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AUSTRALIA

Environmental - Remediation - Engineering - Laboratories - Drilling

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

Hornsby Ku-Ring-Gai Hospital
Derby Road and Burdett Street,
Hornsby NSW

prepared for

Health Infrastructure
C/- Thinc Projects

November 2011

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REFERENCES

- Australian and New Zealand Environment and Conservation Council (ANZECC) (1996) – *Drinking Water Guidelines*.
- Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) – *Guidelines for Fresh and Marine Waters*.
- Department of Urban Affairs and Planning – EPA (1998) "*Managing Land Contamination – Planning Guidelines – SEPP 55 – Remediation of Land*".
- National Environmental Protection Council (NEPC) (1999) – *National Environmental Protection (Assessment of Site Contamination) Measure.*
- NSW EPA (1994) "*Guidelines for Assessing Service Station Sites*".
- NSW EPA (1995) "*Sampling Design Guidelines*".
- NSW EPA (1997) "*Guidelines for Consultants Reporting on Contaminated Sites*".
- NSW DEC (2006) "*Guidelines for the NSW Site Auditor Scheme*".
- NSW EPA (2009) "*Guidelines on Significant Risk of Harm from contaminated land and the duty to report*".
- NSW DECC "*Waste Classification Guidelines, Part 1: Classifying Waste*" (2009). Department of Environment and Climate Change NSW, Sydney

ABBREVIATIONS

AIP	Australian Institute of Petroleum Ltd
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground Storage Tank
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethyl benzene and Xylene
COC	Chain of Custody
DA	Development Approval
DP	Deposited Plan
DQOs	Data Quality Objectives
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
HIL	Health-Based Soil Investigation Level
LGA	Local Government Area
NEHF	National Environmental Health Forum
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photo Ionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance, Quality Control
RAC	Remediation Acceptance Criteria
RAP	Remediation Action Plan
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SVC	Site Validation Criteria
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VHC	Volatile Halogenated Compounds
VOC	Volatile Organic Compounds

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Aargus Pty Ltd (Aargus) was appointed by Health Infrastructure c/- Thinc Projects to undertake a Preliminary Environmental Site Assessment (PESA), phase 1, for the property situated at Hornsby Kui-Ring-Gai Hospital, Derby Road and Burdett Street, Hornsby NSW ("the site") (Figure 1 in Appendix A –Site Plans). The site is occupied by 16 separate hospital buildings.

This PESA has been requested by Health Infrastructure c/- Thinc Projects to determine the potential for onsite contamination arising from any areas of concern located within the site and its surrounding area. This report shall provide a preliminary assessment of any site contamination and, if required, provide a basis for a more detailed investigation.

Site observations indicated there were no olfactory indicators of potential contamination. There is one former underground storage tank located between the 'Linen' and 'Physio Therapy' building, which has been decommissioned.

A number of potential areas of environmental concerns were identified at the site, particularly:

- Whole site where uncontrolled fill was imported to level the site prior to the construction of the buildings and the filling of previous low lying areas;
- Where pesticides were potentially utilised within the site for weed control or beneath buildings / floor slabs for termite control;
- Current & Historical activities;
- Former Underground Storage Tank.
- Carpark areas where leaks and spills from cars may have occurred;
- Vicinity of metal features; and
- Asbestos / Fibro features within the demountable building structures.

All are considered of minimal (low) environmental concerns for the following reasons:

- Fill materials are expected to be minimal across the site.
- Pesticides are not persistent in the environment and the occurrence of pesticides within the site is considered low.
- Current & Historical uses – the site has been used for a range of purposes, however, the concrete surfaces were all in good condition and no significant staining was noted.
- The site surfaces in the car park areas are in good condition with minimal surface cracks and no surface staining visible.
- Degradation of metals is likely to be restricted to the surface soils. This is attributed to rust of the metal features. The significance of this occurring is low as oxidation of rust is a long process and the amounts of metals entering the surface soils would be low.
- Asbestos / Fibro would be in a bonded form within the features and, if present, to be removed by a qualified asbestos contractor during demolition. Asbestos in a bonded form is considered non-friable and as such the building materials are considered safe.

There is a low environmental concern attributed to the former UST and associated features. Based on the above, it is considered that the potential for significant contamination of soil and groundwater within the site is low.

Laboratory results for the soil samples analysed were all lower than the relevant regulatory guideline criteria adopted for this development (HIL 'F' and the Service Station guidelines).

Whilst the above concerns are considered minimal, it is difficult to determine the extent (if any) of potential leaks occurring from the underground tank, pipes/lines and bowser unless sampling occurs. It is recommended that a Tank Validation report be undertaken to determine if contamination has occurred in the vicinity of the UST and associated features. Further samples would be warranted in and around the remaining of the site in order to provide classification of soils for disposal purposes as part of the proposed development.

Any soils requiring removal from the site as part of the excavation for future basement construction should be classified in accordance with the "Waste Classification Guidelines, Part 1: Classifying Waste", NSW DECC (2009). It is expected that a HAZMAT be conducted prior to demolition of any building structures for the site.

If during any potential site works, significant odours and / or evidence of gross contamination not previously detected are encountered, or any other significant unexpected occurrence, site works should cease in that area, at least temporarily, and the environmental consultant should be notified immediately to set up a response to this unexpected occurrence.

Reference should be made to Section 8.0 and Appendix B for limitations of this report.

1.0 INTRODUCTION

Aargus Pty Ltd (Aargus) was appointed by Health Infrastructure c/- Thinc Projects to undertake a Preliminary Environmental Site Assessment (PESA), phase 1, for the property situated at Hornsby Kui-Ring-Gai Hospital, Derby Road and Burdett Street, Hornsby NSW ("the site") (Figure 1 in Appendix A –Site Plans). The site is occupied by 16 separate hospital buildings, driveways, car parking and grassed areas. The site is proposed to be redeveloped into one large building as part of the existing hospital.

This PESA has been requested by the current owner of the site to determine the potential for onsite contamination arising from any areas of concern located within the site and its surrounding area. This report shall provide a preliminary assessment of any site contamination and, if required, provide a basis for a more detailed investigation.

A site visit was undertaken on 28th October 2011. Fieldwork and reporting was conducted in general accordance with the Aargus proposal and with reference to relevant regulatory criteria and Aargus protocols (Appendix G – Aargus Fieldwork Protocols).

2.0 OBJECTIVE

The objective of this PESA was to assess the potential for the soils at the site to have been impacted by previous and current activities undertaken at or adjacent to the site and to assess the site suitability for the proposed development.

This report may also recommend additional investigations and / or remediation works and possible strategies for the management of the site.

3.0 SCOPE OF WORKS

The scope of works for this PESA included:

- Research and review of the information available, including previous environmental investigations, past and current titles, aerial photographs, EPA records, council records and anecdotal evidence, site survey, site records on waste management practices;

- Site walkover, including research of the location of sewers, drains, holding tanks and pits, spills, patches of discoloured vegetation, etc;

- Limited soil sampling; and

- Quality Assurance/Quality Control (QA/QC): work will be undertaken in accordance with the Aargus Protocols, which comply with regulations and are consistent with industry standards.

4.0 REVIEW OF INFORMATION AVAILABLE

4.1 Site identification, zoning

The site is located at Hornsby Kui-Ring-Gai Hospital, Derby Road and Burdett Street, Hornsby NSW (refer to Appendix A –Site Plans). The site comprises of Lot 2 in DP14774, Lot 3 in DP14774, Lot B in DP363790, Lot 23 in DP814181, Lot 1 in DP232290 and Lot 189 in DP752053. The site is approximately 1.058 ha in area, and is bound by Derby Road to the east, Burdett Street to the south, and hospital grounds to the north and west.

4.2 Local geology, hydrogeology, surface waters

The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, 1983), published by the Department of Mineral Resources indicates the residual soils within the site to be underlain by Triassic Age Shale of the Wianamatta Group, comprising black to dark grey shale and laminite.

Department of Natural Resources (DNR) borehole database information indicates that there are no registered water wells within a 0.5 kilometre radius of the site.

The nearest surface water body is Spring Gullies approximately 500m to the south-east. Stormwater from the local and surrounding areas would flow towards this water bodies.

4.3 Review of aerial photographs

A number of aerial photographs obtained from the NSW Department of Lands were reviewed as part of this PESA. Copies of the aerial photographs are kept in the offices of Aargus and are available for examination upon request. The results of this review are presented in the following table:

Table 1: Review of Aerial Photographs

Year	Site		Surrounding areas
1930	Vacant / Rural Residential	The 1930's aerial photograph indicates that the majority of the site vacant. However a rural residential building exists in the western portion of the site.	N: Vacant S: Road E: Road W: Vacant then Road

1951	Commercial / Residential	The site appears to have undergone major changes since the 1951 aerial photograph. N Section: Six separate commercial buildings are visible. S Section: Six separate residential properties are visible.	There appears to have been some modifications within the surrounding area. W: Residential buildings constructed.
1970	Commercial/ residential	The site appears to have undergone major changes since the 1951 aerial photograph. Two commercial buildings had since been erected.	There appears to have been some modifications within the surrounding area. N: Some trees had since been cleared and new commercial building had been erected.
1991	Commercial	The site appears to be major modifications to the site since the 1970 aerial photograph. S Section: One of the residential properties no longer exists. Central Section: New large commercial building now constructed. N section: Buildings have been extended.	There appears to have been some modifications within the surrounding area. W: Neighbouring Residential property had been converted to commercial a car park.
2011	Commercial	The site appears to be unchanged since the 1991 aerial photograph.	There appears to have been some modifications within the surrounding area. W: Neighbouring Residential property had been converted to commercial a car park.

In summary, the aerial photographs reveal that the site and surrounding areas were vacant in the 1930's. It has since been developed and converted to a combination between residential and commercial uses.

4.4 Title search

A review of historical documents held at the NSW Department of Lands offices was undertaken to characterise the previous land use and occupiers of the site. Reference should be made to Appendix H – Land Title Information for a copy of the historical land titles information obtained by Aargus.

As reported above, the site is currently registered as Lot 2 in DP14774, Lot 3 in DP14774, Lot B in DP363790, Lot 23 in DP814181, Lot 1 in DP232290 and Lot 189 in DP752053. The results of the title search are summarised in the following table.

Table 2: Historical Land Title Data

Year	**Owners Lot: 189 in DP752053**
Current	Northern Sydney and Central Coast Health Service
Prior	**Vol: 965 Fol: 126**
1931	Hornsby and District Hospital
1921	Albert Edgar French, Paul Allen Jones, Herbert Edgar McIntosh

Year	**Owners Lot: 1 in DP232290**
Current	Hornsby and District Hospital
Prior	**Vol: 10575 Fol: 144**
1967	Hornsby and District Hospital

Year	**Owners Lot: 2 in DP14774**
Current	The Hornsby and Ku-Ring-Gai Hospital and Health Service
Prior	**Vol: 4273 Fol: 77**
1985	The Hornsby and Ku-Ring-Gai Hospital and Health Service
1971	Doris Maria Burling and Jack Leonard Burling
1945	Henry Ernest Burling
1944	Eric James Halcrow
1929	William Henry Blackler

Year	Owners Lot: 3 in DP14774
Current	Health Administration Comp
Prior	**Vol: 4256 Fol: 39**
1971	Raymond Jooby and Helen Maureen Jooby
1967	Paul Hardy Cutto and Elisa Grace Cutto
1957	Eric James Halcrow
1951	Herbert Jassey Roseburgh
1951	Patrick Joel Delaney and Catherine Lillian Delany
1938	Edward Francis Lewis and Annie Lewis
1924	Charlotte Maud Farrell

Year	Owners Lot: B in DP363790
Current	Hornsby and Ku-Ring-Gai Hospital
Prior	**Vol: 6036 Fol: 24**
1980	Hornsby and Ku-Ring-Gai Hospital
Prior	**Vol: 4223 Fol: 38**
1967	Hornsby and Ku-Ring-Gai Hospital
1949	George Hayes
1941	Annie Andrews Johnson
1934	Reg David Johnson
1928	Dorrace Gould Dick

Year	Owners Lot: 23 in DP814181
Current	Hornsby and Ku-Ring-Gai Hospital Health Serviced
Prior	**Vol: 10575 Fol:146**
1981	Hornsby and Ku-Ring-Gai Hospital
1981	Douglas John Halloran
1967	Dorothy Grace Halloran
Prior	**Vol: 4112 Fol: 26**
1967	Hornsby and Ku-Ring-Gai Hospital
1938	Claude Halloran
1936	Alice Vaughan Howes
1928	Annie Andrews Johnson

In summary, information provided suggests that the site was predominately owned by private and government (commercial) owners. The history of ownership of the site does indicate potential concerns. The concerns are related to the usage of the site by multiple (commercial) hospital operations.

4.5 WorkCover records

Based on site observations, there is an existing decommissioned UST onsite. A search of the records of WorkCover NSW is currently being undertaken. Once this process is complete an addendum to this report including the search will be provided.

4.6 NSW OEH records

The NSW Office of Environment & Heritage (OEH) publishes records of contaminated sites under Section 58 of the Contaminated Land Management (CLM) Act 1997. The notices relate to investigation and/or remediation of site contamination considered to pose a significant risk of harm under the definition in the CLM Act.

A search of the database revealed that the subject site is not listed, furthermore no sites are listed in the Hornsby Council Area.

It should be noted that the OEH record of Notices for Contaminated Land does not provide a record of all contaminated land in NSW.

4.7 Anecdotal evidence

Site engineers indicated that there was a former UST located in between the ‘Linen’ and ‘Physio Therapy’ buildings and was decommissioned approximately 20 years ago.

4.8 Summary of site history

In summary:

- Land title information indicated site was predominately owned by private, government (health services) and commercial owners.
- Aerial photographs reveal that the site has been predominantly been utilised for residential and commercial uses.
- Site engineers indicated that there was a former UST located in between the 'Linen' and 'Physio Therapy' buildings and was decommissioned approximately 20 years ago.

4.9 Proposed development

It is understood that the future proposed development will be to demolish current buildings and construct a multiple storey building as part of the existing hospital.

5.0 SITE VISIT

5.1 General

The site was visited on 28th October 2011 by Emmanuel Woelders to inspect the site for any potential sources of contamination. (CVs are presented in Appendix F – Project Team).

The following items were considered as part of the site visit:

- Description of the building structures;
- Site surroundings;
- Present and past industrial processes and operations at the site;
- Surface water, groundwater, stormwater and sewer;
- Present and past storage of chemicals and wastes associated with site use and their on-site location;
- Waste management practices and management of hazardous materials;
- Presence of Underground Storage Tanks or Above Ground Storage Tanks;
- Odour; and
- Occupational health and safety.

5.2 Site observations

The site is located at Hornsby Kui-Ring-Gai Hospital, Derby Road and Burdett Street, Hornsby NSW, in the Hornsby Council Region. At the time of the site visit the following observations were made:

- The site comprised of the following; 16 brick and metal buildings with metal/tile roofs occupied by the operations of the existing hospital.
- Bitumen and concrete sealed driveways and car parking areas are visible throughout the site.

- Multiple unsealed grassed areas are also present.
- Waste skip bins areas observed next to the Central Building Area building.
- A decommissioned UST was observed in between buildings known as 'Linen' and 'Staff Cafeteria'.
- There were no signs of soil staining, or any other visible indicators of potential contamination. There was no vegetation on-site however vegetation on surrounding properties where not distressed.
- There were no olfactory indicators of potential contamination.
- A hazardous building materials survey was not commissioned as part of this assessment.

The site slopes towards the south-west. The regional topography is slopes to the west.

These site features are reported on Figure 2 in Appendix A – Site Plans and site photographs are presented in Appendix B – Site Photographs.

5.3 Surrounding areas

Surrounding land use was identified as follows:

North	Hospital Grounds
South	Burdett Street then residential properties
East	Derby Road then residential properties
West	Hospital Grounds

The district consists of light commercial and residential land uses.

6.0 AREAS OF ENVIRONMENTAL CONCERNS

Based on the above information, site history and site walkover, the areas of environmental concern (AEC) or associated chemicals of concern (CoC) for the site were identified. These are summarised in the following table.

Table 3: Summary of potential areas and chemicals of concerns

Potential AEC	Description of potentially contaminating activity	CoC	Likelihood of contamination	Remarks
Whole site	Fill materials	Various	Low	Significant filling was not encountered, in addition, concentrations of the analytes tested were well below the SAC.
Whole site	Potential for pesticides to have been sprayed or injected on or underneath concrete slabs and within garden beds.	OCP	Low	If this has occurred, the impact is likely to have been localised.
Current & Historical Uses	Hospital and commercial operations	Various	Low	No significant staining was noted on any of the grass and concrete surfaces or any significant cracks in the concrete.
UST	The tanks and associated lines could have leaked in the past.	Metals, TPH, BTEX, PAH, Phenols	Low	This UST was apparently decommissioned ~20years ago.
Car park areas.	Car parking. Vehicles may have leaked oil, petrol and other chemicals over time.	Metals, TPH, BTEX, PAH	Low	No significant staining was noted on any of the sealed surfaces.
Vicinity of Metal Features	Degradation of metal features	Metals	Low	If this has occurred, the impact is likely to be restricted to the topsoil.
Buildings	Asbestos/Fibro Features	Asbestos	Low	To be removed by a qualified contractor.

7.0 SITE ASSESSMENT CRITERIA

Regulatory criteria – soil

To assess the contamination status of soils at a site, the NSW EPA refers to the document entitled National Environmental Protection Council (1999) *National Environmental Protection (Assessment of Site Contamination) Measure* (NEPM).

The site is proposed to be redeveloped into a multiple story building as part of the existing hospital, so the site will be assessed against the NEPM exposure scenario 'F' health investigation levels hence will (HIL) of the above mentioned guidelines for '*Commercial and Industrial'*.

The NEPM 1999 does not include investigation levels for TPH and BTEX. For assessing contamination by these compounds at sites used for sensitive land use, such as residential, the NSW EPA refers to the NSW EPA (1994) "*Guidelines for Assessing Service Station Sites*". The NSW EPA has recommended that these threshold values should also be used to assess the suitability of sites for less stringent uses, such as residential with minimal access to the soil or parklands.

For standard residential sites, the NSW DEC (2006) "*Guidelines for the NSW Site Auditor Scheme*" notes that concentrations at the site should also be assessed against the environmental investigation levels (EIL) if some parts of the site are used for growing plants or grass.

The soil regulatory guidelines are presented in Table 4 below.

Table 4: Soil regulatory criteria

Contaminant	Assessment Criteria (mg/kg)		Source
	HIL 'F'	NSW EPA	
Inorganics			
Arsenic	500	-	NEPM, 1999
Cadmium	100	-	NEPM, 1999
Chromium (III)	500	-	NEPM, 1999
Copper	5,000	-	NEPM, 1999
Lead	3000	-	NEPM, 1999
Zinc	1500	-	NEPM, 1999
Nickel	35000	-	NEPM, 1999
Mercury	50	-	NEPM, 1999
Organics			
TPH/BTEX			
C_6 to C_9 Fraction	-	65	NSW EPA, 1994
C_{10} to C_{36} Fraction	-	1,000	NSW EPA, 1994
Benzene	-	1	NSW EPA, 1994
Toluene	-	1.4	NSW EPA, 1994
Ethylbenzene	-	3.1	NSW EPA, 1994
Total Xylenes	-	14	NSW EPA, 1994
PAH			
Benzo(a)pyrene	5	-	NEPM, 1999
Total PAH	11	-	NEPM, 1999
OCP			
Aldrin	50	-	NEPM, 1999
Heptachlor	50	-	NEPM, 1999
Dieldrin	50	-	NEPM, 1999
DDD, DDT, DDE	1000	-	NEPM, 1999
Chlordane	250	-	NEPM, 1999

The EPA guidelines indicate that the assessment of soil test results and comparison with defined soil criteria should include consideration of a number of factors such as:

1. Land uses, e.g. residential, agricultural/horticultural, recreation or commercial/industrial.
2. Potential child occupancy.
3. Potential environmental effects including leaching into groundwater.
4. Single or multiple contaminants.
5. Depth of contamination.
6. Level and distribution of contamination.
7. Bioavailability of contaminant(s), e.g. Related to speciation, route of exposure.
8. Toxicological assessment of the contaminant(s), e.g. Toxicokinetics, carcinogenicity, acute and chronic toxicity.
9. Physico-chemical properties of the contaminant(s).
10. State of the site surface, e.g. paved or grassed exposed.
11. Potential exposure pathways.
12. Uncertainties with the sampling methodology and toxicological assessment.

Regulatory criteria – export of fill

To assess the waste classification of materials to be disposed of off-site, the NSW DECC refers to the NSW DECC "Waste Classification Guidelines, Part 1: Classifying Waste" (2009).

8.0 SOIL SAMPLING AND ANALYSIS

Samples were recovered from six (6) locations within the site. These locations were selected to detect any contamination that may have originated from past and present activities. The locations of the surface samples are shown in Appendix A –Site Plans.

Selected samples were dispatched under chain of custody (CoC) conditions to MGT LabMark. The samples were selected for analysis based on the sample location and the material encountered. The laboratory information for the samples collected is shown in the following table below.

Table 5: Summary of sample information

Sample	Depth (m)	Soil Description	Rational	Analytes
BH1	0.5	Topsoil/ Fill	General Coverage Car Parking Metal Feature	Met 8, TPH, BTEX, PAH, OCP
BH2	0.3	Topsoil / Fill	General Coverage Fill Materials Metal Features	Met 8, TPH, BTEX, PAH, OCP
BH3	0.5	Topsoil/ Fill	General Coverage Car Parking Metal Features	Met 8, TPH, BTEX, PAH
BH3	3.0	Topsoil/ Fill	General Coverage Decommissioned UST Metal Features	Met 8, TPH, BTEX, PAH
BH4	0.2	Topsoil/ Fill	General Coverage Fill Materials Metal Features Car parking	Met 8, TPH, BTEX, PAH
BH5	0.1	Topsoil/ Fill	General Coverage Fill Materials Metal Features	Met 8, TPH, BTEX, PAH
BH6	0.3	Topsoil / Fill	General Coverage Fill Materials Metal Feature	Met 8, TPH, BTEX, PAH

9.0 RESULTS

The original laboratory test results certificates are presented in Appendix D – Laboratory Test Results. A summary of the test results together with the assessment criteria adopted are presented in Tables 6, 7 and 8 below followed by a discussion of the test data.

Table 6: Heavy Metals Test Result

Analyte / Sample Reference	Depth(m)	METALS (mg/kg) ARSENIC	CADMIUM	CHROMIUM	COPPER	NICKEL	LEAD	ZINC	MERCURY
BH1	0.5	2.9	<0.1	8.8	<2	<1	7.3	<5	<0.05
BH2	0.3	2	<0.1	11	<2	<1	12	<5	<0.05
BH3	0.5	7.4	<0.1	16	<2	<1	12	<5	<0.05
BH3	3	2.9	0.2	60	16	34	18	41	<0.05
BH4	0.2	2.6	0.2	9.1	17	9.8	4.9	11	<0.05
BH5	0.3	3.9	0.4	12	28	3.2	140	99	0.08
BH6	0.1	1.5	<0.1	32	24	60	3.9	37	<0.05
Practical Quantitation Limits (PQL)		1	0.1	2	2	1	2	5	0.05
NATIONAL ENVIRONMENT PROTECTION MEASURE (1999)									
Health Investigation Levels (HIL) [a] (HIL 'F')		500	100	60%/500 [b]	5000	3000	1500	35000	50/75 [c]

Notes
a: Commercial or industrial development
b: 60% (600000mg/kg) for Chromium (+3) and 600mg/kg for Chromium (+6).
c: 50mg/kg for Methyl Mercury an7d 15mg/kg for Inorganic Mercury.

As shown in Table 6, the metal concentrations were well below the HIL ‘F’.

Table 7: TPH & BTEX Test Result

Analyte / Sample Location	Depth (m)	TPH (mg/kg) C6-C9	C10-C14	C15-C28	C29-C36	C10-C36 [b]	BTEX (mg/kg) BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES
BH1	0.5	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH2	0.3	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH3	0.5	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH3	3	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH4	0.2	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH5	0.3	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
BH6	0.1	<10	<50	<100	<100	<250	<0.5	<0.5	<0.5	<1.5
Practical Quantitation Limits (PQL)		10	50	100	100	NA	0.5	0.5	0.5	1.5
EPA Levels [a]		65	C10-C36 =1000				1	1.4	3.1	14

Notes
a: Contaminated Sites: "Guidelines for Assessing Service Station Sites", 1994, EPA
b: C10-C36 = (C10-C14) + (C15-C28) + (C29-C36); concentrations less than PQL are assumed equal to PQL.
NA: Not Applicable

As indicated in Table 7, the concentrations of TPH & BTEX were well below the NSW EPA Service Station guidelines.

Table 8: Benzo(a)Pyrene, Total PAH and OCP Test Results

Analyte / Sample Location	Depth (m)	PAH (mg/kg) BENZO(a)PYRENE (mg/kg)	TOTAL PAH (mg/kg)	Organochlorine Pesticides (mg/kg) HEPTACHLOR	ALDRIN	DIELDRIN	DDD	DDE	DDT	CHLORDANE (trans & cis)
BH1	0.5	<0.5	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
BH2	0.3	<0.5	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
BH3	0.5	<0.5	<1							
BH3	3	<0.5	<1							
BH4	0.2			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
BH5	0.3			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
BH6	0.1	<0.5	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
Practical Quantitation Limits (PQL)		0.5	NA	0.05	0.05	0.05	0.05	0.05	0.05	0.1
NATIONAL ENVIRONMENT PROTECTION MEASURE (1999) Health Investigation Levels (HIL) [a] (HIL 'F')		5	100	50	50 [b]	50 [b]	1000 [c]			250

Notes
a: Commercial or industrial development
b: Aldrin + Dieldrin
c: Total of DDD + DDE + DDT
NA: Not Applicable

As indicated in Table 8, the benzo(a)pyrene, Total PAH and OCP concentrations were below the HIL 'F' criteria.

9.0 CONCLUSION AND RECOMMENDATIONS

Aargus Pty Ltd (Aargus) was appointed by Health Infrastructure c/- Thinc Projects to undertake a Preliminary Environmental Site Assessment (PESA), phase 1, for the property situated at Hornsby Kui-Ring-Gai Hospital, Derby Road and Burdett Street, Hornsby NSW ("the site").

The site currently comprises of 16 separate hospital buildings and is bounded by hospital grounds to the north and west, Derby Road to the east and Burdett Road to the south. It is understood the site is to be redeveloped into a multi storey commercial building as part of the existing hospital.

Site observations indicated there were no olfactory indicators of potential contamination. There is one former underground storage tank located between the 'Linen' and 'Physio Therapy' building, which has been decommissioned.

A number of potential areas of environmental concerns were identified at the site, particularly:

- Whole site where uncontrolled fill was imported to level the site prior to the construction of the buildings and the filling of previous low lying areas;
- Where pesticides were potentially utilised within the site for weed control or beneath buildings / floor slabs for termite control;
- Current & Historical activities;
- Former Underground Storage Tank.
- Carpark areas where leaks and spills from cars may have occurred;
- Vicinity of metal features; and
- Asbestos / Fibro features within the demountable building structures.

All are considered of minimal (low) environmental concerns for the following reasons:

- Fill materials are expected to be minimal across the site.
- Pesticides are not persistent in the environment and the occurrence of pesticides within the site is considered low.
- Current & Historical uses – the site has been used for a range of purposes, however, the concrete surfaces were all in good condition and no significant staining was noted.
- The site surfaces in the car park areas are in good condition with minimal surface cracks and no surface staining visible.
- Degradation of metals is likely to be restricted to the surface soils. This is attributed to rust of the metal features. The significance of this occurring is low as oxidation of rust is a long process and the amounts of metals entering the surface soils would be low.
- Asbestos / Fibro would be in a bonded form within the features and, if present, to be removed by a qualified asbestos contractor during demolition. Asbestos in a bonded form is considered non-friable and as such the building materials are considered safe.

There is a low environmental concern attributed to the former UST and associated features. Based on the above, it is considered that the potential for significant contamination of soil and groundwater within the site is low.

Laboratory results for the soil samples analysed were all lower than the relevant regulatory guideline criteria adopted for this development (HIL 'F' and the Service Station guidelines).

Whilst the above concerns are considered minimal, it is difficult to determine the extent (if any) of potential leaks occurring from the underground tank, pipes/lines and bowser unless sampling occurs. It is recommended that a Tank Validation report be undertaken to determine if contamination has occurred in the vicinity of the UST and associated features. Further samples would be warranted in and around the remaining of the site in order to provide classification of soils for disposal purposes as part of the proposed development.

Any soils requiring removal from the site as part of the excavation for future basement construction should be classified in accordance with the "Waste Classification Guidelines, Part 1: Classifying Waste", NSW DECC (2009). It is expected that a HAZMAT be conducted prior to demolition of any building structures for the site.

If during any potential site works, significant odours and / or evidence of gross contamination not previously detected are encountered, or any other significant unexpected occurrence, site works should cease in that area, at least temporarily, and the environmental consultant should be notified immediately to set up a response to this unexpected occurrence.

Thank you for the opportunity to undertake this work. We would be pleased to provide further information on any aspects of this report.

For and on behalf of
Aargus Pty Ltd

Emmanuel Woelders
Environmental Scientist

Internal review by

Mark Kelly
Environmental Manager

10.0 LIMITATIONS

To the best of our knowledge information contained in this report is accurate at the date of issue, however, subsurface conditions, including groundwater levels and contaminant concentrations, can change in a limited time. This should be borne in mind if the report is used after a protracted delay.

There is always some disparity in subsurface conditions across a site that cannot be fully defined by investigation. Hence it is unlikely that measurements and values obtained from sampling and testing during environmental works carried out at a site will characterise the extremes of conditions that exist within the site.

There is no investigation that is thorough enough to preclude the presence of material that presently or in the future, may be considered hazardous at the site. Since regulatory criteria are constantly changing, concentrations of contaminants presently considered low may, in the future, fall under different regulatory standards that require remediation.

Opinions expressed herein are judgements and are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions.

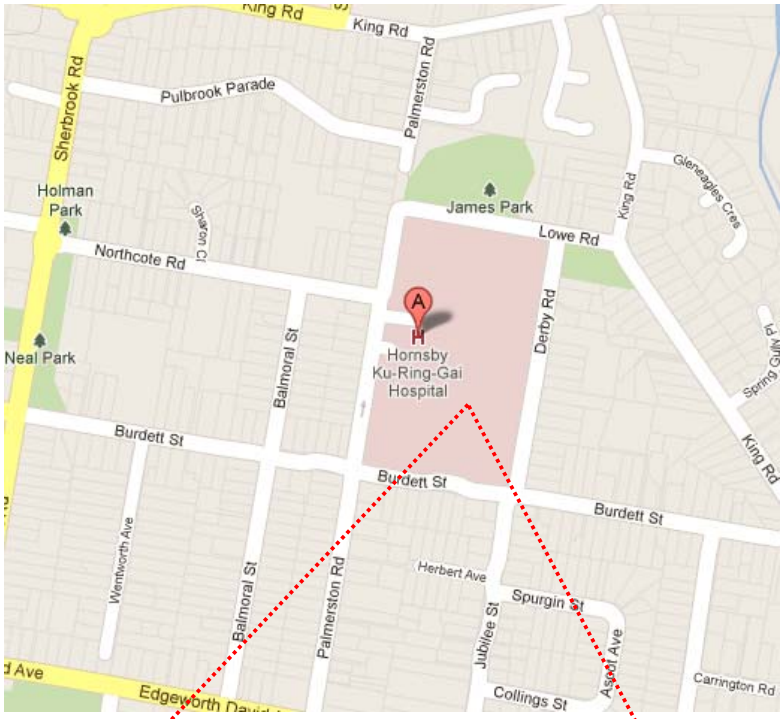
Appendix G – Important information about your environmental site report should also be read in conjunction with this report.

APPENDIX A

LOCALITY MAP & SITE PLAN

Aargus

Locality Map



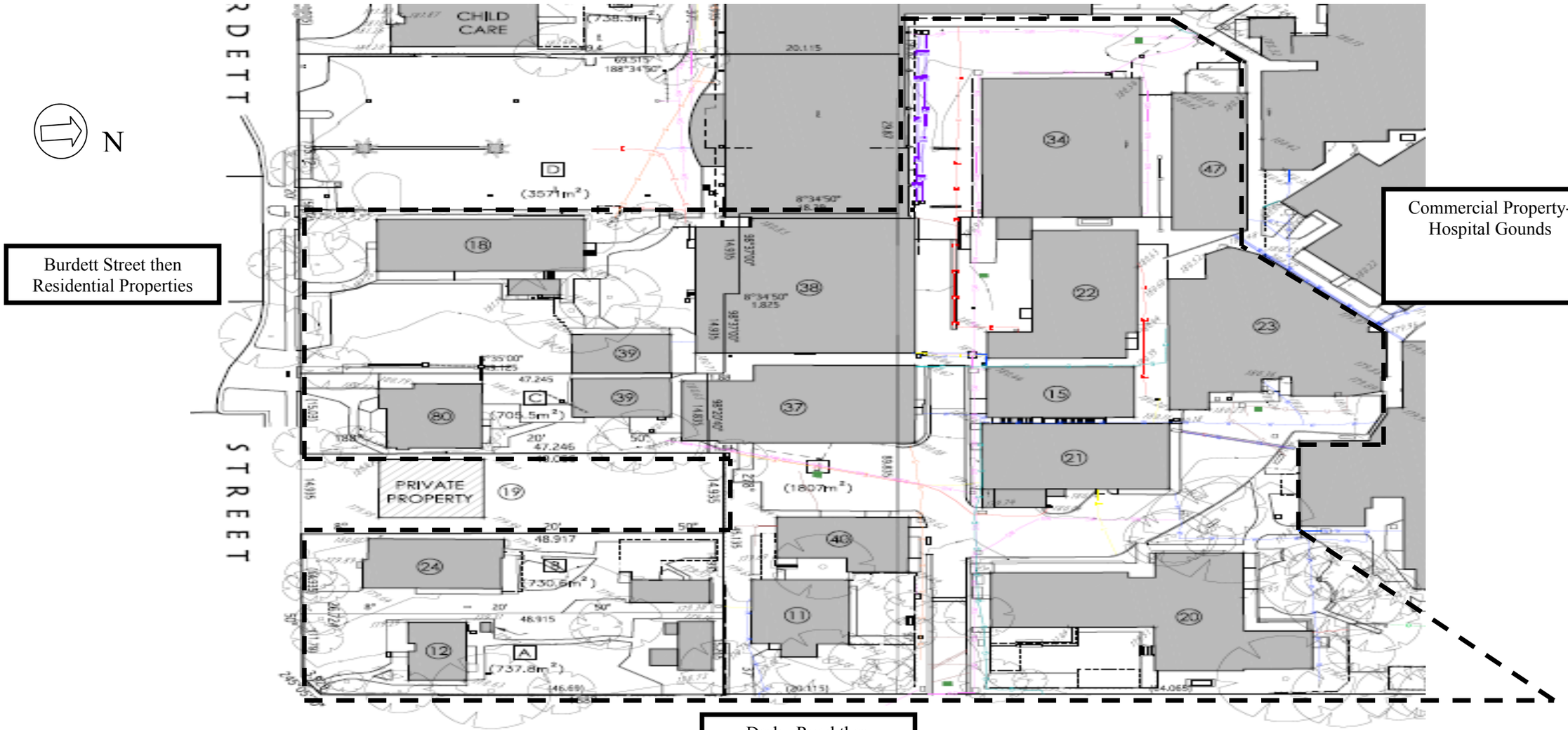
N

Reference Google Maps (2011)

Aargus Environmental- Remediation- Engineering- Drilling - Laboratories				
Drawn	MT	**Preliminary Environmental Site Assessment Health Infrastructure C/- Thinc Health Hornsby Ku-ring-gai Hospital Redevelopment Derby Road & Burdett Street, Hornsby**	Aargus AUSTRALIA	Figure 1
Approved	SZ			
Date	09/11/11			
Scale	NTS			Job No: ES4661/2

SITE PLAN

Hospital Grounds then Palmerston Road



Burdett Street then Residential Properties

Commercial Property- Hospital Gounds

Derby Road then Residential Properties

ABN 46 063 579 313 Aargus Pty Limited Environment – Remediation – Geotechnical Engineering

Drawn	EW
Approved	MK
Date	26.10.2011
Approx Scale	N/A

Preliminary Environmental Site Assessment
Health Infrastructure c/+ Thinc Projects
Hornsby Ku-Ring-Gai Hospital,
Palmerston Road, Hornsby NSW

Aargus AUSTRALIA

Fig 2a

ES4661/2

SITE PLAN

N

Source: *Nearmap*

NUMBER	SITE FEATURES	NUMBER	SITE FEATURES	NUMBER	SITE FEATURES
1	Dietary Podiatry Building	9	Linen Building	17	Staff Cafeteria and Functions Building
2	P.A.D.P Building A	10	Store, Purchasing, Printing, Transport Building	18	Oxidising Gas Tanks
3	P.A.D.P Building B	11	Maintenance Workshop	19	Decommissioned UST
4	Family Cottage	12	Engineering Office Workshop	20	Power Generators
5	Health Administration Corporation Building	13	Central Plating Area Building	21	Waste Skip Bins Area
6	Workcover Staff Counseling Building	14	Kitchen	22	Gas Storage Area
7	No. 1 Derby Road (house)	15	Staff Amenities Building		
8	Physio Therapy Building	16	Pathology Mortuary Building		

Drawn	EW
Approved	MK
Date	26.10.2011
Approx Scale	N/A

Preliminary Environmental Site Assessment
Health Infrastructure c/+ Thinc Projects
Hornsby Ku-Ring-Gai Hospital,
Palmerston Road, Hornsby NSW

Aargus AUSTRALIA

Fig 2b

ES4661/2

APPENDIX B

SITE PHOTOGRAPHS

Aargus

SITE PHOTOGRAPHS

Client	Health Infrastructure
Project	Preliminary Environmental Site Assessment
Location	Hornsby Ku-Ring-Gai Hospital, Palmerston Road, Hornsby NSW
Job No.	ES4661/2
Checked By	MT

Aargus
AUSTRALIA

Photograph 1

View of the Dietary Podiatry P.A.D.P Building facing North from Burdett Street

Photograph 2

View facing south-east from Victoria Road entry

Photograph 3

Linen Building

Photograph 4

Hospital Gounds - Grass Area

Photograph 5

Staff Workcover Counselling Building

Photograph 6

Carparking Area and Pysiotherapy Building

SITE PHOTOGRAPHS

Client	Health Infrastructure
Project	Preliminary Environmental Site Assessment
Location	Hornsby Ku-Ring-Gai Hospital, Palmerston Road, Hornsby NSW
Job No.	ES4661/2
Checked By	MT

Aargus
AUSTRALIA

Photograph 7

Driveway from Derby Road and Staff Cafeteria Building

Photograph 8

Decomissioned UST

Photograph 9

Central Plating Area Building, Showing Skip Location

Photograph 10

Maintainance Workshop Building

Photograph 11

Engineering Building

Photograph 12

Oxidising Gas Tanks Storage

APPENDIX C

LABORATORY RESULTS

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

Aargus Environmental
446 Parramatta Road
Petersham
NSW 2049

Attention: Mark Kelly

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Report	317053-S
Client Reference	HORNSBY PESA ES4661/1
Received Date	Nov 02, 2011

Client Sample ID			**BH1 0.5**	**BH2 0.3**	**BH3 0.5**	**BH3 3.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-No00268**	**S11-No00269**	**S11-No00270**	**S11-No00271**
Date Sampled			**Oct 28, 2011**	**Oct 28, 2011**	**Oct 28, 2011**	**Oct 28, 2011**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	10	mg/kg	< 10	< 10	< 10	< 10
TRH C10-C14	50	mg/kg	< 50	< 50	< 50	< 50
TRH C15-C28	100	mg/kg	< 100	< 100	< 100	< 100
TRH C29-C36	100	mg/kg	< 100	< 100	< 100	< 100
TRH C10-36 (Total)	100	mg/kg	< 100	< 100	< 100	< 100
BTEX						
Benzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total m+p-Xylenes	1	mg/kg	< 1	< 1	< 1	< 1
o-Xylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Xylenes(ortho.meta and para)	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Total BTEX	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
4-Bromofluorobenzene (surr.)	1	%	99	89	91	103
Organochlorine Pesticides (OC)						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDT	0.2	mg/kg	< 0.2	< 0.2	-	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
a-Chlordane	0.05	mg/kg	< 0.05	< 0.05	-	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	-
g-Chlordane	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	-
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	-	-
Dibutylchlorendate (surr.)	1	%	93	98	-	-
Tetrachloro-m-xylene (surr.)	1	%	97	76	-	-

Client Sample ID			**BH1 0.5**	**BH2 0.3**	**BH3 0.5**	**BH3 3.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-No00268**	**S11-No00269**	**S11-No00270**	**S11-No00271**
Date Sampled			**Oct 28, 2011**	**Oct 28, 2011**	**Oct 28, 2011**	**Oct 28, 2011**
Test/Reference	LOR	Unit				
Polyaromatic Hydrocarbons (PAH)						
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b)fluoranthene & Benzo(k)fluoranthene	1	mg/kg	< 1	< 1	< 1	< 1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH	1	mg/kg	< 1	< 1	< 1	< 1
2-Fluorobiphenyl (surr.)	1	%	110	94	100	97
p-Terphenyl-d14 (surr.)	1	%	121	99	100	103
Heavy Metals						
Arsenic	1	mg/kg	2.9	2.0	7.4	2.9
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2
Chromium	2	mg/kg	8.8	11	16	60
Copper	2	mg/kg	< 2	< 2	< 2	16
Lead	2	mg/kg	7.3	12	12	18
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	1	mg/kg	< 1	< 1	< 1	34
Zinc	5	mg/kg	< 5	< 5	< 5	41
% Moisture	0.1	%	19	15	20	24

Client Sample ID			BH4 0.2	BH5 0.3	BH6 0.1
Sample Matrix			Soil	Soil	Soil
mgt-LabMark Sample No.			S11-No00272	S11-No00273	S11-No00274
Date Sampled			Oct 28, 2011	Oct 28, 2011	Oct 28, 2011
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	10	mg/kg	-	-	< 10
TRH C10-C14	50	mg/kg	-	-	< 50
TRH C15-C28	100	mg/kg	-	-	< 100
TRH C29-C36	100	mg/kg	-	-	< 100
TRH C10-36 (Total)	100	mg/kg	-	-	< 100
BTEX					
Benzene	0.5	mg/kg	-	-	< 0.5
Toluene	0.5	mg/kg	-	-	< 0.5
Ethylbenzene	0.5	mg/kg	-	-	< 0.5
Total m+p-Xylenes	1	mg/kg	-	-	< 1
o-Xylene	0.5	mg/kg	-	-	< 0.5
Xylenes(ortho.meta and para)	1.5	mg/kg	-	-	< 1.5
Total BTEX	1.5	mg/kg	-	-	< 1.5
4-Bromofluorobenzene (surr.)	1	%	-	-	99
Organochlorine Pesticides (OC)					
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.2	mg/kg	< 0.2	< 0.2	< 0.2
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
a-Chlordane	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	0.10	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-Chlordane	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	109	113	109
Tetrachloro-m-xylene (surr.)	1	%	93	88	88
Polyaromatic Hydrocarbons (PAH)					
Acenaphthene	0.5	mg/kg	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	< 0.5
Anthracene	0.5	mg/kg	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5
Benzo(b)fluoranthene & Benzo(k)fluoranthene	1	mg/kg	-	-	< 1
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	< 0.5
Chrysene	0.5	mg/kg	-	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	< 0.5
Fluoranthene	0.5	mg/kg	-	-	< 0.5

Client Sample ID			**BH4 0.2**	**BH5 0.3**	**BH6 0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**
mgt-LabMark Sample No.			**S11-No00272**	**S11-No00273**	**S11-No00274**
Date Sampled			**Oct 28, 2011**	**Oct 28, 2011**	**Oct 28, 2011**
Test/Reference	LOR	Unit			
Fluorene	0.5	mg/kg	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	< 0.5
Naphthalene	0.5	mg/kg	-	-	< 0.5
Phenanthrene	0.5	mg/kg	-	-	< 0.5
Pyrene	0.5	mg/kg	-	-	< 0.5
Total PAH	1	mg/kg	-	-	< 1
2-Fluorobiphenyl (surr.)	1	%	-	-	98
p-Terphenyl-d14 (surr.)	1	%	-	-	100
Heavy Metals					
Arsenic	1	mg/kg	2.6	3.9	1.5
Cadmium	0.1	mg/kg	0.2	0.4	< 0.1
Chromium	2	mg/kg	9.1	12	32
Copper	2	mg/kg	17	28	24
Lead	2	mg/kg	4.9	140	3.9
Mercury	0.05	mg/kg	< 0.05	0.08	< 0.05
Nickel	1	mg/kg	9.8	3.2	60
Zinc	5	mg/kg	11	99	37
% Moisture	0.1	%	15	16	5.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: E004 Petroleum Hydrocarbons (TPH)	Sydney	Nov 04, 2011	14 Day
BTEX - Method: E029/E016 BTEX	Sydney	Nov 04, 2011	14 Day
Organochlorine Pesticides (OC) - Method: E013 Organochlorine Pesticides (OC)	Sydney	Nov 04, 2011	14 Day
Polyaromatic Hydrocarbons (PAH) - Method: E007 Polyaromatic Hydrocarbons (PAH)	Sydney	Nov 04, 2011	14 Day
Metals M8 - Method: E022 Acid Extractable metals in Soils, E026 Mercury	Sydney	Nov 04, 2011	28 Day
% Moisture - Method: E005 Moisture Content	Sydney	Nov 04, 2011	28 Day

mgt LabMark
ENVIRONMENTAL LABORATORIES
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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600

Company Name: Aargus Pty Ltd
Address: 446 Parramatta Road
Petersham
NSW 2049

Order No.:
Report #: 317053
Phone: 1300 137 038
Fax: 1300 136 038

Received: Nov 2, 2011 11:40 AM
Due: Nov 7, 2011 4:00 PM
Priority: 3 Day
Contact name: Mark Kelly

Client Job No.: HORNSBY PESA ES4661/1

mgt-LabMark Client Manager: Onur Mehmet

Sample Detail					% Moisture	Metals M8	Organochlorine Pesticides (OC)	mgt-LabMark Suite 7
Laboratory where analysis is conducted								
Melbourne Laboratory - NATA Site #1261								
Sydney Laboratory - NATA Site #1645					X	X	X	X
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
BH1 0.5	Oct 28, 2011		Soil	S11-No00268	X		X	X
BH2 0.3	Oct 28, 2011		Soil	S11-No00269	X		X	X
BH3 0.5	Oct 28, 2011		Soil	S11-No00270	X			X
BH3 3.0	Oct 28, 2011		Soil	S11-No00271	X			X
BH4 0.2	Oct 28, 2011		Soil	S11-No00272	X	X	X	
BH5 0.3	Oct 28, 2011		Soil	S11-No00273	X	X	X	
BH6 0.1	Oct 28, 2011		Soil	S11-No00274	X		X	X

mgt-LabMark Internal Quality Control Review

General

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

Holding Times

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

For samples received on the last day of holding time, notification of testing requirements should have been received at least

6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment

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

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

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

UNITS

mg/kg:milligrams per Kilogram

mg/L:milligrams per litre

µg/L:micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%:Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

TERMS

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

QC - ACCEPTANCE CRITERIA

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

Results <10 times the LOR : No Limit

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

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

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

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample>
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD - eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	mg/kg	< 10			10	Pass	
TRH C10-C14	mg/kg	< 50			50	Pass	
TRH C15-C28	mg/kg	< 100			100	Pass	
TRH C29-C36	mg/kg	< 100			100	Pass	
Method Blank							
BTEX E029/E016 BTEX							
Benzene	mg/kg	< 0.5			0.5	Pass	
Toluene	mg/kg	< 0.5			0.5	Pass	
Ethylbenzene	mg/kg	< 0.5			0.5	Pass	
Total m+p-Xylenes	mg/kg	< 1			1	Pass	
o-Xylene	mg/kg	< 0.5			0.5	Pass	
Xylenes(ortho.meta and para)	mg/kg	< 1.5			1.5	Pass	
Total BTEX	mg/kg	< 1.5			1.5	Pass	
Method Blank							
Organochlorine Pesticides (OC) E013 Organochlorine Pesticides (OC)							
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.2			0.2	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
a-Chlordane	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
g-Chlordane	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polyaromatic Hydrocarbons (PAH) E007 Polyaromatic Hydrocarbons (PAH)							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	< 1			1	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Metals M8 E022 Acid Extractable metals in Soils, E026 Mercury							
Arsenic	mg/kg	< 1			1	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Chromium	mg/kg	< 2			2	Pass	
Copper	mg/kg	< 2			2	Pass	
Lead	mg/kg	< 2			2	Pass	
Mercury	mg/kg	< 0.05			0.05	Pass	
Nickel	mg/kg	< 1			1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	%	100			70-130	Pass	
TRH C10-C14	%	84			70-130	Pass	
LCS - % Recovery							
BTEX E029/E016 BTEX							
Benzene	%	106			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	100			70-130	Pass	
Total m+p-Xylenes	%	97			70-130	Pass	
o-Xylene	%	95			70-130	Pass	
Xylenes(ortho.meta and para)	%	97			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides (OC) E013 Organochlorine Pesticides (OC)							
4.4'-DDD	%	97			70-130	Pass	
4.4'-DDE	%	81			70-130	Pass	
4.4'-DDT	%	79			70-130	Pass	
a-BHC	%	103			70-130	Pass	
a-Chlordane	%	97			70-130	Pass	
Aldrin	%	97			70-130	Pass	
b-BHC	%	104			70-130	Pass	
d-BHC	%	109			70-130	Pass	
Dieldrin	%	98			70-130	Pass	
Endosulfan I	%	97			70-130	Pass	
Endosulfan II	%	96			70-130	Pass	
Endosulfan sulphate	%	75			70-130	Pass	
Endrin	%	91			70-130	Pass	
Endrin aldehyde	%	95			70-130	Pass	
Endrin ketone	%	90			70-130	Pass	
g-BHC (Lindane)	%	98			70-130	Pass	
g-Chlordane	%	97			70-130	Pass	
Heptachlor	%	92			70-130	Pass	
Heptachlor epoxide	%	97			70-130	Pass	
Hexachlorobenzene	%	103			70-130	Pass	
Methoxychlor	%	96			70-130	Pass	
LCS - % Recovery							
Polyaromatic Hydrocarbons (PAH) E007 Polyaromatic Hydrocarbons (PAH)							
Acenaphthene	%	86			70-130	Pass	
Acenaphthylene	%	79			70-130	Pass	
Anthracene	%	91			70-130	Pass	
Benz(a)anthracene	%	73			70-130	Pass	
Benzo(a)pyrene	%	74			70-130	Pass	
Benzo(b)fluoranthene & Benzo(k)fluoranthene	%	79			70-130	Pass	
Benzo(g.h.i)perylene	%	74			70-130	Pass	
Chrysene	%	87			70-130	Pass	
Dibenz(a.h)anthracene	%	71			70-130	Pass	
Fluoranthene	%	81			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fluorene	%	81			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	71			70-130	Pass	
Naphthalene	%	90			70-130	Pass	
Phenanthrene	%	82			70-130	Pass	
Pyrene	%	84			70-130	Pass	
LCS - % Recovery							
Metals M8 E022 Acid Extractable metals in Soils, E026 Mercury							
Arsenic	%	105			70-130	Pass	
Cadmium	%	120			70-130	Pass	
Chromium	%	102			70-130	Pass	
Copper	%	110			70-130	Pass	
Lead	%	105			70-130	Pass	
Mercury	%	123			70-130	Pass	
Nickel	%	117			70-130	Pass	
Zinc	%	123			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Metals M8				Result 1					
Arsenic	S11-Oc17193	NCP	%	37			70-130	Fail	Q13
Cadmium	S11-Oc17193	NCP	%	106			70-130	Pass	
Chromium	S11-Oc17193	NCP	%	116			70-130	Pass	
Copper	S11-Oc17193	NCP	%	98			70-130	Pass	
Lead	S11-Oc17193	NCP	%	99			70-130	Pass	
Mercury	S11-No02136	NCP	%	101			70-130	Pass	
Nickel	S11-Oc17193	NCP	%	106			70-130	Pass	
Zinc	S11-Oc17193	NCP	%	113			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S11-No00271	CP	%	90			70-130	Pass	
Toluene	S11-No00271	CP	%	97			70-130	Pass	
Ethylbenzene	S11-No00271	CP	%	88			70-130	Pass	
Total m+p-Xylenes	S11-No00271	CP	%	87			70-130	Pass	
o-Xylene	S11-No00271	CP	%	89			70-130	Pass	
Xylenes(ortho.meta and para)	S11-No00271	CP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S	NCP	%	80			70-130	Pass	
TRH C10-C14	S11-No00274	CP	%	87			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides (OC)				Result 1					
4.4'-DDD	S11-No00274	CP	%	97			70-130	Pass	
4.4'-DDE	S11-No00274	CP	%	82			70-130	Pass	
4.4'-DDT	S11-No00274	CP	%	82			70-130	Pass	
a-BHC	S11-No00274	CP	%	104			70-130	Pass	
a-Chlordane	S11-No00274	CP	%	94			70-130	Pass	
Aldrin	S11-No00274	CP	%	95			70-130	Pass	
b-BHC	S11-No00274	CP	%	96			70-130	Pass	
d-BHC	S11-No00274	CP	%	108			70-130	Pass	
Dieldrin	S11-No00274	CP	%	97			70-130	Pass	
Endosulfan I	S11-No00274	CP	%	95			70-130	Pass	
Endosulfan II	S11-No00274	CP	%	95			70-130	Pass	
Endosulfan sulphate	S11-No00274	CP	%	71			70-130	Pass	
Endrin	S11-No00274	CP	%	92			70-130	Pass	
Endrin aldehyde	S11-No00274	CP	%	96			70-130	Pass	
Endrin ketone	S11-No00274	CP	%	90			70-130	Pass	
g-BHC (Lindane)	S11-No00274	CP	%	94			70-130	Pass	
g-Chlordane	S11-No00274	CP	%	94			70-130	Pass	
Heptachlor	S11-No00274	CP	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor epoxide	S11-No00274	CP	%	96			70-130	Pass	
Hexachlorobenzene	S11-No00274	CP	%	99			70-130	Pass	
Methoxychlor	S11-No00274	CP	%	97			70-130	Pass	
Spike - % Recovery									
Polyaromatic Hydrocarbons (PAH)				Result 1					
Acenaphthene	S11-No00274	CP	%	88			70-130	Pass	
Acenaphthylene	S11-No00274	CP	%	81			70-130	Pass	
Anthracene	S11-No00274	CP	%	89			70-130	Pass	
Benz(a)anthracene	S11-No00274	CP	%	83			70-130	Pass	
Benzo(a)pyrene	S11-No00274	CP	%	85			70-130	Pass	
Benzo(b)fluoranthene & Benzo(k)fluoranthene	S11-No00274	CP	%	84			70-130	Pass	
Benzo(g.h.i)perylene	S11-No00274	CP	%	74			70-130	Pass	
Chrysene	S11-No00274	CP	%	90			70-130	Pass	
Dibenz(a.h)anthracene	S11-No00274	CP	%	72			70-130	Pass	
Fluoranthene	S11-No00274	CP	%	85			70-130	Pass	
Fluorene	S11-No00274	CP	%	86			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S11-No00274	CP	%	71			70-130	Pass	
Naphthalene	S11-No00274	CP	%	89			70-130	Pass	
Phenanthrene	S11-No00274	CP	%	90			70-130	Pass	
Pyrene	S11-No00274	CP	%	88			70-130	Pass	
Duplicate									
Metals M8				Result 1	Result 2	RPD			
Arsenic	S11-Oc17192	NCP	mg/kg	1.6	1.7	10	30%	Pass	
Cadmium	S11-Oc17192	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Chromium	S11-Oc17192	NCP	mg/kg	7.5	6.7	11	30%	Pass	
Copper	S11-Oc17192	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Lead	S11-Oc17192	NCP	mg/kg	8.7	7.1	21	30%	Pass	
Mercury	S11-No02118	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Nickel	S11-Oc17192	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	S11-Oc17192	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S11-No00274	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C15-C28	S11-No00274	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH C29-C36	S11-No00274	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides (OC)				Result 1	Result 2	RPD			
4.4'-DDD	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S11-No00274	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
a-BHC	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-Chlordane	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-Chlordane	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S11-No00274	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S11-No00274	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Polyaromatic Hydrocarbons (PAH)				Result 1	Result 2	RPD			
Acenaphthene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b)fluoranthene & Benzo(k)fluoranthene	S11-No00274	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Benzo(g.h.i)perylene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S11-No00274	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q13	Some elements for this test have failed in the QC sample. However when at least 80% have passed the QC can be released. All other QC has passed in this test batch

Authorised By

Onur Mehmet	Client Services

NATA Signatories:

James Norford	Senior Analyst-Metal (NSW)
Laura Schofield	Senior Analyst-Volatile (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)

Dr. Bob Symons
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

Uncertainty data is available on request

mgt LabMark
ENVIRONMENTAL LABORATORIES

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3-5 Kingston Town Close
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Phone : +61 3 9564 7055
NATA # 1261 & 1645
Site # 1254 & 14271

Sydney
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16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 8215 6222
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600

Sample Receipt Advice

Company name: **Aargus Pty Ltd**

Contact name: Mark Kelly
Client job number: HORNSBY PESA ES4661/1
COC number: Not provided
Turn around time: 3 Day
Date/Time received: Nov 2, 2011 11:40 AM
MGT lab reference: **317053**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by mgt Sample Receipt : 23.50 Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Organic samples had Teflon liners.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Bob Symons on Phone : +61 2 8215 6222 or by e.mail: enviro.sydney@mgtlabmark.com.au

Results will be delivered electronically via e.mail to Mark Kelly - mark.kelly@aargus.net.

Note: A copy of these results will also be delivered to the general Aargus Pty Ltd email address.

mgt Labmark Sample Receipt

AARGUS PTY LTD

Laboratory Test Request / Chain of Custody Record

446 Parramatta Road
PETERSHAM NSW 2049

P O Box 398
DRUMMOYNE NSW 1470

Tel: 1300 137 038
Fax: 1300 136 038
email: admin@aargus.net

TO: MGT LABMARK
UNIT F3, BUILDING F
16 MARS ROAD
LANE COVE WEST NSW 2066

PH: 028215 6222 FAX: 02 9420 2977
ATTN:

Sampling Date: 28.10.11 Job No: ES4661/1
Sampled By: EW Project: PESA #317053
Project Manager: MK Location: Hornsby

Results required by: Thursday, 08 - 11 - 2011

Sampling details: Location	Depth (m)	Sample type: Soil	Water	Heavy Metals As, Cd, Cr, Cu, Pb, Hg, Ni and Zn	TPH/ BTEX	PAH	OCP						KEEP SAMPLE
N000268 BH1	0.5	DSG		✓	✓	✓	✓						Yes
69 BH2	0.3	DSG		✓	✓	✓	✓						Yes
70 BH3	0.5	DSG		✓	✓	✓							Yes
71 BH3	3.0	DSG		✓	✓	✓							Yes
72 BH4	0.2	DSG		✓			✓						Yes
73 BH5	0.3	DSG		✓			✓						Yes
74 BH6	0.1	DSG		✓	✓	✓	✓						Yes

Relinquished by: Name	Signature	Date	Received by: Name	Signature	Date
Emmanuel Woelders	EW	01.11.2011	Ellen WG		02/11/11 11:40

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	@ mole H^+/tonne
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	

23.5 2/11/11 11-40am

APPENDIX D

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL REPORT

IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL SITE ASSESSMENT

These notes have been prepared by Aargus (Australia) Pty Ltd and its associated companies using guidelines prepared by ASFE (The Association) of Engineering Firms Practising in the Geo-sciences. They are offered to help you in the interpretation of your Environmental Site Assessment (ESA) reports.

REASONS FOR CONDUCTING AN ESA

ESA's are typically, though not exclusively, carried out in the following circumstances:

- as pre-acquisition assessments, on behalf of either purchaser or vender, when a property is to be sold;
- as pre-development assessments, when a property or area of land is to be redeveloped or have its use changed for example, from a factory to a residential subdivision;
- as pre-development assessments of greenfield sites, to establish "baseline" conditions and assess environmental, geological and hydrological constraints to the development of, for example, a landfill; and
- as audits of the environmental effects of an ongoing operation.

Each of these circumstances requires a specific approach to the assessment of soil and groundwater contamination. In all cases however, the objective is to identify and if possible quantify the risks that unrecognised **c**ontamination poses to the proposed activity. Such risks may be both financial, for example, cleanup costs or limitations on site use, and physical, for example, health risks to site users or the public.

THE LIMITATIONS OF AN ESA

Although the information provided by an ESA could reduce exposure to such risks, no ESA, however, diligently carried out can eliminate them. Even a rigorous professional assessment may fail to detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled.

AN ESA REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

Your environmental report should not be used:

- when the nature of the proposed development is changed, for example, if a residential development is proposed instead of a commercial one;
- when the size or configuration of the proposed development is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership
- or for application to an adjacent site.

To help avoid costly problems, refer to your consultant to determine how any factors, which have changed subsequent to the date of the report, may affect its recommendations.

ESA "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to help minimise its impact. For this reason owners should retain the services of their consultants

through the development stage, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Natural processes and the activity of man change subsurface conditions. As an ESA report is based on conditions, which existed at the time of subsurface exploration, decisions should not be based on an ESA report whose adequacy may have been affected by time. Speak with the consultant to learn if additional tests are advisable.

ESA SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Every study and ESA report is prepared in response to a specific brief to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Other persons should not use a report for any purpose, or by the client for a different purpose. No individual other than the client should apply a report even apparently for its intended purpose without first conferring with the consultant. No person should apply a report for any purpose other than that originally contemplated without first conferring with the consultant.

AN ESA REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when design professionals develop their plans based on misinterpretations of an ESA. To help avoid these problems, the environmental consultant should be retained to work with appropriate design professionals to explain relevant findings and to review the adequacy of their plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final borehole or test pit logs are developed by environmental scientists, engineers or geologists based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final logs customarily included in our reports. These logs should not under any circumstances be redrawn for inclusion in site remediation or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimise the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To reduce the likelihood of boring log misinterpretation, the complete report must be available to persons or organisations involved in the project, such as contractors, for their use. Those who o not provide such access may proceed under the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing all the available information to persons and organisations such as contractors helps prevent costly construction problems and the adversarial attitudes that may aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because an ESA is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in transmittals. These are not exculpatory clauses designed to foist liabilities onto some other party. Rather, they are definitive clauses that identify where your consultant's responsibilities begin and end. Their use helps all parties involved recognise their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your ESA report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

APPENDIX E

PROJECT TEAM

EMMANUEL WOELDERS

DATE OF BIRTH:	10/04/1986
EDUCACATION:	**2010**: RABSQA Environmental Auditor Certification - Provisional Auditor Grade, University of New South Wales. **2009** - Current: Masters in Environmental Science and Technology - Specialising in Environmental Mgt and Pollution Control, University of New South Wales. **2009**: Senior First Aid Certificate **2004** - 2008: Bachelor of Environmental Science**,** Australian Catholic University - North Sydney.
FIELDS OF SPECIAL COMPETENCY:	**-**Physical, chemical and biological testing **-**Researching Skills -Environmental Management Plans (EMP). -RABQSA Certified environmental auditor. -Environmental legislation.
EXPERIENCE:	
October 2010 to current	**Aargus Pty Ltd** Environmental Scientist & Geotechnician Description: Conduct of field testing, laboratory analysis and report writing in the environmental area.
July 2009 - November 2009	**PJP Consultants** Environmental Consultant
December 2007	**Hornsby Shire Council**, Water Catchments Team Water Quality Analyst
March 2009 - May 2009	**Combined Force Pty Ltd** **C**ontractor/ Consultant/ Office All-rounder. Description**:** An Environmental Company aiming to reduce greenhouse gas emissions through environmental synergies.

PROJECT EXPERIENCE

Environmental Science

VENM Soil Classification – Sydney Area. The classifications included liaising with site personnel/ contractors, visual site inspections, reviewing relevant geological information, assessing surrounding area for potential contamination. The classification of material was assessed with reference to *"Waste Classification Guidelines, Part 1: Classifying Waste"* NSW DECC (2008).

Soil Classification – Various projects across the Sydney area. The classifications included liaising with site personnel/ contractors, visual site inspections, sampling where applicable (including QA/QC), interpretation of results and assessment against relevant guidelines and reporting. The classification of material was assessed with reference to NSW EPA (1999) – *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes;* NSW DECC (2006, 2nd Edition) *Guidelines for the NSW Site Auditor Scheme* where suitability of fill was required for a particular land use.

Water Sampling, Hornsby Shire Council, NSW – Water sampled from streams and rivers in the Hornsby Shire Council water catchment area was analysed for heavy metals and other contaminants, which may have adversely affected biota.

Groundwater Purging –Engadine and Banksmeadow. Fieldwork included sampling through purging of contaminated groundwater wells.

Historical Review – Title Search information – Included researching and collecting historical and cancelled land titles through computer and manual searches from the Department of Lands.

Various Environmental Report Preparation and Writing for Phase I and Phase II Environmental Assessment for various projects in the Sydney Area. Duties included historical searches, analysing aerial photographs, preparation of borehole logs, and analysis of results.

Geotechnical

Soil Compaction Testing – various projects in the Sydney Area. Testing was performed in accordance with AS1289 5.1.1 (standard), AS1289 5.2.1 (modified) and RTA T162 standards.

Soil Grading Testing – various projects in the Sydney Area. Testing was performed in accordance with AS1289 1.2.1, RTA 102 and 103 standards.

Field Density Testing – various projects in the Sydney Area. Testing was performed in accordance with AS 1289 3.8.1.

M A R K K E L L Y

DATE OF BIRTH	25th October 1975
EDUCATIONAL QUALIFICATIONS	BAppSc (Geology) (Hons) University of New South Wales, Sydney, Australia Majoring in Soil and Groundwater Resources and Remediation
ADDITIONAL COURSES	Groundwater Hydrology Hydrogeochemistry Analysis and Interpretation of Hydrogeochemical Data Physical Aspects of Contaminated Groundwater Interpretation of Aeromagnetics Structural Interpretation and Analysis
PROFESSIONAL MEMBERSHIP	Geological Society of Australia (GSA)
PROFESSIONAL LICENCES	Senior First Aid Certificate (2006) X-ray Fluorescence (XRF) Metal Detector Operation License (EPA License No 24430) Energy Australia Passport (Service No. 7728)
PROFESSIONAL TRAINING	Asbestos Removal Course (TAFE NSW) XRF Training Course Energy Australia inductions, electrical safety rules, environmental training, safety training, first aid training, CPR training, low voltage release and rescue training and courses, substation entry & safely working near live power cables in EA network courses
FIELDS OF SPECIAL COMPETENCY	**Contaminated Land Assessment and Site Remediation –** management, technical advice, planning, data evaluation, coordinating and supervision of environmental/contaminated site assessments including preliminary and detailed assessments, contaminated site remediation and validation with particular reference to soil, water and groundwater. Acid sulphate soils, salinity and hazardous materials assessments.

EXPERIENCE:

2007 – Present	Senior Environmental Geologist – Aargus Pty Ltd
2006 - 2007	Senior Environmental Geologist – Geotechnique Pty Ltd
1999 – 2006	Environmental Geologist – Geotechnique Pty Ltd

PRACTICAL EXPERIENCE (Office)

- Project management, scheduling laboratory chemical analysis, data evaluation and reporting on environmental/contaminated site investigations including preliminary, detailed assessments, remediation and validation
- Preparation of waste classification, including biosolids from sewage treatment plants
- Salinity Assessments
- Preparation of proposals
- Occupational Health & Safety Issues
- Environmental Management Plans
- Coordinating and corresponding with Principal/Senior Environmental Engineers, Environmental Engineers, field staff, management, clients and contractors
- Liaising and negotiating with relevant government departments, statutory authorities
- Basic Turbocad skills

PRACTICAL EXPERIENCE (Field)

- Site inspections
- Soil and water sampling
- Installation of groundwater monitoring wells
- Assessing the contamination status of land/water
- Site remediation and validation
- Site management including remediation, asbestos removal
- PID calibration and use
- Hazardous material assessment
- Salinity indicators
- Service station works including underground storage tank removal
- Gas monitoring

SITES

Investigations have been carried out on a number of sites across the Sydney Metropolitan area, the greater Sydney area, rural NSW and interstate. The types of sites assessed include:

- Rural residential properties including active and former agricultural (market gardens, orchards, nursery, poultry) lands, farming lands, vacant lands etc
- Residential Properties including residential, townhouse and units
- Commercial / Industrial including activities such as tanneries, printing, tyre storage and manufacture, paint storage and manufacture, metal works, foundries, wheat processing and storage, scrap metal yards, metal recyclers etc

- Service Station Sites including small scale operations to larger sites operated by BP, Caltex etc.
- Schools including pre-development, re-development, refurbishing, hazardous materials assessment.
- Childcare Facilities
- Energy Australia facilities including active sites and decommissioning of sites.
- Sewage Treatment Plants including the assessment of biosolids, installation works and initialization of site management plans and inspections.

PROJECT EXPERTISE

Air Quality Monitoring – Levels of volatile gases were monitored to determine Occupational Health and Safety (OH&S) compliance within an enclosed work environment.

Acid Sulphate Soil Assessment – Development areas within potential Acid Sulphate Soil regions were assessed to determine the presence, absence or extent of Acid Sulphate Soils. Duties included site surveys, soil sampling, chemical testing of soils, preparation of borehole logs, liaising with clients and regulatory authorities and report generation.

Asbestos Monitoring – Dust emissions from the demolition of a building and excavation of soil with known asbestos contamination were monitored in order to measure effects on the neighbouring properties. Duties included the use of technical equipment, liaising with site personnel, analysis of data and report generation.

Asbestos Removal – Work involved monitoring the removal and delineating the extent of contamination of bonded asbestos waste from an excavation site.

Buried Chicken Carcass Removal – Work involved monitoring the removal and delineating the extent of buried of chicken carcasses within an existing poultry farm.

Classification of Excavation Material, NSW – Involvement in classifying excavated material from development sites for removal to an appropriate landfill or assessing suitability for use within a proposed development. Duties included liaising with site personnel / contractors, soil sampling and descriptions, QA/QC and report generation.

Dilapidation Assessment –The assessment entailed a site visit and a written and photographic documentation of all structural cracks on walls, ceilings, pavements, grates and road surfaces in the vicinity of the site. The purpose is to establish the pre-existing condition of the buildings so that any claim made for defects that occur during or after construction can be validated. Duties included liaising with site personnel / contractors, site inspection and report generation.

Due Diligence Reports – Carried out in relation to property acquisition and due diligence. Duties varied from report reviews, comments, costing, desktop studies, sampling and assessment, and reporting.

Dust Monitoring – Dust emissions from construction sites were collected over a period of time in order to assess the specific amount of particulate matter escaping the construction area onto neighbouring properties.

Effluent Disposal – Work was undertaken to assess the suitability of soil material for the construction of an effluent treatment and disposal system. Duties included soil sampling, preparation of borehole logs, calculation of permeability and flow rates and report generation.

Environmental Management Plans – Preparation of how the earthworks program are to be undertaken during the development works, the environmental procedures to be followed during operation and includes an Occupation Health & Safety (OH&S) plan.

Ground Water Well Monitoring – Work involved instructing contractors on where to drill monitoring wells, construction and interpretation of survey data of the wells, measurements of groundwater levels, measurement of the rate of groundwater infiltration, sampling of groundwater, QA/QC, determining groundwater flow direction and report generation

Hazardous Materials Assessment – Structures proposed for demolition were surveyed for hazardous material such as asbestos, lead and other substances known to be harmful to human health and the environment. Duties included liaising with contractors and regulatory authorities, identification of hazardous materials, sampling of potential hazardous materials and report generation.

Lead Assessment – Buildings were surveyed for lead paint, dust and soils and assessed to determine if they were harmful to human health and the environment. Duties included liaising with government, regulatory authorities, identification of lead based materials, sampling of these materials and report generation.

Phase 1 Environmental Site Assessments (desktop) – Duties included historical searches, analysing aerial photographs, liaising with authorities (WorkCover, Council's, EPA etc), identification of potential contaminants and report generation.

Phase 2 Environmental Site Assessments – Duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

Remedial Action Plans – Options for the remediation of known contaminated sites were prepared in order to determine the most efficient methods of remediation. Duties included reviewing of previous environmental assessments, data analysis, design and costing of potential remedial options.

Remediation Validation – The collection of data to assess the efficacy of remediation works in decontaminating sites. Duties included liaising with clients, contractors and regulatory authorities, field sampling, QA/QC, data analysis and report generation.

Salinity Assessments – Duties included historical searches, analysing aerial photographs, liaising with authorities, identification of potential contaminants, sampling and analysis design, soil sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

Sampling and Testing Plans – Preparation of sampling location, sampling density and testing program for ESA's and RemVal's that are sent to the Site Auditor for approval.

Site Audit Responses – replying to comments made by NSW Site Auditors on selected jobs to meet final requirements for a full clearance of a site after remedial works have taken place.

Site Based Management Plans – includes detailed management practices, and procedures for all identified environmental issues for every environmentally relevant activity (ERA) within the site. The plans provide the environmental procedures to be followed during operation and are to safeguard the way in which waste is managed.

Soil Vapour Survey – Soil vapours originating from beneath an apartment block development containing known contamination were monitored to assess the affects on human health. Duties included operation of technical equipment, sampling of soil vapours, QA/QC, analysis of data and report generation.

Targeted Environmental Site Assessments – Duties included historical searches, analysing aerial photographs, liaising with authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

Underground Storage Tank Removal – Removal of underground storage tanks in order to satisfy regulatory requirements for the redevelopment of sites. Duties included historical searches, liaising with contractors and regulatory authorities, sampling and analysis design, soil and groundwater sampling, decontamination, QA/QC, data analysis and report generation.

MAJOR PROJECTS

- Auburn Hospital - Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

- Australian Defence Industries site, St Marys – Former defence force lands. An extensive sampling program was managed and the results of soil analysis were reviewed with respect to human heath risk and potential ecological impact. Reports endorsed by accredited site auditor.

- Auburn Catholic Club - Sampling and soil classification of soils, followed by onsite management of the disposal of the soils to licensed landfills.

- Barter & Sons - Former poultry farm, scheduled for industrial / commercial development. Responsible for cost estimating, project management and co-

ordination of site investigation works. Included a review of available site history, and contamination assessment of soils, targeting heavy metals, pesticides and asbestos. Remediation recommended landfill disposal (industrial and solid waste category).

- Brown Consulting (NSW) Group - Newbury Estate, Stanhope Gardens - Former market garden and grazing site developed for low density residential purposes. Responsible for cost estimating, project management and co-ordination of site investigation works, remediation and validation. Included review of site history information, contamination assessment of soils waters and sediment. Remediation recommendations included Landfill disposal and land farming. Reported on site investigations, remediation options (Remediation Action Plan), and validation. Reports endorsed by accredited site auditor.

- Columban Mission Institute, North Turramurra - Duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

- Cronulla Sewage Treatment Plant – Classification of biosolids for disposal off site to other land uses or to landfills.

- Deicorp Pty Ltd – Coulson Street, Erskineville – Former clothing factory and workshops with a UST to be redeveloped into a number of multi-storey residential apartment blocks. The collection of data to assess the efficacy of remediation works in decontaminating the site. Duties included liaising with clients, contractors and regulatory authorities, field sampling, QA/QC, data analysis and report generation. Reports endorsed by accredited site auditor.

- Department of Commerce – Assessment of a number of Department of Housing sites for potential hazardous materials within active housing commission units.

- Department of Housing – Lilyfield - Development of a residential area. Duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

- Department of Lands – Redfern - Development of a major residential area. Duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

- Duffy Kennedy Constructions – Cronulla – A former service station site. Sampling and soil classification of soils, followed by onsite management of the disposal of the soils to licensed landfills.

- EG Property Group / Funds Management –Port Adelaide, SA, Summer Hill and Five Dock, NSW –Active transport company, wheat production plant and silos, former bowling greens, former railway lines, land filling activities, land reclamation. Reports for due diligence and full environmental site assessments, duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil and groundwater sampling, preparation of borehole logs, decontamination, QA/QC and report generation.

- Energy Australia Substations - Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

- Event Project Management - Bundaleer Street, Belrose – An active nursery to be redeveloped as part of extension works to the Covenant Christian School. A Phase 1 and Phase 2 contaminated land investigation with recommendations for remediation techniques and costs.

- Exceland Property Group (NSW) Pty Ltd – The Castellorizian Club at Kingsford. Duties included historical searches, analysing aerial photographs, liaising with authorities (WorkCover, Council's, EPA etc), identification of potential contaminants and report generation.

- Glasson Family Group – Wolli Creek – A large development site comprising a number of industrial properties including factories, warehouses, car yards etc. Conducting sampling and reporting on ASS/PASS and potential management techniques during future development.

- Glenbrook Sewer Installation - Environmental Representative for sewer installation contracts in Glenbrook. Responsible for the preparation of Environmental Management Plans (EMP) and work method statements. Monitored the works undertaken by the contractor, ensuring adequate environmental safeguards are in place and maintained. Prepared inspection reports and EMP status reports for Sydney Water.

- Granville Boys High School – assessment of soils and supervision of remedial works within an existing playing field. Remedial works included removal of soils contaminated with asbestos to an EPA licensed landfill.

- Group Development Services – Carrying out full assessments, from Stage 1 to Stage 4, on numerous rural residential sites in north western Sydney.

- International Speedway, Granville – Assessment of an existing spectator mound for asbestos and other soils analytes and recommendations for capping on-site.

- IWD Pty Ltd - Lyons Road, Drummoyne – A former service station with numerous UST's. The assessment included tank and line tests, gross pollution review, soil

sampling, groundwater sampling, historical review and final data interpretation. Remediation of contaminated soils after the tanks were removed, soil classification and final validating of site surfaces. Reports endorsed by accredited site auditor.

- JK Williams Contracting Pty Ltd - Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

- John Morony Correctional Complex, Berkshire Park – assessment of soils and preparation of remedial costs prior to extension works to the existing prison.

- Landcom - Archbold Road, Eastern Creek and McIver Avenue, Middleton Grange – Former farming lands purchased by Landcom for residential subdivision, school developments, parklands and town centre (shopping facilities etc). Responsible for cost estimating, project management and co-ordination of site investigation works. Preparation of a preliminary RAP and recommendations in remediation techniques and costs.

- Liverpool City Council – Former park lands. Duties included historical searches, analysing aerial photographs, liaising with authorities (WorkCover, Council's, EPA etc), identification of potential contaminants and report generation.

- Mann Group - Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

- Manson Group – Kogarah – Former glass factory with an UST. Preparation of a Remedial Action Plan (RAP), followed by remediation and validation of the site including project management, liaising with contractors and clients, sampling, soil classification and assessment, and final report generation.

- Narwee Boys High School – Preparation of a hazardous materials (HAZMAT) assessment. Analysis involved identifying asbestos materials from lagging, roofing guttering, floor tiles, electricity backing boards, mercury switches, mercury/cadmium lamps, synthetic mineral fibres, lead paint etc.

- Parramatta City Council - Sampling and soil classification of soils, followed by onsite management of the disposal of the soils to licensed landfills.

- Paynter Dixon Constructions Pty Ltd – Homebush – Teachers Credit Union site. Duties included historical searches, analysing aerial photographs, liaising with authorities (WorkCover, Council's, EPA etc), identification of potential contaminants and report generation.

- Penrith City Council - Claremont Meadows Stage 2 – South Western Precinct – Masterplan. Full environmental and salinity assessments were carried out to address the Claremont Meadows Stage 2 DCP - Performance Standards for which is currently under consideration by the Council for the Stage 1 Subdivision Plan of the properties provides for creation of residential allotments, dedication of a Public

Reserve, construction and dedication of new roads and creation of residue lots for future development.

- Proust & Gardner Consulting - Carrying out full assessments, from Stage 1 to Stage 4, on numerous rural residential and residential sites in both the local Sydney and Central Coast regions. Sites included vacant lands, farming lands, market gardens, poultry farms, residential properties and schools.

- Reefway Waste Services – Alexandria and Auburn – Active waste receivers and recyclers. Management of soil quality by analysing soils for reuse. Discussion with DECC on providing a 'gateway' mechanism for removing bona fide resource recovery from the waste regulatory framework.

- Richard Crookes Constructions Pty Ltd – Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

- Robert Moore & Asscoiates - Carrying out full assessments, from Stage 1 to Stage 4, on numerous rural residential and residential sites across Sydney. Sites included vacant lands, farming lands, market gardens and residential properties.

- Royal Botanical Gardens, Sydney – Former works depot. Managing removal of UST's and associated pipelines, sampling and soil classification of soils to an EPA inert and solid waste licensed landfill.

- Sam the Paving Man - Sampling and soil classification of soils, followed by onsite management of the disposal of the soils to licensed landfills.

- Stocklands Mall, Merrylands - Former carpark area. Sampling and soil classification of soils, followed by onsite management of the disposal of the soils to licensed landfills.

- SPAD Pty Ltd – Former chemical factory. Report for full environmental site assessment, duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil sampling, preparation of borehole logs, decontamination, QA/QC and report generation. Preparation of a RAP, managing remedial works and issuing final validation report.

- Sydney Airport Corporation – Soil classification and leachate management for an EPA solid licensed landfill.

- Telstra Depot, Rooty Hill - Report for full environmental site assessment, duties included desktop study, liaising with clients, contractors and regulatory authorities, identification of potential contaminants, sampling and analysis design, soil sampling, preparation of borehole logs, decontamination, QA/QC and report

generation. Preparation of a RAP, managing remedial works and issuing final validation report.

- THG Resource – Kingston, QLD –Active scraps metal and car recycler. Duties included detailing management practices, outlining procedures for all identified environmental issues and providing a plan during operation to safeguard the way in which waste is managed.

- University of Sydney - Various soil classifications and leachate management for an EPA inert and solid licensed landfill.

APPENDIX F

AARGUS FIELDWORK PROTOCOLS

Sampling Quality & Fieldwork Assurance Protocols

January 2011

Aargus AUSTRALIA

TABLE OF CONTENTS

LIST OF TABLES

FIGURES

1.0 OBJECTIVE AND SCOPE

The objective of Aargus Pty Ltd, Aargus Engineering Pty Ltd and Aargus Laboratories Pty Ltd (Aargus) Protocols is to ensure that the methodology followed during fieldworks is adequate to provide data which is usable and representative of the conditions actually encountered at the site.

The scope of these protocols is to:

- Outline the methods and procedures for the field investigations during an engineering, laboratory or environmental assessment or remediation and validation program; and
- Specify methods and procedures which ensure that soil and groundwater samples recovered are representative of the actual subsurface conditions at the site, as well as ensuring that the risk of introducing external contamination to samples and to the environment is minimised.

These protocols must be adhered to by Aargus personnel and by sub-contractors involved in field investigations. Any deviations from these protocols should be explained within the Aargus Report to which they are attached.

2.0 SOIL SAMPLING

2.1 Collection methods

Possible collection methods

Soil samples are generally collected by drilling or excavating the subsurface, using one of the following drilling / excavating technique:

- Rotary air hammer
- Hand auger, trowel or manual handling (shovel)
- Solid or hollow auger
- Backhoe or Excavator

Rotary Air Hammer

The air hammer technique requires the use of synthetic blend lubricants to prevent potential contamination of the borehole if a leak were to occur. In addition, micro-filters

are installed into the drilling airline to avoid contamination by hydrocarbons present in the compressed air.

Samples of rock are generally not collected. Where rock samples are needed, specialised techniques are used.

Hand auger, trowel or manual

A hand auger or trowel is generally used to investigate subsurface conditions of unconsolidated materials at shallow depths or in areas difficult to access with other equipment. Samples are recovered from the hand auger, taking care to avoid cross contamination, especially between samples from the same hole but at different depths. Sampling equipment is to be thoroughly cleaned between sampling events, in accordance with the procedures outlined in Section 2.5 Equipment decontamination. In the case of laboratory sampling, a pick and shovel can be used to gather adequate sample size as cross contamination is not considered an issue.

Solid or Hollow auger

Solid and hollow auger drilling techniques are well suited to unconsolidated materials. The main advantage of the hollow auger technique is that the drill rods allow access of sampling equipment at specified depths within the annulus of the drill rods.

Samples of soil are recovered using a split spoon sampler at specific depth intervals. The split spoon sampler is driven into the soil by the drill rig whilst attached to the end of the drill rods. The retrieved sample is then split lengthways into two halves when duplicate samples are required. A few centimetres of soil from the top of the split spoon sampler is discarded. Samples for volatile analysis are collected first, without mixing.

Test pits and trenches excavated with a backhoe or an excavator

Test Pit and Trenches excavated with a backhoe/excavator are used to collect relatively shallow (i.e. less than 3.5m depth) soil samples on occasions where:

- Access multiple sample locations at a site are needed;
- A description of the subsurface soil profile to approximately 3.5 m depth is required (generally in unsaturated conditions);
- The investigated site is free from known underground services and access problems;
- The investigated site is free from impenetrable surface or near surface layers including concrete and asphalt pavements; and

- Undisturbed soil samples are required, usually at multiple depths.

Backfilling

On completion of drilling / test pitting, the investigated locations are backfilled with cuttings and compacted. Excess drill cuttings are disposed of appropriately. If the sampling location is located in an area used for the circulation of people or vehicles, the top of the sampling location should be sealed with mortar.

2.2 Soil logging

The lithological logging of soil samples and subsurface conditions is undertaken by Aargus personnel. The soil characteristics are logged in accordance with the Australian Standard *AS1726-1993 Geotechnical Site Investigations.* This includes description of grain size, visible staining, odour and colour, and of the clues which may suggest that the soil may be contaminated. Descriptions of soils are made using the Northcote method.

2.3 Collecting soil samples

The soil sample is collected using a stainless steel trowel, or directly with the hand if the sampler wears disposable gloves. Soils are quickly transferred into 250g clean amber glass jars, which have been acid washed and solvent rinsed. The jars are sealed with a screw-on teflon lined plastic lid, labelled, and placed for storage in an ice filled chest. Alternatively for engineering and laboratory sampling, 20kg plastic bulk bags are used and appropriately labelled.

2.4 Labelling of soil samples

Samples are labelled with the following information:

- Job number;
- Date of sample collection;
- Name of the Aargus professional who collected the sample; and
- Sample number: the letters used to label the samples are BH, C, SS, SP, TP and V which refer respectively to borehole samples, composite samples, surface samples, stockpile samples, test pit samples and validation samples. For borehole samples, BH3.1.0 is the sample taken from borehole 3 at 1.0m below ground level. For stockpile samples, SP1/1 is the first sample from stockpile 1. TP1.2.5 is the sample taken from testpit 1 at a depth of 2.5 metres below ground level. V3/F is the validation sample taken from location V3, the letters F N, S, E

and W refer to the floor, north, south, east and west walls of an excavation; if some contamination is found in the validation sample, then chasing out of the contamination is required and in this case, the label of the sample is changed by adding /1 or /2 according to the number of times the contamination has been chased out. B stands for blind and could be B1, B2 etc dependant on how many blind samples were taken.

2.5 Equipment decontamination

The drilling and sampling equipment are cleaned using an appropriate surfactant (e.g. phosphate-free detergent or Decon 90), then rinsed with tap water prior to final rinsing with distilled water.

The following procedures shall be followed for decontamination of drilling and sampling equipment where required:

- buckets or tubs used for decontamination shall be cleaned with tap water and detergent and rinsed with tap water before sampling commences;
- fill first bucket or tub with tap water, and phosphate free detergent;
- fill second bucket or tub with tap water;
- clean equipment thoroughly in detergent water, using a stiff brush; rinse equipment in tap water;
- dry equipment with disposable towels;
- rinse equipment by thoroughly spraying with tap water, then final rinse with distilled water;
- allow equipment to dry; and
- change water and detergent solution between sampling event where required or when water is dirty.

Sampling decontaminated equipment should be kept in a clean area to prevent cross-contamination. Equipment that cannot be thoroughly decontaminated using the detergent wash and water rinse should be cleaned with steam or high pressure water or if a cleaner is not available, not used for further sampling (and labelled clearly "not decontaminated") or discarded. Equipment decontaminated using the high pressure steam cleaner will be treated as described above. Any equipment that cannot be thoroughly decontaminated shall be discarded and replaced.

A new pair of latex gloves is used to handle each sample. Contaminated materials such as disposable clothing should be disposed of in accordance with environmental best practice.

2.6 Surveying of sampling locations

Sampling locations are generally located by reference to existing ground features, e.g. fences, buildings.

If the survey for location and elevation is required, it should be done by a licensed surveyor, or alternatively by an Aargus environmental engineer / scientist if the level of precision required can be obtained by the use of Aargus field equipment. Aargus has GPS equipment and level meters.

If the location is given by a licensed surveyor, it is generally given to the nearest 0.1m and referenced to the Australian Map Grid (AMG) coordinates.

3.0 GROUNDWATER SAMPLING

3.1 Groundwater Sampling Objectives

The primary objective of any groundwater (quality) sampling is to produce groundwater samples that are representative of groundwater in the aquifer and will remain representative until analytical determination or measurements are made.

3.2 Groundwater well construction

Typically wells are installed to gain access to the groundwater to be sampled. Well construction details will depend on hydrogeological setting of the site, for example the depth to groundwater strata present. Relevant information regarding the hydrogeological setting will have been obtained prior the development of any groundwater sampling program.

The preferred drilling methods will depend on the hydrogeological setting of the site and the objectives of the groundwater sampling program. For example, shallow wells in unconsolidated materials, such as sand, may be drilled using a hand auger. Drill rigs using solid of hollow flight augers may be used to drill deeper wells or through semi consolidated materials, such as stiff clay. Rotary air hammer drilling may be used were well is to be drilled through consolidated materials, such as rock. Soil samples may also be collected during drilling (see Section 2.0 SOIL SAMPLING).

Drilling methods and materials must not have an unacceptable impact on the groundwater to be sampled. For example, if groundwater from the wells is to be tested for organic analytes, petroleum based lubricants are not to be used and oil traps must be installed on compressed air lines. Drilling techniques should also minimise compaction or smearing of the boreholes wells and transport of material into different zones, in particular, when drilling through potentially contaminated material to access groundwater.

Drill cuttings accumulated over a hole are to be removed as drilling progresses so as to prevent fallback of cuttings into the hole. Samples may be collected at a range of depths in the borehole profile during drilling.

The depth of groundwater well depends of the purpose of the investigation on the soil profile and the regional geology of the area. If the borehole location is covered by concrete, coring of the superficial hard layer is undertaken first.

Petroleum based lubricants are not used on drilling and sampling equipment, instead, Teflon based greases are used where appropriate. An Aargus professional monitors and records drilling activities, procedures adopted, materials used, progress of the stages of well construction, screen location, standpipe lens, placement, of sand filters and well seals, and general completion details, as well as the lithology of the subsurface, visible staining, unusual odours and colours (if any).

The use of a rotary air hammer rig has many advantages for consolidated material (e.g. rock), including:

- Large diameter to allow precise placement of groundwater monitoring equipment;
- No injection of drilling fluids into the formation with resulting benefits in ensuring integrity of recovered samples, and therefore no need to dispose off-site drilling fluids;
- Rapid penetration in consolidated material; and
- Provision of reliable indications of saturated conditions whilst drilling.

Drill cuttings accumulated over a hole are removed as drilling progresses so as to prevent fallback of cuttings into the hole. Samples are taken at a range of depths in the borehole profile.

Construction of the monitoring well may be carried out by the Aargus professional or the drilling contractor under the direct supervision of the Aargus environmental

scientist/engineer. Typically on completion of drilling, slotted heavy duty PVC pipe (generally 50mm in diameter for the installation of monitoring well) is inserted into the drilled hole. The base of the pipe is capped prior to insertion in order to prevent natural soils entering the well from below. The drilled area surrounding the pipe screen is filled with coarse-grained sand. Bentonite or cement grout seal plugs may be placed above the screen depending on the hydrogeological setting of the site and sand cement mix. Excess drill cuttings are disposed of in accordance with environmental best practice.

The Aargus professional will monitor and record drilling activities, and materials encountered during drilling (including visible staining, unusual odours and colours (if any)). They will log the procedures adopted, materials used, and well construction (i.e. location of the screen, placement of sand packs and well seals and general completion details).

3.3 Development of monitoring wells

Development is the process of removing fine sand silt and clay from the aquifer around the well screen in order to maximise the hydraulic connection between the bore and the formation.

Development involves removal of fluids that may have been introduced during drilling operations as well as fines from the sand filter and screens. Well development generally involves actively agitating the water column in the well then pumping water out until, ideally, water pumped comes out visibly clean and of constant quality. Development can be undertaken immediately after installation of the groundwater well or after sufficient time has been allowed for bentonite / grout seals to consolidate.

Bores used for groundwater quality monitoring should be developed after drilling, then left for a period until bore chemistry can be demonstrated to have stabilised, any where between 24 hours and 7 days.

3.4 Purging of monitoring well

In most groundwater monitoring wells, there is a column of stagnant water above the screen that remains standing in the bore between sampling rounds. Stagnant water is generally not representative of formation water because it is in contact with bore construction materials for extended periods, is in direct contact with the atmosphere and is subject to different chemical equilibria.

Purging is the process of removing this water from the well prior to sampling. In newly installed wells, the disturbance cause by drilling may also affect water present in the

well, and purging may be carried out concurrently with well development. Ideally wells should be purged at the lowest rate practicable until stable water chemistry is achieved.

Purging is to be performed less than 24 hours before sample collection, but usually it is performed just before sampling. The default procedure for purging a groundwater monitoring well is as follows:

- If required, measure the concentration of volatile organic vapours in the well standpipe headspace.
- Measure the depth to the standing water level in the well standpipe and the total depth of the well relative to a reference mark (generally the top of the groundwater pipe). The depth of any light non-aqueous phase liquids (LNAPL) floating on the standing water should be recorded if present using an interface probe or other suitable device.
- Calculate the volume of the groundwater in the well standpipe. The internal diameter of the well casing and the diameter of the drill hole are used to calculate the volume of water to be removed during development (nominally a minimum of three well volumes, including water present in the sand pack, should be abstracted during purging).
- Samples of water are collected generally following development/purging of each well volume. The samples are measured immediately in the field for water quality parameters, pH, electrical conductivity, redox potential and temperature. Water quality measurement probes are to be calibrated against stock standards on regular basis and decontaminated between wells.
- Pump/bail groundwater from the well until the water quality parameters have stabilised (i.e. within 10% of the previous reading) or the well is pumped/bailed dry. Collect all purged water into an appropriate volume measurement vessel. Purged water is disposed of appropriately.
- Record all appropriate development details on the well development and sampling sheet.
- Decontaminate all equipment used in the purging procedure.

3.5 Groundwater sampling

For each sampling event, starting water levels, purging times and volumes, water quality parameters and sample details are recorded on well development and sampling sheets.

At each groundwater monitoring well, a polyethylene sheet or Eski lid is placed beside the well head and firmly fixed into position. Sampling equipment is placed onto the sheet to avoid cross contamination between the ground surface and the groundwater in the well.

Groundwater samples are collected in a bailer (Stainless Steel or disposable polymer) fitted with an emptying device. The bailer is decontaminated prior to use. All groundwater samples are retrieved at an appropriate rate in order for turbulence (which leads to cloudy samples) to be minimised.

When collecting a water sample the bailer is lowered gently into the well, until it is within the screened interval. The bailer is then steadily withdrawn, to minimise agitation of water in the well and disturbance of the surrounding sand filter material.

The procedure for using the bailer is:

- Slowly lower the bailer into the water and allow it to sink and fill with a minimum of disturbance;
- Empty the first bailer sample into a container in order to measure the volume of bailed water and to rinse the bailer with well water;
- Emptying the bailer through the bottom-emptying device (BED) collects the samples. The sample is discharged down the side of the sample bottle to minimise entry turbulence;
- Collect samples for volatile organics first, followed by semi-volatiles, other organics and then inorganics;
- The flow from the BED is adjusted so that a relatively low flow rate is maintained.

3.6 Low flow purging

Purging large volumes of water can be impractical, hazardous or may adversely affect the contaminant distribution in the sub-surface (e.g. through dilution). Low-flow purging involves minimal disturbance of the water column and aquifer and is preferable to the removal of a number of bore volumes. This method removes only small volumes of water, typically at rates of 0.1 to 1.0L/min, at a discrete depth within the bore.

Low-flow purging consists essentially of the following steps:

- The pump inlet is carefully and slowly placed in the middle or slightly above the middle of the screened interval at the point where the contaminant concentration is required (dedicated pumps, such as bladder pumps, are ideal for low-flow

sampling). Placement of the pump inlet too close to the bottom of the bore can cause increased entrainment of solids, which have collected in the bore over time.

- Purging begins, typically at a rate of 0.1 to 1.0L/min, although higher rates may be possible provident the rate of purging does not cause significant draw down in the bore.
- During purging, groundwater stabilisation parameters should be measured and recorded to determine when they stabilise.
- When parameters have stabilised, the sample may be collected, at a rate slower or equal to purge rate.

3.7 Labelling of water samples

The water samples are identified with the same information than soil samples. GW4/2 is the sample collected from well GW4, and 2 refers to the sample number from this well, i.e. second time the well is sampled.

3.8 Sampling containers

Water samples are generally collected in bottles and containers provided by the laboratory who will analyse the samples. These are generally plastic bottles for inorganic analysis, and amber glass bottles for organic analysis. Vials are used to collect samples to be analysed for volatile organics. Sampling containers have appropriate preservatives added.

The bottles are filled to overflowing so as to remove air bubbles as much as possible prior to firmly screwing on the container cap. When performing purge and trap analyses, the vials are filled to 100% of their capacity. For headspace analyses, the vials are filled to approximately 75% of their capacity.

3.9 Well surveying

If the survey for location and elevation of a groundwater well is required, it should be done by a licensed surveyor, or alternatively by an Aargus environmental engineer / scientist if the level of precision required can be obtained by the use of Aargus field equipment.

If the location is given by a licensed surveyor, it is generally given to the nearest 0.1m and referenced to the Australian Map Grid (AMG) coordinates.

If the elevation is given by a licensed surveyor, the top of the standpipe and the ground surface adjacent to the standpipe are generally given to the nearest 0.01m and may be

referenced to the Australian Height Datum (AHD). Relative levels (RLs) can be used if general contours are required.

4.0 SURFACE WATERS AND STORMWATER SAMPLING

4.1 Surface waters

Surface water samples are collected by hand, using automatic samplers, batch samplers or continuous samplers which can be installed to take samples at discrete time intervals or continuously. For well mixed surface water samples (up to 1m depth) a sample bottle is immersed by hand covered by a glove below the surface. Samples are also taken with sample poles that have extension arms so that more representative samples can be taken. For areas where access is difficult, samples can be collected using a retractable sample extension pole (sample bottle on the end) or in a bucket and transferred to sample bottles immediately following collection. Other methods such as pumping systems, depth samplers, automatic samplers, and integrating systems are all relatively similar with water samples being supplied to a discharge point where samples can be collected in appropriate bottles.

4.2 Stormwater

The monitoring of stormwater quality is generally required prior to reject waters into stormwater drains. Field measurements are generally carried out using a Hanna Multiprobe prior to the discharge of the water to stormwater. The water parameters measured include pH, electrical conductivity (EC, in mS/cm) and Total Dissolved Solids (TDS).

If sampling is required, samples to be analysed for inorganic compounds are collected in plastic bottles, and samples to be analysed for organic compounds are collected in amber glass bottles. The bottles are filled to overflowing so as to remove air bubbles as much as possible prior to firmly screwing on the container cap. Sample containers may have preservatives added, in accordance with the laboratory recommendations.

Vials are used for volatile organic analysis. When performing purge and trap analysis, the vials should be filled to 100% of their capacity, whereas for headspace measurements, the vials should be filled to approximately 75% of their capacity..

4.3 Filtration devices

Water filtration devices may be required to filter surface water before it is discharged to the stormwater network, in order to remove suspended solids in water. One of the most

simple and commonly used filtration device consists of between two to four retention sedimentation bays with a geotextile covering the inlet and outlet hoses.

Litter traps (wire or plastic grids or netting) may also be used to remove larger particles or debris. Other techniques to reduce the amount of suspended matter in water include wet basins, artificial wetlands, infiltration trenches and basins, sand filters and porous pavements. Some of these latter methods are also likely to reduce the bacterial levels in water.

The use of these filtration devices does not preclude carrying out monitoring of water quality following treatment and prior to discharge, particularly to the stormwater system.

5.0 FIELD TESTING

5.1 Field measurements

Field measurement of soils and groundwater parameters provides a rapid means of assessing certain aspects of soil and water quality. They are generally taken to:

- Ensure that formation water is being sampled
- Ensure screening of soils prepares samples for laboratory testing
- Provide on-site measurements for soil and water quality parameters that are sensitive to sampling and may change rapidly (e.g. temperature, pH, redox and dissolved oxygen (DO)).
- Compare with laboratory measurements of these parameters to assist in the interpretation of analytical results of other parameters (e.g. check for chemical changes due to holding time, preservation and transport).

Field measurements may be taken either in-situ or after groundwater has been extracted from a bore. Field measurements should be taken immediately before collecting each sample.

pH and dissolved oxygen meters need to be calibrated before every use, in accordance with the manufacturer's instructions. If field meters are to be used over several hours, periodic readings of a reference solution must be made to ensure calibration is stable.

5.2 PID Photo Ionisation Detector

Photo Ionisation Detector (PID) measurements are used to provide indicative field measurements of the amount of ionisable vapours released from a soil or water sample into the head space above the sample.

The procedure for field screening of samples using the PID is as follows:

- Prior to testing commencing, the PID is calibrated using standard laboratory calibration gas. The battery of the PID should also be sufficiently charged for the duration of the testing;
- The background concentrations of total ionisable compounds in the ambient air in the vicinity of the work area are established prior to the commencement of site activities. Background measurements are normally taken approximately 5 to 10m upwind of the work area. The readings are observed before and after each measurement of a sample to ensure that the PID is operating correctly. The maximums, fluctuations and other relevant comments are recorded.
- A glass sample jar is filled with the soil sample to be tested. The jar should not be filled more than 3/4 full;
- The jar is sealed with aluminium foil or plastic wrap and the lid is screwed;
- At least 20 minutes after placing the sample into the sampling jar, check that the PID reading is constant and similar to the background. Insert the top of the PID through the foil or plastic wrap in order to measure the ionisable vapour concentrations in the airspace above the sample;
- Monitor and record the PID readings noting fluctuations and maximum readings;
- Monitor the readings after returning the PID to a location with background concentrations. Interchangeable, clean, in-line filters for the PID probe are available to allow rapid decontamination of the unit in the field if background readings measured by the instrument are significantly greater than the background air concentration initially established;
- If perforations are present in the aluminium foil prior to analysis reseal the jar and test after having waited again for at least 20minutes.

An alternative acceptable method is to place the soil to be tested in a disposable zip loc plastic bag and test the sample by punching a hole in the bag with the PID tube to sample the gas from the bag.

6.0 ACID SULFATE SOILS

6.1 Desktop Classification

An initial review of Acid Sulphate Soils (ASS) Planning Maps is undertaken to identify the likelihood and risk of ASS being present at the site. The following geomorphic conditions of the site are also checked as an indication of the presence of ASS: sediments of recent geological age (Holocene) ~ 6000 to 10 000 years old; soil horizons less than 5m AHD (Australian Height Datum); marine or estuarine sediments and tidal lakes; coastal wetlands or back swamp areas; waterlogged or scalded areas; inter-dune swales or coastal sand dunes; areas where the dominant vegetation is mangroves, reeds, rushes and other swamp tolerant and marine vegetation; areas identified in geological descriptions or in maps bearing sulfide minerals, coal deposits or former marine shales/sediments; and deeper older estuarine sediments >10m below the ground surface.

6.2 Site Walkover

The presence on site of hydrogen sulphide odours, acid scalds, flocculated iron, monosulfidic sludges, salt crusts, stressed vegetation, corrosion of concrete and/or steel structures and water logged soils are noted as cues for the presence of ASS.

6.3 Visual Classification

Visual indicators taken into account for the presence of ASS are the presence of jarosite (pale yellow colour) horizons or mottling, unripe muds (waterlogged, soft, blue grey or dark greenish grey in colour), silty sands and sands (mid to dark grey in colour) and the presence of shells.

6.4 Sample Collection

Samples are collected to at least one metre below the depth of the proposed excavation or estimated drop in the water table, or two metres below ground level, whichever is deepest. Samples are collected from every soil horizon or every 0.25m. Large shells, stones and fragments of wood, charcoal and other matter are noted, but removed from the sample. Small roots are not removed from the sample. If laboratory analysis is required, samples are sent for laboratory testing within 24 hours of sampling.

6.5 Field Testing

The field pH peroxide test (pH_{FOX}) is used to obtain an indication of the presence of oxidisable sulphur in the soil. The procedure for this test is as follows:

- A small sample of soil (<100g) is collected in a glass jar and split into two sub-samples. One sub-sample is made into a 1:5 (soil : deionised water) solution in order to measure field soil pH and electrical conductivity (EC) analysis. If the resulting pH is less than 4 (pH_F<4), the sample is identified as actual acid sulphate soil (AASS)

- The second sub-sample is made into a 1:5 (soil : Hydrogen Peroxide) solution to measure pH of oxidised soil. Sodium Hydroxide (NaOH)-adjusted analytical (30%) grade Hydrogen Peroxide (H_2O_2) is used as the soil oxidising agent. A mobile electronic pH/EC probe is used to measure soil pH.

- The presence of oxidisable sulphides, organic matter or manganese in the sample, will trigger a chemical reaction. The type of effervescence and any colour change is noted with the final pH measured to give an indication of the potential change in pH should the soil remain exposed to oxygen. If the resulting pH is less than 3 (pH_{FOX}<3) or if pH_{FOX} is at least one unit less than the pH_F, this suggests that the soil tested is potential acid sulfate soil (PASS).

6.6 Laboratory Testing

When the field test suggests that the material tested contains ASS or PASS, this should be confirmed by laboratory analysis (POCAS/SPOCAS or TOS testing).

7.0 NOISE MONITORING

Measurements are taken at a range of times during the day in order to assess the trends in noise emission over time. Noise is measured using a hand-held Rion NA-29 Sound Level Meter with digital microphone. Some noise meters change and appropriate equioment which is calibrated is used for all monitoring. The reference level of the meter is checked before and after the measurements using a Rion NC-73 Sound Level Calibrator to ensure there is no significant drift. Noise measurements are made over a 15-minute interval using the “fast” response of the sound level meter. 5dB would be added if the noise is substantially tonal or impulsive in character. Measurements should be adapted to the type of noise being measured i.e. construction, occupation, club, etc.

8.0 DUST MONITORING

Sampling is conducted at locations of potential concern. The deposit gauge static sampler contains a glass funnel measuring approximately 150mm with the angle of the cones sides being 60 degrees, placed into a rubber stoppers in the mouth of a five-litre glass receptacle. The deposit gauge is placed in a stand so that the height of the funnel of the deposit gauge is between 1.8 and 2.2m above ground level. A quantity of 7.8g copper sulfate pentahydrate dissolved in water is placed in the glass receptacle in order to prevent algal growth.

Exposure periods vary depending on the purpose of the investigation but typically the period is 30 ±2 days. Samples are usually analysed for measured soils: total solids, insoluble solids, ash and combustible solids.

Dust can also be measured using a High Volume Air Sampler. Such sampler should be located at least 2 metre away from any structures so that an undisturbed sample can be collected. HVASs can be used indoors or outdoors.

9.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

9.1 Introduction

Inaccuracies in sampling and analytical programs can result from many causes, including collection of unrepresentative samples, unanticipated interferences between elements during laboratory analyses, equipment malfunctions and operator error. Inappropriate sampling, preservation, handling, storage and analytical techniques can also reduce the precision and accuracy of results.

The Australian Standard AS4482.1-2005 *Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds* has documented procedures for quality assurance (QA) and quality control (QC) for sampling and analysis to ensure that the required degree of accuracy and precision is obtained. The Australian Standard also recommends the use of two laboratories for the implementation of a QA program for the analyses in addition to the QC procedures followed by the primary laboratory.

9.2 Field QAQC samples

General

Procedures for duplicate sampling should be identical to those used for routine sampling and duplicate samples will be despatched for analysis for the same parameters using the

same methods as the routine samples. No homogenisation of samples which may induce the loss of volatile compounds (such as BTEX) should occur. Whenever possible, the selection of samples for duplicate analyses should be biased towards samples believed to contain the contaminant of concern.

Intra-laboratory duplicates

Intra-laboratory duplicate samples, also referred to as Blind duplicates, are used to assess the variation in analyte concentration between samples collected from the same sampling point and / or also the repeatability of the laboratory analyses. Samples are split in the field to form a primary sample and a QC duplicate (intra-laboratory replicate) sample. The intra-laboratory duplicates are taken from a larger than normal quantity of soil collected from the same sampling point, removed from the ground in a single action, and divided into two vessels. These samples are submitted to the laboratory as two individual samples without any indication to the laboratory that they have been duplicated.

Intra-laboratory duplicate samples should be collected at a rate of approximately 1 in 20 soil samples and analysed for the full suite of analytes. At least one intra-laboratory duplicate sample should be included in each batch of samples.

Inter-laboratory duplicates

Inter-laboratory duplicate samples, also referred to as Split duplicates, provide a check on the analytical proficiency of the laboratories. The samples are taken from a larger than normal quantity of soil collected from the same sampling point, removed from the ground in a single action, and divided into two vessels. One sample from each set is submitted to a different laboratory for analysis. The same analytes should be determined by both laboratories using the same analytical methods.

Inter-laboratory duplicates should be collected at a rate of approximately 1 in 20 soil samples and analysed for the full suite of analytes. At least one inter-laboratory duplicate sample should be included in each batch of samples.

Blanks

<u>Rinsate Blanks</u>

Rinsate blank samples provide information on the potential for cross-contamination of substances from the sampling equipment used. Rinsate blanks are collected where cross-contamination of samples is likely to impact on the validity of the sampling and assessment process (e.g. when the investigation level of a contaminant is close to the detection limit for this contaminant). They are prepared in the field using empty bottles and the distilled water used during the final rinse of sampling equipment. After

completion of the decontamination process, fresh distilled water is poured over the sampling equipment and collected. The distilled water is exposed to the air for approximately the same time the sample would be exposed. The collected water is then transferred to an appropriate sample bottle and the proper preservative added, if required.

One rinsate blank par day and / or one per piece of sampling equipment are collected during the decontamination process, and analysed for the analytes of interest. At least one rinsate blank should be included in each batch of samples. One rinsate blank should be collected for every 50 samples collected and analysed for the full suite of analytes.

Trip Blanks / Spikes

Trip blanks / spikes are a check on the sample contamination originating or lost from sample transport, handling, and shipping. These are samples of soil or water prepared by the laboratory with a zero or known concentration of analytes.

Field Blanks

Field blanks are a check on sample contamination originating from sample transport, handling, shipping, site conditions or sample containers. These are similar to trip blanks except the water is transferred to sample containers on site.

9.3 Laboratory quality assurance / quality control

The laboratories undertake the analyses utilising their own internal procedures and their test methods (for which they are NATA, or equivalent, accredited) and in accordance with their own quality assurance system which forms part of their accreditation.

Laboratory duplicate samples

Laboratory duplicate samples measure precision. These samples are taken from one sample submitted for analytical testing in a batch. The rate of duplicate analysis will be according to the requirements of the laboratory's accreditation but should be at least one per batch. Precision is reported as standard deviation SD or Relative Percent Difference %RPD, being:

$$\%RPD = \frac{(D1 - D2)}{(D1 + D2)} \times 200$$

where: D1: sample concentration and D2: duplicate sample concentration

Replicate data for precision is expected to be less than 30% RPD at concentration levels greater than ten times the EQL, or less than 50% RPD at concentration levels less than ten times the EQL. Sample results with a RPD exceeding 100% require specific

discussion. Note that certain methods may allow for threshold limits outside of these limits.

Matrix Spiked Samples

Matrix spiked samples are used to monitor the performance of the analytical methods used, and to assess whether the sample matrix has an effect of on the extraction and analytical techniques. A sample is spiked by adding an aliquot of known concentration of the target analyte(s) to the sample matrix prior to sample extraction and analysis. These samples should be analysed at a rate of approximately 5% of all analyses, or at least one per batch. Matrix spikes are reported as a percent recovery %R, being:

$$\%R = \frac{(SSR-SR)}{SA} \times 100$$

where: SSR: spiked sample result, SR: sample result (blank) and SA: spike added

Recovery data for accuracy is described by control limits specified by the laboratory (generally ranging between 70% and 130%) and referenced to US EPA SW-846 method guidelines values.

Laboratory Blank

Laboratory blanks are used to correct for possible contamination resulting from the preparation or processing of the samples. These are usually an organic or aqueous solution that is as free as possible of analyte and contains all the reagents in the same volume as used in the processing of the samples. Laboratory blanks must be carried through the complete sample preparation procedure and contain the same reagent concentrations in the final solution as in the sample solution used for analysis. Laboratory blanks should be analysed at a rate of once per process batch, and typically at a rate of 5% of all analyses.

Laboratory Control Samples

Laboratory Control Samples, also referred to as Quality Control Check Samples, are used to assess the repeatability and long term accuracy of the laboratory analysis. These are externally prepared and supplied reference material containing representative analytes under investigation. Recovery check portions should be fortified at concentrations that are easily quantified but within the range of concentrations expected for real samples. Laboratory Control samples should be analysed at a rate of one per process batch, and typically at a rate of 5% of analyses. Laboratory control samples are reported as a percent recovery %R, being:

$$\%R = \frac{(SSR-SR)}{SA} \times 100$$

where: SSR: spiked sample result, SR: sample result (blank) and SA: spike added

Recovery data for accuracy is described by control limits specified by the laboratory and referenced to US EPA SW-846 method guidelines values. Ideally, all calculated recovery values should be within the acceptable limits. However, in the event that control limit outliers are reported, professional judgement is used to assess the extent to which such results may affect the overall usability of data.

Surrogates

Surrogates are used to provide a means of checking, for every analysis, that no gross errors have occurred at any stage of the procedure leading to significant analyte losses. Surrogate are quality control monitoring spikes, which are added to all fields and QAQC samples at the beginning of the sample extraction process in the laboratory. Surrogates are closely related to the sample analytes being measured (particularly with regard to extraction, recovery through cleanup procedures and response to chromatography) and are not normally found in the natural environment.

Surrogate spikes will not interfere with quantification of any analytes of interest and may be separately and independently quantified by virtue of, for example, chromatographic separation or production of different mass ions in a GC/MS system. Surrogates are measured as Percent Recovery %R expressed as:

$$\%R = \frac{(SSR)}{SA} \times 100$$

where: SSR: spiked sample result and SA: spike added

Recovery data for accuracy is described by control limits specified by the laboratory and referenced to US EPA SW-846 method guidelines values.

10.0 DATA QUALITY OBJECTIVES

10.1 General

Data Quality Objectives (DQOs) are defined to ensure that the data is sufficiently accurate and precise to be used for the purpose of the project works. DQOs are defined for a number of areas including:

- sampling methods;
- decontamination procedures;

- sample storage (including nature of the containers) and preservation;
- laboratory analysis, including PQL, recoveries (surrogates, spikes), duplicates;
- preparation of CoC forms;
- document and data completeness; and
- data comparability.

The NSW DEC Contaminated Sites Guidelines for the NSW Site Auditor Scheme (2nd Ed) 2006 also provide a seven step process for Data Quality Objectives (DQOs). These are as follows:

- State the problem
- Identify the decisions
- Identify inputs to the decision
- Define the study boundaries
- Develop a decision rule
- Specify limits on decision errors
- Optimise the design for obtaining data

DQOs must be adopted for all assessments and remediation programmes. The DQO process must be commenced before any investigative works begin on a project.

10.2 Field DQOs

The DQOs for sampling methods, decontamination procedures, sample storage (including nature of the containers) and preservation, preparation of CoC forms, and document and data completeness are the Aargus protocols which have been described in the previous sections of this document.

10.3 Assessment of RPD values for field duplicate samples

The criteria used to assess RPD values for field duplicate samples is based on discussion reported in AS4482.1 1997, a summary of which is presented below:

Table 1: RPD acceptance criteria

Sample type	Typical acceptable RPD
Intra-laboratory duplicate (blind duplicate)	30-50°% (*)
Inter-laboratory duplicate (split duplicate)	30-50% (*)

It is noted that other factors such as sampling technique, sample variability, absolute concentration relative to criteria and laboratory performance should also be considered when evaluating RPD values.

The Australian Standard also states that the variation can be expected to be higher for organic analytes than for inorganics, and for low concentrations of analytes (lower than five times the detection limit). Based on Aargus Pty Ltd experience, RPD up to 70% are considered to be acceptable for organic species. RPD of 100% or more are generally considered to demonstrate poor correlation and should be discussed.

10.4 Laboratory Data Quality Objectives (DQO)

General

Aargus also provides internal laboratory testing for a range of physical parameters. Aargus is NATA certified to conduct these tests.

SGS is the Aargus-preferred laboratory for the chemical analysis of primary samples. SGS is accredited by the National Association of Testing Authorities (NATA).

The laboratory generally used by Aargus for analysing inter-duplicate samples is Labmark.

Analytical methods including detection limits are provided on each laboratory report and are checked as part of the data review process.

Laboratory QA/QC

Specific to SGS, standard QA/QC data includes LCS, MB, CRM (CRM metals only), Laboratory Duplicate (1 in first 5-10 samples, then every tenth sample) and Spike sample (1 in first 5-20 samples, then every 20th sample), and surrogate recovery's (target

organics). All QA/QC is reviewed by a senior chemist prior to customer release and includes a DQO comment on final report. Additional QA/QC maybe performed on batches less than 10 samples; however additional charges shall apply at the appropriate analytical rate/sample.

Laboratory analyses DQOs

The following table summarises laboratory analyses DQOs.

Table 2: Laboratory Data Quality Objectives (DQOs)

Laboratory QA/QC Testing	Laboratory QA/QC Acceptance Criteria
Method Blanks	For all inorganic analytes the Method Blanks must be less than the LOR. For organics Method Blanks must contain levels less than or equal to LOR.
Surrogate Spikes	At least two of three routine level soil sample Surrogate Spike recoveries are to be within 70-130% where control charts have not been developed and within the estimated control limited for charted surrogates. Matrix effects may void this as an acceptance criteria. Any recoveries outside these limits will have comment. Water sample Surrogates Spike recoveries are to within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criteria. Any recoveries outside these limits will have comment.
Matrix Spikes	Sample Matrix Spike duplicate recovery RPD to be <30%. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike.
Laboratory Control Samples	Control standards must be 80-120% of the accepted value. Control standard recoveries are to be within established control limits or as a default 60-140% unless compound specific limits apply.
Laboratory Duplicate Samples	For Inorganics laboratory duplicates RPD to be <15%. For Organics Laboratory duplicates must have a RPD <30%.
Calibration of Chromatography Equipment	The calibration check standards must be within +/-15%. The calibration check blanks must be less than the LOR.

Non-compliances

Exceedances of QAQC results outside the DQO should be thoroughly investigated and discussed with the laboratories concerned, and the outcomes of these investigations should be recorded in the project files.

11.0 USE AND CALCULATION OF THE 95% UCL FOR SITE VALIDATION PURPOSE

For environmental services, statistical analysis is performed on data. Validation of a site at the completion of remediation works should comply with the recommendations of the applicable guidelines. For a site to be considered uncontaminated or successfully remediated, the typical minimum requirement is that the 95% upper confidence limit (UCL) of the arithmetic average concentration of the contaminant(s) is less than an acceptable limit, eg the threshold value of an health-based investigation level.

The calculation of the 95% UCL of the arithmetic average concentration method requires that the probable average concentration and standard deviation of the contaminant be known. This method is most applicable for validation sampling, where the mean concentration and the standard deviation can be estimated from sampling results. The 95% UCL is calculated as follows:

$$95\%\ UCL = mean + t_{\alpha,n-1} \frac{STDEV}{\sqrt{n}}$$

where

mean	arithmetic average of all sample measurements
$t_{\alpha,n-1}$	A test statistic (Student's t at an α level of significance and n-1 degrees of freedom)
α	The probability (in that case chosen to be 0.05) that the 'true' average concentration of the sampling area might exceed the UCL average determined by the above equation
STDEV	Standard deviation of the sample measurements
n	number of samples measurements

12.0 COPYRIGHT

13.0 ABBREVIATIONS

ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soil
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethyl benzene and Xylene
CoC	Chain of Custody
DEC	Department of Conservation (formerly EPA)
DIPNR	Department of Infrastructure Planning and Natural Resources
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
HIL	Health-Based Soil Investigation Level
LGA	Local Government Area
NEHF	National Environmental Health Forum
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NSL	No Set Limit
OCP/OPP	Organochlorine Pesticides /Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbon
PASS	Potential Acid Sulfate Soil
PCB	Polychlorinated Biphenyl
PID	Photo Ionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance, Quality Control
RAC	Remediation Acceptance Criteria
RAP	Remediation Action Plan
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SVC	Site Validation Criteria
SWL	Standing Water Level
TCLP	Toxicity Characteristics Leaching Procedure
TESA	Targeted Environmental Site Assessment
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit
VHC	Volatile Halogenated Compounds
VOC	Volatile Organic Compounds

14.0 REFERENCES

- ANZECC (1992) – *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.*
- ANZECC (1996) – *Drinking Water Guidelines.*
- ANZECC (2000) – *Guidelines for Fresh and Marine Waters.*
- Land and Biodiversity committee (2003) – *Minimum Construction requirements for water bores in Australia.*
- National Environment Protection Council (NEPC) (1999) – *National Environmental Protection (Assessment of Site Contamination) Measure.*
- Netherlands Ministry of Spatial Planning, Housing and the Environment (1994 rev. 2000) – *Environmental Quality Objectives in the Netherlands.*
- New South Wales Environment Protection Authority (1994) – *Guidelines for Assessing Service Station Sites.*
- New South Wales Environment Protection Authority (1995) – *Sampling Design Guidelines.*
- New South Wales Environment Protection Authority (1997) – *Guidelines for Consultants Reporting on Contaminated Sites.*
- New South Wales Environment Protection Authority (1998) – *Guidelines for the NSW Site Auditor Scheme.*
- New South Wales Department of Environment & Conservation (2006) – *Guidelines for the NSW Site Auditor Scheme (2nd Ed).*
- New South Wales Environment Protection Authority (1999) – *Guidelines on Significant Risk of Harm from contaminated land and the duty to report.*
- New South Wales Environment Protection Authority (1999) – *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-liquid Wastes.*
- New South Wales Environment Protection Authority (2005) – *Guidelines for assessing former orchards and market gardens.*
- QLD Department of Environment (DoE) (1998) – *Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland.*
- QLD EPA – Waste Management Branch, Contaminated Land Section – *Details about investigation thresholds and sampling – sent to Aargus on 14 Nov 2000.*
- Standards Australia AS1726-1993 (1993) – *Geotechnical Site Investigations.*
- Standards Australia AS4482.1-1997 (1997) – *Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds.*
- Standards Australia AS5667.11-1998 (1998) – *Water Quality Sampling: Guidance on the Sampling of Groundwaters.*
- Victorian EPA (2000) – *Groundwater Sampling Guidelines*

FIGURES

Figure 1 Typical Groundwater Monitoring Well Construction Details

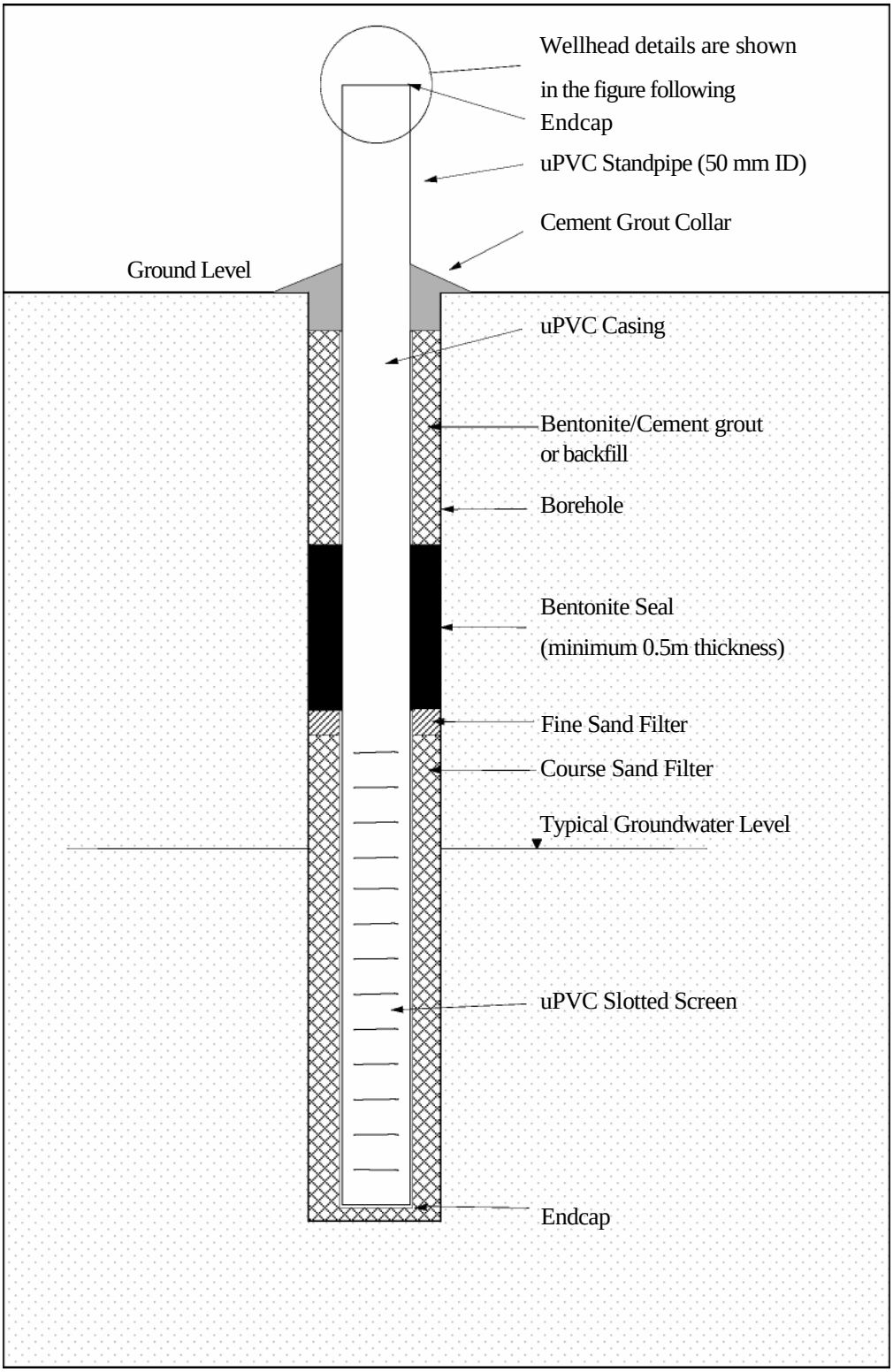
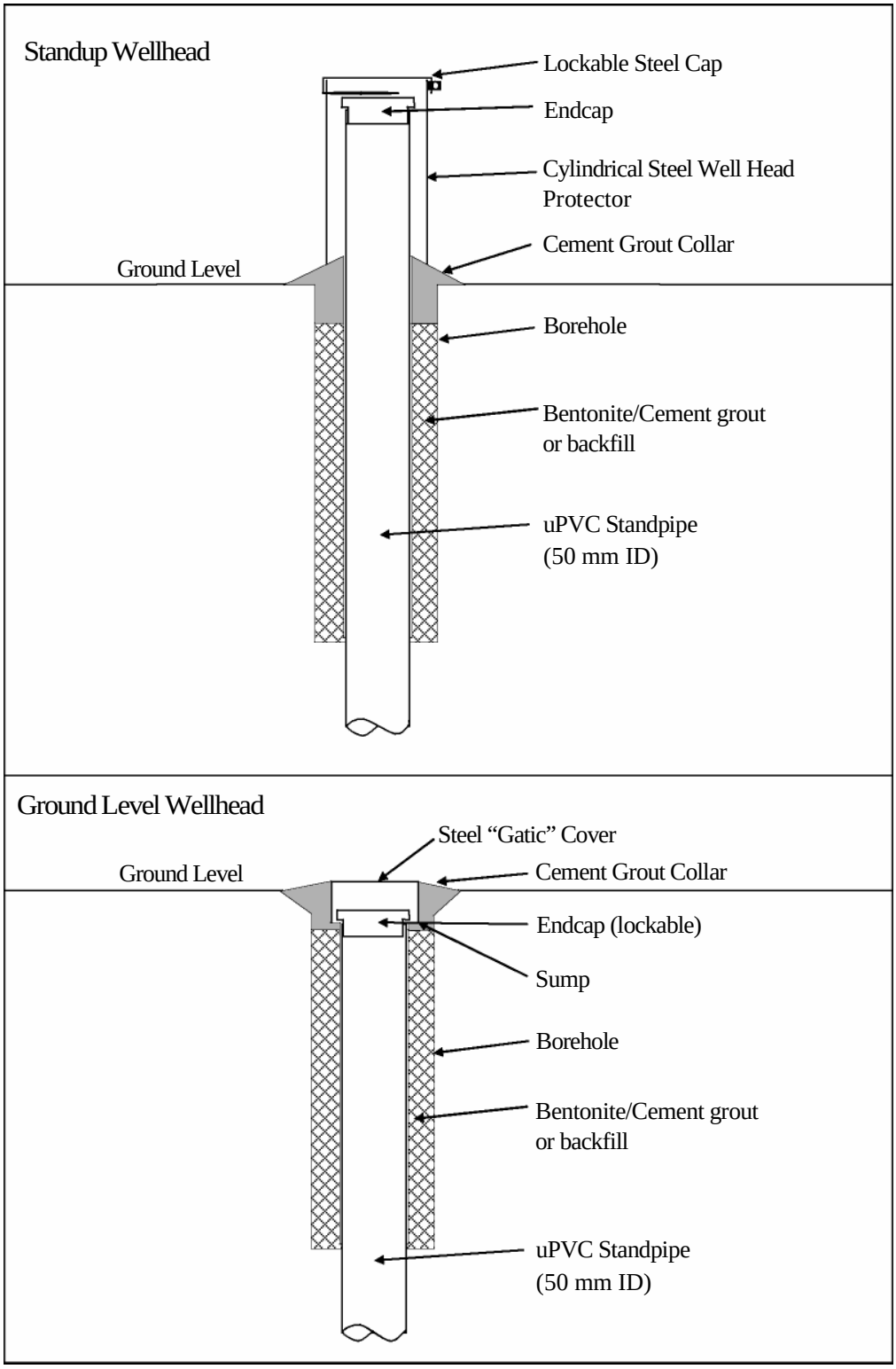


Figure 2 Groundwater Wellhead Construction Details



APPENDIX G

LAND TITLE SUMMARY

Aargus

AARGUS PTY LTD

LAND TITLE SEARCH SUMMARY

Hornsby Ku-Ring-Gai Hospital, Hornsby NSW

Ref No: ES4661/2
Site Identification: Lot 2 in DP14774, Lot 3 in DP14774, Lot B in DP363790, Lot 23 in DP814181, Lot 1 in DP232290 and Lot 189 in DP752053.
Local Government Area: Hornsby
Parish: South Colah
County: Cumberland

Year	Owners Lot: 189 in DP752053
Current	Northern Sydney and Central Coast Health Service
1931	Hornsby and District Hospital
1921	Albert Edgar French, Paul Allen Jones, Herbert Edgar McIntosh

Year	Owners Lot: 1 in DP232290
Current	Hornsby and District Hospital
1967	Hornsby and District Hospital

Year	Owners Lot: 2 in DP14774
Current	The Hornsby and Ku-Ring-Gai Hospital and Health Service
1985	The Hornsby and Ku-Ring-Gai Hospital and Health Service
1971	Doris Maria Burling and Jack Leonard Burling
1945	Henry Ernest Burling
1944	Eric James Halcrow
1929	William Henry Blackler

Year	Owners Lot: 3 in DP14774
Current	Health Administration Comp
1971	Raymond Jooby and Helen Maureen Jooby
1967	Paul Hardy Cutto and Elisa Grace Cutto
1957	Eric James Halcrow
1951	Herbert Jassey Roseburgh
1951	Patrick Joel Delaney and Catherine Lillian Delany
1938	Edward Francis Lewis and Annie Lewis
1924	Charlotte Maud Farrell

Year	Owners Lot: B in DP363790
Current	Hornsby and Ku-Ring-Gai Hospital
1980	Hornsby and Ku-Ring-Gai Hospital
1967	Hornsby and Ku-Ring-Gai Hospital
1949	George Hayes
1941	Annie Andrews Johnson
1934	Reg David Johnson
1928	Dorrace Gould Dick

Year	Owners Lot: 23 in DP814181
Current	Hornsby and Ku-Ring-Gai Hospital Health Serviced
1981	Hornsby and Ku-Ring-Gai Hospital
1981	Douglas John Halloran
1967	Dorothy Grace Halloran
1967	Hornsby and Ku-Ring-Gai Hospital
1938	Claude Halloran
1936	Alice Vaughan Howes
1928	Annie Andrews Johnson

TITLE SEARCH

No. 05

Reference: 8/14774

DP814181 ******* FOLIO CANCELLED *******

NEW FOLIO HAS BEEN CREATED FOR LOT 23 IN DP814181

```
*****************************************
*                                       *
* PLEASE ENQUIRE AT INFORMATION DELIVERY *
*   COUNTER FOR RETURN OF YOUR TICKET    *
*   AS REGARDS THIS FOLIO IDENTIFIER     *
*                                       *
*****************************************
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*****************************************
*                                       *
* COPIES OF CANCELLED FOLIO IDENTIFIERS  *
*     CAN NOW BE OBTAINED FROM THE       *
*     INFORMATION DELIVERY COUNTER       *
*                                       *
*****************************************
```

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TITLE SEARCH

Computer Folio Certificate issued under Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
23/814181	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
1	27/11/1991

No. 05

Search certified to:

7/11/2011 11:37 AM

LAND

LOT 23 IN DEPOSITED PLAN 814181

AT HORNSBY

LOCAL GOVERNMENT AREA HORNSBY

PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND

TITLE DIAGRAM DP814181

FIRST SCHEDULE

THE HORNSBY & KU-RING-GAI HOSPITAL AND AREA HEALTH SERVICE

SECOND SCHEDULE (5 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

2 B620508 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

3 B709400 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

4 B935109 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

5 C103869 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE

END OF PAGE 1 - CONTINUED OVER

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COMPUTER FOLIO REFERENCE	
23/814181	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
1	27/11/1991

No. 05

Search certified to:

7/11/2011 11:37 AM

NOTATIONS (CONTINUED)

IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 03

Search certified to: 7/11/2011 11:40AM

Computer Folio Reference: 2/232290 **Page 1**

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

Prior Title(s): VOL 10575 FOL 145

Recorded	Number	Type of Instrument	C.T. Issue
5/6/1987		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/3/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
27/11/1991	DP814181	DEPOSITED PLAN	FOLIO CANCELLED
24/12/1993		AMENDMENT: LOCAL GOVT AREA	

*** END OF SEARCH ***

10575145

[redacted]

ICATE OF TITLE

TY ACT, 1900, as amended.

NEW SOUTH WALES

Crown Grant Volume 1041 Folio 147
Prior Title Volume 4377 Folio 104

Vol. 10575 Fol. 145

ID Edition issued 14-6-1967.

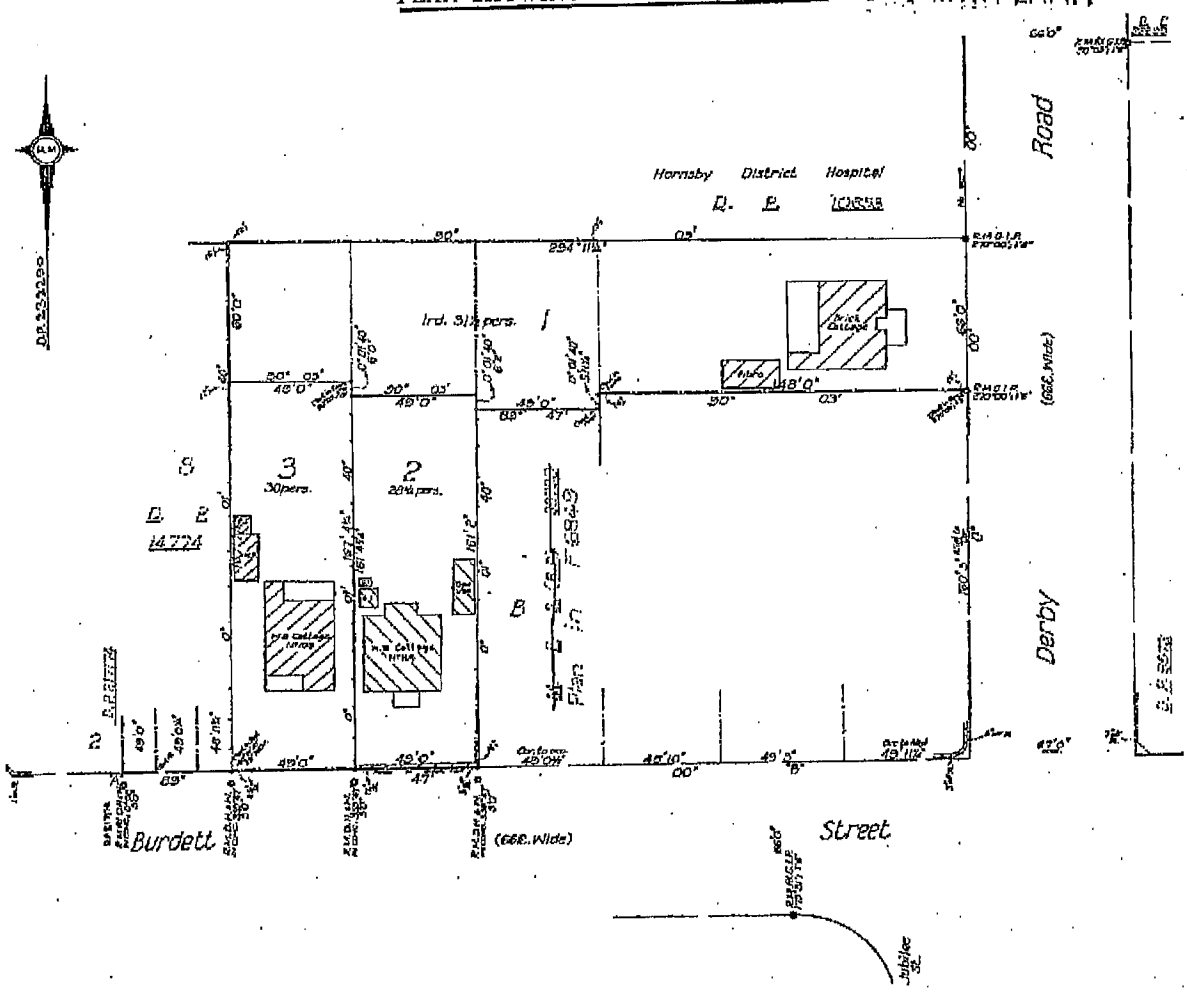
Fol. 145 Vol. 10575 (Page 1)

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

Witness J. Ufflick.

CANCELLED
Registrar General.

PLAN SHOWING LOCATION OF LAND SEE AUTO FOLIO



ESTATE AND LAND REFERRED TO

S Estate in Fee Simple in Lot 2 in Deposited Plan 232290 in the Shire of Hornsby Parish of South Colah and County of Cumberland EXCEPTING THEREOUT the minerals reserved by the Crown Grant.

FIRST SCHEDULE (continued overleaf)

~~ANNIE ANDREWS [redacted] of Hornsby, Widow.~~

SECOND SCHEDULE (continued overleaf).

GRM 1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
CV 2. Covenant created by Transfer No.B935109-P

Registrar General

PT 1 ,17 V.C.N. Blight, Government Printer

Vol. 10575 Fol 145

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar-General
Victor Keith Taylor of Wahroonga, Police Officer	Transmission	P169432	23-12-1974	28-2-1975	
John Raymond Andrews of Hornsby, Technical Officer and Lorraine Glenda Andrews his wife, as joint tenants	Transfer	P350023	------	7-8-1975	
The Hornsby & Ku-Ring-Gai Hospital and Area Health Service by Transfer W178870. Registered 4-2-1986					

CANCELLED

OFF AUTO FOLIO

P169432 T/A
P350023
4
W178869 D
-70 R

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION		
Mortgage	P350024	------	to N.S.W. Permanent Building Society Limited	7-8-1975		Discharged	W178869	

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

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 04

Search certified to: 7/11/2011 11:40AM

Computer Folio Reference: 3/232290 **Page 1**

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

Prior Title(s): VOL 10575 FOL 146

Recorded	Number	Type of Instrument	C.T. Issue
5/6/1987		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/3/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
27/11/1991	DP814181	DEPOSITED PLAN	FOLIO CANCELLED
24/12/1993		AMENDMENT: LOCAL GOVT AREA	

*** END OF SEARCH ***

10575146

[redacted]ICATE OF TITLE

[redacted]TY ACT, 1900, as amended.

NEW SOUTH WALES

Crown Grant Volume 1041 Folio 147
Prior Title Volume 4112 Folio 26

Vol. 10575 Fol. 146

[redacted]ID

Edition issued 14-6-1967.

Fol. 146 Vol. 10575 (Page 1)

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

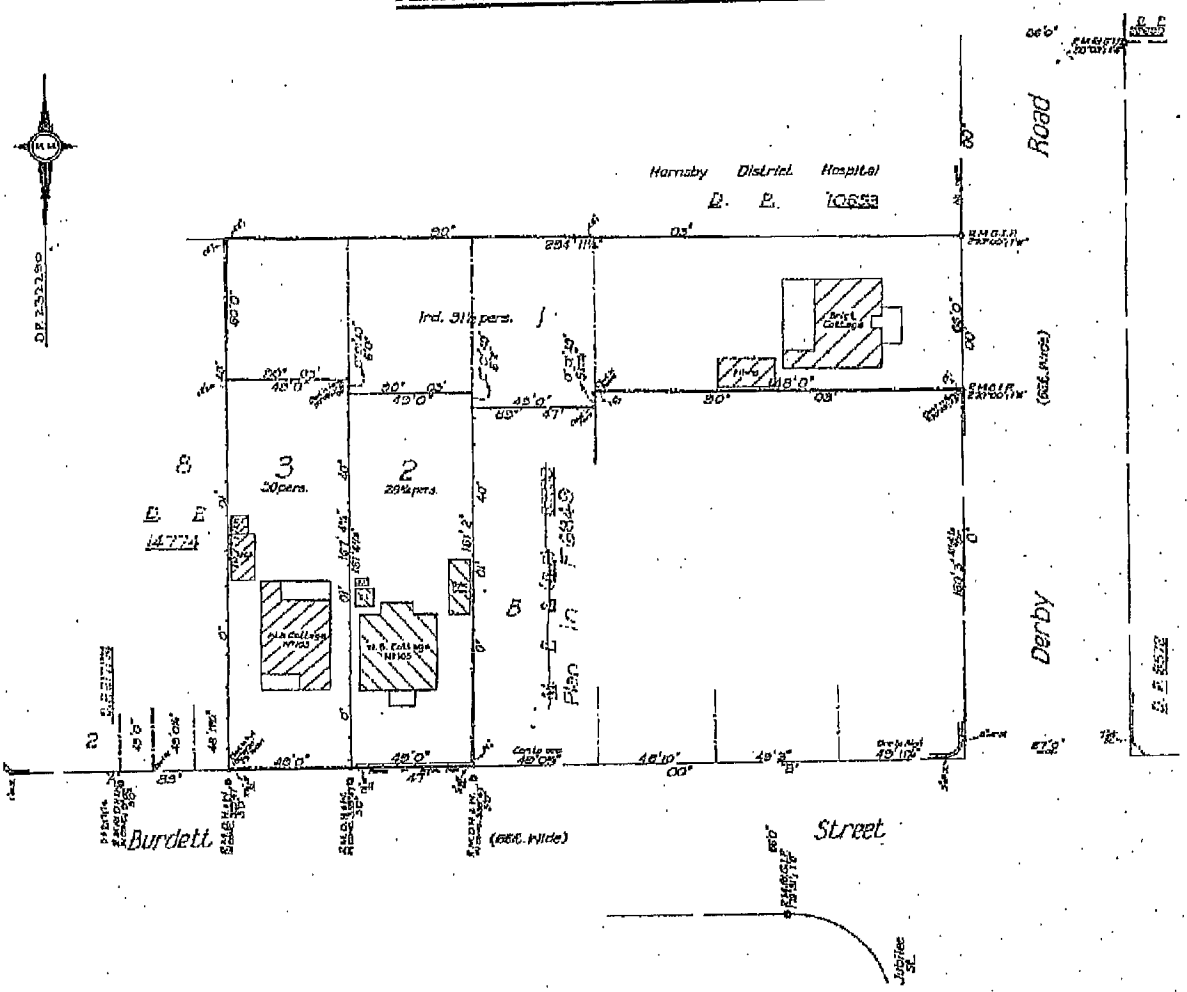
CANCELLED

Witness J. Affleck.

Registrar General

SEE ALSO E.N.'S

PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO

S Estate in Fee Simple in Lot 3 in Deposited Plan 232290 in the Shire of Hornsby Parish of South Colah and County of Cumberland EXCEPTING THEREOUT the minerals reserved by the Crown Grant.

FIRST SCHEDULE (continued overleaf)

~~DOROTHY GRACE HALTORAN, of Hornsby, Widow.~~

SECOND SCHEDULE (continued overleaf)

GRM 1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
CV 2. Covenant created by Transfer No.B620508.P

Registrar General

PT 1 .17 V.C.N. Blight, Government Printer

S276246
S440087

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar-General
Douglas John Hattoran of Pymble, General Manager The Hornsby and Ku-Ring-Gai Hospital by Transfer S440087. Registered 7-5-1981	Transmission	S276246		28.4.1981	

CANCELLED

SEE AUTO FOLIO

Vol. 10575 Fol 146

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION		

(Page 2 of 2 pages)

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

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
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No. 01

Search certified to: 7/11/2011 11:40AM

Computer Folio Reference: 8/14774

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

Prior Title(s): VOL 4516 FOL 243

Recorded	Number	Type of Instrument	C.T. Issue
19/12/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
19/2/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
27/11/1991	DP814181	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 02

Search certified to: 7/11/2011 11:40AM

Computer Folio Reference: 9/14774

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

Prior Title(s): VOL 4190 FOL 52

Recorded	Number	Type of Instrument	C.T. Issue
14/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
30/6/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
27/11/1991	DP814181	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

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TITLE SEARCH

Computer Folio Certificate issued under Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
23/814181	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
1	27/11/1991

No. 46

Search certified to:

7/11/2011 10:02 AM

LAND

LOT 23 IN DEPOSITED PLAN 814181
AT HORNSBY
LOCAL GOVERNMENT AREA HORNSBY
PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND
TITLE DIAGRAM DP814181

FIRST SCHEDULE

THE HORNSBY & KU-RING-GAI HOSPITAL AND AREA HEALTH SERVICE

SECOND SCHEDULE (5 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

2 B620508 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

3 B709400 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

4 B935109 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

5 C103869 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE

END OF PAGE 1 - CONTINUED OVER

NOTATIONS (CONTINUED)

IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

A division of the Department of **Finance & Services**

HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 39

Search certified to: 7/11/2011 9:55AM

Computer Folio Reference: 23/814181

First Title(s): VOL 1041 FOL 147

Prior Title(s): 8-9/14774 2-3/232290

Recorded	Number	Type of Instrument	C.T. Issue
27/11/1991	DP814181	DEPOSITED PLAN	FOLIO CREATED EDITION 1

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

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TITLE SEARCH

Computer Folio Certificate issued under Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
1/232290	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
-	-

No. 45

Search certified to:

7/11/2011 10:03 AM

VOL 10575 FOL 144 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 1 IN DEPOSITED PLAN 232290

LOCAL GOVERNMENT AREA HORNSBY

PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND

TITLE DIAGRAM DP232290

FIRST SCHEDULE

THE HORNSBY AND DISTRICT HOSPITAL

SECOND SCHEDULE (2 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

* 2 COVENANT CREATED BY TRANSFER NO'S B620508, B747086, B935109 AND B959849 AFFECTING PARTS

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

A division of the Department of **Finance & Services**

HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 40

Search certified to: 7/11/2011 9:58AM

Computer Folio Reference: 1/232290

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

Prior Title(s): VOL 10575 FOL 144

Recorded	Number	Type of Instrument	C.T. Issue
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24/3/1988		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
24/12/1993		AMENDMENT: LOCAL GOVT AREA	
16/11/2010	AF880639	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

10575144

[redacted]IFICATE OF TITLE
[redacted]ERTY ACT, 1900, as amended.

NEW SOUTH WALES

Crown Grant Volume 1041 Folio 147
Prior Titles Volume 4112 Folio 26
Volume 4223 Folio 38
Volume 4377 Folio 104
Volume 4397 Folio 90

DIEU ET MON DROIT

ID

Vol. 10575 Fol. 144

Edition issued 14-6-1967.

(Page 1) Vol. 10575 Fol. 144

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

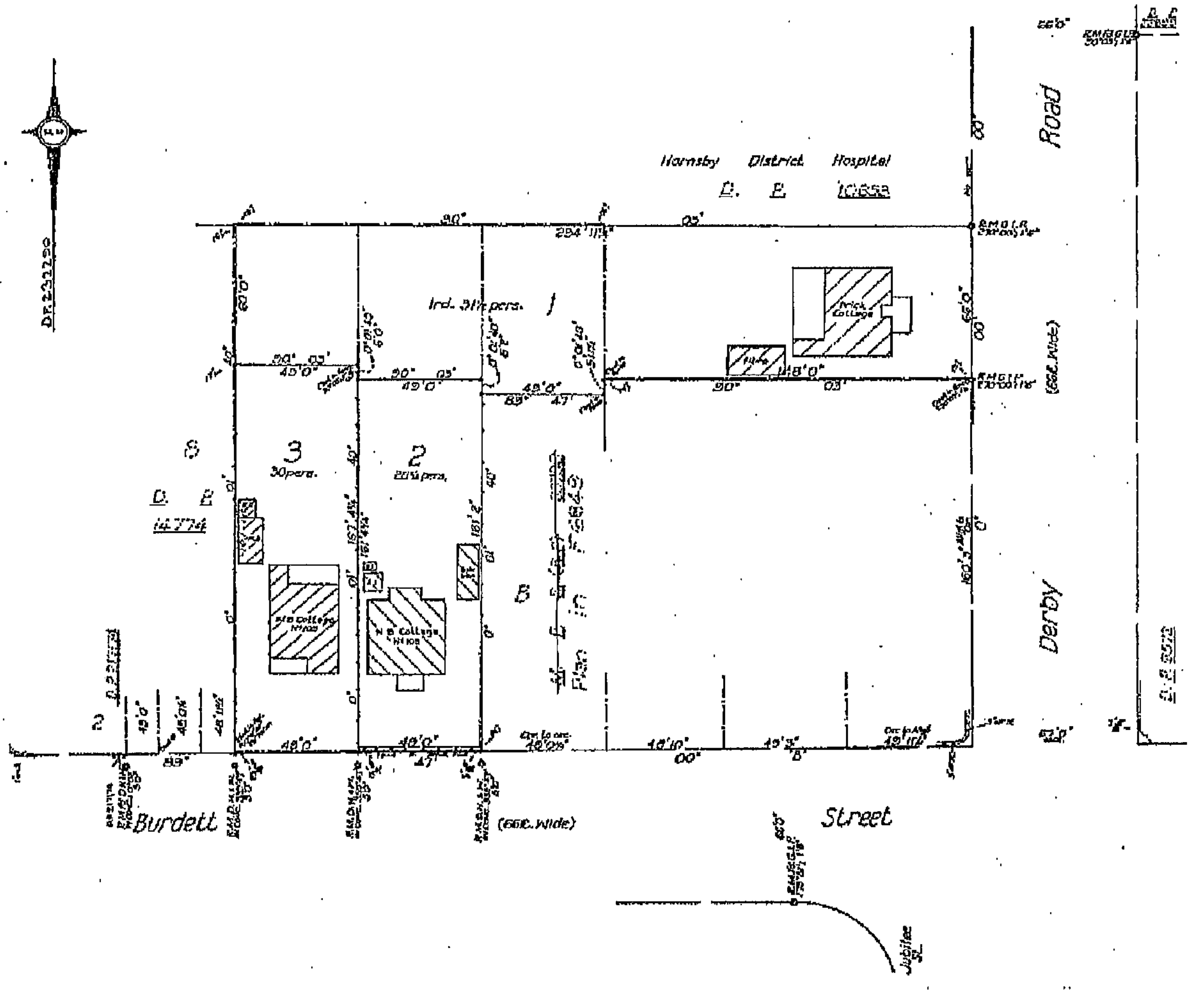
Witness J. Afflick.

CANCELLED

Registrar General.

SEE AUTO FOLIO

PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO

S Estate in Fee Simple in Lot 1 in Deposited Plan 232290 in the Shire of Hornsby Parish of South Colah and County of Cumberland EXCEPTING THEREOUT the minerals reserved by the Crown Grant.

FIRST SCHEDULE (continued overleaf)

THE HORNSBY AND DISTRICT HOSPITAL.

SECOND SCHEDULE (continued overleaf)

GRM 1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
AA 2. Covenants created by Transfers Nos.B620508, B747086, B935109 and B959849 affecting parts.

Registrar General

PT 1, 17 V.C.N. Blight, Government Printer

Dual Entitlement
CT at DELIVERY.

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar-General

CANCELLED

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION		

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

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TITLE SEARCH

Computer Folio Certificate issued under
Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
B/363790	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
-	-

No. 47

Search certified to:

7/11/2011 10:02 AM

VOL 6036 FOL 24 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT B IN DEPOSITED PLAN 363790
AT HORNSBY
LOCAL GOVERNMENT AREA HORNSBY
PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND
TITLE DIAGRAM DP363790

FIRST SCHEDULE

THE HORNSBY AND KU-RING-GAI HOSPITAL (T R592102)

SECOND SCHEDULE (2 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

2 B747086 COVENANT

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 38

Search certified to: 7/11/2011 9:55AM

Computer Folio Reference: B/363790

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

Prior Title(s): VOL 6036 FOL 24

Recorded	Number	Type of Instrument	C.T. Issue
2/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
7/11/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

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TITLE SEARCH

Computer Folio Certificate issued under Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
189/752053	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
1	26/7/2010

No. 44

Search certified to:

7/11/2011 10:03 AM

LAND

LOT 189 IN DEPOSITED PLAN 752053

LOCAL GOVERNMENT AREA HORNSBY

PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND

(FORMERLY KNOWN AS PORTION 189)

TITLE DIAGRAM CROWN PLAN 1176.2030

FIRST SCHEDULE

NORTHERN SYDNEY AND CENTRAL COAST AREA HEALTH SERVICE (RP AF640307)

SECOND SCHEDULE (2 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

2 LAND EXCLUDES THE ROAD(S) SHOWN IN DP10653 NOW CLOSED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 41

Search certified to: 7/11/2011 9:55AM

Computer Folio Reference: 189/752053 **Page 1**

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

Prior Title(s): VOL 965 FOL 126

Recorded	Number	Type of Instrument	C.T. Issue
15/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
16/1/1991		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
24/10/1994		AMENDMENT: TITLE DIAGRAM	
26/7/2010	AF640307	APPLN TO RECORD NEW REGISTERED PROPRIETOR	EDITION 1

*** END OF SEARCH ***

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TITLE SEARCH

Computer Folio Certificate issued under Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
3/14774	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
1	18/8/1997

No. 48

Search certified to:

7/11/2011 10:02 AM

LAND

LOT 3 IN DEPOSITED PLAN 14774

LOCAL GOVERNMENT AREA HORNSBY

PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND

TITLE DIAGRAM DP14774

FIRST SCHEDULE

HEALTH ADMINISTRATION CORPORATION (T 3331573)

SECOND SCHEDULE (2 NOTIFICATIONS)

---

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)

2 B910474 COVENANT

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

NSW GOVERNMENT | Land & Property Information

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 37

Search certified to: 7/11/2011 9:57AM

Computer Folio Reference: 3/14774

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

Prior Title(s): VOL 4356 FOL 39

Recorded	Number	Type of Instrument	C.T. Issue
18/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
14/2/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
18/8/1997	3331573	TRANSFER	EDITION 1

*** END OF SEARCH ***

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TITLE SEARCH

Computer Folio Certificate issued under
Section 96D of the Real Property Act 1900

COMPUTER FOLIO REFERENCE	
2/14774	
EDITION No. & DATE OF CURRENT CERTIFICATE OF TITLE	
-	-

No. 49

Search certified to:
7/11/2011 10:02 AM

VOL 4273 FOL 77 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 2 IN DEPOSITED PLAN 14774
LOCAL GOVERNMENT AREA HORNSBY
PARISH OF SOUTH COLAH COUNTY OF CUMBERLAND
TITLE DIAGRAM DP14774

FIRST SCHEDULE

THE HORNSBY & KU-RING-GAI HOSPITAL AND AREA HEALTH SERVICE
(T V920180)

SECOND SCHEDULE (2 NOTIFICATIONS)
---
1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)
2 B808192 COVENANT

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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HISTORICAL TITLE SEARCH

Certificate issued under Section 96G
of the Real Property Act 1900

No. 36

Search certified to: 7/11/2011 9:54AM

Computer Folio Reference: 2/14774

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

Prior Title(s): VOL 4273 FOL 77

Recorded	Number	Type of Instrument	C.T. Issue
18/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
13/2/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED

*** END OF SEARCH ***