Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
ABN 17 003 550 801

REPORT EXPLANATION NOTES

INTRODUCTION

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

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

DESCRIPTION AND CLASSIFICATION METHODS

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

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

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

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

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

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

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

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

SAMPLING

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

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

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

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

INVESTIGATION METHODS

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

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

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

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

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

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

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

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

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

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

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

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

  N>30
  15, 30/40mm

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

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

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

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

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

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

The information provided on the charts comprise:

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

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

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

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

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

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

Two relatively similar tests are used:

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

LOGS

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

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

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

GROUNDWATER

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

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

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

FILL

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

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

LABORATORY TESTING

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

ENGINEERING REPORTS

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

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

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

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

SITE ANOMALIES

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

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

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

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

REVIEW OF DESIGN

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

SITE INSPECTION

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

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site.

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GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

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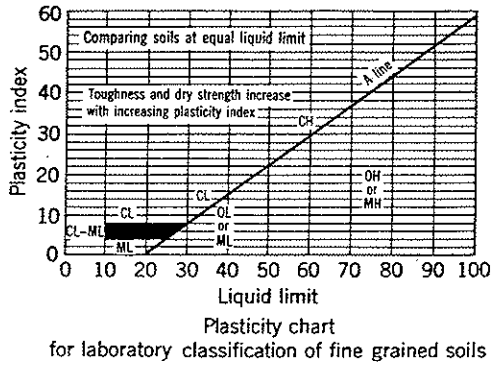
UNIFIED SOIL CLASSIFICATION TABLE

Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)						Group Symbols[a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils: More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels: More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% — *GW, GP, SW, SP* More than 12% — *GM, GC, SM, SC* 5% to 12% — *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for *GW*
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		Atterberg limits above "A" line, with *PI* greater than 7
	Sands: More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for *SW*
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures		Atterberg limits below "A" line with *PI* greater than 7
Fine-grained soils: More than half of material is *smaller* than 75 μm sieve size	Identification Procedures on Fraction Smaller than 380 μm Sieve Size		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
	Silts and clays: liquid limit less than 50		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays: liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

NOTE: 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e.g. GW-GC, well graded gravel-sand mixture with clay fines).

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

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LOG SYMBOLS

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

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LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

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

ROCK STRENGTH

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

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

ABBREVIATIONS USED IN DEFECT DESCRIPTION

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

APPENDIX B

(Laboratory Reports and Chain of Custody Documents)

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
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CERTIFICATE OF ANALYSIS 52258

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Todd Hore

Sample log in details:

Your Reference:	**E24595KH, Ryde**		
No. of samples:	13 Soils		
Date samples received / completed instructions received	24/02/11	/	24/02/11

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	3/03/11	/	2/03/11
Date of Preliminary Report:	Not issued		

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Results Approved By:

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Chemist

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Reporting Supervisor

Matt Mansfield
Approved Signatory

vTRH & BTEX in Soil						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011	26/02/2011	26/02/2011	26/02/2011
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	82	84	86	89	85

vTRH & BTEX in Soil		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	26/02/2011
vTRH C_6 - C_9	mg/kg	<25
Benzene	mg/kg	<0.5
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1.0
m+p-xylene	mg/kg	<2.0
o-Xylene	mg/kg	<1.0
Surrogate aaa-Trifluorotoluene	%	90

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	119	125	126	126	118

sTRH in Soil (C10-C36)		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	25/02/2011
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	230
TRH C_{29} - C_{36}	mg/kg	140
Surrogate o-Terphenyl	%	128

PAHs in Soil						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.1	<0.1	0.3
Pyrene	mg/kg	<0.1	<0.1	0.1	<0.1	0.4
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	<0.1	<0.1	0.1	<0.1	0.2
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.3
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.09	<0.05	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Surrogate p-Terphenyl-d_{14}	%	122	125	126	122	123

PAHs in Soil		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	25/02/2011
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	1.1
Anthracene	mg/kg	0.2
Fluoranthene	mg/kg	1.8
Pyrene	mg/kg	1.9
Benzo(a)anthracene	mg/kg	0.8
Chrysene	mg/kg	0.7
Benzo(b+k)fluoranthene	mg/kg	1.1
Benzo(a)pyrene	mg/kg	0.7
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3
Surrogate p-Terphenyl-d_{14}	%	119

Organochlorine Pesticides in soil						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011	26/02/2011	26/02/2011	26/02/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	77	75	73	74	68

Organochlorine Pesticides in soil		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	26/02/2011
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Surrogate TCLMX	%	72

Organophosphorus Pesticides						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011	26/02/2011	26/02/2011	26/02/2011
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	77	75	73	74	68

Organophosphorus Pesticides		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	26/02/2011
Diazinon	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Surrogate TCLMX	%	72

PCBs in Soil						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011	26/02/2011	26/02/2011	26/02/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	77	75	73	74	68

PCBs in Soil		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date extracted	-	25/02/2011
Date analysed	-	26/02/2011
Arochlor 1016	mg/kg	<0.1
Arochlor 1221*	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Surrogate TCLMX	%	72

Acid Extractable metals in soil						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Arsenic	mg/kg	22	9	6	<4	6
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	18	15	10	6	17
Copper	mg/kg	16	21	20	2	49
Lead	mg/kg	47	53	27	10	30
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	4	7	4	8
Zinc	mg/kg	50	72	44	19	34

Acid Extractable metals in soil			
Our Reference:	UNITS	52258-11	52258-13
Your Reference	----------	BH6	Dup1
Depth	----------	0.2-0.5	-
Date Sampled		21/02/2011	21/02/2011
Type of sample		Soil	Soil
Date digested	-	25/02/2011	25/02/2011
Date analysed	-	25/02/2011	25/02/2011
Arsenic	mg/kg	<4	18
Cadmium	mg/kg	<0.5	<0.5
Chromium	mg/kg	14	15
Copper	mg/kg	49	18
Lead	mg/kg	37	56
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	11	4
Zinc	mg/kg	48	59

Moisture						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/02/2011	25/02/2011	25/02/2011	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011	26/02/2011	26/02/2011	26/02/2011
Moisture	%	13	16	9.4	2.4	12

Moisture			
Our Reference:	UNITS	52258-11	52258-13
Your Reference	----------	BH6	Dup1
Depth	----------	0.2-0.5	-
Date Sampled		21/02/2011	21/02/2011
Type of sample		Soil	Soil
Date prepared	-	25/02/2011	25/02/2011
Date analysed	-	26/02/2011	26/02/2011
Moisture	%	11	14

Asbestos ID - soils						
Our Reference:	UNITS	52258-1	52258-4	52258-6	52258-8	52258-10
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1-0.5	1-1.5	0-0.3	0.1-0.3	0.1-0.3
Date Sampled		22/02/2011	22/02/2011	21/02/2011	21/02/2011	21/02/2011
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/2/2011	28/2/2011	28/2/2011	28/2/2011	28/2/2011
Sample Description	-	Approx 40g Rocks & Soil	Approx 40g Rocks & Soil	Approx 40g Rocks & Soil	Approx 40g Soil & Sand	Approx 40g Soil & Sand
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Asbestos ID - soils		
Our Reference:	UNITS	52258-11
Your Reference	----------	BH6
Depth	----------	0.2-0.5
Date Sampled		21/02/2011
Type of sample		Soil
Date analysed	-	28/2/2011
Sample Description	-	Approx 40g Soil & Sand
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected

Method ID	Methodology Summary
GC.16	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC.8	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
AS4964-2004	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			26/02/2011	52258-1	26/02/2011 || 26/02/2011	LCS-4	26/02/2011
vTRH C_6 - C_9	mg/kg	25	GC.16	<25	52258-1	<25 || <25	LCS-4	86%
Benzene	mg/kg	0.5	GC.16	<0.5	52258-1	<0.5 || <0.5	LCS-4	84%
Toluene	mg/kg	0.5	GC.16	<0.5	52258-1	<0.5 || <0.5	LCS-4	98%
Ethylbenzene	mg/kg	1	GC.16	<1.0	52258-1	<1.0 || <1.0	LCS-4	96%
m+p-xylene	mg/kg	2	GC.16	<2.0	52258-1	<2.0 || <2.0	LCS-4	102%
o-Xylene	mg/kg	1	GC.16	<1.0	52258-1	<1.0 || <1.0	LCS-4	92%
Surrogate aaa-Trifluorotoluene	%		GC.16	84	52258-1	82 || 87 || RPD: 6	LCS-4	95%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
TRH C_{10} - C_{14}	mg/kg	50	GC.3	<50	52258-1	<50 || <50	LCS-4	114%
TRH C_{15} - C_{28}	mg/kg	100	GC.3	<100	52258-1	<100 || <100	LCS-4	136%
TRH C_{29} - C_{36}	mg/kg	100	GC.3	<100	52258-1	<100 || <100	LCS-4	116%
Surrogate o-Terphenyl	%		GC.3	100	52258-1	119 || 128 || RPD: 7	LCS-4	116%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	102%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	107%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	120%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	113%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	120%
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	LCS-4	123%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	52258-1	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	52258-1	<0.05 || <0.05	LCS-4	108%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	123	52258-1	122 || 122 || RPD: 0	LCS-4	118%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			26/02/2011	52258-1	26/02/2011 || 26/02/2011	LCS-4	26/02/2011
HCB	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	88%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	88%
Heptachlor	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	85%
delta-BHC	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	84%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	93%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	89%
Dieldrin	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	103%
Endrin	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	93%
pp-DDD	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	92%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	LCS-4	99%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	78	52258-1	77 || 78 || RPD: 1	LCS-4	71%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			26/02/2011	52258-1	26/02/2011 || 26/02/2011	LCS-4	26/02/2011
Diazinon	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	LCS-4	95%
Fenitrothion	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	LCS-4	95%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	52258-1	<0.1 || <0.1	LCS-4	102%
Surrogate TCLMX	%		GC.8	78	52258-1	77 || 78 || RPD: 1	LCS-4	76%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-4	25/02/2011
Date analysed	-			26/02/2011	52258-1	26/02/2011 || 26/02/2011	LCS-4	26/02/2011
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	LCS-4	110%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	52258-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	78	52258-1	77 || 78 || RPD: 1	LCS-4	96%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-1	25/02/2011
Date analysed	-			25/02/2011	52258-1	25/02/2011 || 25/02/2011	LCS-1	25/02/2011
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	52258-1	22 || 14 || RPD: 44	LCS-1	93%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	52258-1	<0.5 || <0.5	LCS-1	98%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	52258-1	18 || 18 || RPD: 0	LCS-1	96%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	52258-1	16 || 16 || RPD: 0	LCS-1	97%
Lead	mg/kg	1	Metals.20 ICP-AES	<1	52258-1	47 || 55 || RPD: 16	LCS-1	94%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	52258-1	0.1 || 0.1 || RPD: 0	LCS-1	118%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	52258-1	4 || 4 || RPD: 0	LCS-1	97%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	52258-1	50 || 57 || RPD: 13	LCS-1	96%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			25/02/2011
Date analysed	-			26/02/2011
Moisture	%	0.1	LAB.8	<0.10

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

Report Comments:

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Todd Hore

Sample log in details:

Your reference:	**E24595KH, Ryde**
Envirolab Reference:	**52258**
Date received:	24/02/11
Date results expected to be reported:	**3/03/11**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	13 Soils
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice

Comments:

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

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E24595KH Date Results Required: standard turnaround Sheet 1 /	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Todd Hore

Project: Proposed Grayhwaite Rehabilitation Centre
Location: Ryde
Sampler: DS

Sample Preservation: In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 13	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	
22/02/2011	1	BH1	0.1-0.5	Glass jar + Asb Bag	0	Natural		X										
22/02/2011	2	BH1	1-1.5	Glass jar + Asb Bag	0	Natural												
22/02/2011	3	BH2	0.1-0.3	Glass jar + Asb Bag	0	Fill												
22/02/2011	4	BH2	1-1.5	Glass jar + Asb Bag	0	Fill		X										
22/02/2011	5	BH2	1.7-2	Glass jar + Asb Bag	0	Natural												
21/02/2011	6	BH3	0-0.3	Glass jar + Asb Bag	0	Fill		X										
21/02/2011	7	BH3	0.5-1	Glass jar + Asb Bag	0	Natural												
21/02/2011	8	BH4	0.1-0.3	Glass jar + Asb Bag	0	Fill		X										
21/02/2011	9	BH4	1-1.2	Glass jar + Asb Bag	0	Natural												
22/02/2011	10	BH5	0.1-0.3	Glass jar + Asb Bag	0	Fill		X										
21/02/2011	11	BH6	0.2-0.5	Glass jar + Asb Bag	0	Fill		X										
21/02/2011	12	BH6	1-1.5	Glass jar + Asb Bag	0	Natural												
21/02/2011	13	Dup 1		Glass jar	0	Soil				X								
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
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				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200
Job No: 52258
Date received: 24-2-11
Time received: 3pm
Received by: E
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:	
[signature]	24/2/11	10am	[signature]	24-2-11 3pm

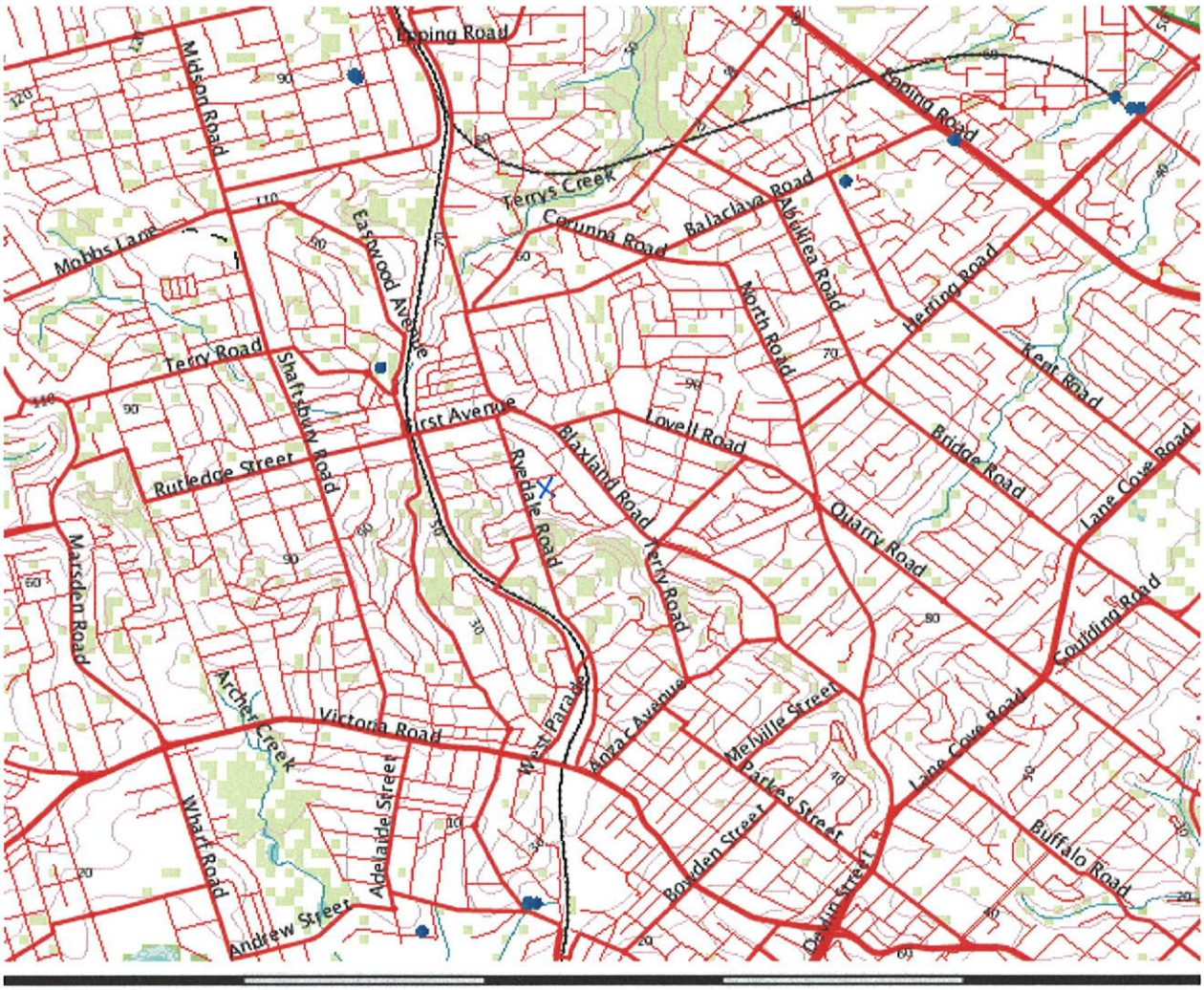
APPENDIX C

(Site History Documents – Groundwater Bore Records)

E24595KH, Denistone

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au

Wednesday, March 02, 2011



Legend

Symbol	Layer	Custodian
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	
Primary/arterial road Motorway/freeway Railway Runway Contour Background	Topographic base map	

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Wednesday, March 2, 2011

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW110173

Works Details (top)

GROUNDWATER NUMBER	GW110173
LIC-NUM	10BL602983
AUTHORISED-PURPOSES	RECREATION (GROUNDWATER)
INTENDED-PURPOSES	RECREATION (GROUNDWATER)
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Other Govt
COMMENCE-DATE	
COMPLETION-DATE	2009-02-02
FINAL-DEPTH (metres)	48.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	EASTWOOD PARK
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	5.50
SALINITY	
YIELD	2.80

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6259586.00
EASTING	322335.00
LATITUDE	33 47' 20"
LONGITUDE	151 4' 52"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	FIELD OF MARS
PORTION-LOT-DP	1 167919

Licensed (top)

COUNTY	CUMBERLAND
PARISH	FIELD OF MARS
PORTION-LOT-DP	1 167919

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	2.50	219			Down Hole Hammer
1		Hole	Hole	2.50	4.80	165			Down Hole Hammer
1	1	Casing	Steel	-0.40	2.60	165			Driven into Hole
1	1	Casing	PVC Class 9	0.40	38.60	140			Screwed and Glued; Suspended in Clamps

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
25.50	26.00	0.50				0.60		0.25	1800.00
37.10	37.40	0.30		5.50		2.80		0.25	2700.00

Drillers Log (top)

no details

(Site History Documents – Historical Land Title Records)

ADVANCE LEGAL SEARCH PTY LIMITED

(ACN 077 067 068)
ABN 49 077 067 068

PO Box 149
Yagoona NSW 2199

Telephone: +612 9754 1590
Mobile: 0412 169 809
Facsimile: +612 9754 1364
Email: alsearch@optusnet.com.au

09th January 2011

ENVIRONMENTAL INVESTIGATION SERVICE PTY LIMITED
PO Box 976,
NORTH RYDE BC NSW 1670

Attention: Todd Hore

RE: **1 Denistone Road, Denistone**
EIS Job Number: E24595KH

Note 1: **Lot 1 DP 1137800**
Note 2: **Lot 2 DP 1137800**

Note 1:

Current Search

Folio Identifier 1/1137800 (title attached)
DP 1137800 (plan attached)
Dated 5th January 2011
Registered Proprietor:
THE STATE OF NEW SOUTH WALES

Title Tree
Lot 1 DP 1137800

Folio Identifier 1/1137800

Folio Identifier 1/869614

See Notes (a) and (b)

(a)

F/I 6/3/7997

CTVol 2884 Fol 219

CTVol 1115 Fol 59

****

(b)

Folio Identifier 157/752035

CTVol 4700 Fol 144

****

Summary of Proprietor(s)
Lot 1 DP 1137800

Year	Proprietor
	(Lot 1 DP 1137800)
2010 – todate	The State of New South Wales
2009 – 2010	Health Administration Corporation
	(Lot 1 DP 869614)
1997 – 2009	Health Administration Corporation
(2005 – 2009)	*(commercial lease shown on Historical Search 1/869614)*

See Notes (a) & (b)

Note (a)

	(Lot 6 Section 3 DP 7997)
1989 – 1997	Health Administration Corporation
	(Lot 6 Section 3 DP 7997 – CTVol 2884 Fol 219)
1952 – 1989	The Ryde District Soldiers' Memorial Hospital
1938 – 1950	Pearl Porter, spinster
1920 – 1938	Mary Ann Porter
1918 – 1920	James Elton Morren, carpenter
1918 – 1918	Frank David Muller, gentleman John Edgar Terry, accountant
	(Portion 48, Parish of Hunters Hill – Area 128 Acres 3 Roods 4 ¼ Perches – CTVol 1115 Fol 59)
1914 – 1918	Frank David Muller, gentleman John Edgar Terry, accountant
1894 – 1914	Richard Rouse Terry

*****

Note (b)

	(Lot 157 DP 752035)
1989 – 1997	Health Administration Corporation
	(Part of Portion 15, Parish of Hunter's Hill – Area 17 Acres 3 Roods 17 ¾ Perches – CTVol 4700 Fol 144)
1929 – 1989	The Ryde District Soldiers' Memorial Hospital Grantee (land as a site for hospital)

*****

Note 2:

Current Search

Folio Identifier 2/1137800 (title attached)
DP 1137800 (plan attached)
Dated 5th January 2011
Registered Proprietor:
NORTH SYDNEY AND CENTRAL COAST AREA HEALTH SERVICE

-

Title Tree
Lot 2 DP 1137800

Folio Identifier 2/1137800

Folio Identifier 1/869614

See Notes (a), (b), (c) and (d)

(a)	**(b)**	**(c)**	**(d)**
F/I 3/37997	F/I 4/37997	F/I 5/3/7997	F/I 157/752035
CTVol 2843 Fol 47	CTVol 3175 Fol 75	CTVol 3596 Fol 137	CTVol 4700 Fol 144
CTVol 1115 Fol 59	CTVol 1115 Fol 59	CTVol 3255 Fol 9	
		CTVol 1115 Fol 59	
****	****	****	****

Summary of Proprietor(s)
Lot 2 DP 1137800

Year	Proprietor
	(Lot 2 DP 1137800)
2009 – todate	North Sydney and Central Coast Area Health Service
(2009 – 2055)	*(lease to Energy Australia, shown on current title)*
	(Lot 1 DP 869614)
1997 – 2009	Health Administration Corporation
(2005 – 2009)	*(commercial lease shown on Historical Search 1/869614)*

See Notes (a), (b), (c) & (d)

Note (a)

	(Lot 3 Section 3 DP 7997)
1989 – 1997	Health Administration Corporation
	(Lot 3 Section 3 DP 7997 – Area 32 Perches – CTVol 2843 Fol 47)
1940 – 1989	The Ryde District Soldiers' Memorial Hospital
1940 – 1940	David Wild Crawley, retired blacksmith David James Crawley, engineer
1920 – 1940	Harriet Crawley
1920 – 1920	Jack Crawley, motor car trimmer
1918 – 1920	Richard Harold Gray, car builder
1918 – 1918	Frank David Muller, gentleman John Edgar Terry, accountant
	(Portion 48, Parish of Hunters Hill – Area 128 Acres 3 Roods 4 ¼ Perches – CTVol 1115 Fol 59)
1914 – 1918	Frank David Muller, gentleman John Edgar Terry, accountant
1894 – 1914	Richard Rouse Terry

*****

Note (b)

	(Lot 4 Section 3 DP 7997)
1989 – 1997	Health Administration Corporation
	(Lot 4 Section 3 DP 7997 – Area 32 Perches – CTVol 3175 Fol 75)
1942 – 1989	The Ryde District Soldiers' Memorial Hospital
1942 – 1942	Perpetual Trustee Company (Limited), MORTGAGEE
1929 – 1942	Ada Alice Burns
1928 – 1929	Joseph Lorriman, musician
1928 – 1928	Madeline Blanche Doutty
1921 – 1928	George Henry Evans, packer
	(Portion 48, Parish of Hunters Hill – Area 128 Acres 3 Roods 4 ¼ Perches – CTVol 1115 Fol 59)
1914 – 1921	Frank David Muller, gentleman John Edgar Terry, accountant
1894 – 1914	Richard Rouse Terry

*****

Note (c)

	(Lot 5 Section 3 DP 7997)
1989 – 1997	Health Administration Corporation
	(Lot 5 Section 3 DP 7997 – Area 32 Perches – CTVol 3596 Fol 137)
1943 – 1989	The Ryde District Soldiers' Memorial Hospital
1924 – 1943	William Whitelegg
1924 – 1924	Madeline Blanche Doutty
	(Part Portion 48, Parish of Hunter's Hill – Area 75 Acres 1 Rood ½ Perch – CTVol 3255 Fol 9)
1921 – 1924	Frank David Muller, gentleman John Edgar Terry, accountant
	(Portion 48, Parish of Hunters Hill – Area 128 Acres 3 Roods 4 ¼ Perches – CTVol 1115 Fol 59)
1914 – 1921	Frank David Muller, gentleman John Edgar Terry, accountant
1894 – 1914	Richard Rouse Terry

*****

Note (d)

	(Lot 157 DP 752035)
1989 – 1997	Health Administration Corporation
	(Part of Portion 15, Parish of Hunter's Hill – Area 17 Acres 3 Roods 17 ¾ Perches – CTVol 4700 Fol 144)
1929 – 1989	The Ryde District Soldiers' Memorial Hospital

*****

Land & Property Management Authority
Land & Property Information

Cadastral Records Enquiry Report

Ref : BOX 97 - DENISTONE

Requested Parcel : Lot 1 DP 1137800

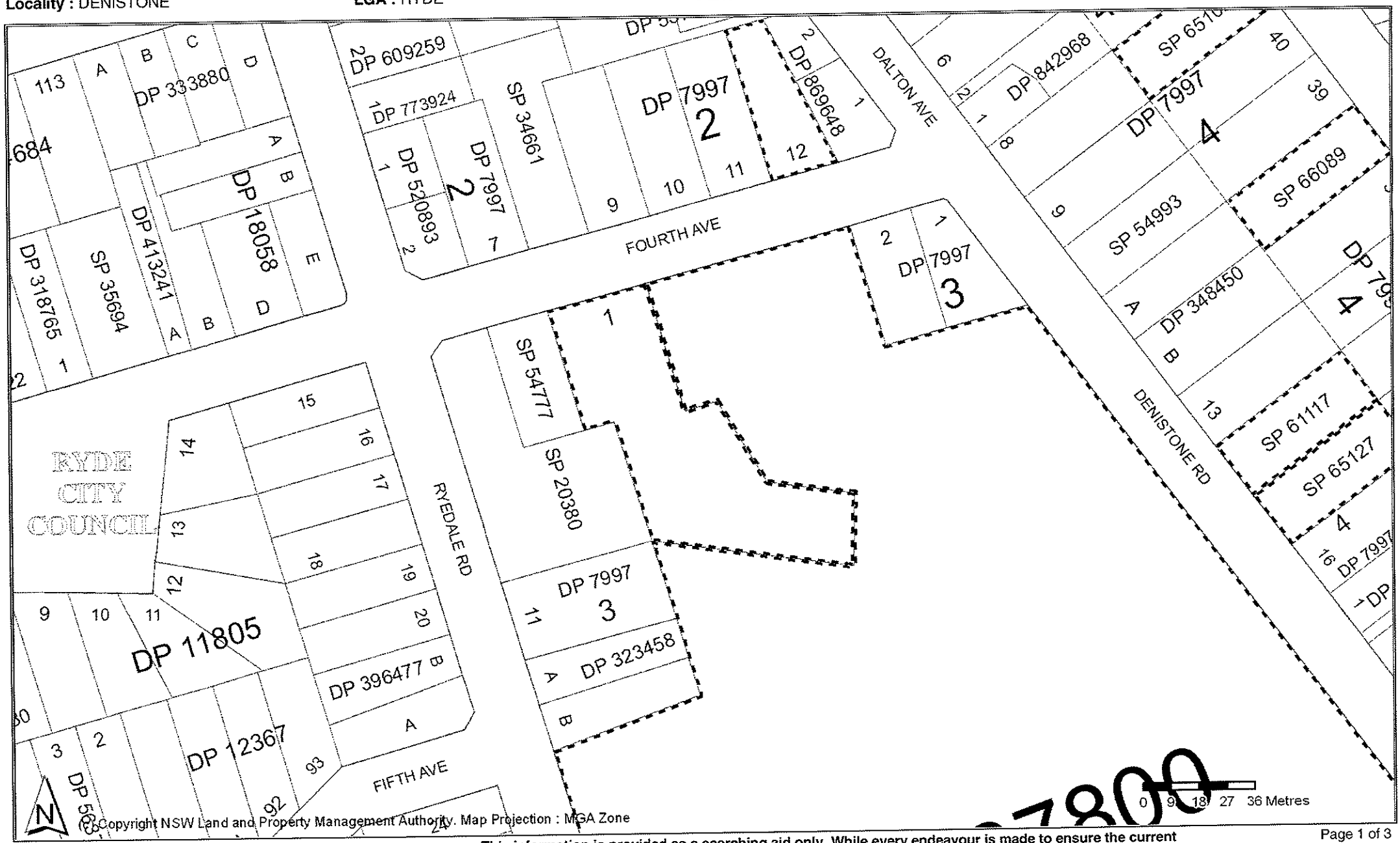
Identified Parcel : Lot 1 DP 1137800

Locality : DENISTONE

LGA : RYDE

Parish : HUNTERS HILL

County : CUMBERLAND



Report Generated 10:42:15 AM, 6 January, 2011

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

Land & Property Management Authority
Land & Property Information

Cadastral Records Enquiry Report

Requested Parcel : Lot 2 DP 1137800

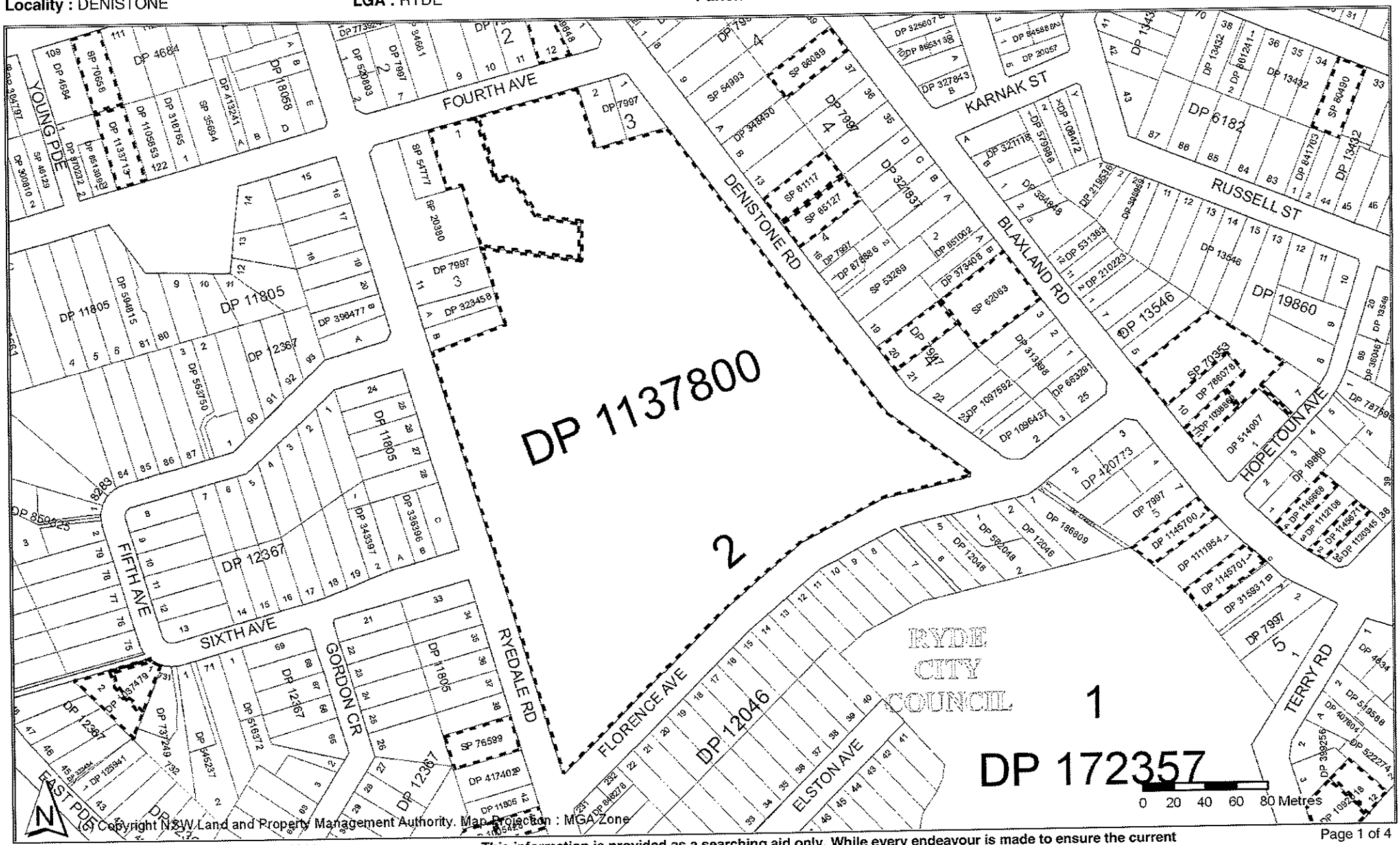
Identified Parcel : Lot 2 DP 1137800

Locality : DENISTONE

LGA : RYDE

Parish : HUNTERS HILL

County : CUMBERLAND



Report Generated 10:58:55 AM, 6 January, 2011

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/1137800

SEARCH DATE	TIME	EDITION NO	DATE
5/1/2011	8:53 PM	3	20/4/2010

LAND

LOT 1 IN DEPOSITED PLAN 1137800
AT DENISTONE
LOCAL GOVERNMENT AREA RYDE
PARISH OF HUNTERS HILL COUNTY OF CUMBERLAND
TITLE DIAGRAM DP1137800

FIRST SCHEDULE

THE STATE OF NEW SOUTH WALES (T AF341194)

SECOND SCHEDULE (4 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS AFFECTING THE PART SHOWN SO BURDENED IN DP869614
2 A639388 COVENANT
3 B81644 COVENANT
4 AF427765 CAVEAT BY THE REGISTRAR GENERAL

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 8:54PM

FOLIO: 1/1137800

First Title(s): VOL 4700 FOL 144
Prior Title(s): 1/869614

Recorded	Number	Type of Instrument	C.T. Issue
29/4/2009	DP1137800	DEPOSITED PLAN	LOT RECORDED FOLIO NOT CREATED
26/5/2009	AE676386	REQUEST	FOLIO CREATED EDITION 1
3/3/2010	AF341194	TRANSFER	EDITION 2
20/4/2010	AF427765	CAVEAT BY REGISTRAR GENERAL	EDITION 3

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 8:56PM

FOLIO: 1/869614

First Title(s): OLD SYSTEM
Prior Title(s): 3-6/3/7997 157/752035

Recorded	Number	Type of Instrument	C.T. Issue
25/7/1997	DP869614	DEPOSITED PLAN	FOLIO CREATED EDITION 1
4/10/2005	AB779535	LEASE	EDITION 2
29/11/2005	AB915952	APPLICATION	EDITION 3
		FIRST TITLES(S) AS AMENDED: VOL 4700 FOL 144, OLD SYSTEM.	
7/4/2009	AE598382	DEPARTMENTAL DEALING	
29/4/2009	DP1137800	DEPOSITED PLAN	
26/5/2009	AE676386	REQUEST	FOLIO CANCELLED

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:02PM

FOLIO: 3/3/7997

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 2843 FOL 47

Recorded	Number	Type of Instrument	C.T. Issue
16/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
16/10/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
23/7/1997	DP869614	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:03PM

FOLIO: 4/3/7997

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 3175 FOL 75

Recorded	Number	Type of Instrument	C.T. Issue
17/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
13/6/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
23/7/1997	DP869614	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:04PM

FOLIO: 5/3/7997

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 3596 FOL 137

Recorded	Number	Type of Instrument	C.T. Issue
17/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
26/6/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
23/7/1997	DP869614	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:05PM

FOLIO: 6/3/7997

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 2884 FOL 219

Recorded	Number	Type of Instrument	C.T. Issue
16/9/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/10/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
23/7/1997	DP869614	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:01PM

FOLIO: 157/752035

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 4700 FOL 144

Recorded	Number	Type of Instrument	C.T. Issue
20/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
27/2/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
25/7/1996		AMENDMENT: TITLE DIAGRAM	
23/7/1997	DP869614	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

Req:R593007 /Doc:DL AF341194 /Rev:05-Mar-2010 /Sts:NO.OK /Prt:06-Jan-2011 18:52 /Pgs:ALL /Seq:1 of 1
Ref:Geo_Logix - Winda /Src:T

Form: 01T
Release: 3.6
www.lands.nsw.gov.au

TRANSFER

New South Wales
Real Property Act 1900

AF341194C

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the R by this form for the establishment and maintenance of the Real Property A the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY Office of State Revenue use only

Crown Instrument not liable to Stamp Duty
Section 308 Duties Act 1997 No 123
I. V. KNIGHT Crown Solicitor
Per

(A) **TORRENS TITLE** 1/1137800

(B) **LODGED BY**

Document Collection Box	Name, Address or DX, Telephone, and Customer Account Number if any	CODES
813E	LLPN 123589U I. V. KNIGHT, CROWN SOLICITOR DX 19 SYDNEY Reference: HTH19000731 T10 CTV	T JT TJ TW

(C) **TRANSFEROR** HEALTH ADMINISTRATION CORPORATION

(D) **CONSIDERATION** The transferor acknowledges receipt of the consideration of $ and as regards

(E) **ESTATE** the above land transfers to the transferee an estate in fee simple

(F) **SHARE TRANSFERRED**

(G) Encumbrances (if applicable):

(H) **TRANSFEREE** HER MAJESTY QUEEN ELIZABETH II IN RIGHT OF THE STATE OF NEW SOUTH WALES AS TRUSTEE FOR THE GRAYTHWAITE TRUST

(I) **TENANCY:**

DATE

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

Signature of witness: B. Wil

Name of witness: BRYSON WILSON
Address of witness: 73 MILLER ST, NORTH SYDNEY

Certified correct for the purposes of the Real Property Act 1900 by the authorised officer named below.

Signature of authorised officer:

Authorised officer's name: DENNIS JENNER
Authority of officer: DELEGATE
Signing on behalf of: HEALTH ADMINISTRATION CORPORATION

Certified correct for the purposes of the Real Property Act 1900 by the person whose signature appears below.

Signature:

I. V. KNIGHT
CROWN SOLICITOR
BY HIS EMPLOYED SOLICITOR

Signatory's name:
Signatory's capacity: transferee's solicitor

PAUL COLLINS

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 2/1137800

SEARCH DATE	TIME	EDITION NO	DATE
5/1/2011	9:06 PM	1	29/6/2009

LAND

LOT 2 IN DEPOSITED PLAN 1137800
AT DENISTONE
LOCAL GOVERNMENT AREA RYDE
PARISH OF HUNTERS HILL COUNTY OF CUMBERLAND
TITLE DIAGRAM DP1137800

FIRST SCHEDULE

NORTH SYDNEY AND CENTRAL COAST AREA HEALTH SERVICE

SECOND SCHEDULE (5 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 LAND EXCLUDES MINERALS AFFECTING THE PART SHOWN SO BURDENED IN DP869614
3 A639388 COVENANT
4 B81644 COVENANT
5 AB779535 LEASE TO ENERGYAUSTRALIA OF SUBSTATION NO 8434 "RYDE HOSPITAL NO. 2" SHOWN DESIGNATED (P) TOGETHER WITH RIGHT OF WAY & EASEMENT AFFECTING ANOTHER PART OF THE LAND ABOVE DESCRIBED SHOWN DESIGNATED (C) IN PLAN WITH AB779535. EXPIRES: 31/5/2055.

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:08PM

FOLIO: 2/1137800

First Title(s): VOL 4700 FOL 144 OLD SYSTEM
Prior Title(s): 1/869614

Recorded	Number	Type of Instrument	C.T. Issue
29/4/2009	DP1137800	DEPOSITED PLAN	LOT RECORDED FOLIO NOT CREATED
26/5/2009	AE676386	REQUEST	FOLIO CREATED CT NOT ISSUED
29/6/2009	AE785574	REQUEST	EDITION 1

*** END OF SEARCH ***

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
5/1/2011 9:09PM

FOLIO: 1/869614

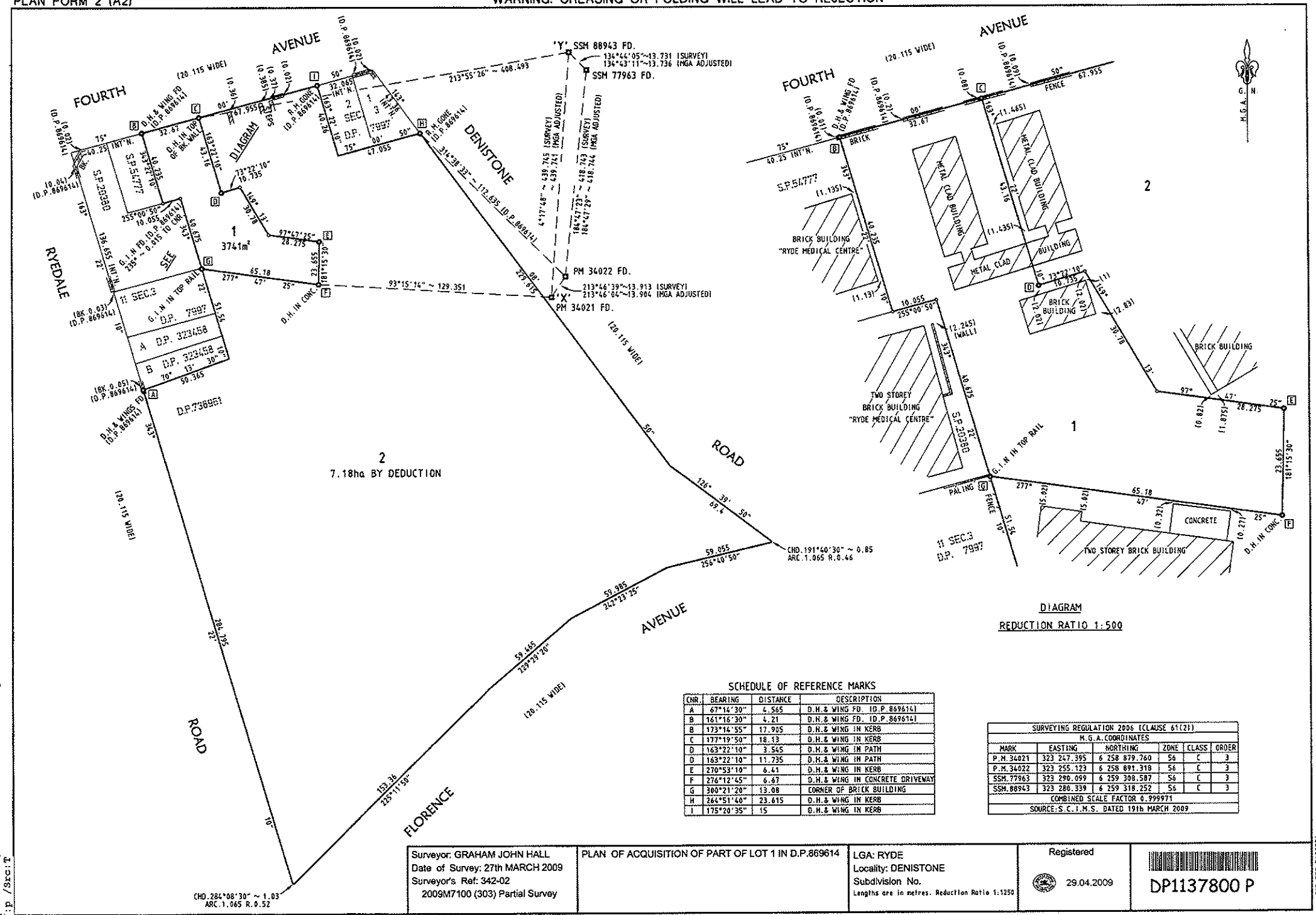
First Title(s): OLD SYSTEM
Prior Title(s): 3-6/3/7997 157/752035

Recorded	Number	Type of Instrument	C.T. Issue
25/7/1997	DP869614	DEPOSITED PLAN	FOLIO CREATED EDITION 1
4/10/2005	AB779535	LEASE	EDITION 2
29/11/2005	AB915952	APPLICATION	EDITION 3
		FIRST TITLES(S) AS AMENDED: VOL 4700 FOL 144, OLD SYSTEM.	
7/4/2009	AE598382	DEPARTMENTAL DEALING	
29/4/2009	DP1137800	DEPOSITED PLAN	
26/5/2009	AE676386	REQUEST	FOLIO CANCELLED

*** END OF SEARCH ***

EIS - Denistone PRINTED ON 5/1/2011

PLAN FORM 2 (A2) WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION Sheet 1 of 1 sheets



SCHEDULE OF REFERENCE MARKS

CNR.	BEARING	DISTANCE	DESCRIPTION
A	67°14'30"	4.565	D.H.& WING FD. (D.P.869614)
B	161°16'30"	4.21	D.H.& WING FD. (D.P.869614)
B	173°14'55"	17.905	D.H.& WING IN KERB
C	177°19'50"	18.13	D.H.& WING IN KERB
D	163°22'10"	3.545	D.H.& WING IN PATH
D	163°22'10"	11.735	D.H.& WING IN PATH
E	270°53'10"	6.41	D.H.& WING IN KERB
F	276°12'45"	6.67	D.H.& WING IN CONCRETE DRIVEWAY
G	300°21'20"	13.08	CORNER OF BRICK BUILDING
H	264°51'40"	23.615	D.H.& WING IN KERB
I	175°20'35"	15	D.H.& WING IN KERB

SURVEYING REGULATION 2006 (CLAUSE 61(2)) M.G.A. COORDINATES					
MARK	EASTING	NORTHING	ZONE	CLASS	ORDER
P.M.34021	323 247.395	6 258 879.760	56	C	3
P.M.34022	323 255.123	6 258 891.318	56	C	3
SSM.77963	323 290.099	6 259 308.587	56	C	3
SSM.88943	323 280.339	6 259 318.252	56	C	3
COMBINED SCALE FACTOR 0.999971					
SOURCE:S.C.I.M.S. DATED 19th MARCH 2009					

Surveyor: GRAHAM JOHN HALL
Date of Survey: 27th MARCH 2009
Surveyor's Ref: 342-02
2009M7100 (303) Partial Survey

PLAN OF ACQUISITION OF PART OF LOT 1 IN D.P.869614

LGA: RYDE
Locality: DENISTONE
Subdivision No.
Lengths are in metres. Reduction Ratio 1:1250

Registered 29.04.2009

DP1137800 P

CAD REF: 342025

Req:R590100 /Doc:DP 1137800 P /Rev:30-Apr-2009 /Sts:SC.OK /Prt:05-Jan-2011 20:52 /Pgs:ALL /Seq:1 of 2
Ref:p /Src:F

DEPOSITED PLAN ADMINISTRATION SHEET Sheet 1 of 1 sheet(s)

SIGNATURES, SEALS AND STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

IT IS INTENDED TO ACQUIRE LOT 1

Use PLAN FORM 6A
for additional certificates, signatures, seals and statements

Crown Lands NSW / Western Lands Office Approval

I.....In approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature:.....

Date:.....

File Number:.....

Office:.....

Subdivision Certificate

I certify that the Provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed ..... set out herein
(insert 'subdivision' or 'new road')

.....
* Authorised Person/General Manager/Accredited Certifier

Consent Authority:.....

Date of Endorsement:.....

Accreditation no:.....

Subdivision Certificate no: .....

File no: .....

*Delete whichever is inapplicable

DP1137800 S

Registered: 29.04.2009

Title System: TORRENS

Purpose: ACQUISITION

PLAN OF
ACQUISITION OF PART OF LOT 1
IN D.P.869614

LGA: RYDE

Locality: DENISTONE

Parish: HUNTERS HILL

County: CUMBERLAND

Surveying Regulation, 2006

I, GRAHAM JOHN HALL

of CRAIG & RHODES PTY LTD
LEVEL 4, 16-18 CAMBRIDGE ST.EPPING 2121

a surveyor registered under the Surveying Act, 2002, certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying Regulation, 2006 and was completed on: 27th MARCH 2009

The survey relates to LOT 1. RESIDUE LOT 2 IS COMPILED FROM D.P.869614 CLOCKWISE FROM [H] TO [A].

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature Graham Hall. Dated 30/3/09
Surveyor registered under the Surveying Act, 2002

Datum Line: 'X'-'Y'

Type: Urban/~~Rural~~

Plans used in preparation of survey / ~~compilation.~~

D.P.7997
D.P.633186
D.P.846278
D.P.868386
D.P.869614
D.P.869648
S.P.20380
S.P.54777

(If insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: 342-02
2009M7100 (303) Partial Survey

* OFFICE USE ONLY

CAD REF: 34202S1

(Site History Documents – WorkCover Records)

TH 18 JAN 2011

WorkCover
NEW SOUTH WALES

Our Ref: D11/003504
Your Ref: Nizam Ahamed

17 January 2011

Attention: Todd Hore
Environmental Investigation Services
PO Box 976
NORTH RYDE BC NSW 1670

Dear Mr Hore,

RE SITE: 1 Denistone Street Deniston

I refer to your site search request received by WorkCover NSW on 13 January 2011 requesting information on licences to keep dangerous goods for the above site.

Enclosed are copies of the documents that WorkCover NSW holds on Dangerous Goods Licence 35/019511 relating to the storage of dangerous goods at the above-mentioned premises, as listed on the Stored Chemical Information Database (SCID).

If you have any further queries please contact the Dangerous Goods Licensing Team on (02) 4321 5500.

Yours Sincerely

Diana Hayes
Senior Licensing Officer
Dangerous Goods Notification Team

Application for Licence to Keep Dangerous Goods

WorkCover NEW SOUTH WALES

Application for ☐ new licence ☑ amendment ☐ transfer ☑ renewal of expired licence

PART A – Applicant and site information See page 2 of Guidance Notes.

1 Name of applicant | ACN

David Knight | N/A

2 Postal address of applicant | Suburb/Town | Postcode

Denistone Rd | Eastwood | 2122

3 Trading name or site occupier's name

Ryde Hospital & Community Health Services

4 Contact for licence inquiries

Phone | Fax | Name

02 98580774 | 02 98580718 | David Knight

5 Previous licence number (if known) 35/ 019511

6 Previous occupier (if known) N/A

7 Site to be licensed

No | Street

Ryde Hospital | Denistone Rd

Suburb / Town | Postcode

Eastwood | 2122

8 Main business of site Hospitals (Except Psychiatric Hospital)

9 Site staffing: Hours per day 24 Days per week 7

10 Site emergency contact

Phone | Name

02 9874 0191 | Switch Board on duty Assistant Director Nursing

11 Major supplier of dangerous goods BOC Gases

12 If a new site or for amendments to depots – see page 4 of Guidance Notes.

Plan stamped by: Name of Accredited Consultant | Date stamped

Chemcore Consulting |

I certify that the details in this application (including any accompanying computer disk) are correct and cover all licensable quantities of dangerous goods kept on the premises.

13 Signature of applicant | Printed name | Date

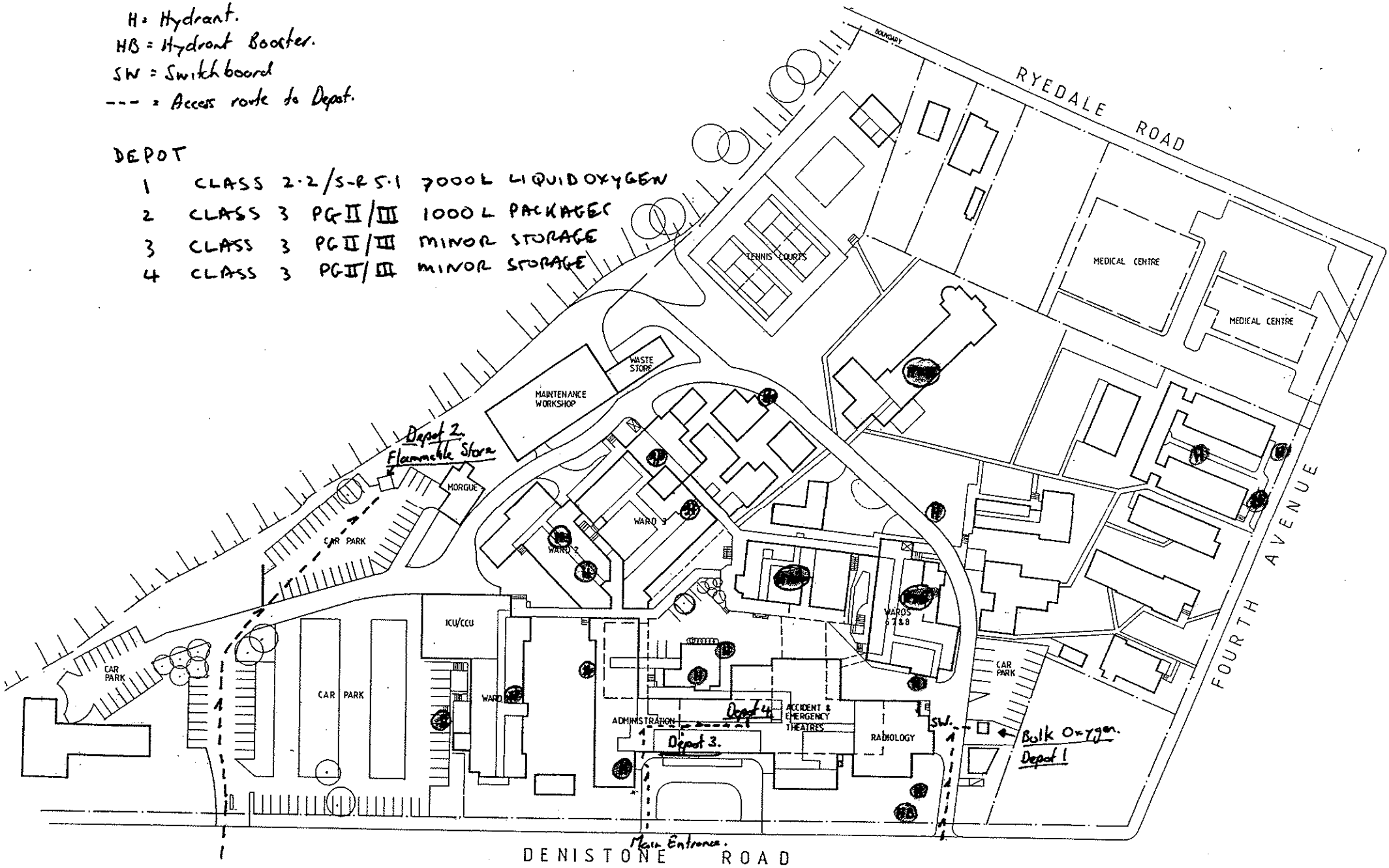
[signature] | David Knight |

Please send your application, marked *CONFIDENTIAL*, to: **Dangerous Goods Licensing, WorkCover NSW, Level 3, GPO Box 5364, SYDNEY NSW 2001**

H = Hydrant.
HB = Hydrant Booster.
SW = Switchboard
--- = Access route to Depot.

DEPOT

1	CLASS 2·2/5·R 5·1	7000L	LIQUID OXYGEN
2	CLASS 3 PG II/III	1000L	PACKAGED
3	CLASS 3 PG II/III	MINOR	STORAGE
4	CLASS 3 PG II/III	MINOR	STORAGE



THE RYDE HOSPITAL

DENISTONE RD EASTWOOD

Morrison Design Partnership Architects P/L

SCALE 1:500
0 10 20 30 40 50M

N

What is a depot? See page 5 of the Guidance Notes.

PART C – Dangerous Goods Storage *Complete one section per depot.*

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity
1	Above Ground Tank.	2.2.	7000L

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1073	Oxygen, Liquid	2.2	–	Liquid Oxygen.	4,500	L

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³

What is a depot? See page 5 of the Guidance Notes.

PART C – Dangerous Goods Storage *Complete one section per depot.*

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity
2.	Rooted Store.	3.	1000 litres.

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1300	Turpentine.	3·2	III	Mineral Turpentine.	300	L
1170	Methylated Spirit	3·1	II	Methylated Spirit.	200	L
1270	Petroleum Fuel	3.	II	Petrol.	100	L

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity
3.	Flammable Liquid Cabinet. (Pharmacy)	3	100 Litres

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1090	Acetone.	3	II	Acetone B.P.	4	L
1170	Ethanol.	3	II	Chlorhexidine.	80	L
1170.	Methylated Coal Tar Solution	3	II	Coal Tar Solution.	2.	L
1170	Alcohol (ETHANOL)	3	II	Alcohol 70%	20	L
1170.	Alcohol (ETHANOL)	3	II	Alcohol 95%	10	L
1170.	Benzoin	3	II	Friars Balsam.	1	L
						L

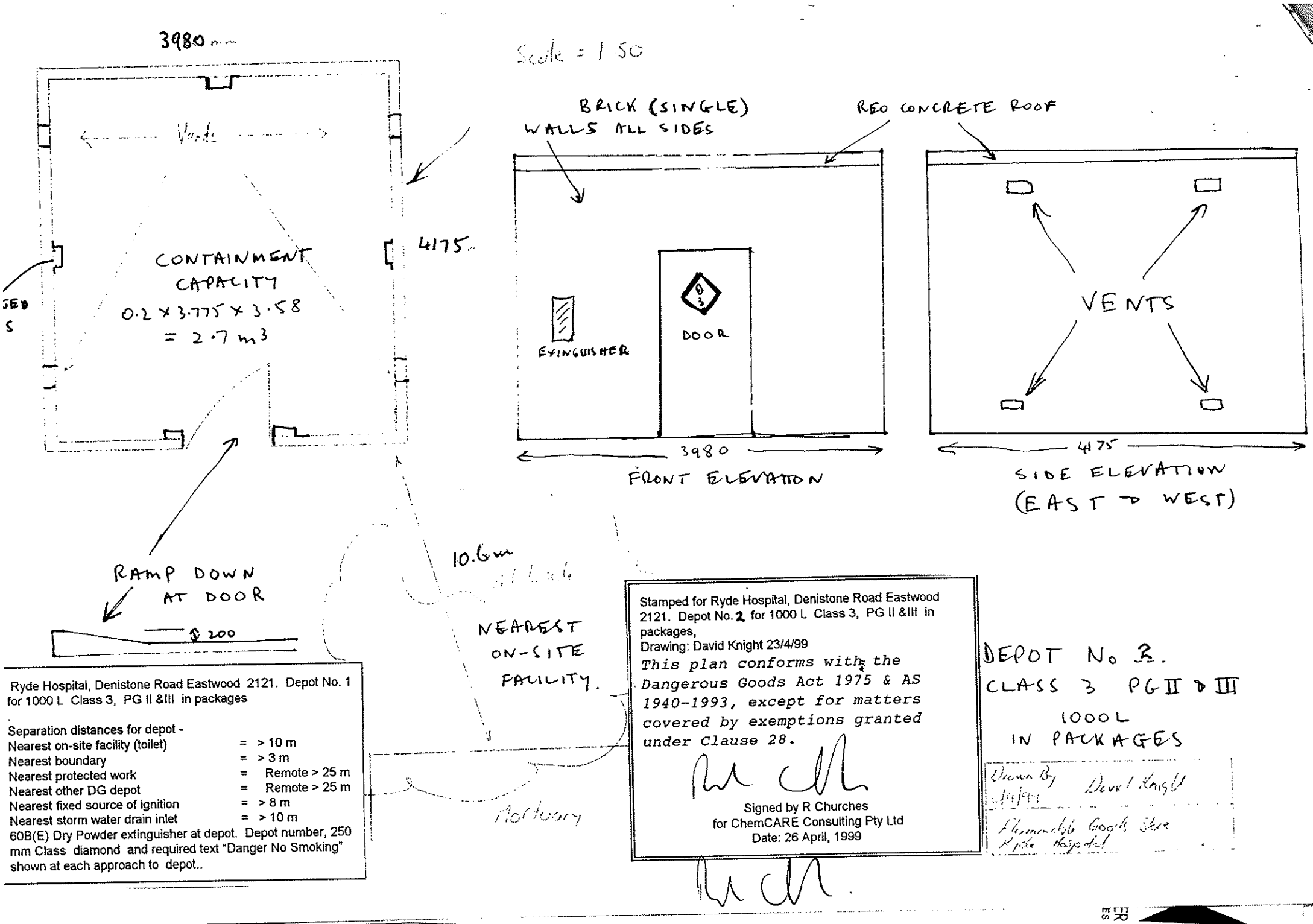
What is a depot? See page 5 of the Guidance Notes.

PART C – Dangerous Goods Storage *Complete one section per depot.*

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot Number	Type of depot (see page 5)	Depot Class	Maximum storage capacity
4.	Flammable liquid Cabinet: (Pathology)	3.	100 litres

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1090	Acetone.	3	II	Acetone.	10	L
1170	Methylated Spirit. (ETHANOL)	3	II	Methylated Spirit.	20	L



Ryde Hospital, Denistone Road Eastwood 2121. Depot No. 1 for 1000 L Class 3, PG II &III in packages

Separation distances for depot -

Nearest on-site facility (toilet)	=	> 10 m
Nearest boundary	=	> 3 m
Nearest protected work	=	Remote > 25 m
Nearest other DG depot	=	Remote > 25 m
Nearest fixed source of ignition	=	> 8 m
Nearest storm water drain inlet	=	> 10 m

60B(E) Dry Powder extinguisher at depot. Depot number, 250 mm Class diamond and required text "Danger No Smoking" shown at each approach to depot..

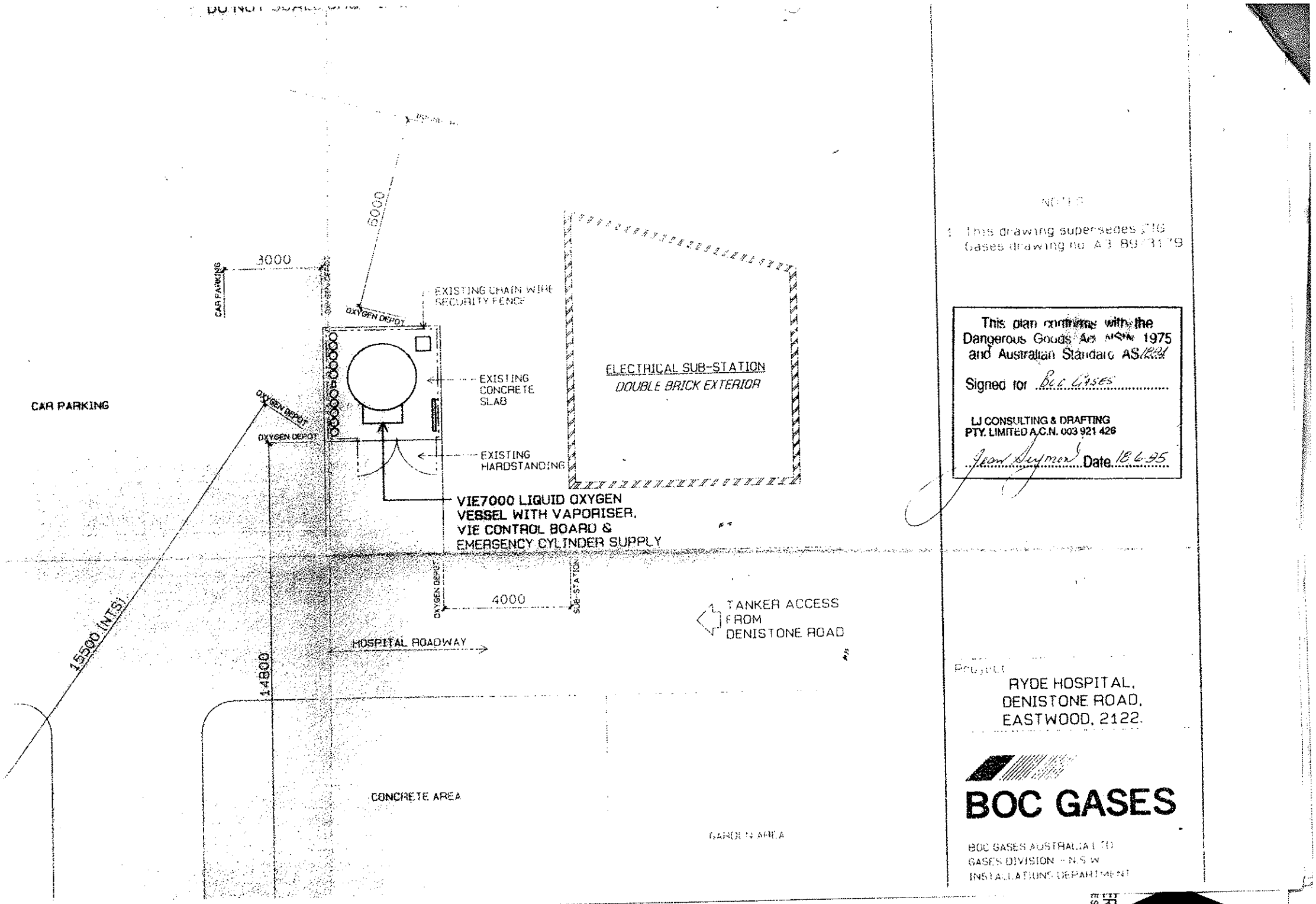
Stamped for Ryde Hospital, Denistone Road Eastwood 2121. Depot No. 2 for 1000 L Class 3, PG II &III in packages,
Drawing: David Knight 23/4/99
This plan conforms with the Dangerous Goods Act 1975 & AS 1940-1993, except for matters covered by exemptions granted under Clause 28.

Signed by R Churches
for ChemCARE Consulting Pty Ltd
Date: 26 April, 1999

DEPOT No 2.
CLASS 3 PG II & III
1000L
IN PACKAGES

Drawn By David Knight

Flammable Goods Store Ryde Hospital



NOTES

1. This drawing supersedes BOC Gases drawing no. A3 89/31/79

This plan complies with the Dangerous Goods Act NSW 1975 and Australian Standard AS1894

Signed for BOC Gases

LJ CONSULTING & DRAFTING PTY. LIMITED A.C.N. 003 921 426

Jean Lymer Date 18.4.95

Project

RYDE HOSPITAL,
DENISTONE ROAD,
EASTWOOD, 2122.

BOC GASES

BOC GASES AUSTRALIA LTD
GASES DIVISION - N.S.W.
INSTALLATIONS DEPARTMENT

landing

35/019511

Denistone Road
Eastwood NSW 2122
Telephone (02) 9874 0199
Facsimile (02) 9874 5414

RYDE HOSPITAL & COMMUNITY HEALTH SERVICES

23 December, 1996

9858 0[illegible]768

Chief Inspector
Dangerous Goods
Workcover Authority of NSW
Ref: 35/019511

Dear Sir/Madam

In reply to your letter of 5 December 1996 concerning the underground storage tank, please accept the following information.

The 20000L tank used for petrol storage and distribution for the hospital vehicle fleet was made obsolete in 1990, following the introduction of fuel cards issued by the petroleum suppliers.

This led to the decommissioning of the tank, draining of fuel and inerting carried out by filling with sand. All associated pipework, pump and equipment was removed and returned to Royal North Shore Hospital. This was carried out by a company called Oilsafe Pty Ltd, 29 Cabarita Road, Concord.

Enclosed is a copy of the hospital order form showing this information.

Should you require any further information please contact myself on the above number.

Noted on Computer
Still waiting for compliance date 3
NT 13/1/97

Yours faithfully

ML. B

MICHAEL BROWN
Fire Safety and Security

Application for Licence to Keep Dangerous Goods

Status conditional
Comments applic'n
d licence issued on
condition clients
site upgr in compl
compliance by 31/1/97

R
S

Application for ☑ **new licence** ☐ **amendment** ☐ **transfer** ☐

18.9.97

* send upgraded licence.

PART A – Applicant and site information

1 Name of applicant — ACN

RYDE HOSPITAL + COMMUNITY HEALTH SERVICES

2 Postal address of applicant — Suburb/Town — Postcode

DENISTONE RD EASTWOOD — 2122

3 Trading name or site occupier's name

4 Contact for licence inquiries
Phone — Fax — Name

DR 9874 0199 — 9858 0756 — MICHAEL BROWN, FIRE SAFETY OFFICER

5 Previous licence number (if known) 35/ 019511

6 Previous occupier (if known)

7 Site to be licensed
No — Street

DENISTONE RD

Suburb / Town — Postcode

EASTWOOD — 2122

8 Main business of site — HOSPITAL — X6.12

9 Site staffing: Hours per day X 24 — Days per week X 7

10 Emergency contact
Phone — Name

DR - 9874 0199 — X FIRE SAFETY OFFICER

11 Major supplier of dangerous goods

12 If a new site or for amendments to depots
Plan stamped by: — Name of Accredited Consultant — Date stamped

I certify that the details in this application (including any accompanying computer disk) are correct and cover all licensable quantities of dangerous goods kept on the premises.

13 Signature of applicant — Date

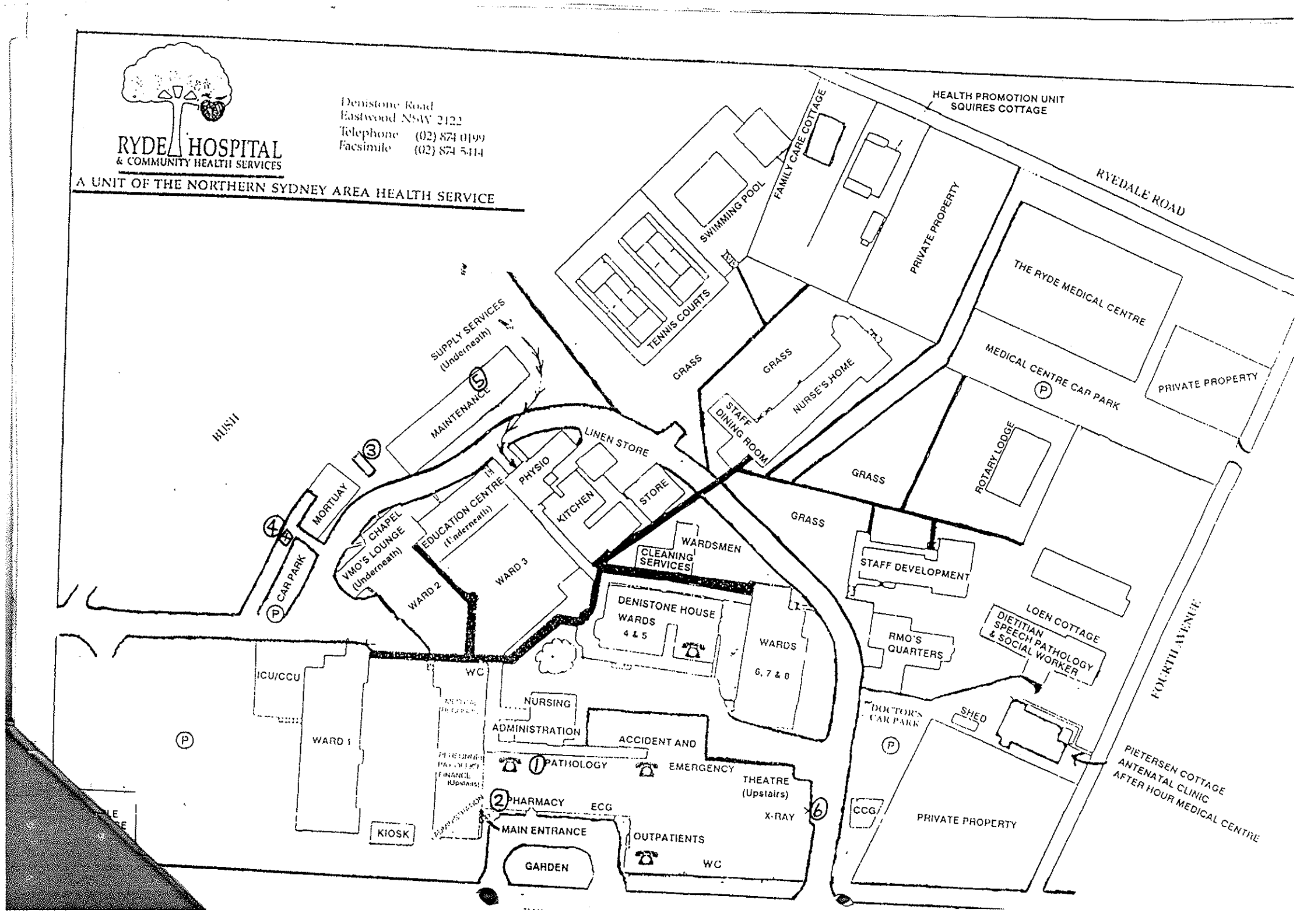
M.L. — 13/11/96

Please send your application, marked *CONFIDENTIAL*, to:
Dangerous Goods Licensing, Level 3, Locked Bag 10, Clarence Street, SYDNEY NSW 2000

Sent 17/12/96

RECEIVED
18 NOV 1996
SCIENTIFIC SERVICES BRANCH

DATA ENTERED
2 DEC 1996


RYDE HOSPITAL
& COMMUNITY HEALTH SERVICES
A UNIT OF THE NORTHERN SYDNEY AREA HEALTH SERVICE
Denistone Road
Eastwood NSW 2122
Telephone (02) 874 0199
Facsimile (02) 874 5414
HEALTH PROMOTION UNIT
SQUIRES COTTAGE
RYEDALE ROAD
FAMILY CARE COTTAGE
SWIMMING POOL
TENNIS COURTS
PRIVATE PROPERTY
THE RYDE MEDICAL CENTRE
MEDICAL CENTRE CAR PARK
PRIVATE PROPERTY
SUPPLY SERVICES
(Underneath)
MAINTENANCE
BUSH
GRASS
GRASS
NURSE'S HOME
STAFF DINING ROOM
LINEN STORE
PHYSIO
KITCHEN
STORE
MORTUARY
CHAPEL
VMO'S LOUNGE
(Underneath)
EDUCATION CENTRE
(Underneath)
WARD 2
WARD 3
CAR PARK
WARDSMEN
CLEANING SERVICES
GRASS
ROTARY LODGE
STAFF DEVELOPMENT
LOEN COTTAGE
DIETITIAN
SPEECH PATHOLOGY
& SOCIAL WORKER
RMO'S QUARTERS
DENISTONE HOUSE
WARDS
4 & 5
WARDS
6, 7 & 8
FOURTH AVENUE
ICU/CCU
WARD 1
WC
NURSING
ADMINISTRATION
ACCIDENT AND
EMERGENCY
PATHOLOGY
PHARMACY
ECG
X-RAY
THEATRE
(Upstairs)
MAIN ENTRANCE
OUTPATIENTS
WC
GARDEN
KIOSK
DOCTORS' CAR PARK
SHED
CCG
PRIVATE PROPERTY
PIETERSEN COTTAGE
ANTENATAL CLINIC
AFTER HOUR MEDICAL CENTRE

– Dangerous Goods Storage *Complete one section per depot.*

have more depots than the space provided, photocopy sufficient sheets first.

delete existing depots then add these.

Depot Number	Type of depot	Depot Class	Maximum storage capacity
✓1	FLAMMABLE LIQ. CABINET PATHOLOGY ~~LABORATORY~~	3	200 L

UN Number	Correct Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1170	METHYL ALCOHOL	3	II	METHYLATED SPIRITS	40	L
1307	XYLOL	3	II		20	L

Depot Number	Type of depot	Depot Class	Maximum storage capacity
✓2	FLAMMABLE LIQUID CABINET IN ~~PHARMACY~~	3	200 L

UN Number	Correct Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1170	ALCOHOL 95%$_{v/v}$	3	II		30-50	L
1090	ACETONE	3	II		5	L

Depot Number	Type of depot	Depot Class	Maximum storage capacity
✓3	Roofed Store SHIPPING CONTAINER	3	~~5~~ 40L

UN Number	Correct Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1270	PETROLEUM FUEL	3	II	PETROL	40	L

Depot Number	Type of depot	Depot Class	Maximum storage capacity
✓4	ROOFED STORE	3	200 L

UN Number	Correct Shipping Name	Class	PG (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
1300	MINERAL TURPENTINE	3	III	TURPS	100	L
1170	METHYL ALCOHOL	3	II	METHYLATED SPIRITS	100	L

PART C – Dangerous Goods Storage *Complete one section per depot.*

If you have more depots than the space provided, photocopy sufficient sheets fir

Depot Number	Type of depot	Depot Class	Maximum storage capacity
5	Exempt Storage Shed MAINTENANCE / ~~GARDEN STORE~~	6.1(b)	7 L

UN Number	Correct Shipping Name	PG Class (I, II, III)	Product or common name	Typical quantity	Unit, e.g. L, kg, m³
3017	PESTICIDES, ORGANOPHOSPHORUS	6.1(b) III	YATES ROGOR	1-2	L
2757	INSECTICIDE BENDIO CARB	6.1(b)	FICAM* W	5	L
N/A	VARIOUS GARDEN PRODUCTS	N.O.S.	"	15	kg
N/A	AQUEOUS FORMULATION ~~RD~~ GLYPHOSPHATE		ROUNDUP	10	L

Depot Number	Type of depot	Depot Class	Maximum storage capacity
6	Exempt storage area CYLINDER ~~STORE~~	2.2 ~~5.1~~	0

UN Number	Correct Shipping Name	PG Class (I, II, III)	Product or common name	Typical quantity	Unit, ~~e.g.~~ ~~L~~, ~~kg~~, (m³)
1072	OXYGEN	~~5.1~~	MEDICINAL O2	18 x 'C' CYL.	7.2 m³
1070	ENTONOX	2.2 ~~5.1~~	50% O2 IN N2O MIXTURE	8 x 'D'	12.8 m³
1070	NITROUS OXIDE	.2	N2O	8 x 'G'	264 kg
1013	CARBON DIOXIDE	2.2	CO2	4 x 'D'	24 kg
1002	MEDICAL AIR	2.2	AIR	6 x 'E'	19.2 m³

(Site History Documents – DECCW Records)

Summary of Licence No: 7617

View this licence (PDF document 0 kb)

Licence holder: **NORTHERN SYDNEY AND CENTRAL COAST AREA HEALTH SERVICE**

Premises: RYDE HOSPITAL
DENNISTONE RD EASTWOOD 2122
LGA: Ryde **Catchment:** Sydney Coast-Georges River

Administrative fee: $760.00

Status of licence: No longer in force

Licence type: Premises

Activity type: *Hazardous, Industrial or Group A Waste Generation or Storage

Licence review: Completed 30 May 05

Notices

Number	Issue date	Notice type
1048304 View notice	30 May 05	S 58 Licence Variation
1018994 View notice	23 Oct 02	S 58 Licence Variation

Annual Return Information information about non compliance

Start date	End date	Date received	Non-compliance	LBL Data
22 Mar 07	21 Mar 08	26 May 08	No	Not subject to LBL
22 Mar 06	21 Mar 07	01 May 07	No	Not subject to LBL
22 Mar 05	21 Mar 06	19 May 06	No	Not subject to LBL
22 Mar 04	21 Mar 05	28 Apr 05		Not subject to LBL
22 Mar 03	21 Mar 04	05 Apr 04	No	Not subject to LBL
22 Mar 02	21 Mar 03	28 Mar 03	No	Not subject to LBL
22 Mar 01	21 Mar 02	16 Apr 02	No	Not subject to LBL
22 Mar 00	21 Mar 01	04 May 01	No	Not subject

APPENDIX D

(Sampling Protocols and QA/QC Definitions)

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS.The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

a) Prepare a test pit/borehole log.
b) Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill/rig excavator such that the drill rig/excavator can operate in a safe manner.
c) Ensure all sampling equipment has been decontaminated prior to use.
d) Remove any surface debris from the immediate area of the sampling location.
e) Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possibly to prevent the loss of volatiles.If possible, fill the glass jars completely.
f) Collect samples for asbestos analysis and place in a zip-lock plastic bag.
g) Label the jar and/or bag with the EIS job number, sample location (eg. BH1), sampling depth interval and date.If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
h) Photoionisation detector (PID) screening of volatile organic compounds (VOCs) shouldbe undertaken on samples using the soil sample headspace method. Headspace measurementsare taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
i) Record the lithology of the sample and sample depth on the borehole/test pit log in accordance with AS1726-1993[23].
j) Store the sample in a sample container cooled with ice or chill packs. On completionof the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab.All samples are preserved in accordance with AS 4482.1:2005, AS 4482.2:1999 and AS/NZS 5667.1:1998.
k) Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle.Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
l) Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

[23] *Geotechnical Site Investigations*, Standards Australia 1993 (AS1726-1993)

a) All of the equipment associated with the soil sampling procedure should be decontaminatedbetween every sampling location.
b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent (Decon 90)
   - Potable water
   - Stiff brushes
   - Plastic sheets
c) Ensure the decontamination materials are clean prior to proceeding with the decontamination.
d) Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
e) In the bucket containing the detergent scrub the sampling equipment until all the material attached to the equipment has been removed.
f) Rinse sampling equipment in the bucket containing potable water.
g) Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes that equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

a) After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
b) Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casingand well.
c) Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dipmeter.The collar level should be taken (if required) during the site visit using a dumpy level and staff.

d) Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or low flow) techniques. Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
   - Micropore filtration system or Stericup single-use filters (for heavy metals samples).
   - Filter paper for Micropore filtration system.
   - Bucket with volume increments.
   - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles.
   - Bucket with volume increments.
   - Flow cell.
   - pH/EC/Eh/T meters.
   - Plastic drums used for transportation of purged water.
   - Esky and ice.
   - Nitrile gloves.
   - Distilled water (for cleaning).
   - Electronic dip meter.
   - Micro-purge pump pack and pump head.
   - Air and water tubing for Micro-purge.
   - Groundwater sampling forms.

e) If single-use stericup filtration is not being used, clean the Micropore filtration systemthoroughly with distilled water prior to use and between each sample. Filter paper should bechanged between samples. 0.45um filter paper should be placed below the glassfibre filter paper in the filtration system.

f) Ensure all non-disposable sampling equipment is decontaminated or that new disposableequipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwaterequipment is outlined at the end of this section.

g) Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.

h) Groundwater samples are obtained from the monitoring wells using low flow/micro-purgesampling equipment to reduce the disturbance of the water column and loss of volatiles.

i) During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instrumentsto assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.

j) All measurements are recorded on specific data sheets.

k) Once steady state conditions are considered to have been achieved, groundwater samples areobtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.

l) All samples are preserved in accordance with water sampling requirements detailed in theNEPM 1999 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998.

m) Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

a) All of the equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent.
   - Potable water.
   - Distilled water
   - Plastic Sheets or bulk bags (plastic bags)

c) Fill one bucket with clean potable water and phosphate free detergent, and one bucketwith distilled water.

d) Flush potable water and detergent through pump head. Wash sampling equipment and pump headusing brushes in the bucket containing detergent until all materials attached to the equipment are removed.

e) Flush pump head with distilled water.

f) Change water and detergent solution after each sampling location.

g) Rinse sampling equipment in the bucket containing distilled water.

h) Place cleaned equipment on clean plastic sheets.

i) If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*(1994[24]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[25]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.*"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" Keith 1991.

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable

---

[24] *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,*US EPA, 1994 (US EPA SW-846)

[25] *Environmental Sampling and Analysis, A Practical Guide*, Keith, H, 1991 (Keith 1991)

limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel;
- Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are

reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula;

$$\frac{\text{(Spike Sample Result – Sample Result)}}{\text{Concentration of Spike Added}} \times 100$$

Acceptable recovery limits are 70% to 130%.

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$