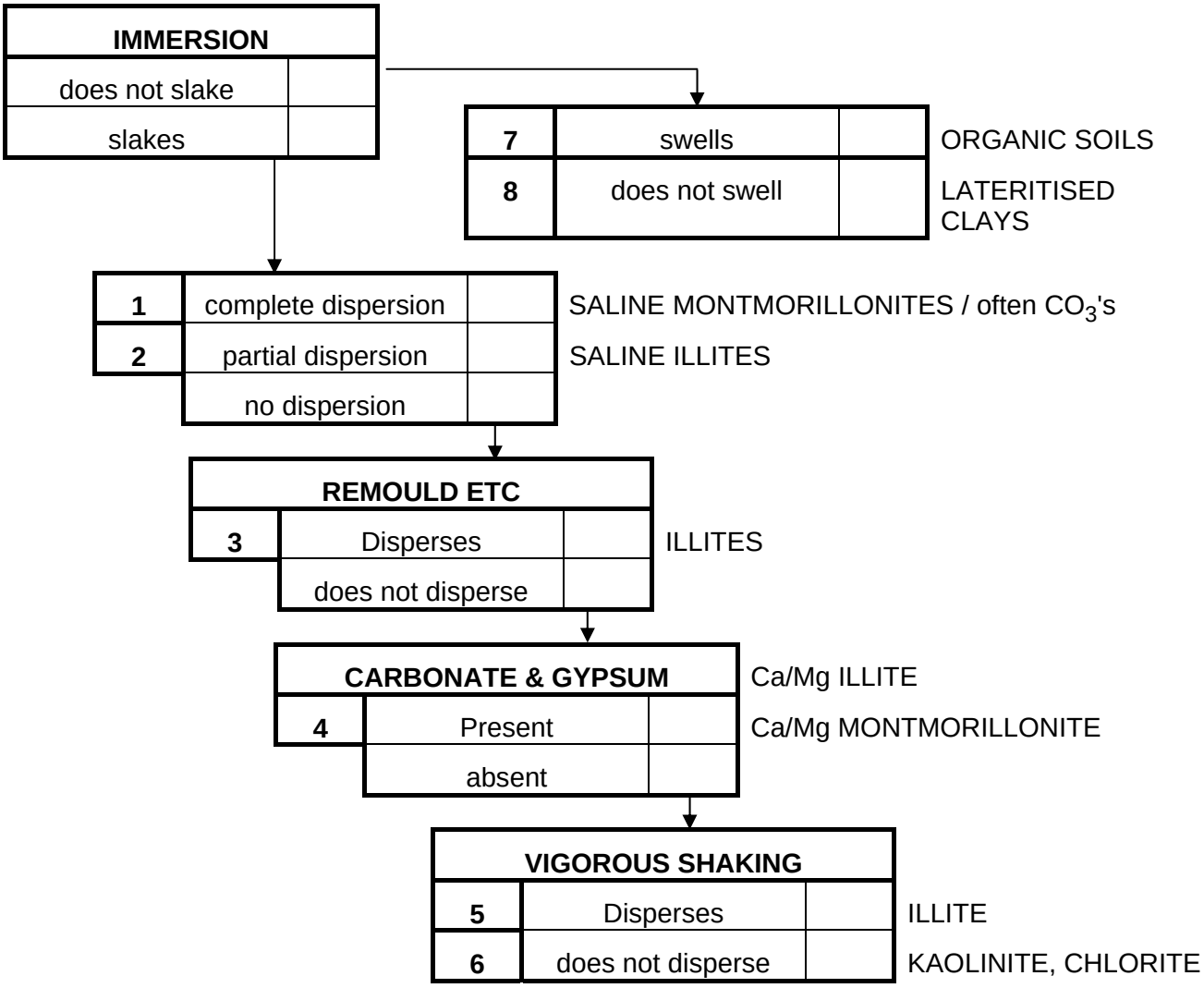
REPORT NO. S04-189C **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 23 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION GRAVEL – Brown gravel with some sand and silt and a trace of clay.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

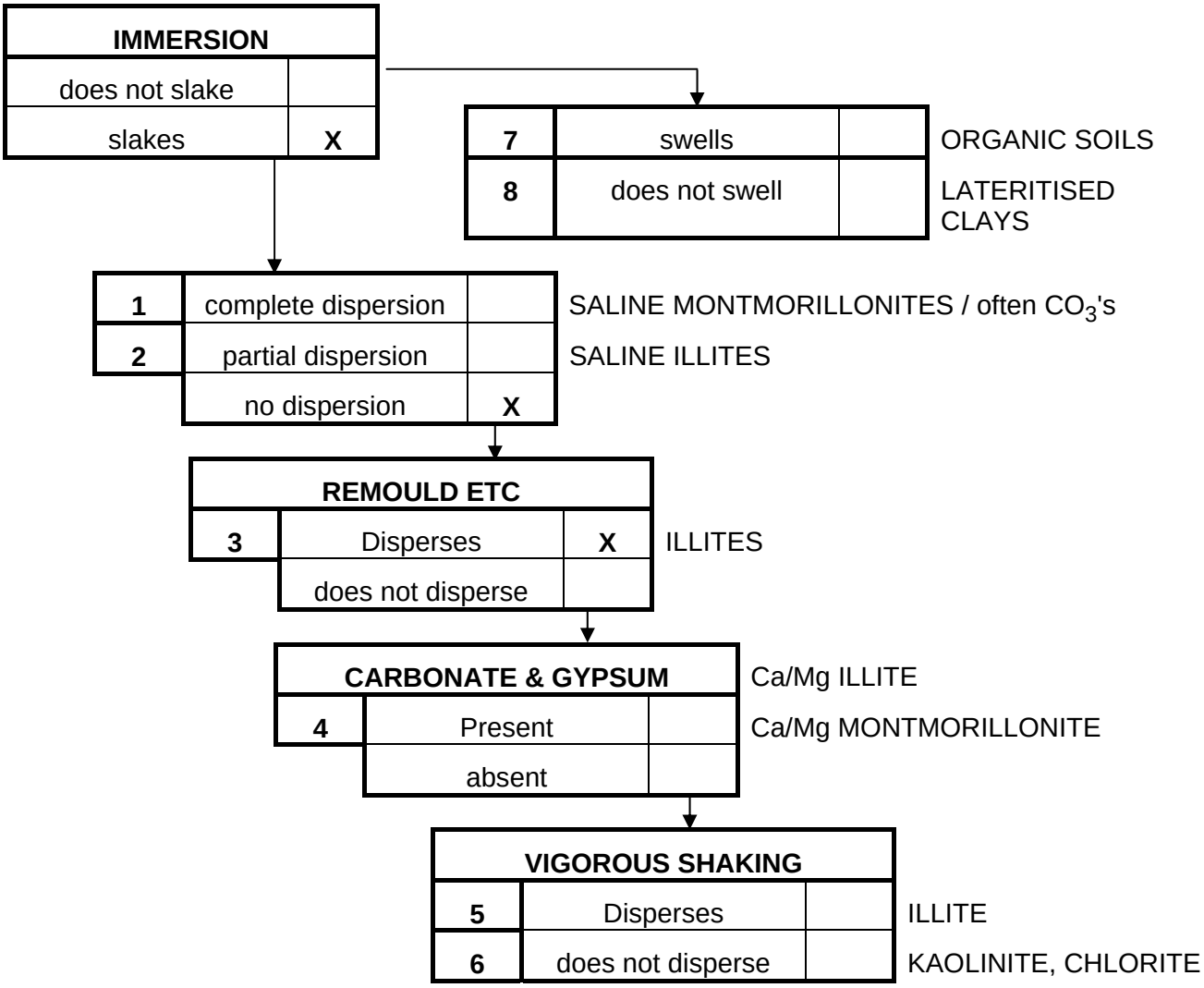
REPORT NO. S04-189D **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 14 **DEPTH:** 0.5



EMERSON CLASS NUMBER **3**

SAMPLE DESCRIPTION SILTY CLAY – Grey mottled brown silty clay with a trace of organics.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

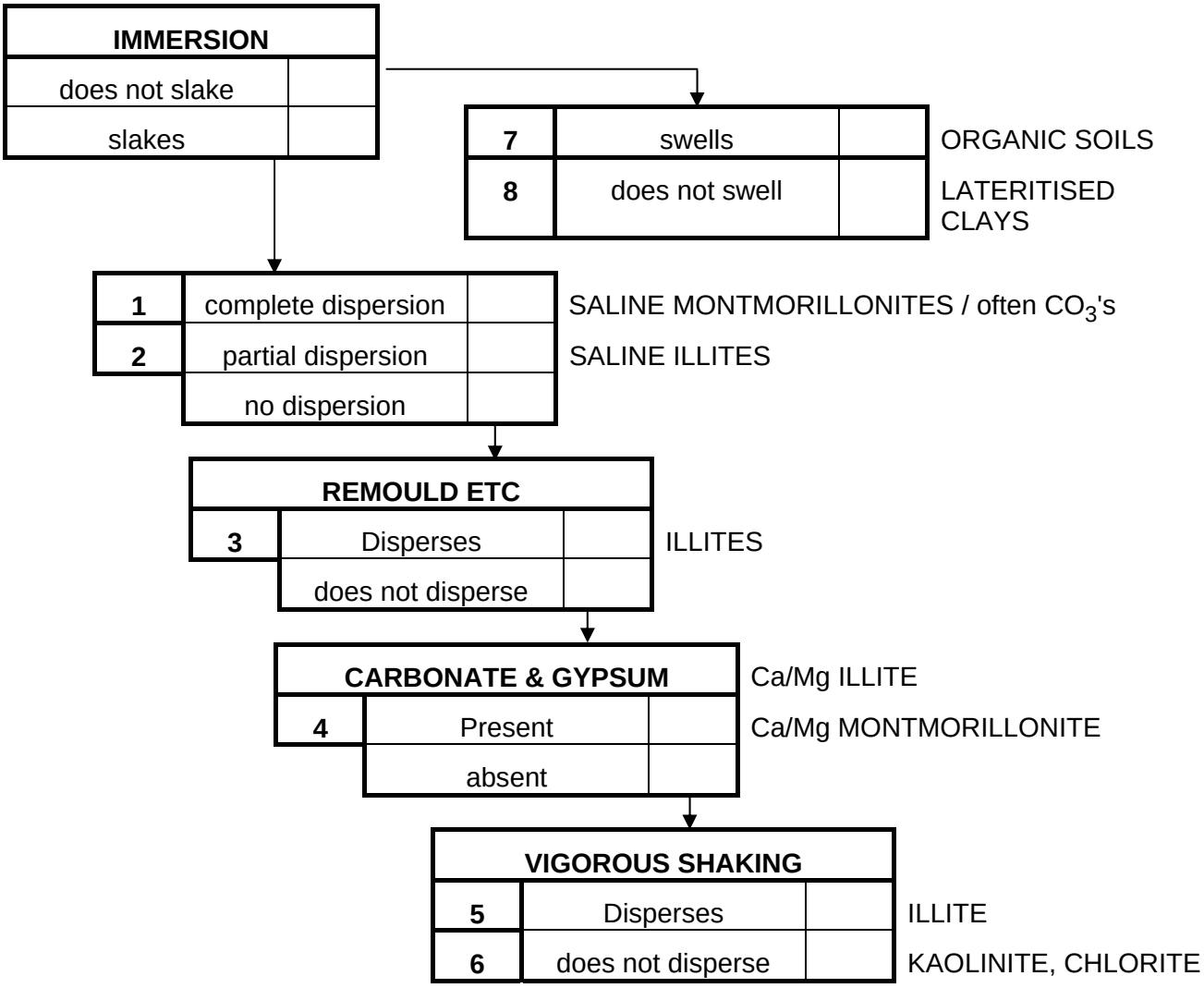
REPORT NO. S04-189C **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 33 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION SAND – Dark brown medium grained sand

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

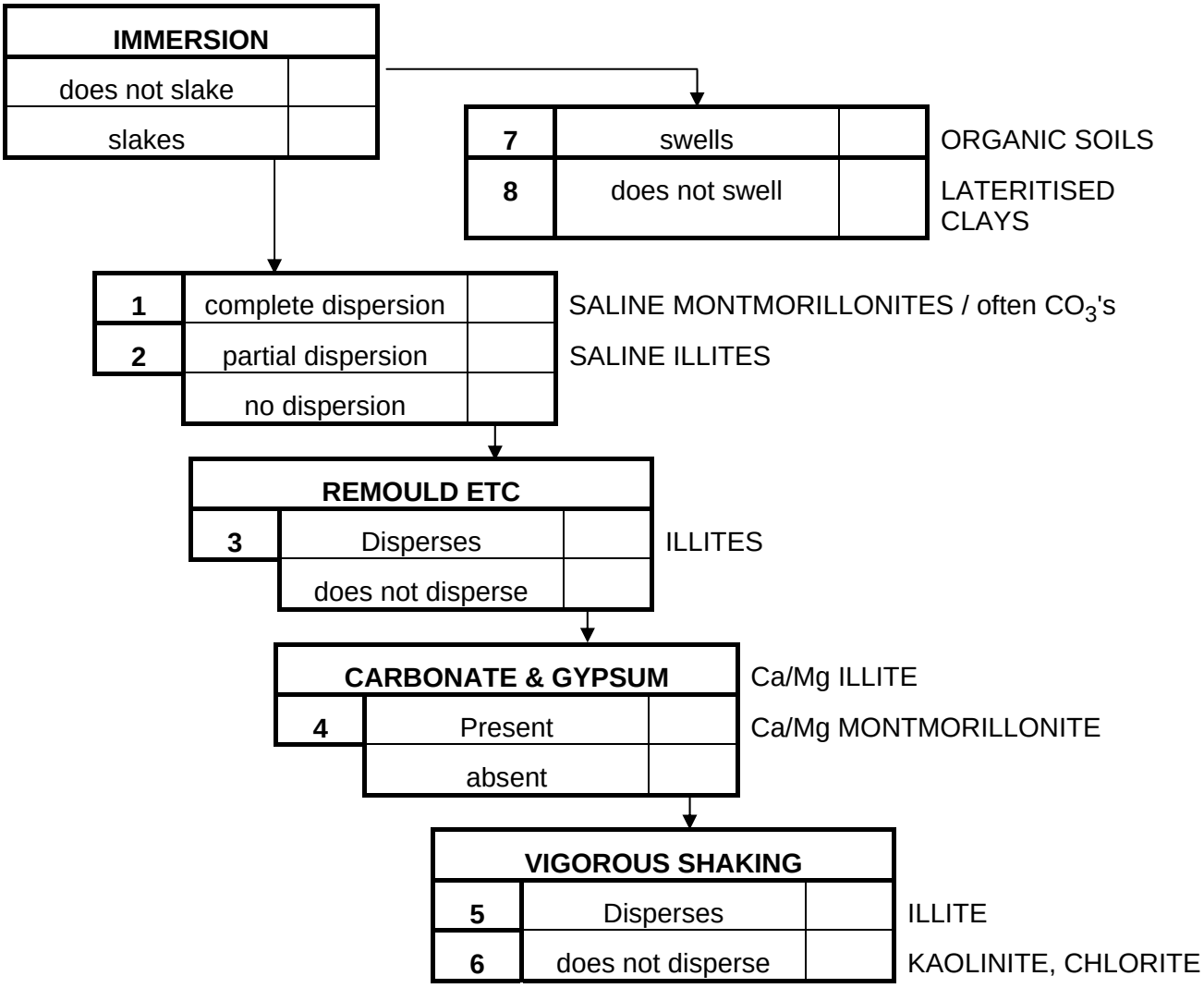
REPORT NO. S04-189E **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 39 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION SILTY SAND – White/light grey fine grained silty sand with some clay and a trace of gravel.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

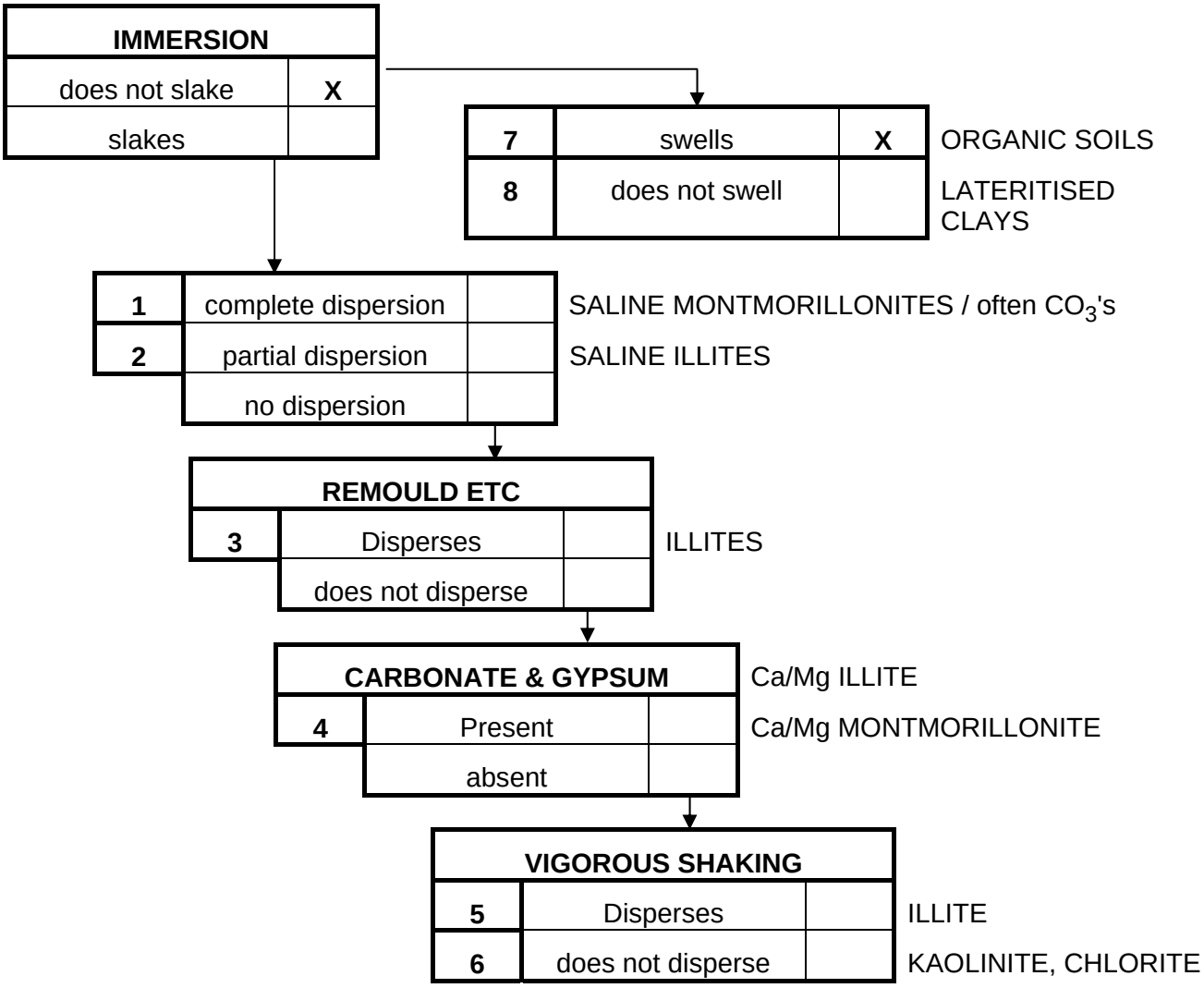
REPORT NO. S04-189F **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 74 **DEPTH:** 0.5



EMERSON CLASS NUMBER **7**

SAMPLE DESCRIPTION SILTY CLAY – Brown mottled red brown silty clay.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

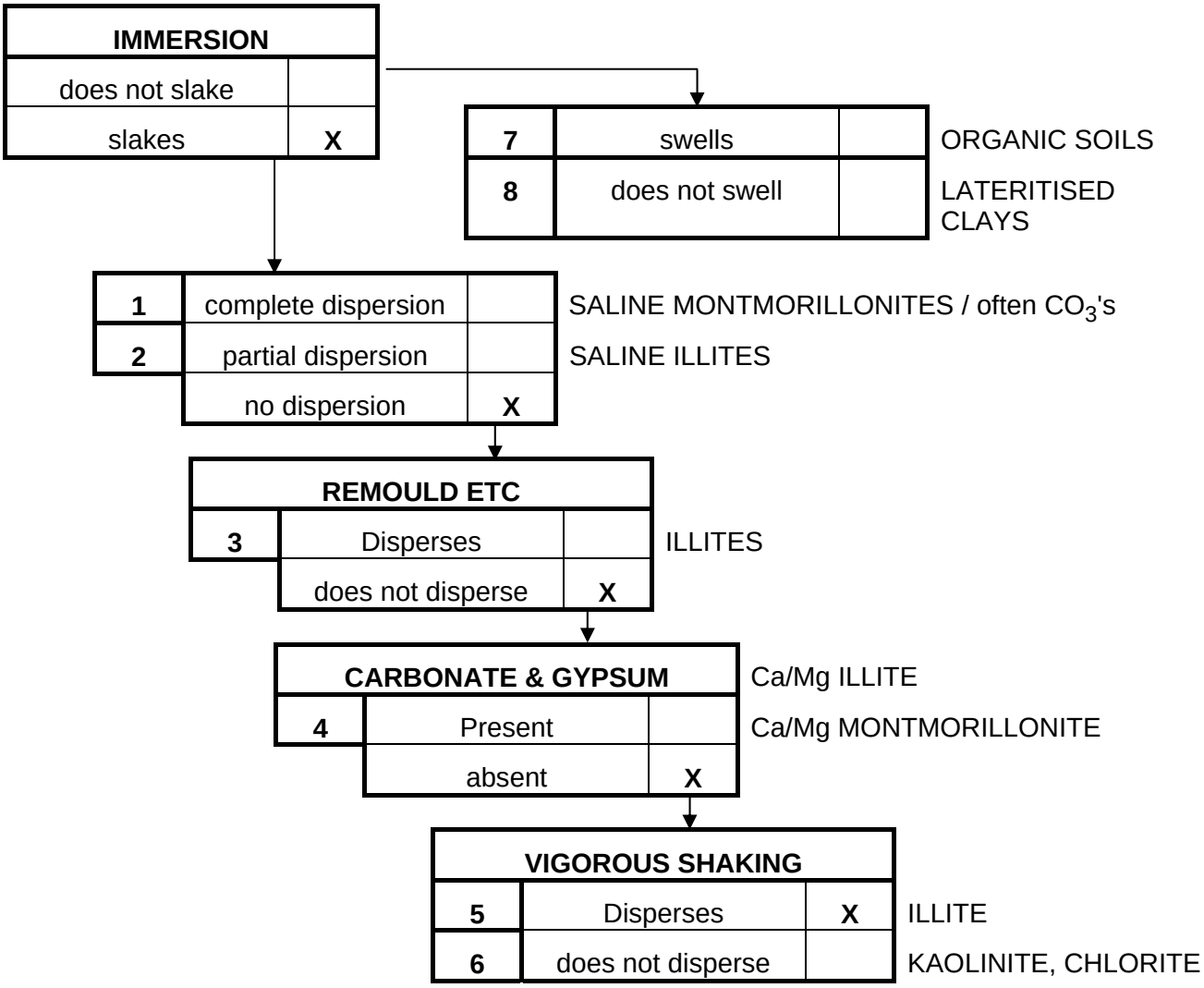
REPORT NO. S04-189G **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 83 **DEPTH:** 0.5



EMERSON CLASS NUMBER **5**

SAMPLE DESCRIPTION SILTY CLAY – Brown silty clay with some gravel.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

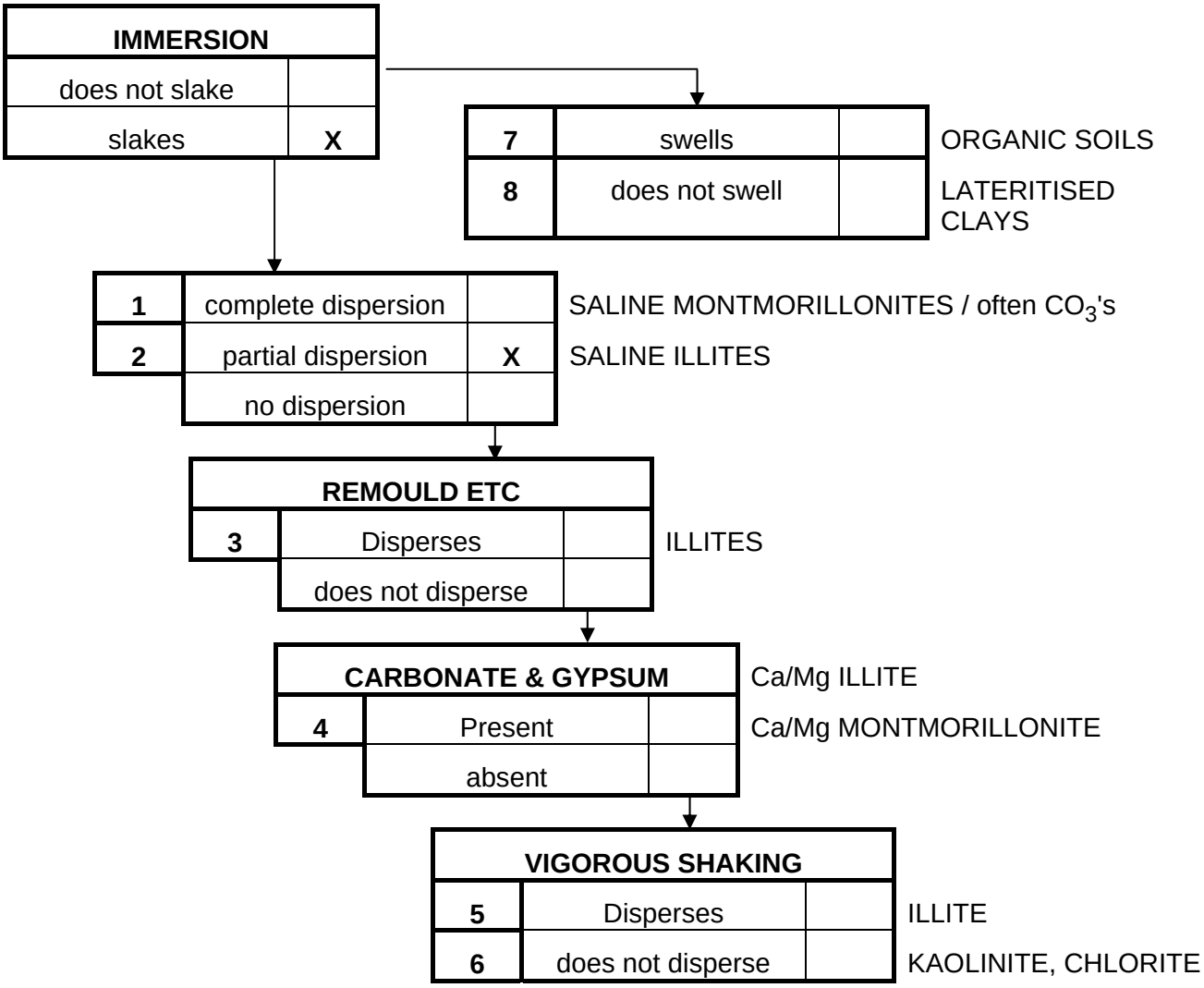
REPORT NO. S04-189H **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 88 **DEPTH:** 0.5



EMERSON CLASS NUMBER **2**

SAMPLE DESCRIPTION SILTY CLAY – Grey mottled light brown silty clay with some gravel.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

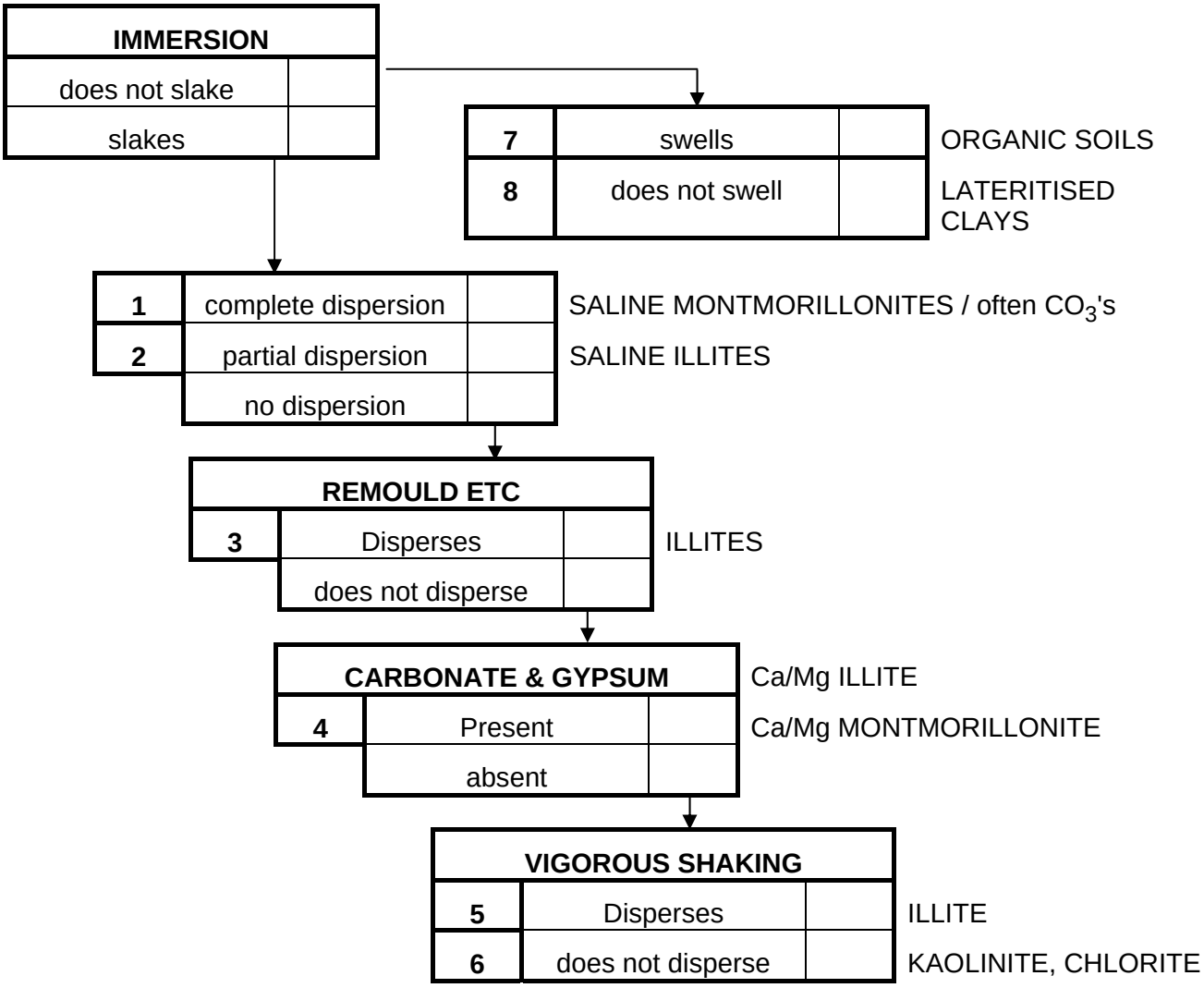
REPORT NO. S04-189I **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 89 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION SILTY SAND – Brown fine to medium grained silty sand with some gravel.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

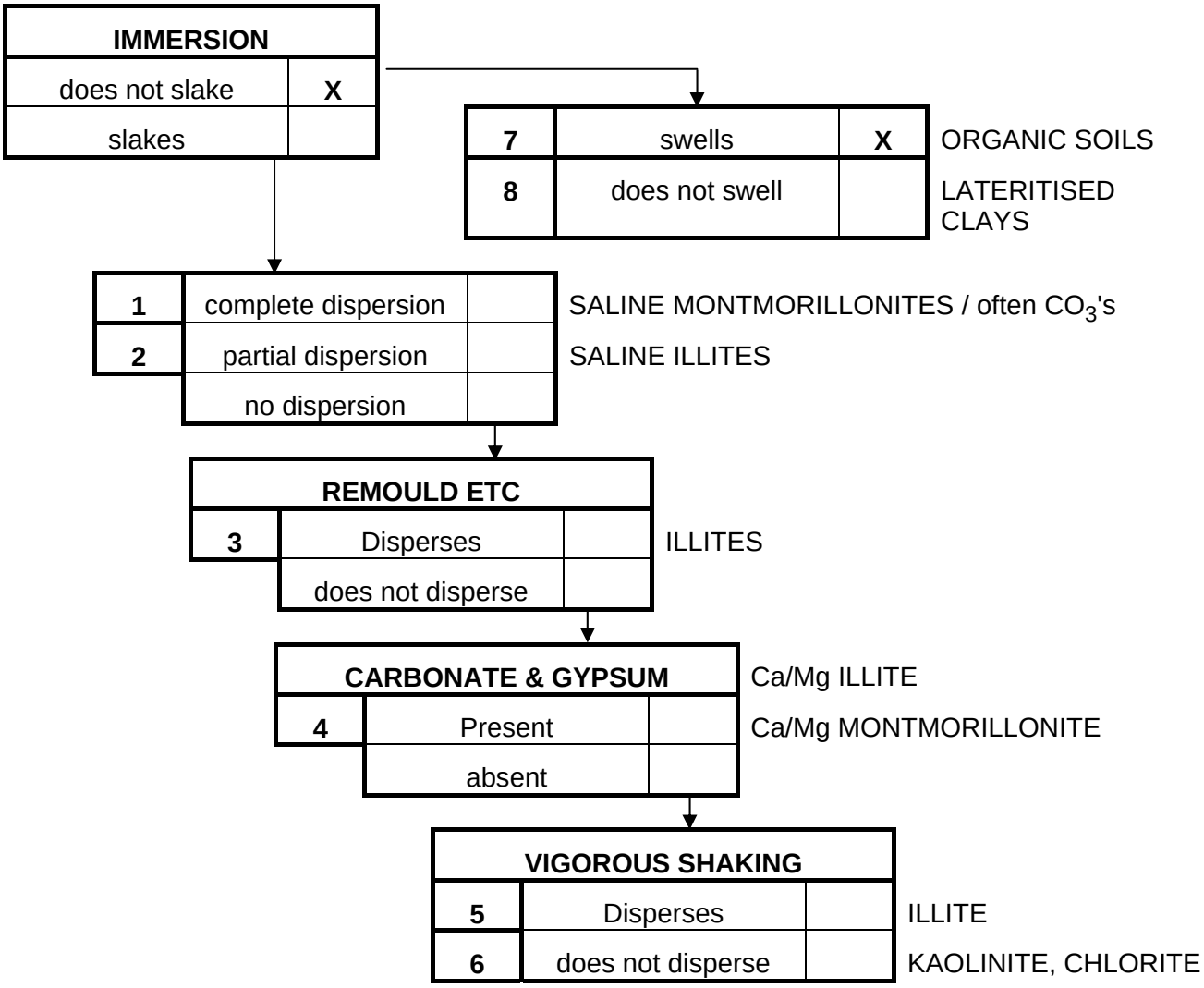
REPORT NO. S04-189J **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 92 **DEPTH:** 0.5



EMERSON CLASS NUMBER **7**

SAMPLE DESCRIPTION SILTY CLAY – Brown silty clay with a trace of sand.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

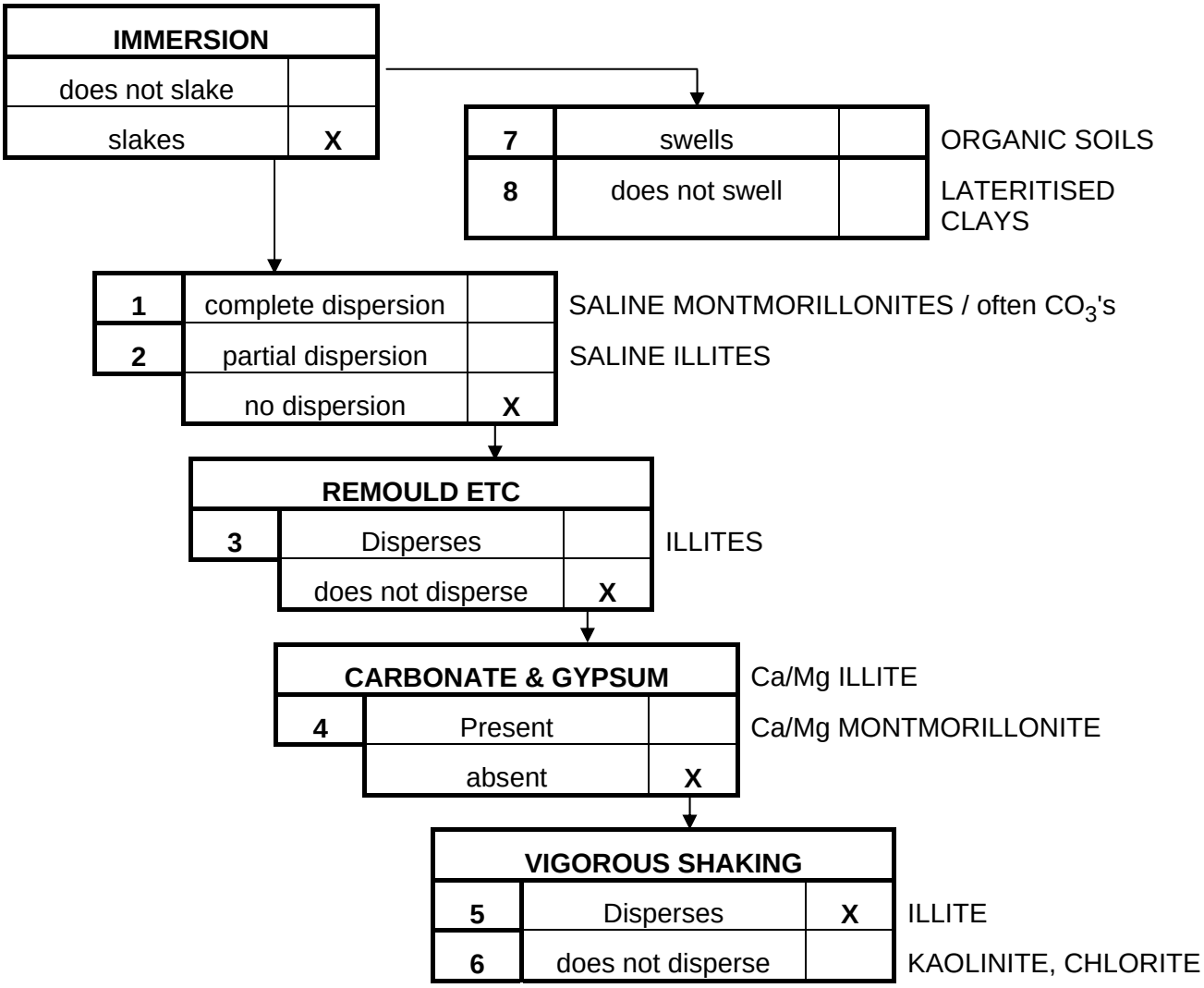
REPORT NO. S04-189K **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 99 **DEPTH:** 0.5



EMERSON CLASS NUMBER **5**

SAMPLE DESCRIPTION SILTY CLAY – Brown silty clay with some organics.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

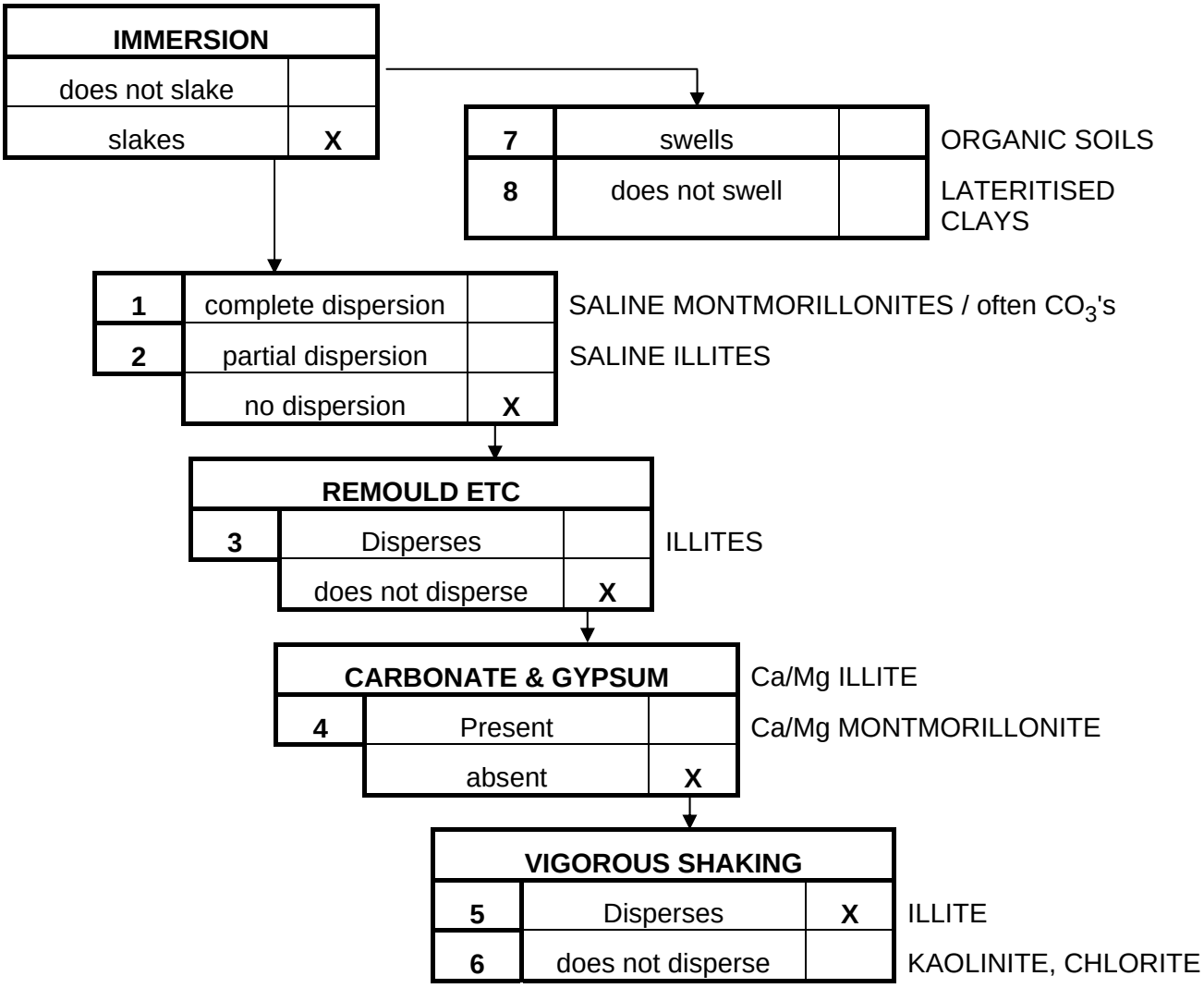
REPORT NO. S04-189L **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 100 **DEPTH:** 0.5



EMERSON CLASS NUMBER **5**

SAMPLE DESCRIPTION GRAVELLY SANDY CLAY – Brown gravelly sandy clay.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

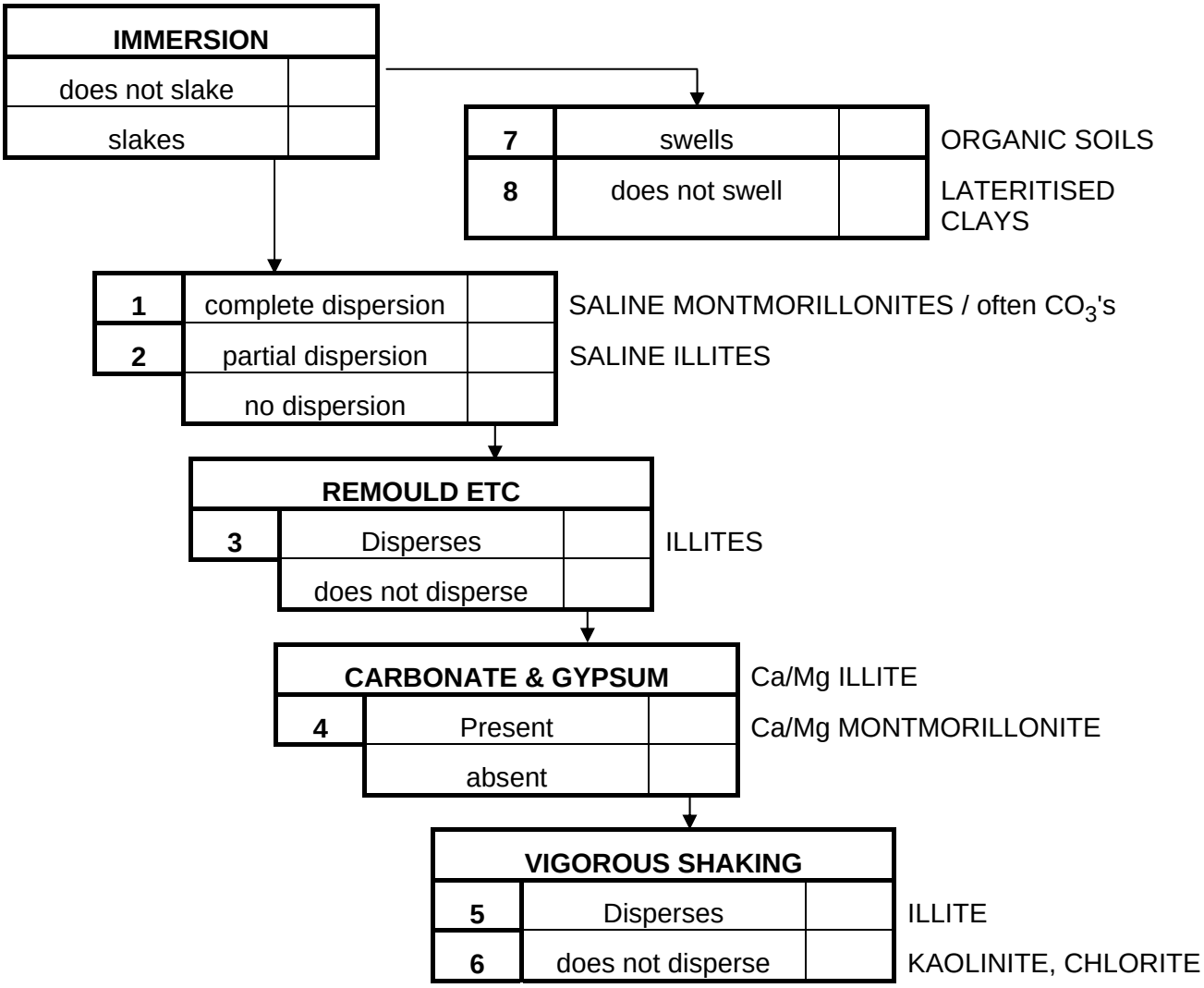
REPORT NO. S04-189M **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 106 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION GRAVELLY CLAYEY SAND – Red brown fine to medium grained gravelly clayey sand.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

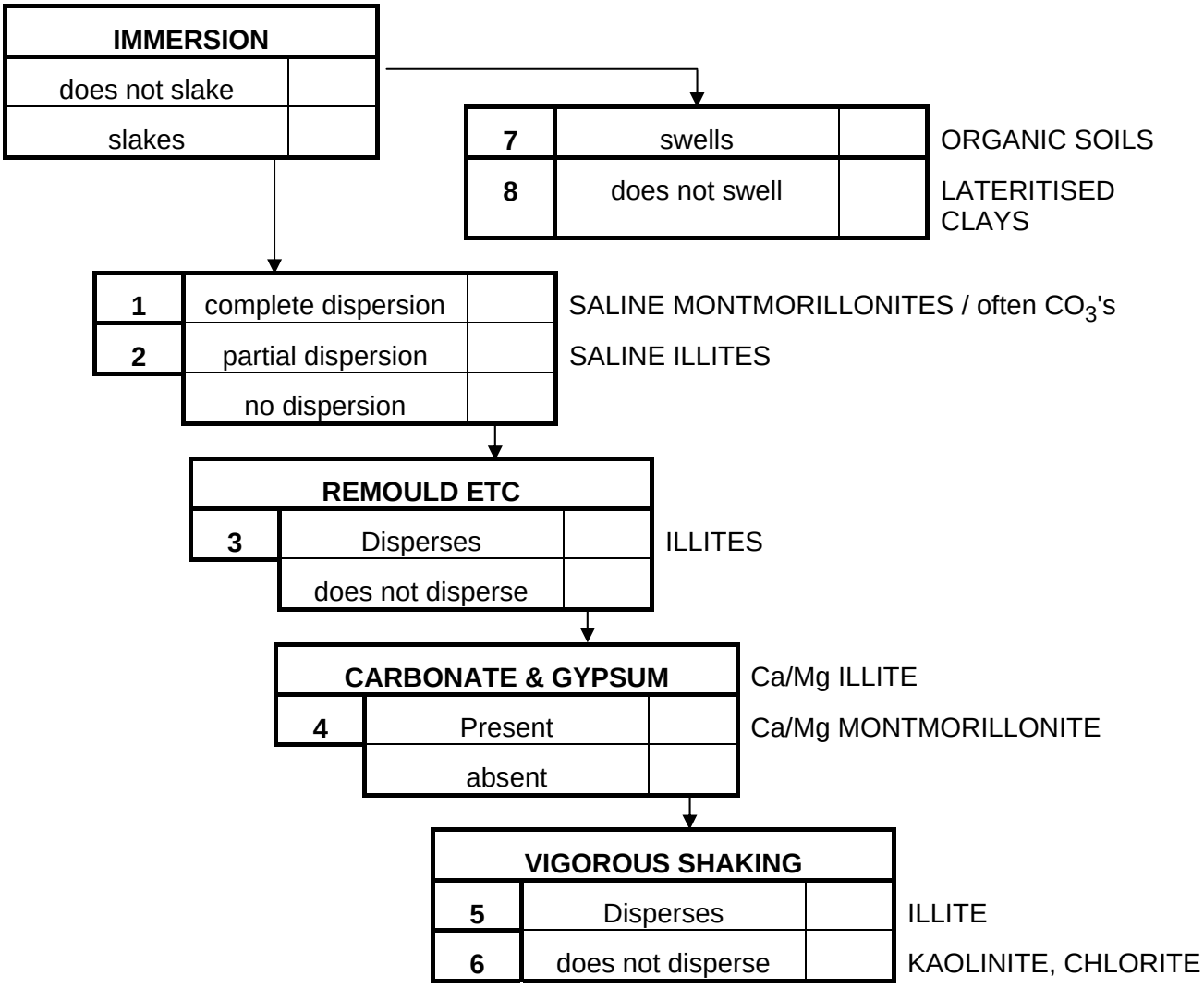
REPORT NO. S04-189N **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 112 **DEPTH:** 0.5



EMERSON CLASS NUMBER **N/A – Inappropriate material for testing**

SAMPLE DESCRIPTION SILTY SAND – Grey brown medium grained silty sand.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

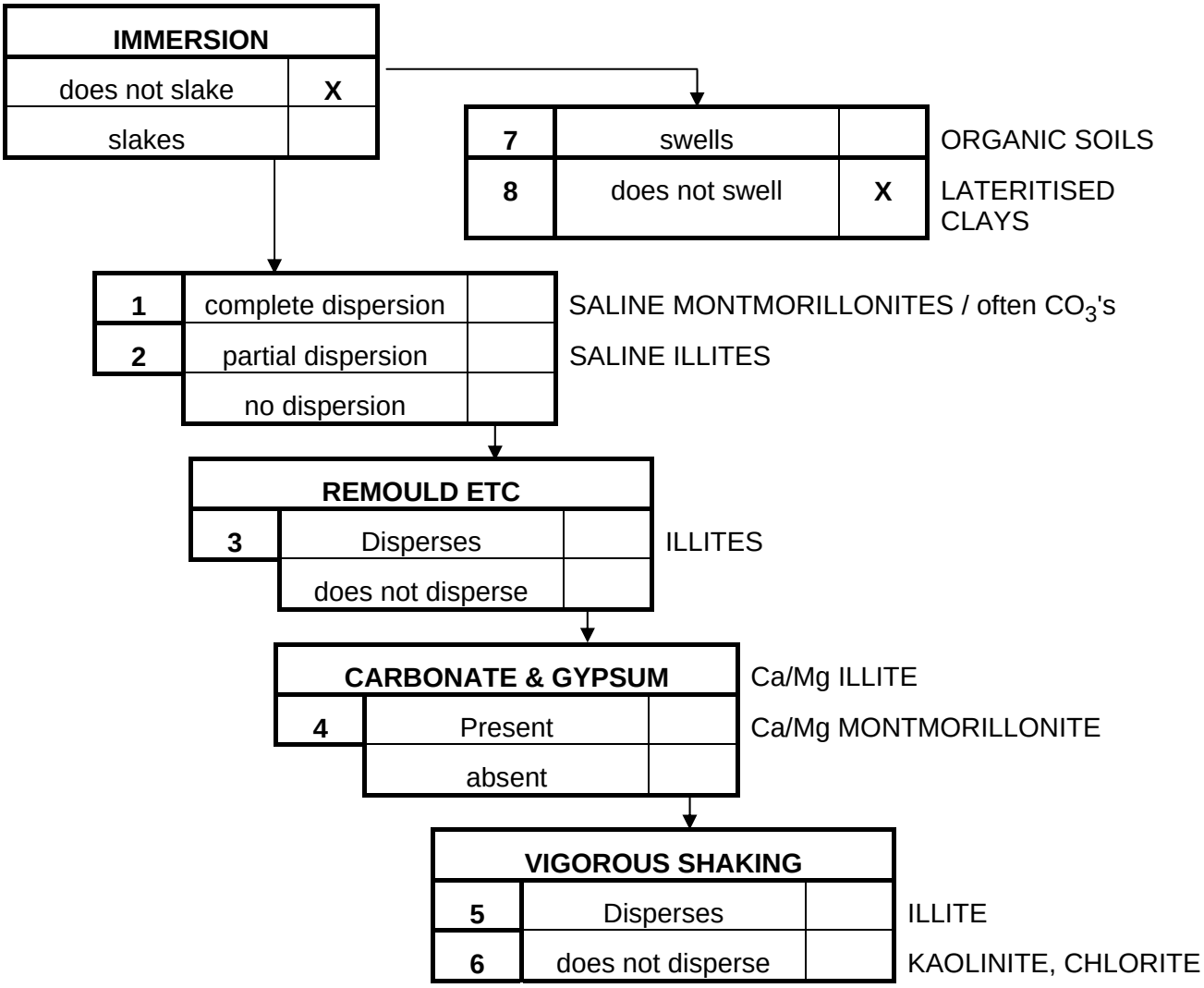
REPORT NO. S04-189O **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 20-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 113 **DEPTH:** 0.5



EMERSON CLASS NUMBER **8**

SAMPLE DESCRIPTION SILTY CLAY – Grey mottled brown gravelly silty clay.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

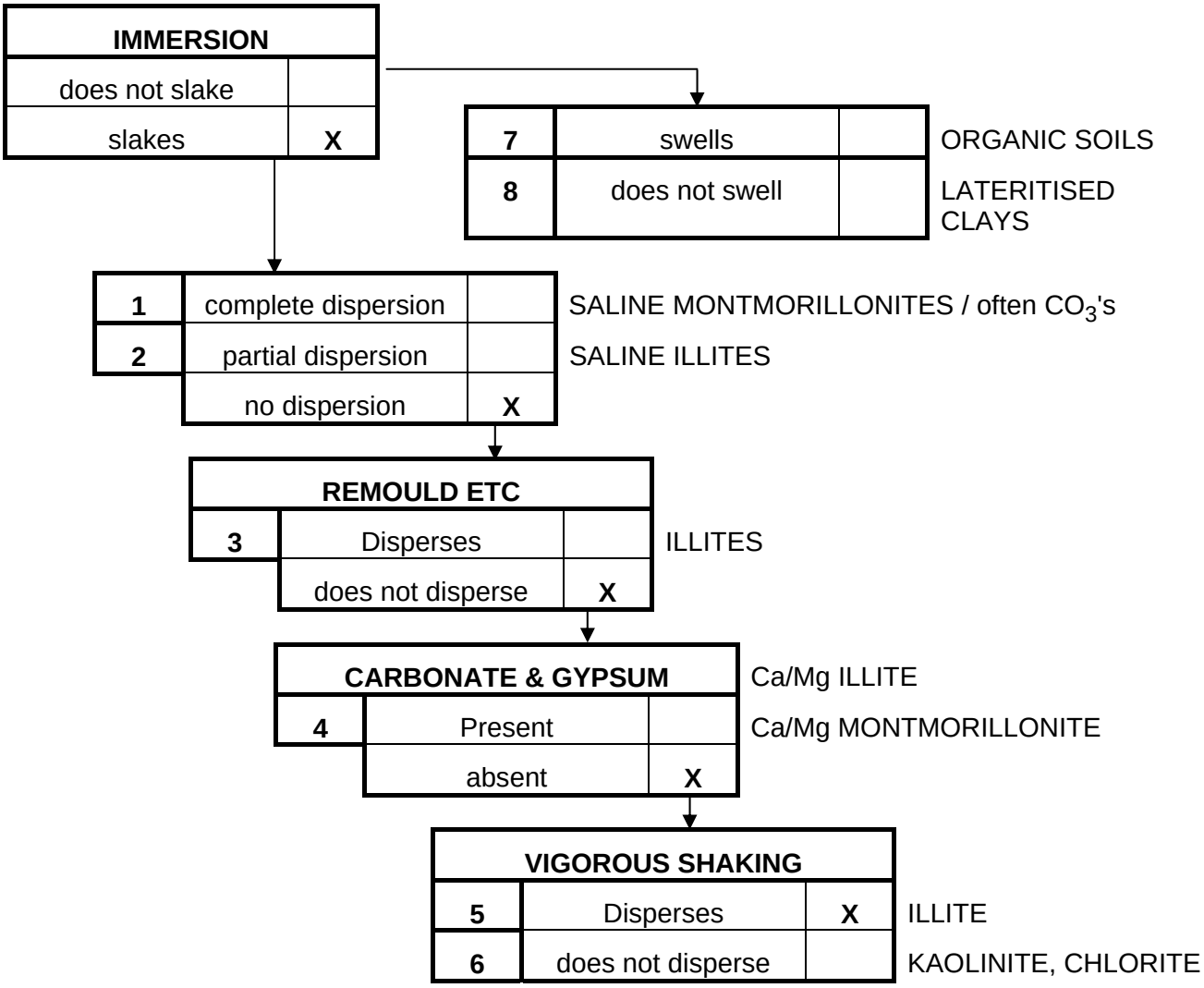
REPORT NO. S04-189P **SIGNED BY**: N.WEIMANN

RESULTS OF EMERSON CLASS NUMBER TEST

CLIENT: CAMPBELLTOWN COUNCIL **DATE:** 19-05-04

PROJECT: MENANGLE PARK LAND CAPABILITY STUDY **PROJECT NO.:** 36500

LOCATION: MENANGLE PARK **TEST No:** 4 **DEPTH:** 0.5



EMERSON CLASS NUMBER **5**

SAMPLE DESCRIPTION SILTY CLAY - Brown mottled grey silty clay with a trace of organics.

NATURE OF WATER Distilled

WATER TEMPERATURE 20^0C

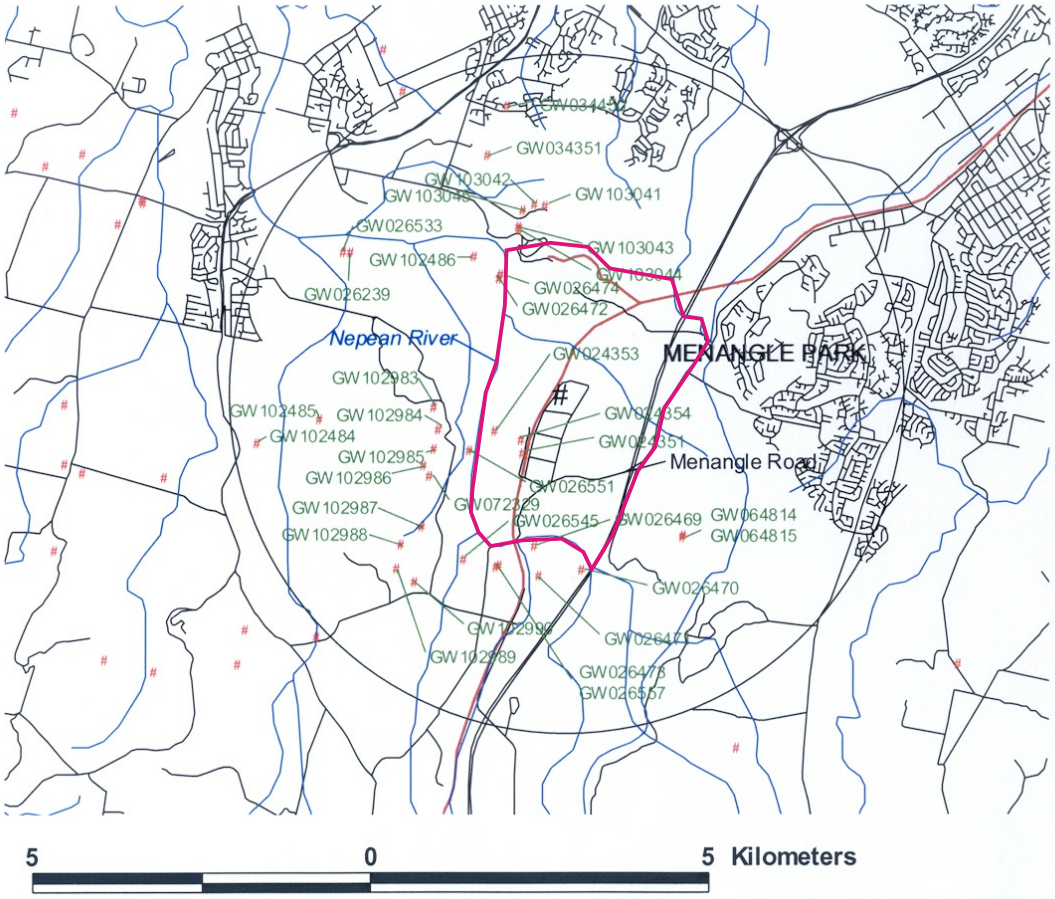
TESTED BY: RH
CHECKED BY: NW

TEST METHOD: AS1289.3.8.1-1997

REPORT NO. S04-189A **SIGNED BY**: N.WEIMANN

APPENDIX F
Bore Search Results

Groundwater Bores at a 5km radius near Menangle Road Menengle Park dated 27/07/2004



Groundwater Bores
Streams.shp
Roads.shp
Rail.shp

Title: Groundwater Bore Search Locality Map (DIPNR) Land Capabiltiy Study Menangle Park			Douglas Partners Geotechnics · Environment · Groundwater
Client: Campbelltown City Council / Landcom			**Office:** Sydney
Drawn by: SJB	**Scale:** as shown	**Project Number:** 36500	**Drawing No.** F1
Approved by: SJB		**Date:** 3 August 2004	

Sydney, Newcastle, Brisbane, Woolongong, Campbelltown

Melbourne, Perth, Wyong, Townsville, Cairns, Darwin

Date/Time :27-Jul-2004 08:33 AM
User :STANNER
Report :RMGW001D.QRP
Executable :S:\G5\PROD32\Ground.exe
Exe Date :28-Apr-2004
System :Groundwater
Database :Edbp

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW024351

Converted From HYDSYS

License :10BL018771

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	RECREATION (GROUNDWATER)	NOT KNOWN
Work Status :(Unknown)		
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 21.90 m
Completion Date :01-May-1966 **Drilled Depth :** 21.90 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA :603 - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CUMBERLAND	MENANGLE	15
	Licensed :CUMBERLAND	MENANGLE	16

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6223675 **Latitude (S) :**34° 6' 25"
Elevation Source :(Unknown) **Easting :**291815 **Longitude (E) :**150° 44' 35"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	(Unknown)	0.00	21.30	152			(Unknown)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
1.20	9.10	7.90	Unconsolidated			0.00			(Unknown)
14.90	19.40	4.50	Unconsolidated	6.00		0.19			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.21	1.21	Sand	Sand	
1.21	9.14	7.93	Silt Orange Sandy	Silt	
9.14	14.93	5.79	Clay Red Grey	Clay	
14.93	19.50	4.57	Clay Red Grey Water Supply	Clay	
14.93	19.50	4.57	Gravel Small	Gravel	
19.50	21.94	2.44	Shale	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-May-1966		6.00		0.19		Bailer			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW024351 *Converted From HYDSYS*

Remarks

WATER FOR TROTTING TRACK

***** End of GW024351 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW024353 *Converted From HYDSYS*

License :10BL018772

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	RECREATION (GROUNDWATER)	NOT KNOWN
Work Status : Test Hole		
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 24.30 m
Completion Date :01-May-1966 **Drilled Depth :** 24.40 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA :603 - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CUMBERLAND	MENANGLE	14
	Licensed :CUMBERLAND	MENANGLE	14

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6223980 **Latitude (S) :**34° 6' 15"
Elevation Source :(Unknown) **Easting :**291375 **Longitude (E) :**150° 44' 18"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
4.50	22.40	17.90	Unconsolidated	4.50		0.38			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.21	1.21	Loam Dark Brown Sandy	Loam	
1.21	4.57	3.36	Loam Light Brown Sandy	Loam	
4.57	22.55	17.98	Clay Sandy Water Supply	Clay	
22.55	24.38	1.83	Shale	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-May-1966	0.50	4.50		0.38		Bailer			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

BAILED DRY AFTER 60 MIN

***** End of GW024353 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW024354

Converted From HYDSYS

License :10BL018773

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	RECREATION (GROUNDWATER)	NOT KNOWN
Work Status : Test Hole		
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 21.30 m
Completion Date :01-May-1966 **Drilled Depth :** 21.30 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA :603 - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CUMBERLAND	MENANGLE	14
	Licensed :CUMBERLAND	MENANGLE	15

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6223860 **Latitude (S) :**34° 6' 19"
Elevation Source :(Unknown) **Easting :**291770 **Longitude (E) :**150° 44' 33"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
11.10	11.50	0.40	Unconsolidated						(Unknown)
12.80	19.20	6.40	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.52	1.52	Sand Light Brown	Sand	
1.52	7.01	5.49	Clay Yellow Sandy	Clay	
7.01	8.83	1.82	Clay Pinkish	Clay	
8.83	9.44	0.61	Clay Yellow Sandy	Clay	
9.44	11.12	1.68	Clay Orange Sandy	Clay	
11.12	11.58	0.46	Clay Orange Sandy Water Supply	Clay	
11.12	11.58	0.46	Gravel Small	Gravel	
11.58	12.80	1.22	Clay Orange Sandy	Clay	
12.80	19.20	6.40	Clay Orange Sandy Water Supply	Clay	
12.80	19.20	6.40	Gravel Small	Gravel	
19.20	21.33	2.13	Shale Some Soft Some Firm	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-May-1966		2.40				Bailer			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW024354 *Converted From HYDSYS*

BAILED DRY AFTER 5 MIN TEST

***** End of GW024354 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026239

Converted From HYDSYS

License :10BL019653

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 22.80 m
Completion Date : **Drilled Depth :** 22.90 m

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity : (Unknown)
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	1
	Licensed :CAMDEN	CAMDEN	1

Region :10 - SYDNEY SOUTH COAST
River Basin :212 - HAWKESBURY RIVER
Area / District :

CMA Map :9029-4N CAMDEN
Grid Zone :56/1 **Scale :**1:25,000

Elevation :
Elevation Source :(Unknown)

Northing :6226475 **Latitude (S) :**34° 4' 52"
Easting :289085 **Longitude (E) :**150° 42' 51"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
14.60	22.80	8.20	(Unknown)			3.16			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	2.74	2.74	Loam Dark Brown Sandy	Sand	
2.74	7.01	4.27	Sand	Sand	
7.01	8.83	1.82	Sand Silt	Clay	
8.83	17.06	8.23	Clay Light Brown Water Supply	Gravel	
8.83	17.06	8.23	Gravel Small	Clay	
17.06	21.03	3.97	Clay Light Brown Silty Water Supply	Sand	
17.06	21.03	3.97	Sand	Gravel	
17.06	21.03	3.97	Gravel Small	Sand	
21.03	22.25	1.22	Sand Water Supply	Gravel	
21.03	22.25	1.22	Gravel Clay	Shale	
22.25	22.86	0.61	Shale Water Supply		

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	11-Mar-1983				3.16		(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026239 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026469

Converted From HYDSYS

License :10BL019648

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 20.40 m
Completion Date :01-Nov-1965 **Drilled Depth :** 20.40 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6222315 **Latitude (S) :**34° 7' 9"
Elevation Source :(Unknown) **Easting :**292075 **Longitude (E) :**150° 44' 44"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
15.80	19.70	3.90	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	10.66	10.66	Sand Black Loose Moist Silty Fine	Sand	
10.66	15.84	5.18	Sand Dark Brown Loose Silty Wet Fine-medium	Sand	
15.84	19.81	3.97	Sand Loose Silty Fine Water Supply	Sand	
19.81	20.42	0.61	Clay Sandy Moist Firm Stiff	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026469 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026470 *Converted From HYDSYS*

License :10BL019649

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 1.90 m
Completion Date :01-Nov-1965 **Drilled Depth :** 2.00 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-1N CAMPBELLTOWN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6222020 **Latitude (S) :**34° 7' 19"
Elevation Source :(Unknown) **Easting :**292785 **Longitude (E) :**150° 45' 11"

GS Map :0075D1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.98	1.98	Silt Dark Brown Firm	Sand	
0.00	1.98	1.98	Sand Traces Moist Fine		

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965				0.00		(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026470 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026471 *Converted From HYDSYS*

License :10BL019650

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 5.40 m
Completion Date :01-Nov-1965 **Drilled Depth :** 5.50 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6221885 **Latitude (S) :**34° 7' 23"
Elevation Source :(Unknown) **Easting :**292150 **Longitude (E) :**150° 44' 46"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.70	4.90	2.20	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	2.74	2.74	Silt Dark Brown Firm Moist	Silt	
2.74	5.02	2.28	Silt Dark Brown Soft Water Supply	Silt	
5.02	5.48	0.46	Clay Firm Stiff	Clay	
5.02	5.48	0.46	Sand Fine	Sand	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026471 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026472

Converted From HYDSYS

License :10BL019651

		Authorised Purpose(s)	Intended Purpose(s)
Work Type :	Bore	IRRIGATION	IRRIGATION
Work Status :	Test Hole	STOCK	
Construct. Method :	Cable Tool		
Owner Type :	Private		

Commenced Date : **Final Depth :** 28.90 m
Completion Date : **Drilled Depth :** 29.00 m

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity : (Unknown)
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	1
	Licensed :CAMDEN	CAMDEN	1

Region :10 - SYDNEY SOUTH COAST
River Basin :212 - HAWKESBURY RIVER
Area / District :

CMA Map :9029-4N CAMDEN
Grid Zone :56/1 **Scale :**1:25,000

Elevation :
Elevation Source :(Unknown)

Northing :6226225 **Latitude (S) :**34° 5' 2"
Easting :291305 **Longitude (E) :**150° 44' 17"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
16.70	24.30	7.60	Unconsolidated						(Unknown)
27.50	28.80	1.30	Fractured						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.52	1.52	Loam Dark Brown Sandy	Loam	
1.52	21.33	19.81	Sand Light Brown Silt Water Supply	Sand	
21.33	24.38	3.05	Sand Light Brown Water Supply	Sand	
21.33	24.38	3.05	Silt Traces	Silt	
24.38	27.58	3.20	Sand Grey	Sand	
24.38	27.58	3.20	Gravel Small	Gravel	
24.38	27.58	3.20	Silt Traces	Silt	
27.58	28.95	1.37	Shale Water Supply	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	11-Mar-1983						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026472 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026473

Converted From HYDSYS

License :10BL019652

		Authorised Purpose(s)	Intended Purpose(s)
Work Type :	Bore	IRRIGATION	IRRIGATION
Work Status :	Test Hole	STOCK	
Construct. Method :	Cable Tool		
Owner Type :	Private		

Commenced Date : **Final Depth :** 19.20 m
Completion Date :01-Nov-1965 **Drilled Depth :** 19.20 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6222000 **Latitude (S) :**34° 7' 19"
Elevation Source :(Unknown) **Easting :**291550 **Longitude (E) :**150° 44' 23"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
11.50	18.20	6.70	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	11.58	11.58	Silt Dark Brown Firm Moist	Silt	
11.58	18.28	6.70	Silt Dark Brown Very Soft Water Supply	Silt	
11.58	18.28	6.70	Sand Traces Fine	Sand	
18.28	19.20	0.92	Clay Light Brown Grey Firm Sandy	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026473 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026474

Converted From HYDSYS

License :10BL019645

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 26.10 m
Completion Date :01-Nov-1965 **Drilled Depth :** 26.20 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	1
	Licensed :CAMDEN	CAMDEN	1

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6226280 **Latitude (S) :**34° 4' 60"
Elevation Source :(Unknown) **Easting :**291330 **Longitude (E) :**150° 44' 18"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
13.10	24.60	11.50	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	1.06	1.06	Loam Grey Sandy Fine	Soil	
1.06	13.25	12.19	Silt Grey Dry Water Supply	Silt	
13.25	14.32	1.07	Silt Sandy Water Supply	Silt	
14.32	18.28	3.96	Silt Light Brown Very Sandy Water Supply	Silt	
18.28	24.68	6.40	Sand Yellow Medium Water Supply	Sand	
18.28	24.68	6.40	Silt	Silt	
24.68	26.18	1.50	Clay Yellow Sandy Moist Firm Stiff	Clay	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026474 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026533

Converted From HYDSYS

License :10BL019643

		Authorised Purpose(s)	Intended Purpose(s)
Work Type :	Bore	IRRIGATION	IRRIGATION
Work Status :	Test Hole	STOCK	
Construct. Method :	Cable Tool		
Owner Type :	Private		

Commenced Date : **Final Depth :** 21.30 m
Completion Date :01-Nov-1965 **Drilled Depth :** 21.30 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	1
	Licensed :CAMDEN	CAMDEN	1

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6226475 **Latitude (S) :**34° 4' 52"
Elevation Source :(Unknown) **Easting :**288975 **Longitude (E) :**150° 42' 47"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
17.30	21.20	3.90	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Topsoil Moist Sandy	Topsoil	
0.30	4.57	4.27	Silt Dark Grey Black Loose	Silt	
4.57	9.14	4.57	Silt Sandy Moist Soft	Silt	
9.14	17.67	8.53	Silt Moist Soft Water Supply	Silt	
17.67	21.33	3.66	Silt Soft Water Supply	Silt	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026533 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026545

Converted From HYDSYS

License :10BL019647

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 8.50 m
Completion Date :01-Nov-1965 **Drilled Depth :** 8.50 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6222055 **Latitude (S) :**34° 7' 17"
Elevation Source :(Unknown) **Easting :**291030 **Longitude (E) :**150° 44' 3"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.10	3.90	1.80	Unconsolidated			0.00			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.91	0.91	Silt Dark Brown Firm Moist	Silt	
0.91	3.96	3.05	Silt Dark Brown Very Soft	Silt	
0.91	3.96	3.05	Gravel Traces Fine	Gravel	
3.96	8.22	4.26	Clay Grey Firm Moist Plastic	Clay	
8.22	8.53	0.31	Sandstone Decomposed	Sandstone	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026545 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026551

Converted From HYDSYS

License :10BL019646

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 10.90 m
Completion Date :01-Nov-1965 **Drilled Depth :** 11.00 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	1
	Licensed :CAMDEN	CAMDEN	1

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6223670 **Latitude (S) :**34° 6' 25"
Elevation Source :(Unknown) **Easting :**291015 **Longitude (E) :**150° 44' 4"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.91	0.91	Loam Grey Sandy Dry	Material	
0.91	9.14	8.23	Silt Dry	Silt	
9.14	10.66	1.52	Silt Dry Fine	Silt	
10.66	10.97	0.31	Shale Dry	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Nov-1965				0.00		(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026551 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW026557 *Converted From HYDSYS*

License :10BL019642

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	IRRIGATION	IRRIGATION
Work Status : Test Hole	STOCK	
Construct. Method : Cable Tool		
Owner Type : Private		

Commenced Date : **Final Depth :** 28.30 m
Completion Date :01-May-1966 **Drilled Depth :** 28.40 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :** (Unknown)
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	2
	Licensed :CAMDEN	CAMDEN	2

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6221990 **Latitude (S) :**34° 7' 19"
Elevation Source :(Unknown) **Easting :**291515 **Longitude (E) :**150° 44' 22"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
15.80	28.20	12.40	Unconsolidated						(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	3.66	3.66	Loam Dark Brown Sandy	Sand	
3.66	16.46	12.80	Sand Water Supply	Sand	
3.66	16.46	12.80	Silt Traces	Silt	
16.46	18.90	2.44	Sand Pete Water Supply	Sand	
18.90	20.12	1.22	Sand Grey Silt Water Supply	Sand	
20.12	26.06	5.94	Sand Silt Water Supply	Sand	
26.06	28.04	1.98	Sand Grey Silt Water Supply	Sand	
28.04	28.35	0.31	Sand Grey Silt Water Supply	Sand	
28.04	28.35	0.31	Boulders	Boulders	
28.35	28.36	0.01	Shale Black	Shale	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-May-1966						(Unknown)			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW026557 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW034351

Converted From HYDSYS

License :10BL026444

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	NOT KNOWN	IRRIGATION
Work Status :(Unknown)		
Construct. Method : Rotary		
Owner Type : Private		

Commenced Date : **Final Depth :** 182.90 m
Completion Date :01-Sep-1968 **Drilled Depth :** 182.90 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA :603 - SYDNEY BASIN **Salinity :** Brackish
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CUMBERLAND	NARELLAN	10
	Licensed :CUMBERLAND	NARELLAN	17 752045

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6228040 **Latitude (S) :**34° 4' 3"
Elevation Source :(Unknown) **Easting :**291025 **Longitude (E) :**150° 44' 8"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Nil	0.00	0.00	152			(Unknown)

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Topsoil	Topsoil	
0.30	5.48	5.18	Clay Yellow	Clay	
5.48	115.82	110.34	Shale Black Grey	Shale	
115.82	182.88	67.06	Sandstone White	Sandstone	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Sep-1968	0.00			1.06		Airlift			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW034351 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW034450 *Converted From HYDSYS*

License :10BL026445

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	NOT KNOWN	NOT KNOWN
Work Status :(Unknown)		
Construct. Method : Rotary		
Owner Type : Private		

Commenced Date : **Final Depth :** 190.50 m
Completion Date :01-Sep-1968 **Drilled Depth :** 190.50 m

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA :603 - SYDNEY BASIN **Salinity :** Brackish
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CUMBERLAND	NARELLAN	10
	Licensed :CUMBERLAND	NARELLAN	13 752045

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : **Northing :**6228775 **Latitude (S) :**34° 3' 39"
Elevation Source :(Unknown) **Easting :**291260 **Longitude (E) :**150° 44' 18"

GS Map :0075C1 **AMG Zone :**56 **Coordinate Source :**GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
118.90	128.00	9.10	Fractured			1.06			Brackish

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Topsoil	Topsoil	
0.30	6.09	5.79	Clay Red	Clay	
6.09	128.01	121.92	Shale Grey Black Water Supply	Shale	
128.01	144.78	16.77	Sandstone White	Sandstone	
144.78	190.50	45.72	Sandstone White Soft	Sandstone	

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Sep-1968	0.00			1.06		Airlift			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW034450 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW064814

Converted From HYDSYS

License :

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore		DOMESTIC
Work Status : (Unknown)		STOCK
Construct. Method : Rotary Air		
Owner Type : Private		

Commenced Date : **Final Depth :** 48.00 m
Completion Date : 01-Jan-1985 **Drilled Depth :** 0.00

Contractor Name :
Driller : 1587 CARPENTER, Anthony Michael

Property : **Standing Water Level :**
GWMA : **Salinity :**
GW Zone : **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : CUMBERLAND	MENANGLE	105
	Licensed :		

Region : 10 - SYDNEY SOUTH COAST **CMA Map :** 9029-1N CAMPBELLTOWN
River Basin : 212 - HAWKESBURY RIVER **Grid Zone :** 56/1 **Scale :** 1:25,000
Area / District :

Elevation : 0.00 **Northing :** 6222605 **Latitude (S) :** 34° 7' 1"
Elevation Source : **Easting :** 294240 **Longitude (E) :** 150° 46' 9"

GS Map : 0075D1 **AMG Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	01-Jan-1985									

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW064814 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW064815

Converted From HYDSYS

License :

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore		DOMESTIC
Work Status : (Unknown)		STOCK
Construct. Method : Rotary Air		
Owner Type : Private		

Commenced Date : **Final Depth :** 64.00 m
Completion Date : 29-Jan-1985 **Drilled Depth :** 0.00

Contractor Name :
Driller : 1587 CARPENTER, Anthony Michael

Property : **Standing Water Level :**
GWMA : **Salinity :** S.Brackish
GW Zone : **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : CUMBERLAND	MENANGLE	105
	Licensed :		

Region : 10 - SYDNEY SOUTH COAST **CMA Map :** 9029-1N CAMPBELLTOWN
River Basin : 212 - HAWKESBURY RIVER **Grid Zone :** 56/1 **Scale :** 1:25,000
Area / District :

Elevation : 0.00 **Northing :** 6222590 **Latitude (S) :** 34° 7' 2"
Elevation Source : **Easting :** 294240 **Longitude (E) :** 150° 46' 9"

GS Map : 0075D1 **AMG Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Steel	-0.50	60.00	165			Driven into Hole
1	1	Opening	Slots - Vertical	42.00	60.00	165		1	Oxy-Acetylene Slotted; SL: 0mm; A: 2mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
18.00	19.00	1.00	Consolidated	24.00		0.25			S.Brackish
42.00	44.00	2.00	Consolidated	24.00		3.79			S.Brackish
47.00	49.00	2.00	Fractured	24.00		5.06			S.Brackish
56.00	58.00	2.00	Consolidated	24.00		3.79			S.Brackish

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By
Single-Rate Pumping Test	29-Jan-1985		24.00		12.89		Airlift			

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW064815 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW072329 *Converted From HYDSYS*

License :10BL155242

	Authorised Purpose(s)	Intended Purpose(s)
Work Type :	MONITORING BORE	
Work Status :(Unknown)		
Construct. Method :		
Owner Type :		

Commenced Date : **Final Depth :**
Completion Date :01-Jan-1989 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :CAMDEN	CAMDEN	LOT1 DP168893
	Licensed :CAMDEN	CAMDEN	LOT1 DP168893

Region :10 - SYDNEY SOUTH COAST **CMA Map :**9029-4N CAMDEN
River Basin :212 - HAWKESBURY RIVER **Grid Zone :**56/1 **Scale :**1:25,000
Area / District :

Elevation : 0.00 **Northing :**6223262.9 **Latitude (S) :**34° 6' 37"
Elevation Source : **Easting :**290455.8 **Longitude (E) :**150° 43' 42"

GS Map : **AMG Zone :**56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

9 PIEZOMETRES WERE CONTRUCTED TO MONITOR THE GROWNDWATER LEVEL AT BARRAGAL LAGOON.

***** End of GW072329 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102484

License :10BL156728

		Authorised Purpose(s)	**Intended Purpose(s)**
Work Type :	Bore	MONITORING BORE	MONITORING BORE
Work Status :	(Unknown)		
Construct. Method :			
Owner Type :			

Commenced Date : **Final Depth :** 17.50 m
Completion Date :01-Jan-1995 **Drilled Depth :**

Contractor Name :ENGINEERING EXPLORATION
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	**County**	**Parish**	**Portion/Lot DP**
	Form A :		
	Licensed :CAMDEN	CAMDEN	LOT 11 DP531897

Region :10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :**6223585 **Latitude (S) :**34° 6' 25"
Elevation Source : **Easting :**287828.237 **Longitude (E) :**150° 42' 1"

GS Map : **AMG Zone :**56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG APPLICATION ONLY

***** End of GW102484 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102485

License : 10BL156728

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	MONITORING BORE	MONITORING BORE

Work Status : (Unknown)
Construct. Method :
Owner Type :

Commenced Date : **Final Depth :** 20.10 m
Completion Date : 01-Jan-1995 **Drilled Depth :**

Contractor Name : ENGINEERING EXPLORATION
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed : CAMDEN	CAMDEN	LOT 11 DP531897

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing : 6224005
Easting : 288716.362

Latitude (S) : 34° 6' 12"
Longitude (E) : 150° 42' 36"

GS Map : **AMG Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG APPLICATION ONLY

***** End of GW102485 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102486

License :10BL156728

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

Work Type : Bore
Work Status :(Unknown)
Construct. Method :
Owner Type :

Commenced Date : **Final Depth :**
Completion Date :01-Jan-1995 **Drilled Depth :**

Contractor Name :ENGINEERING EXPLORATION
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed :CAMDEN	CAMDEN	LOT 11 DP531897

Region :10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :**6226519 **Latitude (S) :**34° 4' 52"
Elevation Source : **Easting :**290865.935 **Longitude (E) :**150° 44' 2"

GS Map : **AMG Zone :**56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
ABANDONED
DATA FROM AG APPLICATION ONLY

***** End of GW102486 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102983

License : 10BL155242

Work Type : Bore
Work Status : (Unknown)
Construct. Method :
Owner Type :

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

Commenced Date :
Completion Date : 01-Jan-1989
Final Depth :
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed : CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :
Easting :
Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

***** End of GW102983 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102984

License : 10BL155242

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	MONITORING BORE	MONITORING BORE

Work Status : (Unknown)
Construct. Method :
Owner Type :

Commenced Date : **Final Depth :**
Completion Date : 01-Jan-1989 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Form A :			
Licensed :	CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY
9 PIEZOMETRES

***** End of GW102984 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102985

License : 10BL155242

Work Type : Bore
Work Status : (Unknown)
Construct. Method :
Owner Type :

Authorised Purpose(s)
MONITORING BORE

Intended Purpose(s)
MONITORING BORE

Commenced Date :
Completion Date : 01-Jan-1989

Final Depth :
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed : CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :
Easting :

Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY
9 PIEZOMETRES

***** End of GW102985 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102986

License : 10BL155242

		Authorised Purpose(s)	**Intended Purpose(s)**
Work Type :	Bore	MONITORING BORE	MONITORING BORE
Work Status :	(Unknown)		
Construct. Method :			
Owner Type :			
Commenced Date :	**Final Depth :**		
Completion Date :	01-Jan-1989 **Drilled Depth :**		
Contractor Name :			
Driller :			
Property :	- N/A	**Standing Water Level :**	
GWMA :	- SYDNEY BASIN	**Salinity :**	
GW Zone :	-	**Yield :**	

Site Details

Site Chosen By	**County**	**Parish**	**Portion/Lot DP**
	Form A :		
	Licensed : CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
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9 PIEZOMETRES

***** End of GW102986 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102987

License : 10BL155242

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	MONITORING BORE	MONITORING BORE

Work Status : (Unknown)
Construct. Method :
Owner Type :

Commenced Date : **Final Depth :**
Completion Date : 01-Jan-1989 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Form A :			
Licensed :	CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY
9 PIEZOMETRES

***** End of GW102987 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102988

License : 10BL155242

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	MONITORING BORE	MONITORING BORE

Work Status : (Unknown)
Construct. Method :
Owner Type :

Commenced Date : **Final Depth :**
Completion Date : 01-Jan-1989 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :**
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Form A :			
Licensed :	CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY
9 PIEZOMETRES

***** End of GW102988 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102989

License : 10BL155242

		Authorised Purpose(s)	**Intended Purpose(s)**
Work Type :	Bore	MONITORING BORE	MONITORING BORE
Work Status :	(Unknown)		
Construct. Method :			
Owner Type :			
Commenced Date :	**Final Depth :**		
Completion Date :	01-Jan-1989 **Drilled Depth :**		
Contractor Name :			
Driller :			
Property :	- N/A	**Standing Water Level :**	
GWMA :	- SYDNEY BASIN	**Salinity :**	
GW Zone :	-	**Yield :**	

Site Details

Site Chosen By	**County**	**Parish**	**Portion/Lot DP**
	Form A :		
	Licensed : CAMDEN	CAMDEN	LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
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9 PIEZ0METRES

***** End of GW102989 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW102990

License : 10BL155242

Work Type : Bore
Work Status : (Unknown)
Construct. Method :
Owner Type :

Authorised Purpose(s)
MONITORING BORE

Intended Purpose(s)
MONITORING BORE

Commenced Date :
Completion Date : 01-Jan-1989

Final Depth :
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By

County
Form A :
Licensed : CAMDEN

Parish
CAMDEN

Portion/Lot DP
LOT1 DP168893

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :
Easting :

Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	P.V.C.	2.50	5.00	100			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY
9 PIEZOMETRES

***** End of GW102990 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW103041

License : 10BL157306

		Authorised Purpose(s)	Intended Purpose(s)
Work Type :	Bore	MONITORING BORE	MONITORING BORE
Work Status :	(Unknown)		
Construct. Method :			
Owner Type :			

Commenced Date : **Final Depth :** 61.20 m
Completion Date : 01-Jan-1995 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :** 50.00 m
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :**

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed : CUMBERLAND	NARELLAN	LOT1061 DP801307

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	61.20				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

***** End of GW103041 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW103042

License : 10BL157306

		Authorised Purpose(s)	Intended Purpose(s)
Work Type :	Bore	MONITORING BORE	MONITORING BORE
Work Status :	(Unknown)		
Construct. Method :			
Owner Type :			

Commenced Date : **Final Depth :** 40.00 m
Completion Date : 01-Jan-1995 **Drilled Depth :**

Contractor Name :
Driller :

Property : - N/A **Standing Water Level :** 12.00 m
GWMA : - SYDNEY BASIN **Salinity :**
GW Zone : - **Yield :** 0.10 L/s

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed : CUMBERLAND	NARELLAN	LOT1061 DP801307

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** **Latitude (S) :**
Elevation Source : **Easting :** **Longitude (E) :**

GS Map : **AMG Zone :** **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	40.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

***** End of GW103042 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW103043

License : 10BL157306

	Authorised Purpose(s)	Intended Purpose(s)
Work Type : Bore	MONITORING BORE	MONITORING BORE

Work Status : (Unknown)
Construct. Method :
Owner Type :

Commenced Date :
Completion Date : 01-Jan-1995
Final Depth : 30.00 m
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level : 17.00 m
Salinity :
Yield : 0.10 L/s

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : **Licensed :** CUMBERLAND	NARELLAN	LOT1061 DP801307

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :
CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :
Northing :
Easting :
Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	30.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

***** End of GW103043 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW103044

License : 10BL157306

Work Type : Bore
Work Status : (Unknown)
Construct. Method :
Owner Type :

Authorised Purpose(s)
MONITORING BORE

Intended Purpose(s)
MONITORING BORE

Commenced Date :
Completion Date : 01-Jan-1995

Final Depth : 10.00 m
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By

County
Form A :
Licensed : CUMBERLAND

Parish
NARELLAN

Portion/Lot DP
LOT1061 DP801307

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :
Easting :

Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	10.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

***** End of GW103044 *****

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES
Work Summary

GW103045

License : 10BL157306

Work Type : Bore
Work Status : (Unknown)
Construct. Method :
Owner Type :

Authorised Purpose(s)
MONITORING BORE

Intended Purpose(s)
MONITORING BORE

Commenced Date :
Completion Date : 01-Jan-1995

Final Depth : 40.00 m
Drilled Depth :

Contractor Name :
Driller :

Property : - N/A
GWMA : - SYDNEY BASIN
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By

County
Form A :
Licensed : CUMBERLAND

Parish
NARELLAN

Portion/Lot DP
LOT1061 DP801307

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :
Easting :

Latitude (S) :
Longitude (E) :

GS Map :
AMG Zone :
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	40.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones

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

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

(No Drillers Log Details Found)

Pumping Tests - Summaries

Pumping Test Type	Date	Duration (hr)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Summary Details Found)

Pumping Tests - Readings

Pumping Test Type	Date	Time (mins)	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Intake Depth (m)	Test Method	To Measure Water Level	To Measure Discharge	Tested By

(No Pumping Test Reading Details Found)

Chemical Treatment

Treatment	Method	Duration	Success

(No Chemical Treatment Details Found)

Development

Method	Time Taken	Other Development Method

(No Development Details Found)

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

***** End of GW103045 *****

***** End of Report *****