Douglas Partners
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Integrated Practical Solutions

Report on
Phase 1 Contamination Assessment

Proposed Tamworth Hospital Redevelopment

Prepared for
Aurecon Group

Acting on Behalf of
Health Infrastructure NSW

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Executive Summary

This report details the methodology and results of a Phase 1 Contamination Assessment (PCA) undertaken by Douglas Partners Pty Ltd (DP) for the proposed redevelopment of Tamworth Base Hospital.

The proposed development at the site includes the construction of new hospital buildings at the site, and an associated ring road and car parking areas. The investigation was requested by Health Infrastructure, owners of the site and in consultation with Aurecon Group Brand (Pty) Ltd [Aurecon], managers for the project and Taylor Thomson Whitting (NSW) Pty Ltd [TTW], designers for the project.

The investigation included a desktop review of available data, subsurface investigation including the drilling of thirty test bores and excavation of four test pits, followed by laboratory testing and engineering analysis.

Based on the information gathered, DP considers that the site has been subjected to potentially contaminating activities or land uses. These include the presence of the landfill within the eastern area of the site, the importation of filling during the construction of the existing car parking areas, the demolition of previous buildings during the construction of the car parking areas and the possible illegal dumping which appears to have occurred in the area of the proposed western car park. The landfill site in the eastern area of the hospital presents a moderate risk for the migration of landfill gas through filling or the bedrock, particularly where excavation is proposed for the development.

A Phase 2 Contamination Assessment should be undertaken to assess the data gaps identified within the Phase 1 assessment and provide greater confidence in the contamination status of the site using targeted sampling methodologies in the areas of environmental concern in accordance with *Contaminated Site: Sampling Design Guidelines* (Ref 2).

Based on the results of the assessment, it is considered that the proposed development areas are suitable for the proposed developments, on the proviso that favourable results are obtained from the recommended Phase 2 investigation.

The additional (Phase 2) investigations should primarily include the following:

- Additional sampling and testing in the altered location of the proposed Western Car Park;
- Supplementary targeted sampling and testing in the areas of former buildings identified in the Central Car Park and area of proposed extension;
- Installation of groundwater and gas monitoring bores in the landfill, together with a gas monitoring bore between the landfill (potential source site) and the proposed basement excavation.

The existing on site filling, described variously as silty sand, sandy clay or clay would be classified as *General Solid Waste* and should be transported and disposed of within an appropriately licensed landfill. The natural soils within the proposed excavation area could be provisionally classified as Virgin Excavated Natural Material (VENM).

A hazardous building materials assessment should be undertaken prior to demolition of any buildings on the site for the proposed development.

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Report on Phase 1 Contamination Assessment
Proposed Tamworth Hospital Redevelopment

1. Introduction

This report details the methodology and results of a Phase 1 contamination assessment (including waste classification) undertaken by Douglas Partners Pty Ltd (DP) for the proposed redevelopment of Tamworth Base Hospital. The investigation was requested by Health Infrastructure, owners of the site and was carried out in consultation with Aurecon Group Brand (Pty) Ltd [Aurecon], managers for the project and Taylor Thomson Whitting (NSW) Pty Ltd [TTW], designers for the project. The scope of work is based on DP's proposal, reference WYG120041 dated 2 March 2012 which was accepted by Aurecon Group Brand (Pty) Ltd, acting on behalf of Health Infrastructure on 5 March 2012.

This assessment was undertaken to support a development application for the construction of new hospital buildings at the site, and an associated ring road and car parking areas (identified in Drawing 1, Appendix A) and to assist with the design of works.

The preliminary contamination investigation (PCA) was undertaken primarily to assess the site's contamination status and the suitability of the site soils (natural and filling) for re-use or disposal off-site. The PCA was undertaken with respect to the staged investigation approach outlined in *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55 – Ref 1), the *Contaminated Site: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA – Ref 2).

The investigation included a desktop review of available data, subsurface investigation including the drilling of thirty test bores and excavation of four test pits, followed by laboratory testing and engineering analysis.

DP has previously prepared a Phase 1 Contamination Assessment and Preliminary Geotechnical Investigation for the early works associated with this project. Further details of these assessments are provided in Section 5.1.

2. Scope of Work

In brief, DP's scope of works included:

- Collation and interpretation of data from the following sources:-
  - Published data, including topographical, geological and hydrogeological maps;
  - Historical aerial photographs;
  - NSW Environmental Protection Agency (EPA) Contaminated Land and Protection of Environment Operations databases;

  - Registered groundwater bore licence search;
  - Site plans, archives, anecdotal information and previous reports;
- Site inspection to provide a visual assessment of potential contamination sources;
- Intrusive investigation at thirty-four (34) locations throughout the proposed development;
- Sampling and testing of representative soil samples for chemical contaminants; and
- Preparation of a report outlining the works undertaken and the findings of the PCA.

3. Site Identification and Description

3.1 Site Identification and Proposed Development

Tamworth Base Hospital is located in the north-west of Tamworth and is bounded by Johnston Street to the south and Dean Street to the west. The site is also within the Tamworth Regional Local Government Area.

Undeveloped cleared land bounds the site to the north and a former quarry (present landfill) site is located to the east. The landfill encroaches upon the hospital land and the proposed ring road passes through the western area of the landfill. Drawing 4 in Appendix B shows the lot boundaries in the vicinity of the proposed development. Drawing 1 of Appendix B shows the site features and the proposed development areas.

The overall hospital site comprises the following parcels:

- Lot 1 in DP533835
- Lot 2 in DP533835
- Lot 99 in DP753848;
- Lot 335 in DP735848

The landfill site comprises the following parcels of land:

- Lot 7008 in DP1076546
- Lot 108 in DP753848; and
- Lot 109 in DP753848

The land to the west of the hospital within which the proposed western car park will be constructed, comprises the following parcels of land:

- Lot 7306 in DP1159338; and
- Lot 357 in DP753848

The site area covered by the proposed development is shown on Drawing 1 in Appendix B. It covers areas within each of the allotments outlined above and comprises the following key components:-

- A new five storey Acute Care Building. Excavation of up to 6 m is proposed;
- The construction of a ring road commences at the intersection of Johnston Street and Smith Street and extends to the north for approximately 400 m to join up with the existing loop road near the ambulance workshop;
- The construction of a new staff car parking area to the east of the existing ambulance workshop;
- The re-sealing and extension of the existing central car parking area;
- The construction of a new western car park within the land to the north-west of the hospital (Lot 7306 in DP1159338 and Lot 357 in DP753848).

3.2 Site Description

The developed area of the hospital covers an area of approximately 37 hectares and is located on moderately undulating hill slopes which generally fall to the south, south-east and south-west. Surface levels within the hospital grounds range from approximately RL 420 m relative to Australian Height Datum (AHD) in the northern part of the site to approximately RL 390 m AHD in the south-western corner.

Acute Care Building
The proposed Acute Care building will be located in the central area of the hospital (refer Figure 1 and Drawing 1).

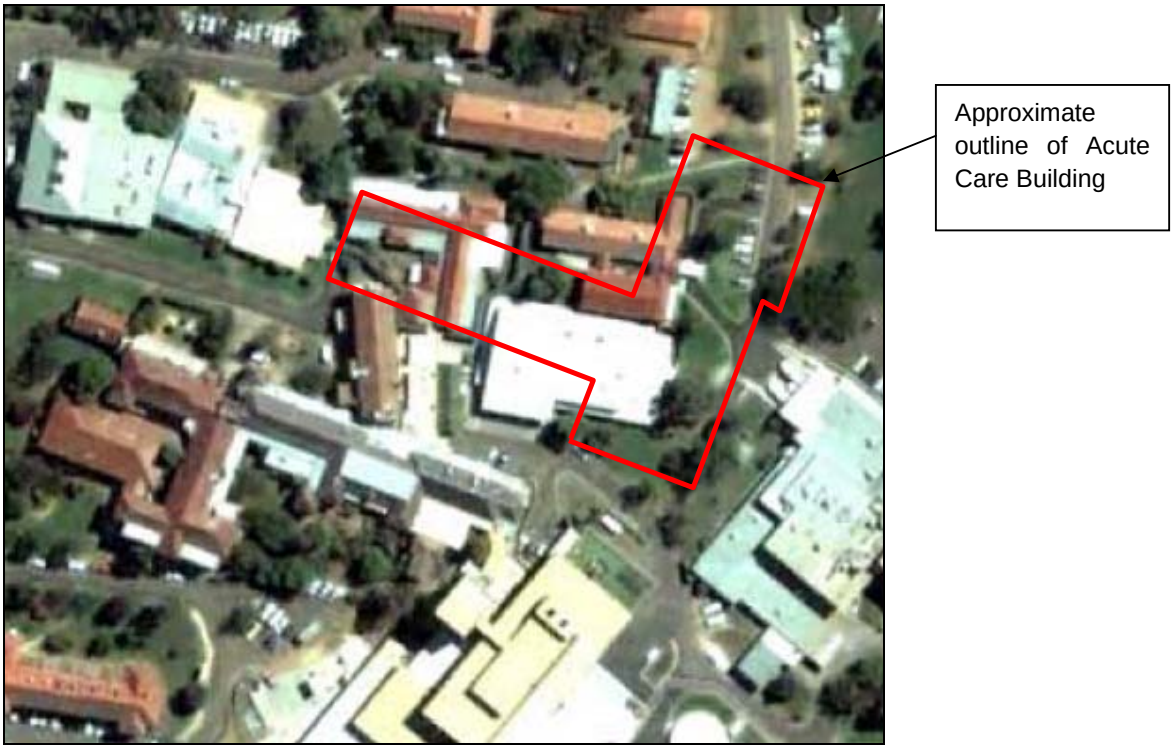


Figure 1: Approximate outlined of proposed Acute Care Building

A number of existing buildings are present within the proposed footprint of the Acute Care Building and will require demolition for the proposed development. These are a combination of single and two storey buildings, generally of masonry construction. Cut and fill earthworks appears to have been undertaken during the development of this area of the site, with a number of terraced areas and intermediate batters of up to 2 m in height.

The areas surrounding the existing buildings are generally either grassed or are within pavement alignments.

Ring Road and Staff Car Park

The new ring road will be located in the eastern and northern section of the hospital site (refer Drawing 1). The majority of the ring road alignment passes through either crown land or the eastern extents of the hospital grounds. The ring road alignment commences at the intersection of Johnston Street and Smith Street (assigned Ch 00) and extends in a northerly direction for approximately 280 m, before turning to the north-west and passing to the south of the existing Ambulance Workshop, before connecting with the existing loop road. The first approximately 210 m of the proposed ring road will be located within the area which includes the boundary between the hospital site and a former quarry (present landfill site). This section of the proposed alignment predominantly has a sparse coverage of grass. From approximately Ch 210 to 300 m, the ground surface is bare earth (filling).

Based on the location of survey pegs placed by the project surveyor, it appears that the landfill site encroaches upon the hospital site. The survey pegs were placed within the stockpiles present within the western section of the former landfill (refer Figure 2 and Drawing 3).

Figure 2: Drilling rig at Bore 109 with stockpiles on hospital boundary

Beyond approximately CH 300 the alignment passes through a recently constructed car park (refer Figure 3) with a spray seal wearing course and a batter slope to the north of the car park, which exposes a combination of gravelly clay and meta-siltstone bedrock.

Figure 3: Existing staff car park in north-eastern area of site

A new staff car parking area is to be constructed to the east of the Ambulance Workshop (refer Drawing 1).

Central Car Parking Area

The central car parking area is approximately 55 m by 45 m and is located within the north-western area of the hospital site (refer Figure 4).

Figure 4: Central car park, looking south

It has a spray seal wearing course and inspection of the area identified a number of defects in the pavement including crocodile cracking, rutting and stone loss. The car park will be extended to the east and west of its present extents into generally grass covered areas with scattered trees.

Western Car Park

The area of the new western car park is within partially cleared land to the west of the hospital and to the north of the gaol (refer Figure 5).

Figure 5: Access track to Bore 113 (western car park)

4. Physical Setting

4.1 Topography

Review of the local topographic mapping and a site survey plan indicates that the site is located on the southern flanks of a north-east to south-west trending ridge line. The ground surface within the hospital generally falls to the south at slopes of approximately 5°.

The existing car parking areas are essentially flat with slight cross falls to either the east or south-east.

Observation suggests that the natural surface levels throughout the site have been significantly modified, particularly within the area of the former quarry. Intrusive investigation in this area encountered up to 10.5 m of filling within the section of the ring road pavement alignment. Similarly, filling of up to 3 m depth was encountered in the bores drilled in the recently constructed staff car park.

Minor terracing appears to have been formed during the construction of the hospital with numerous batter slopes of less than 2 m in height observed around the site.

Any surface water entering the site of the proposed Acute Care building is anticipated to be collected in the formal drainage system. Surface water from the proposed ring road is anticipated to enter on-site drains and/or flow off site to the landfill site to the east, then enter the stormwater drainage system on Johnston Street.

4.2 Adjacent Site Uses

Surrounding land uses include the following:

- North (up slope) – Cleared land, probably formerly grazing.
- West (across slope and down slope) – Tamworth Base Hospital and Tamworth Gaol beyond Dean Street.
- South (down slope) – Combination of Tamworth Base Hospital and Johnston Street and beyond to residential development.
- East (across slope and down slope) – Former quarry, which has been progressively filled as a landfill site).

The potential for contamination migrating from the existing, surrounding land uses is considered to be generally low with the exception of the former quarry (present landfill) which is considered to be moderate.

4.3 Regional Geology and Soil Landscape

Reference to the Tamworth 1:250,000 Series Geological Sheet indicates that the site is underlain by metamorphic rocks comprising greywackes, argillites, and limestones belonging to the Yarimite Formation of Devonian Age. The previous and present investigations at the site confirmed the mapping with bedrock comprising metasiltstones encountered in several of the bores undertaken for the concurrent geotechnical investigation and observed beneath the existing emergency department.

4.4 Acid Sulphate Soils

Given the elevation of the site, acid sulphate soils are not likely to be encountered within the natural soil profile.

4.5 Groundwater

Given the site's topography and geology it is considered unlikely that relatively shallow groundwater is present within the soil profile at the site. Permanent groundwater is, however, likely to be present within Yarimite Formation. Notwithstanding, some seepage may also be located at the interface of localised permeability boundaries such as at the interface of filling and residual soils, or residual soils and weathered bedrock which will be dependent on soil types and the prevailing weather conditions.

A search for registered groundwater bores in the Department of Natural Resources groundwater bore database [Note: this function has been taken up by NSW Office of Water) indicated that three licensed bores are located in close proximity to the hospital, as follows:

- GW057928 on Lot 99, DP753848 (hospital site);
- GW052834 on Lot 395, DP753848 (gaol site); and
- GW965054 on Lot 2, DP519841.

A copy of the search results is provided in Appendix E.

The bore reports indicated the subsurface profile consisted of soil to depths ranging from 1 m to 22m, underlain by shale and basalt. Groundwater was present at depths ranging from 15 m to 17 m below the ground surface.

It is anticipated that the regional groundwater flows to the south.

5. Site History

5.1 Previous Assessments

DP has undertaken a number of previous investigations at the site. The locations of the previous investigations are shown on Drawing 2 and are discussed below.

5.1.1 Proposed Development

- *Report on Preliminary Geotechnical Investigation, Proposed Early Works Programme, Tamworth Hospital Redevelopment, Tamworth*, Project No. 75393.02 dated April 2012. This investigation report was prepared using relevant information obtained from the intrusive investigation data available at the time of preparation. The purpose of the preliminary geotechnical investigation was to support a development application for the early works programme for the site, which included the construction of the ring road, staff car parking, central car park modifications and western car park.
- *Report on Phase 1 Contamination Assessment, Proposed Early Works Programme, Tamworth Hospital Redevelopment, Tamworth*, Project No. 75393, Document No.1, dated April 2012. This investigation included a walk over inspection and site history together with comments on the areas of concern for contaminating activities in relation to the early works programme.

5.1.2 Previous Site Developments

- *Report on Geotechnical Investigation, Proposed Extensions to Emergency Department and Banksia Mental Health Unit, Tamworth Base Hospital*, Project No. 29745 dated June 2001. This investigation comprised the drilling of four test bores within the area around the Main Brudelin Wing (south-west of the proposed early works development area) and three bores within the Banksia Mental Health Unit (north-west of the proposed early works development area). The bores were drilled to depths ranging from 1.2 m to 5.3 m within the soil and weathered bedrock. Conditions encountered in the bores generally comprised filling including silty clays, silty sands and metasiltstone gravel with some ash to depths of up to 2.5 m, overlying stiff to very stiff residual clays and silty clays, which in turn was underlain by metasiltstone bedrock.
- *Report on Foundation Conditions, Proposed Hospital Extensions, Tamworth*, Project No. 2140 dated July 1969. This investigation comprised the excavation of fifteen (15) test pits to depths of up to 10 feet (3 m) within the area of the existing Brudelin Building and to the south-east and

south of the workshops (engineering building). This area is to the west and south of the proposed early works development area. Conditions encountered in the pits included filling, comprising mainly ash and rubble to depths of up to 5 feet (1.5 m). The filling was underlain by residual clay with bedrock described as shale (probably meta-siltstone) encountered at depths ranging from 1.6 feet (0.5 m) to 9 feet (2.7 m).

- *Report on Subsoil Investigation, Tamworth Hospital*, Project No. 2405 dated December 1969. This investigation comprised the excavation of nine test pits to depths of up to 6 feet (1.8 m) within the area to the south-east and south of the workshops (engineering building). This area is to the west and south of the proposed early works development area. Conditions encountered in the pits included filling, comprising mainly ash with burnt garbage, scrap timber, metal and bottles to depths of up to 5 feet (1.5 m). The filling was underlain by residual clay.
- *Report on Foundation Conditions, Tamworth Hospital*, Project No. 673 dated September 1964. This investigation comprised the drilling of six test bores to depths of up to nearly 9 feet (2.7 m) within the area approximately 15 m to 60 m to the east of the former boiler room workshop. Conditions encountered in the pits included gravelly clay overlying bedrock described as shale (probably metasiltstone) at depths ranging from 1 to 6 feet (0.3 m to 1.8 m). Ash filling was encountered in one location approximately 15 m east of the former boiler room.
- *Report on Foundation Conditions, Proposed Nurse Home, Tamworth*, Project No. 266 dated 1961. This project included the drilling of four bores in the south-eastern area of the site (approximately 150 m to the west of the proposed loop road). Conditions encountered included residual clay soils overlying bedrock described as shale at depths ranging from about 3 to 4 feet (0.9 m to 1.2 m).

5.1.3 Reports by others

The client provided DP with a number of previous reports undertaken by others for the purposes of the present investigation. These previous reports included the following:

- *New England North West Regional Cancer Centre, Tamworth Rural Referral Hospital, Tamworth, Preliminary Site Contamination Assessment*, Report No. RGS00140.1-AE, prepared by Regional Geotechnical Solution and dated November 2010. The investigation included the collection of thirteen near surface samples from within the proposed Cancer centre footprint, located approximately 100 m to the west of the proposed ring road. Areas of concern for the site included mixed fill / hospital refuse in former waste dumps (particularly incinerator ash) and herbicide and pesticide used for the treatment of white ants or weed spraying. The results of the report indicated that there was a low likelihood of soil contamination in fill material or natural soils within the site of the proposed Cancer Centre.
- *New England North West Regional Cancer Centre, Tamworth Rural Referral Hospital, Tamworth, Geotechnical Investigation*, Report No. RGS00140.1-AD, prepared by Regional Geotechnical Solution and dated November 2010. This investigation included drilling of eleven test bores and three test pits in the footprint of the proposed cancer centre. Conditions encountered in the pits and bores included filling comprising a mixture of gravel, clay and ash to depths ranging from 0.2 m to 2 m, overlying residual clay soils, which in turn were underlain by bedrock described as either sandstone or siltstone at depths ranging from 0.4 m to 2 m.
- *Tamworth Hospital Stage 2 and 3 – Preliminary Geotechnical Investigation, prepared by Coffey Projects*, dated December 2009. The investigation included excavation of seven test pits, located

throughout the hospital grounds. A number of the pits were located near the southern section of the proposed ring road and encountered residual clay soils to depths of 0.7 m and 0.3 m, overlying extremely weathered or highly weathered bedrock, described as shale or argillite. A further test pit (Pit 5) excavated in the area of the recently constructed car park in the north-eastern area of the site encountered gravelly clay filling to 1.2 m overlying residual clay soils.

5.2 Regulatory Notices Search

The NSW EPA Register of Contaminated Land was searched for any Regulatory Notices that may be current on the site issued under the *Contaminated Land Management (CLM) Act* 1997 and Section 55 of the *Protection of the Environment Operations (POEO) Act 1997* (Ref 1). The information obtained indicated that no Licences, Notices or Orders were current for the site.

5.3 Historical Aerial Photographs

Historical aerial photographs were reviewed dating back over 50 years and approximately every 10 to 20 years thereafter to assess any major changes to the site and surrounding areas during this period. The following historical aerial photographs were reviewed:

- Photograph – Tamworth NSW 43-5077 Run 3, dated 11.11.1953;
- Photograph – Tamworth NSW 15825031 Run 2, dated 17.09.1968;
- Photograph – Tamworth NSW 224149 Run 2T, dated 22.06.1974;
- Photograph – Tamworth NSW 4169 Run 2, dated 27.11.1993;
- Google image, dated 2004

Table 1 summarises the observations made during the review.

Table 1: Observed changes in aerial photos from 1953 to present day

Key Structure/Area	1953	1968	1974	1993	2004
Ring Road and Staff Car Park	Cleared pastoral land	Signs of excavation are evident in the area of the former quarry (present landfill) and appears to extend under proposed ring road and staff car park	Former quarry being progressively filled at the time	Former quarry being progressively filled at the time	Former quarry being progressively filled at the time
Central Car Park	Appears to be a building in the footprint of the present Central Car Park surrounded by cleared land	No major change	No major change	Building demolished and car park constructed	Two additional buildings to the east and west of the Central Car Park area
Western Car Park	Cleared pastoral land	Cleared land with a number of access tracks	No major changes	Partially cleared of vegetation and access road to residence constructed	No major changes
Acute Care Building	Hospital present over a smaller footprint than the present and mainly contained within the south-west corner of the site.	No major changes	Several new buildings in north-eastern corner of proposed Acute Care	Ward 11 had been built Linen and engineering building expanded	No major changes
General Hospital Site	Surrounding landuse appears to have been pastoral. A series of what appear to be earthen berms were present within the hillside to the north of the hospital site. The gaol is present to the west of the hospital	Continuing expansion of hospital site with additional buildings constructed to north, east and south of hospital extents of 1953	Construction of the current Brudelin Wing in the central area and a separate building in the south-east corner (near intersection of Johnston Street and Smith Street)	Further construction to the east of linen/engineering building Northern loop road Arcadia Mental Health, CADE Unit and Ambulance Workshop constructed	No major changes

5.4 Oral Historical Information

As part of the *Preliminary Contamination Assessment* discussions were undertaken with site representatives (including Mr Michael Page, Assistant Hub Manager, North West Hub, NSW Health) from Tamworth Hospital who have been employed at the site for between 20 and 30 years. The following information, pertinent to the current site area, as described in Section 3.1 and shown on Drawing 1 of Appendix B, was gathered during an interview and site walkover:

- The former landfill site was an unlicensed Tamworth Council landfill which has been in operation for several decades (evident in the 1968 photo). Discussion with Mr Darren Rickard of Tamworth Precision Excavations (TPE), who currently leases the landfill site, has indicated that TPE have been continuing to fill the site over the last five years or so using "clean" filling which did not include putrescible waste;
- No information in relation to the landfilling operations being carried out by Tamworth Council prior to TPE leasing the site have been made known to DP;
- A boiler was present within the hospital grounds to produce steam and was located to the east of the present engineering building. The ash from the boiler was progressively deposited over the ground surface in the area to the south of the boiler, presently occupied by the helipad and the eastern extent of the Brudelin Building. Previous investigations at the site identified the presence of ash in this area. This area is believed to be beyond the extent of the proposed redevelopment;
- It is understood that the staff car park, located to the north of the linen building, was constructed by TPE within the last six years and included excavation into the hillside immediately to the south of the ambulance maintenance building and placement of filling within the area to create a uniform grade. Discussion with TPE personnel indicated that VENM material was used during the construction, however, no documentation to verify this has been provided to DP. Discussion with the ground staff at the hospital indicated that filling of up to several metres was placed in a former gully running in a roughly north-south orientation within the western area of the staff car park. It is understood that the filling was predominantly clay but also included concrete slabs, metal and bricks. The results of the concurrent geotechnical investigation in this area (including Bores 212, 213 and 214) indicated that up to 2.1 m of filling in this area and significantly greater in the area of the former landfill;
- No indication of the burial of medical waste on the site was provided by on site staff during discussions;
- An existing building measuring about 16 m long by 5 m wide and located to the west of the staff car park was identified to contain asbestos by means of a sign placed on the eastern face of the building. It is unknown whether any previous testing for the presence of asbestos has been undertaken on this building which will require demolition for the construction of internal pavements. DP has undertaken a hazardous material assessment of this building (Ref 3) and confirmed the presence of asbestos and lead based paints;
- To the knowledge of the ground staff interviewed, there had been no spillages, fires or accidents that may have resulted in potential contamination at the site;
- It is expected that dangerous goods may be stored within the linen building to the south of the staff car park, although this building is beyond the area of proposed development;

6. Field Work Methods

The fieldwork was undertaken between 19 and 23 March 2012 and comprised a combination of site inspection survey, drilling of test bores, excavation of test pits and in situ testing.

Site Inspection Survey

A site walkover of the proposed early works development area was undertaken by Michael Gawn of DP on the 20 March 2012. The site features observed during the inspection are summarised in Section 8.

Test Pits and Test Bores

The fieldwork comprised drilling of thirty test bores and excavation of four test pits. Complete bore hole and test pit logs are provided in Appendix C for reference.

Drawing 2 in Appendix B shows the location of the test pits and bores in relation to the proposed development.

The majority of the bores were drilled using a track mounted drilling rig using 100 mm diameter spiral flight augers within the soils and weak bedrock, and NMLC diamond coring techniques in the underlying bedrock. Standard penetration tests (SPTs) were generally undertaken in the overburden at 1 m depth intervals from 1 m depth. The shallow bores (generally 100 series) were drilled using a 3.5 tonne excavator fitted with a 250 mm diameter solid flight auger attachment.

The pits were excavated using a 3.5 tonne excavator fitted with a 450 mm bucket and spade teeth. Dynamic penetrometer testing or pocket penetrometer testing of samples was undertaken at selected test pit and bore locations.

The bores and pits were set out by a geotechnical engineer from Douglas Partners Pty Ltd (DP) at locations agreed upon between DP and TTW. The geotechnical engineer logged the subsurface profile in each bore and pit and took representative disturbed and undisturbed samples for identification purposes and laboratory testing.

Point load strength index testing was undertaken on samples of the bedrock retrieved from the bores. The results of this testing is presented on the attached test bore logs.

Photographs of the core retrieved from the bores are provided in Appendix C.

At the completion of field work, all test locations were reinstated with spoil from the drilling or excavation. Where the bores were drilled through existing pavements, the wearing course was reinstated using Cold-mix asphaltic concrete.

7. Field Work Results

Details of the subsurface conditions encountered in the test bores and pits are presented in the report sheets in Appendix C. These should be read in conjunction with the explanatory notes, which define the descriptive terms and classification methods.

A summary of test pit and bore locations together with termination depth and depth to bedrock is presented in Table 1 below.

Table 1 – Summary of Test Locations

Bore / Pit	Location	Easting	Northing	Termination Depth (m)	Depth to Bedrock (m)
100	Johnston Street / Ring Road	302189	6560154	0.85	0.85
101	Ring Road (within landfill)	302216	6560268	2.3	NE
102	Internal Roads	302088	6560323	1.2	NE
103	Ring Road (within landfill)	302214	6560353	2.1	2.1
104	Internal Roads	301956	6560426	1.2	NE
105	Ring Road (within landfill)	302208	6560221	0.8	0.8
106	Behind Linen Building	302188	6560361	1.1	0.8
107	Internal Roads	302034	6560496	1.2	NE
108	Staff Car Park (within landfill)	302213	6560485	2	1.8
109	Ring Road (within landfill)	302222	6560423	11.3	11.3
110	Central Car Park	301979	6560516	1.2	1.2
111	Internal Roads	302085	6560491	1.2	NE
112	Ring Road (within existing car park)	302165	6560462	0.7	0.7
113	Western Car Park	301848	6560596	1.2	NE
114A	Central Car Park	301975	6560560	1.2	NE
115	Ring Road (within landfill)	302200	6560446	3	NE
115A	Ring Road (within landfill)	302201	656447	3.7	3.4
116	Ring Road (within landfill)	302213	6560438	9.1	9.1
200	Acute Care Building	302058	6560383	2.73	1.2
201	Acute Care Building	302077	6560369	4	1.8
202	Acute Care Building	301975	6560437	4	2.3
203	Acute Care Building	302079	6560409	2.6	1.9
204	Acute Care Building	302108	6560433	9	2
205	Acute Care Building	302084	6560442	1.6	1
206	Acute Care Building	302030	6560462	4.24	2.85
207	Acute Care Building	301987	6560478	2.6	2.2
208	Acute Care Building	302075	6560473	10	2.6
209	Acute Care Building	302127	6560477	11	1.8
210	Acute Care Building	302119	6560413	1.05	0.8
211	Acute Care Building	302019	6560389	4	1.8
212	Acute Care Building	302117	6560448	3.15	3.15
213	Ring Road (within existing car park)	302188	6560430	1.4	1.4
214	Within existing car park	302165	6560432	0.3	0.3
TC1	Cutting with former quarry	302245	6560547	N/A	N/A
TC2	Cutting with former quarry	302290	6560543	N/A	N/A

Note: Coordinates obtained from hand held GPS to UTM WGS84

A brief summary of the conditions encountered at test locations within key proposed development areas is provided in the following sections.

7.1 Acute Care Building

The relevant test locations for the acute care building include Bores 200 to 212.

Detailed logs of the test bores, together with the results of point load index testing are provided in Appendix C. A summary of the conditions encountered in these bores is provided below.

Filling	Generally comprising silty sand or sandy clay with brick fragments, gravel, timber and occasionally coal fragments and encountered in all bores except Bore 208 to depths ranging from 0.1 m to 1.5 m. The deeper filling was encountered in Bores 206 (northern side of proposed Acute Care Building) and within the recently constructed staff car park within the north-eastern area of the site (Bore 212).
Residual Clay	Stiff to hard sandy clay or silty clay, with colours variously described as red brown, orange brown, brown in all bores beneath the filling or at the surface (Bore 208) and continuing to depths ranging from 0.8 m to 3.15 m.
Bedrock	Generally meta-siltstone bedrock, initially of extremely low to very low strength, increasing to high strength with depth in some bores. Basalt bands were encountered within the meta-siltstone and granite was encountered below 10.1 m depth in Bore 209. The bedrock was generally fractured.

7.2 Ring Road and Eastern Car Park

The relevant test locations for the ring road include the following:

- Pits 101, 103, 105
- Bores 100, 108, 109, 112, 115, 115A, 116, 209 and 213

A summary of the conditions encountered in these bores and pits is provided below.

Wearing Course	Spray seal wearing course in Bores 100, 112, 209 and 213 to depths ranging from 0.02 m to 0.05 m
Granular Pavement Material	Grey or brown sandy gravel to depths ranging from 0.09 m to 0.7 m in Bores 100, 112, 209 and 213.
Filling	Associated within the landfill (Pits 101, 103, 105 and Bores 108, 108A, 115, 115A, 116 and 209) ranging in depth from 0.7 m to 11.3 m. The depth of filling increased towards the northern area of the landfill site and was encountered at its greatest depth in Bore 109. It generally consisted of gravelly sandy clay with various amounts of non-putrescible inclusions

	such as brick fragments, metal, plastic, asphaltic concrete and concrete. Minor amounts of ash were encountered at 2 m depth in Bore 109 and the filling was predominantly grey silty clay with some gravel below about 4.5 m in Bore 109. The results of the DPT and SPT indicated that the filling was in a poorly to moderately compacted condition.
Residual Clay or Gravelly Clay	Very stiff to hard sandy gravelly clay in Bores 100, Pit 101, 103, 105 and Bore 209 at depths ranging from 0.09 m to 1.7 m.
Bedrock	Generally meta-siltstone, ranging in strength from very low to high strength in all bores and pits (except Pit 101) at depths ranging from 0.7 m to 11.3 m.

It is understood that the existing staff car park, through which the ring road will pass and the eastern car park will be constructed, was formed within the last six years and included excavation into the hillside immediately to the south of the ambulance maintenance building and placement of filling within the area to create a uniform grade. Discussion with the civil contractor responsible for the construction of the car park (Total Precision Excavation) indicated that VENM material was used during the construction, however, no documentation to verify this has been provided to DP. Discussion with the ground staff at the hospital indicated that filling of up to several metres deep was placed in a former gully running in a roughly north-south orientation through the western area of the staff car park. The ground staff indicated that the filling was predominantly clay but also included concrete slabs, metal and bricks. Conditions encountered Bores 212, 213 and 214 indicated that up to 2.1 m of filling in this area and although no concrete slabs or metal was encountered within these bores, such material should be considered in the development of an unexpected finds protocol for the site (refer Section 12.1).

7.3 Staff Car Park

Pit 108 and Bore 108 were drilled within the proposed staff car park area and the conditions encountered included the following:

Filling	Generally consisting of dark brown silty clay or silty sandy clay with traces of plastic, timber and metal, in a poorly compacted condition to depths of 1.8 m and 1.9 m in Bore 108 and Pit 108 respectively. Very low strength meta-siltstone was encountered in Bore 108 and 108A below the filling. In Bore 108, refusal of the auger string fitted with a tungsten carbide cutting tip occurred at 2 m depth, which indicates that the bedrock is of at least low strength.

7.4 Eastern Car Park

Bore 113 was drilled within the vicinity of the proposed eastern car park and the conditions encountered included the following:

Filling	Silty clay filling to 0.05 m depth. It should be noted that asphaltic concrete and concrete was noted on the ground surface in the vicinity of Bore 113.
Residual Clay	Hard orange brown gravelly sandy clay, which continued to termination of the bore at 1.2 m.

It should be noted that since the completion of field work, the position of the eastern car park has been moved to the south-west, resulting in Bore 113 being located approximately 20 m to the north-east of the car parking area. Whilst inspection of the general vicinity of the car park suggest that similar conditions may be present within the new proposed car park area, the subsurface conditions have not been specifically investigated.

7.5 Central Car Park

The relevant test locations for the ring road include Bores 110, 114A and 207

A summary of the conditions encountered in these bores and pits is provided below.

Wearing Course	Spray seal wearing course in Bore 114A to 0.02 m depth.
Granular Pavement Material	Light brown and grey sandy gravel in Bore 114A to 0.18 m depth.
Filling	Brown sandy clayey gravel or gravelly sandy clay in Bores 110 and 114A at the surface and 0.18 m depth respectively and continued to 0.15 m and 0.7 m depth respectively. The results of the DPT indicate that the filling was in a well compacted condition.
Residual Clay	Very stiff to hard brown or grey brown sandy clay or clay in all bores at depths ranging from 0.15 m to 0.7 m.
Bedrock	Meta-siltstone bedrock in Bore 207 from 2.2 m depth. Refusal of the auger string fitted with a tungsten carbide cutting tip occurred at 2.6 m depth, which indicates that the bedrock is of at least low strength.

7.6 Groundwater Observations

No free groundwater was observed during the drilling of the bores, although core drilling of the rock introduced water and therefore prevented groundwater observations in a number of the test bores. Similarly, no free groundwater was encountered in the test pits, which were limited to depths of less than 3 m. It should be noted that groundwater levels are variable and affected by climatic conditions and soil permeability.

Furthermore, the presence of deep filling in the landfill site results in the elevation at the base of the filling being similar to the elevation of groundwater recorded in the groundwater wells detailed on the Department of Natural Resources groundwater bore database. The bores drilled in the landfill did not remain open for sufficient time to establish standing groundwater levels and hence it is possible that groundwater may be present within the base of the filling.

8. Site Inspection / Observations

The site features observed during the inspection are summarised below. General site topography was consistent with that described in Section 4.1 Reference should be made to Drawing 1, which shows the site features and areas of the site discussed below.

- The landfill encroaches upon the hospital site as discussed in Section 3.2;
- A number of stockpiles of various sizes were present within the area of the proposed ring road (refer Figure 6);

Figure 6: Landfill site (looking south). The boundary of hospital passes though large stockpile on right

- A number of drums were noted within the former landfill, close to the proposed ring road alignment (refer Figure 7).

Figure 7: Drums and concrete pipes in landfill area

- The area of the proposed western car park is a grass covered with scattered trees;
- Some lumps of asphalt and concrete were observed scattered on the surface (refer Figure 8). Similarly, the ground surface appeared to have been previously modified. It should be noted that since the field work has been undertaken the proposed western car park has been moved to the south and Bore 113 was located approximately 10 m to the north of the car park footprint;

Figure 8: Asphalt on ground surface near Bore 113

9. Laboratory Testing

9.1 Contamination Testing

Thirty-two selected soil samples (including three QA/QC samples) from the bores and pits were analysed for the following suite of potential contaminants by Envirolab Services Pty Ltd (a NATA accredited laboratory):

- Metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH);
- Benzene, Toluene, Ethyl Benzene and Xylene (BTEX);
- Organochlorine Pesticides (OCP);
- Polychlorinated Biphenyls (PCB); and
- Asbestos in soil

Detailed results of the testing are provided in Appendix D and are summarised in Table 1.

A brief review of laboratory quality control test results was undertaken and, in summary, indicated that the accuracy and precision of the soil testing procedures, as inferred by the QA/QC data, is generally considered to be of sufficient standard to allow the data reported to be used to interpret contamination conditions.

Sample ID	Soil	Sampling Date	Heavy Metals								PAH		TPH		Benzene	Toluene	Ethylbenzene	Total Xylene	PCB[2]	OCP[2]	Asbestos
			As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	B(a)P	total[2]	C6-C9	C10-C36							
101 / 0.3	F	21/3/12	ND	ND	11	34	10	ND	9	54	0.56	6.0	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
101 / 0.6	F	21/3/12	ND	ND	16	31	47	0.3	16	130	0.39	3.4	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
103 / 0.5	F	21/3/12	ND	ND	15	27	27	ND	10	58	0.71	8.5	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
105 / 0.1	F	21/3/12	ND	ND	8	33	6	ND	6	64	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
105 / 0.6	F	21/3/12	ND	ND	6	26	4	ND	5	59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
106 / 0.5	F	19/3/12	ND	ND	4	13	3	ND	2	56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
108 / 0.1	F	19/3/12	ND	ND	25	34	9	ND	24	45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
108 / 1.0	F	19/3/12	ND	ND	22	28	10	ND	18	52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
109 / 0.1	F	19/3/12	ND	ND	23	28	10	ND	22	46	0.07	0.2	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
109 / 1.5	F	19/3/12	ND	ND	10	32	13	ND	9	60	0.56	5.2	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
200 / 0.1	F	19/3/12	ND	ND	15	39	36	ND	12	92	0.07	0.5	ND	190	ND	ND	ND	ND	ND	ND (individual)	ND
200 / 0.5	N	19/3/12	ND	ND	12	27	11	0.4	6	55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
201 / 0.1	F	19/3/12	ND	ND	12	23	10	ND	9	62	ND	0.1	ND	110	ND	ND	ND	ND	ND	ND (individual)	ND
201 / 0.8	N	19/3/12	ND	ND	9	14	4	ND	4	73	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
202 / 0.5	F	22/3/12	ND	ND	12	18	40	0.1	8	58	0.09	0.1	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
PQL			4	0.5	1	1	1	0.1	1	1	0.05	0.1	25	250	0.5	0.5	1	2	0.6	0.1 (individual)	0.1 g/kg
Assessment Criteria																					
Background Ranges[3]			1 - 50	1	5 - 1000	2 - 100	2 - 200	0.03	5 - 500	200	-	-	-	-	-	-	-	-	-	-	
HIL10			100	20	12%	1000	300	15	600	7000	1	20	65[8]	1000[8]	1[8]	1.4[8]	3.1[8]	14[8]	10	10/50/200/10[7]	Free of Asbestos[4]
HIL[4]			500	100	60%	5000	1500	75	3000	35000	5	100	65[8]	1000[8]	1[8]	1.4[8]	3.1[8]	14[8]	50	10/50/200/10[7]	Free of Asbestos[4]
PPBIL[5]			20	3	400	100	600	1	60	200	-	-	-	-	-	-	-	-	-	-	NC
General Solid Waste[6]			100	20	100	NC	400	4	40	NC	0.8	200	650	10000	10	288	600	1000	50	50	NC

Notes:

1 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment
2 where analytical results below laboratory practical quantitation limit (PQL) for all compounds, results quoted as <PQL of most compounds
3 NEPM Background Ranges Guidelines (Ref 9)
4 Health based investigation levels for commercial land use (Ref 7)
5 Provisional phytotoxicity based investigation levels (Ref 7)
6 General Solid Waste Guidelines (Ref 10)
7 OCP thresholds given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
8 NSW EPA Service Station Guidelines
9 Correspondence from NSW EPA Director of Contaminated Sites
10 Health based investigation levels for residentiall land use with accessible soils (Ref 7)

ND Not detected at reporting limit
- not analysed / not applicable
PQL Laboratory practical quantative limit
Bold Exceedes Guidel
F/N/W Filling / Natural / Water
NC No Criteria

Table 1: Results of Soil Analysis (All results in mg/kg unless otherwise stated)

Sample ID	Soil	Sampling Date	Heavy Metals								PAH		TPH		Benzene	Toluene	Ethylbenzene	Total Xylene	PCB[2]	OCP[2]	Asbestos
			As	Cd	Cr[1]	Cu	Pb	Hg	Ni	Zn	B(a)P	total[2]	C6-C9	C10-C36							
203 / 1	N	19/3/12	ND	ND	9	21	6	ND	5	56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
205 / 0.1	F	19/3/12	ND	ND	11	19	13	ND	11	84	0.07	0.2	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
205 / 0.5	N	19/3/12	ND	ND	9	23	9	ND	6	54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
206 / 0.5	F	22/3/12	ND	ND	14	21	29	1.4	7	48	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
206 / 2 - 2.45	N	22/3/12	ND	ND	8	27	4	ND	4	69	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
110 / 0.3	N	21/3/12	ND	ND	11	23	7	ND	8	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
113 / 0.5	N	21/3/12	ND	ND	6	25	3	ND	5	39	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
114A / 0.5	F	21/3/12	ND	ND	9	18	7	ND	6	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
114A / 0.8	N	21/3/12	ND	ND	10	23	7	ND	11	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
212 / 0.1	F	22/3/12	ND	ND	4	10	2	ND	3	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
212 / 1.0 - 1.45	F	22/3/12	ND	ND	22	29	5	ND	13	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
214 / 0.1	F	22/3/12	ND	ND	5	18	3	ND	3	66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
102 / 0.5	N	21/3/12	ND	ND	7	27	9	ND	7	71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
208 / 0.1	N	19/3/12	ND	ND	11	19	16	ND	10	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
QA1 (106/0.5)	F	19/3/12	ND	ND	5	15	4	ND	3	65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
QA2 (108 / 0.1)	F	19/3/12	ND	ND	22	34	9	ND	20	45	0.2	1.9	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
QA3 (114A / 0.5)	F	21/3/12	ND	ND	8	17	6	ND	6	33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND (individual)	ND
PQL			4	0.5	1	1	1	0.1	1	1	0.05	0.1	25	250	0.5	0.5	1	2	0.6	0.1 (individual)	0.1 g/kg
Assessment Criteria																					
Background Ranges[3]			1 - 50	1	5 - 1000	2 - 100	2 - 200	0.03	5 - 500	200	-	-	-	-	-	-	-	-	-	-	
HIL[4]			500	100	60%	5000	1500	75	3000	35000	5	100	65[8]	1000[8]	1[8]	1.4[8]	3.1[8]	14[8]	50	10/50/200/10[7]	Free of Asbestos[4]
PPBIL[5]			20	3	400	100	600	1	60	200	-	-	-	-	-	-	-	-	-	-	NC
General Solid Waste[6]			100	20	100	NC	100	4	40	NC	0.8	200	650	10000	10	288	600	1000	50	50	NC

Notes:

1 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment
2 where analytical results below laboratory practical quantitation limit (PQL) for all compounds, results quoted as <PQL of most compounds
3 NEPM Background Ranges Guidelines (Ref 9)
4 Health based investigation levels for commercial land use (Ref 7)
5 Provisional phytotoxicity based investigation levels (Ref 7)
6 General Solid Waste Guidelines (Ref 10)
7 OCP thresholds given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
8 NSW EPA Service Station Guidelines
9 Correspondence from NSW EPA Director of Contaminated Sites

ND Not detected at reporting limit
- not analysed / not applicable
PQL Laboratory practical quantative limit
Bold Exceedes Guidel
F/N/W Filling / Natural / Water
NC No Criteria

10. Proposed Development

The proposed development at the site includes demolition of a number of existing buildings at the site and construction of a new five storey Acute Care Building together with various pavements and car parking areas throughout the Tamworth Hospital Site.

The site area covered by the proposed development is shown on Drawing 1 in Appendix B.

The key components of the proposed development are as follows:-

- A new five storey Acute Care Building within the central area of the site. Excavation of up to 6 m will be required for the building (mainly in the north-eastern corner) and placement of up to 2 m of filling in the south-western corner;
- The building will have two basement levels. The higher basement will be located within the northern section of the building and will be at RL 413 m AHD. The lower basement will be limited to the southern area of the building and will have a finished floor level of RL 408.5 m;
- The construction of a ring road commencing at the intersection of Johnston Street and Smith Street and extending to the north for approximately 400 m to join up with the existing loop road near the ambulance workshop. The ring road will extend over the area of the existing landfill site and into the recently constructed staff car parking area;
- The proposed ring road will be at grade with the existing ground surface and cuts and fills will be less than 0.5 m. The proposed eastern car park will be within the footprint of the existing staff car park and will required excavation of up to 2 m;
- The construction of a new staff car parking area to the east of the existing ambulance workshop. The car park will be over the existing landfill area. Based on review of the "Concept Overall Plan" Drawing SD-CI-NE-SK-002 Revision 7 indicates that the finished levels of the car park will vary from RL 418 to 420 m AHD. The existing surface levels in the proposed car park area range from about RL 417 to 420 m AHD. Therefore, cut and fill in the order of 2 m may be required for the construction of the staff car park;
- The re-sealing and extension of the existing central car parking area. The extensions will be to the east and north of the existing car park by about 10 m in width;
- The construction of a new western car park within the land to the north-west of the hospital (Lot 7306 in DP1159338 and Lot 357 in DP753848). The construction of this car park will require placement of up to 1.5 m of filling.

11. Contaminants of Concern

11.1 Adopted Assessment Criteria

The following guidelines were used as comparative criteria to assess the environmental quality of the soil samples collected from the site.

- **Guideline 1:** Site assessment criteria, viz. The health-based [soil] investigation levels (HIL) for various land uses (Column 4 for commercial land use), as specified in NSW EPA *Guidelines for the NSW Site Auditors Scheme* (2006) (Ref 4).
- **Guideline 2:** With respect to TPH and BTEX, threshold concentrations [in soil] for sensitive land use were adopted, from NSW EPA's *Guidelines for Assessing Service Station Sites*, (Ref 5) 1994 (no comprehensive TPH or BTEX health-based criteria are available in *Guidelines for the NSW Site Auditors Scheme*) (Ref 7).
- **Guideline 3:** *Environmental Soil Quality Guideline 'Background' levels*, as given in NEPC (1999). *The National Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater* (Ref 6). Note that for the majority of organic analytes, where no published background levels were available, the respective practical quantitation limits were used as the assessment basis.

For waste classification of the filling the following guideline was also referenced:

- **Guideline 4:** *Waste Classification Guidelines, Part 1: Classifying Waste* – Department of Environment, Climate Change and Water NSW, December 2009 (Ref 7).

11.2 Potential Contaminant Sources

Based on the findings of the desktop review and site walkover, the principal sources of potential contamination within the area of the proposed early works development are presented in Table 2 below:

Table 2 – Potential Contamination Sources

Potential Contamination Source/Activity	Area Affected	Potential For Contamination	Primary Potential Contaminants of Concern
Landfill Operations	Eastern section of ring road and bulk excavations	Moderate (soil and groundwater and subsurface gas)	Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Hg & Zn), Petroleum Hydrocarbons (TRH, BTEX), PAH, Phenol, PCB & VOC, asbestos nutrients, Landfill gas (particularly methane)
Filling beneath buildings and surface coverings	Building footprints, roadway and carpark	Low (soil)	Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Hg & Zn), Petroleum Hydrocarbons (TRH, BTEX), PAH and Asbestos, Pesticides (OCP)
Former Buildings previously demolished and requiring demolition	Central car park	Low to Moderate (soil)	Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Hg & Zn), Petroleum Hydrocarbons (TRH, BTEX), PAH, PCB, Pesticides (OCP) and Asbestos
Illegal Dumping	In area of western car park	Low to Moderate (soil)	Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Hg & Zn), Petroleum Hydrocarbons (TRH, BTEX), PAH, PCB, Pesticides (OCP) , Cyanide and Asbestos
Importation of Filling	Staff car park	Low to Moderate (soil)	Heavy Metals (As, Cd, Cr, Cu, Ni, Pb, Hg & Zn), Petroleum Hydrocarbons (TRH, BTEX), PAH, PCB, Pesticides (OCP) and Asbestos

Notes:
As = Arsenic, Cd = Cadmium, Cr = Chromium, Cu = Copper, Pb = Lead,
Hg = Mercury, Ni = Nickel and Zn = Zinc
TRH = Total Petroleum Hydrocarbons, BTEX = Benzene, Toluene, Ethyl Benzene & Xylene
PAH = Polycyclic Aromatic Hydrocarbons, PCB = Polychlorinated Biphenyls
OCP = Organochlorine Pesticides, VOC = Volatile Organic Compounds, Phenols = Total Phenolics,
Asbestos = Identification of asbestos fibres in soil

In summary, the site history review indicated that the site has been operating as a hospital for at least 50 years and, before that time, probably had a rural (grazing) land use. The surrounding land has been used primarily as grazing with the exceptions of the gaol to the west and the former quarry (present landfill) site to the east.

Based on the above the results of chemical testing, the potential for contamination to have impacted the subject site from the surrounding properties is considered to be low. It is noted that the site is located on a broad crest of a flank of the adjacent mountain range with slight slope down to the south and therefore, whilst off-site activities to the north, east and west present a potential source of contamination the most significant potential off-site contamination sources are considered to be past activities to the east of the site (landfill). Adjacent areas to the north of the site appeared to be generally grass covered undeveloped land.

The landfill site in the eastern area of the hospital presents a moderate risk for the migration of landfill gas through filling or the bedrock, particularly where excavation is proposed for the development. The presence of landfill gas was not assessed during the Phase 1 contamination assessment and is considered to be a data gap in the assessment of the site.

The conditions encountered in the bores drilled within the landfill site included predominantly silty sandy clay and sandy clay filling with some metal, brick fragments, plastic and concrete. The hospital site and proposed development is adjacent to and within a landfill site which has been progressively filled over a long duration. No records of the constituents of the filling are available and hence, although the conditions encountered in the bores drilled by DP indicate that the filling is predominantly

of a clayey nature and no putrescible waste was encountered, the presence of contaminants with the potential to create migratory landfill gases cannot be discounted. Furthermore, the bores undertaken during the present investigation are on the edge of the landfill site and do not cover the whole filled area and hence the type of material in the remainder of the landfill is not known.

Closed landfill sites that contain non-putrescible waste can be a source of landfill gas via anthropogenic constituents and the decay of timber, organic soils, green waste and other biodegradable material. The test bores undertaken for the concurrent geotechnical investigation indicated that the bedrock is highly fractured in places and hence there is a risk of migration of landfill gas, if present, via advection through the discontinuities in the bedrock.

Similarly, it is unknown whether the base and sides of the landfill area were lined prior to filling operations commencing, although this is unlikely given the age of the landfill. No evidence of a liner was detected in the test bores undertaken in this area. Whilst groundwater was not encountered in the bores during the investigation, the presence of deep filling in the landfill site results in the elevation at the base of the filling being similar to the elevation of groundwater recorded in the groundwater wells detailed on the Department of Natural Resources groundwater bore database. The bores drilled in the landfill did not remain open for sufficient time to establish standing groundwater levels and hence the risk of migration of contaminant through the regional groundwater has not been assessed at this stage and should be further assessed during a Phase 2 (Detailed) Contamination Assessment.

It is noted that the list of primary contaminants of concern (listed in Table 2) may not include all the active chemicals used at the hospital or landfill (former quarry) historical land use. However, the primary potential contaminants of concern provide a general indication and are considered to be an adequate screen for comprehensive testing.

11.3 Fate of Contaminants

Based on the works undertaken, it is possible to provide some comment on the potential fate of any contaminant releases to the environment. The potential fate of contamination depends on a number of factors including: type of contamination (physical state & solubility), location of the contaminants (surface or at depth) and site factors (soil permeability, topography & groundwater regime).

Review of the local topographic mapping and a site survey plan indicates that the site is located on the southern flanks of a north-east to south-west trending ridge line. The ground surface within the hospital site generally falls to the south and south-west at slopes of approximately 5°.

Given the site topography, subsurface conditions (shallow residual clay soils over bedrock) and absence of groundwater within any of the test bores undertaken within the hospital site the potentially contaminating activities identified would generally not be expected to migrate a significant distance from the area of release. A notable exception to this is the landfill area where filling was encountered to 10.5 m depth. As discussed in Section 11.2, the bores did not remain open for sufficient time to establish standing groundwater levels in this area and hence the risk of migration of contaminant through the regional groundwater has not been assessed at this stage and should be further assessed during a Phase 2 (Detailed) Contamination Assessment.

Similarly, the potential for landfill gas, if present within the landfill, to migrate to the hospital site and into the proposed excavations should be further assessed during a Phase 2 (Detailed) Contamination Assessment.

12. Preliminary Material Assessment

12.1 Contamination Status

The inorganic and organic concentrations of the filling and soils as reported in Table 1 were considered generally indicative of background concentrations and do not indicate the presence of any contamination within the materials assessed.

Chemical contaminant levels in all soil samples tested were less than the adopted land use assessment criteria for a commercial land use (Ref 6).

The existing on site filling, described variously as silty sand, sandy clay or clay would be classified as *General Solid Waste* and should be transported and disposed of within an appropriately licensed landfill.

Based on the brief site historical information review, site inspection and the laboratory results, the natural soils within the proposed excavation area could be provisionally classified as Virgin Excavated Natural Material (VENM).

The above classification is based on the proviso that acceptance by the receptor site/relevant authority has been obtained, and that the material is not mixed/cross contaminated with non-VENM materials (e.g. filling, topsoils, road pavements or anthropogenic inclusions). It is recommended that the excavation for the proposed medical centre be undertaken in the presence of a qualified consultant from Douglas Partners Pty Ltd to confirm the presence of VENM between the test pit/bore locations and assist with segregation of filling and topsoil from the VENM.

It is also recommended that sites receiving the above-mentioned materials should perform cross checks on the imported materials, to ensure that the material matches the soil description provided in this report.

The current classification assessment is based on a limited number of test locations. It does not apply to materials beyond the limit of the intrusive assessment, or to materials different from the natural soil and filling types described above, or materials exhibiting signs of contamination. In this regard the civil contractor for the project should establish an unexpected finds protocol for the handling of material suspected of containing contamination (ie. filling including anthropogenic inclusions not described in this report such as asbestos, ash, medical waste and organic waste, fibro fragments, staining and odours). The protocol should set out procedures for the identification, segregation and waste assessment of any such unexpected material. Handling, transport and disposal of soil must be conducted in accordance with the *Protection of the Environment Operations (POEO) Act* 1997.

13. Conclusions and Recommendations

Douglas Partners has conducted a Phase 1 Contamination Assessment for the proposed redevelopment of the Tamworth Base Hospital. The redevelopment at the site will include the construction of a five storey building, including basement construction involving excavation of up to 6 m, together with the construction of new ring road and several car parking areas.

The ring road will pass through the area of a former landfill (now rehabilitation site).

The site area and proposed development is discussed in Section 3.1 and identified in Drawing 1 (Appendix B).

Based on the information gathered, DP considers that the site has been subjected to potentially contaminating activities or land uses. These include the presence of the landfill within the eastern area of the site, the importation of filling during the construction of the existing car parking areas, the demolition of previous buildings during the construction of the car parking areas and the possible illegal dumping which appears to have occurred in the area of the proposed western car park.

Given the absence of a shallow groundwater table (i.e. groundwater is expected to be at greater than 5 m depth within bedrock) and the clay soils, the risk posed to the local human and environmental receptors from historical activities within the site is assessed as being is relatively low with the exception of the landfill site where a moderate potential risk has been assessed to be present.

The number of samples and chemical tests undertaken during the Phase 1 Contamination Assessment were designed as a broad systematic assessment, as requested by the client, and will not satisfy the minimum sampling density required by the *Sampling Design Guidelines*. The chemical tests carried out during the present Phase 1 investigation all returned either non-detections or minor detections below the respective land use guideline criteria for the analytes tested. However, given the contamination issues identified, scope of the Phase 1 intrusive investigations and variable subsurface conditions encountered, a Phase 2 Contamination Assessment should be undertaken to assess the data gaps identified within the Phase 1 assessment and provide greater confidence in the contamination status of the site using targeted sampling methodologies in the areas of environmental concern in accordance with *Contaminated Site: Sampling Design Guidelines* (Ref 2).

Based on the results of the assessment, it is considered that the proposed development areas are suitable for the proposed developments, on the proviso that favourable results are obtained from the recommended Phase 2 investigation.

The additional (Phase 2) investigations should primarily include the following:

- Additional sampling and testing in the altered location of the proposed Western Car Park;
- Supplementary targeted sampling and testing in the areas of former buildings identified in the Central Car Park and area of proposed extension;
- Installation of groundwater and gas monitoring bores in the landfill, together with a gas monitoring bore between the landfill (potential source site) and the proposed basement excavation.

A hazardous building materials assessment should be undertaken prior to demolition of any buildings on the site for the proposed development. In this regard, it is noted that DP is currently undertaking a

hazardous material assessment of a small storage building located within the north-eastern area of the site, which it is understood will require demolition for the development. Additional buildings at the site will require demolition and should also be subject to a hazardous material assessment.

The investigation did not include assessment for radioactivity or pathogens, although it is noted that no medical waste was observed in the intrusive investigations.

14. Limitations

Douglas Partners (DP) has prepared this report for the redevelopment of the Tamworth Base Hospital in accordance with DP's proposal WYG120041 dated 2 March 2012 and an email dated 30 March 2012, which was accepted by Aurecon Group Brand (Pty) Ltd, acting on behalf of Health Infrastructure on 4 April 2012.

The report is provided for the exclusive use of Health Infrastructure and their agents for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

15. References

1. *Managing Land Contamination, Planning Guidelines SEPP 55* – Remediation of Land, 1998.
2. NSW EPA, *Contaminated Sites: Sampling Design Guidelines*, September 1995.
3. Douglas Partners Pty Ltd, *Report on Hazardous Material Assessment, Proposed Demolition of Storage Building, Tamworth Base Hospital*, Project 75393.01, April 2012
4. NSW EPA, Contaminated Sites: *Guidelines for the Site Auditor Scheme*, April 2006.
5. NSW EPA, Contaminated Sites: *Guidelines for Assessing Service Station Sites*, December 1994.
6. National Environment Protection (Assessment of Site Contamination) Measure (NEPM) National Environment Protection Council (NEPC) 1999.
7. Department of Environment and Climate Change, NSW, Waste Classification Guidelines Part 1: Classifying Waste, December 2009

Douglas Partners Pty Ltd

Appendix A

About this Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- 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 first be washed out of the hole if water measurements are to be made.

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

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP 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 and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

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

About this Report

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, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report 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. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

Sampling

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

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

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud 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 the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This 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.

Soil Descriptions

Douglas Partners

Description and Classification Methods

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

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

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

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

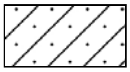
Soils


Topsoil

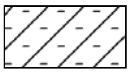

Peat


Clay

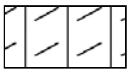

Silty clay

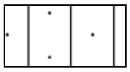

Sandy clay

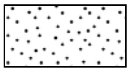

Gravelly clay

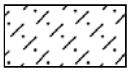

Shaly clay

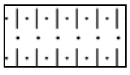

Silt


Clayey silt


Sandy silt

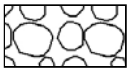

Sand

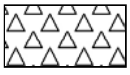

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

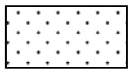

Talus

Sedimentary Rocks

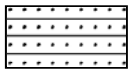

Boulder conglomerate

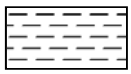

Conglomerate


Conglomeratic sandstone

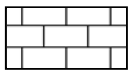

Sandstone


Siltstone


Laminite

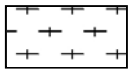

Mudstone, claystone, shale

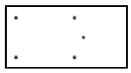

Coal


Limestone

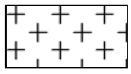
Metamorphic Rocks

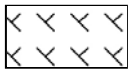

Slate, phyllite, schist

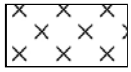

Gneiss

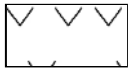

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite

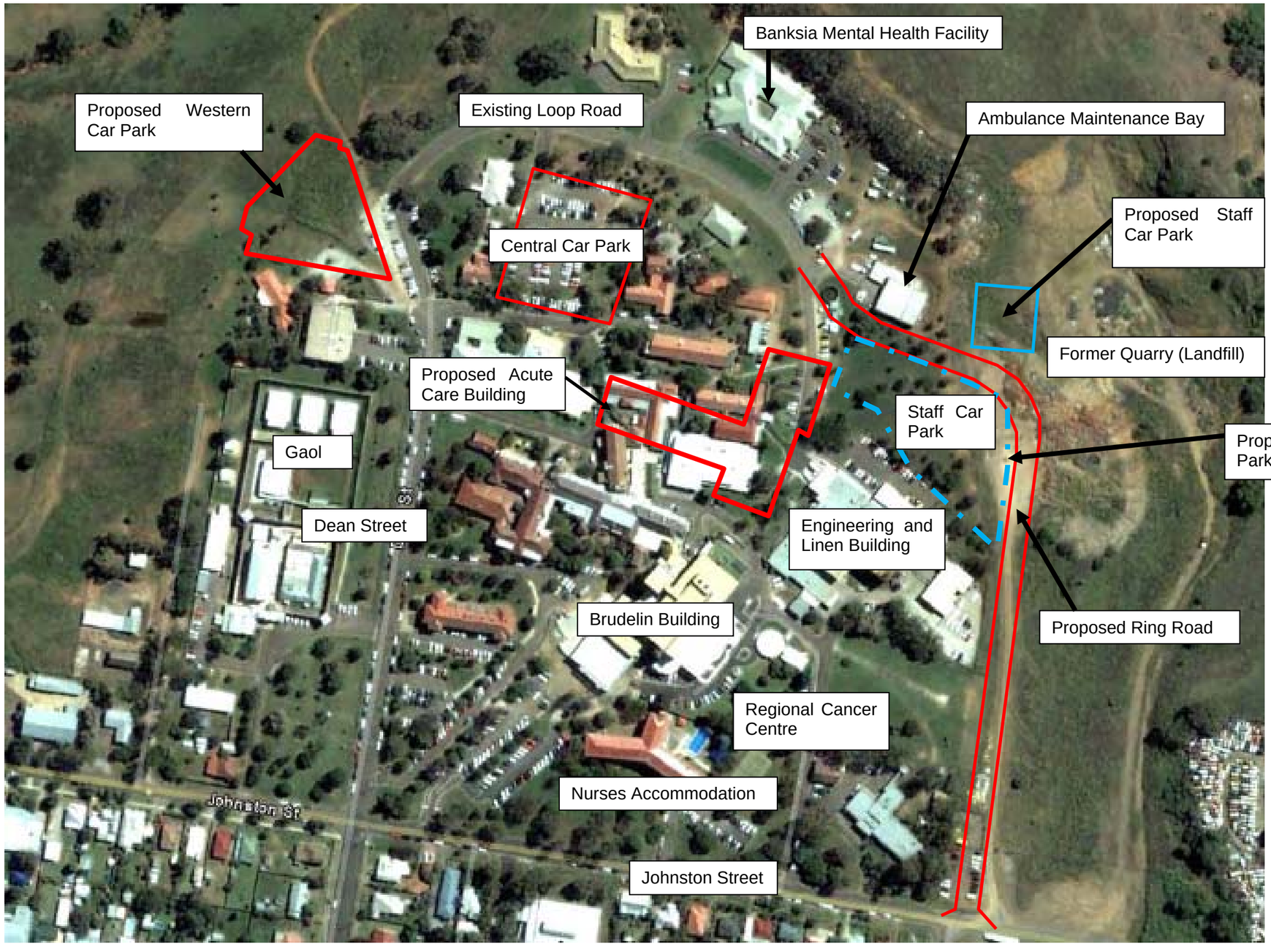

Dacite, epidote

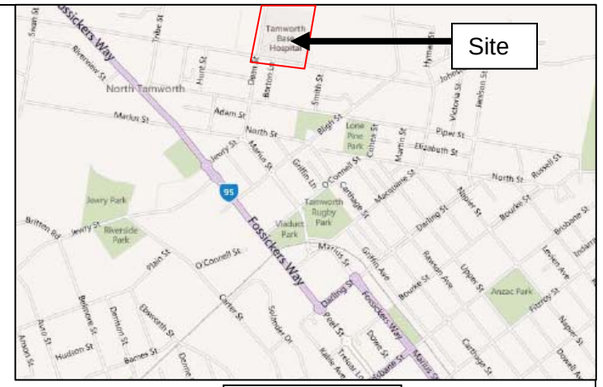

Tuff, breccia


Porphyry

Appendix B

Drawings





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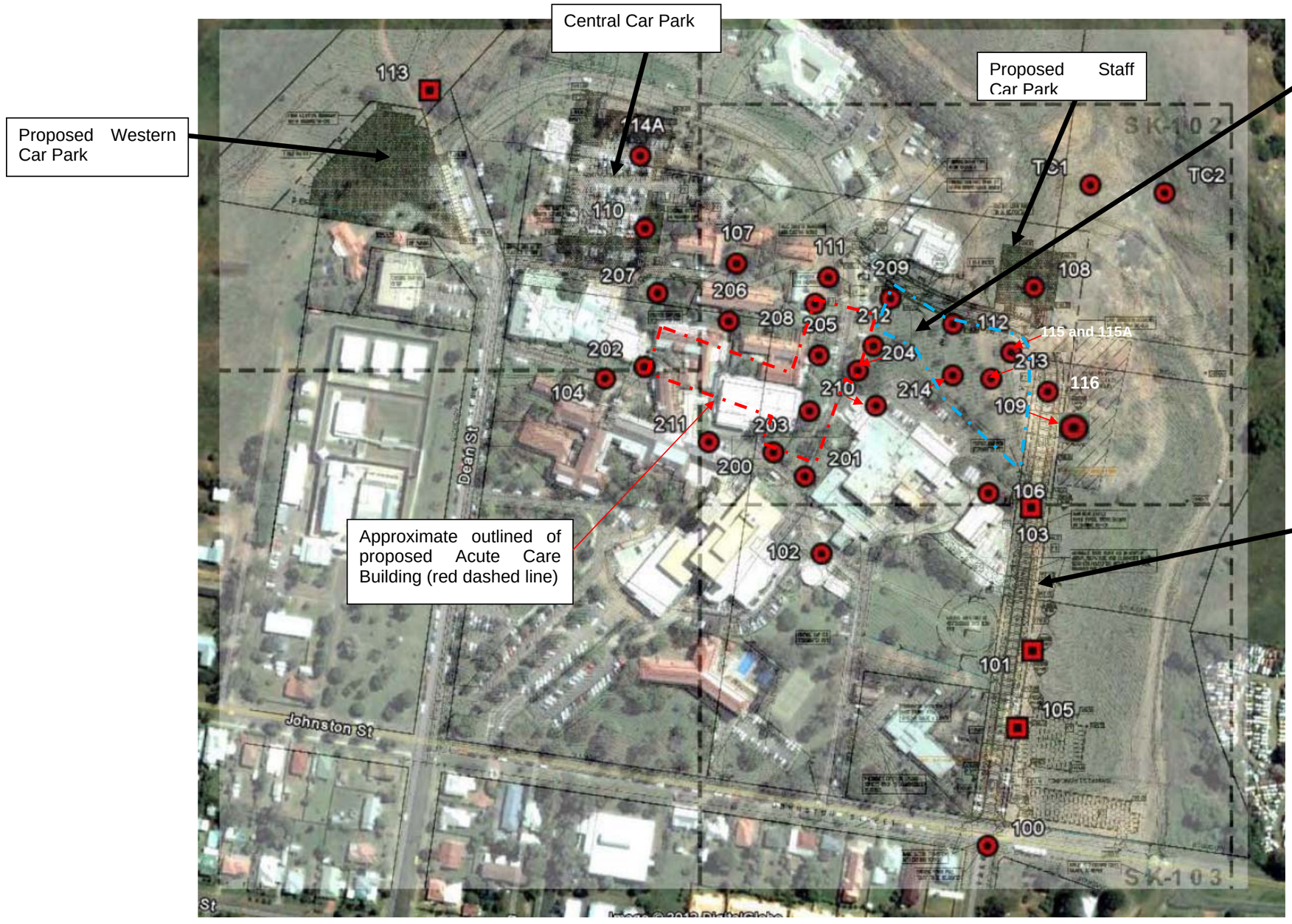
Geotechnics / Environment / Groundwater

CLIENT:	Health Infrastructure		
OFFICE:	Wyong	DRAWN BY:	MPG
SCALE:	NTS	DATE:	20.04.12

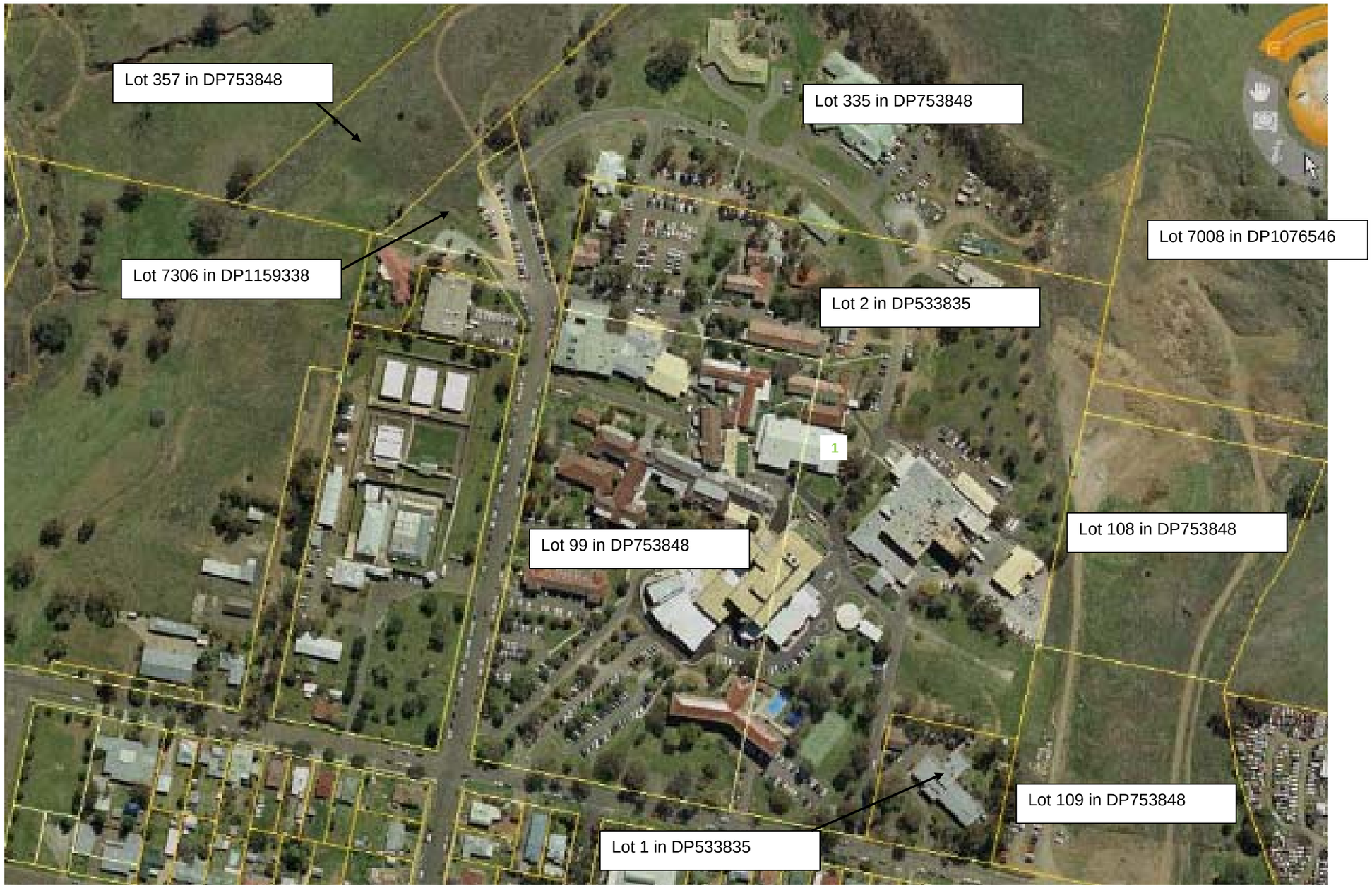
TITLE: **Site Features Plan**
Phase 1 Contamination Assessment – Tamworth Hospital Redevelopment
Tamworth Hospital

PROJECT No:	75393.00
DRAWING No:	1
REVISION:	A



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Health Infrastructure		TITLE:	**Test Location Plan**	PROJECT No: 75393.00
	OFFICE:	Wyong	DRAWN BY: MPG		**Phase 1 Contamination Assessment**	DRAWING No: 2
	SCALE:	NTS	DATE: 20.4.12		**Tamworth Hospital**	REVISION: A

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Health Infrastructure		TITLE:	**Groundwater Wells Location Plan** **Tamworth Base Hospital Redevelopment** **Tamworth**	PROJECT No:	75393
	OFFICE:	Wyong	DRAWN BY: MPG			DRAWING No:	3
	SCALE:	NTS	DATE: 20.04.12			REVISION:	A



Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	Health Infrastructure			TITLE:	**Site Identification – Phase 1 Contamination Assessment**
OFFICE:	Wyong	DRAWN BY:	MPG		**Tamworth Base Hospital Redevelopment**
SCALE:	NTS	DATE:	20.04.12		**Tamworth**

PROJECT No:	75393
DRAWING No:	4
REVISION:	A

Appendix C

Relevant Test Pit and Test Bore Logs

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 100
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
	0.02	SPRAY SEAL							
	0.09	FILLING: Grey and brown sandy gravel filling, dry							
		SANDY GRAVELLY CLAY: Very stiff to hard, orange brown sandy gravelly clay, M<Wp		B	0.3				>>
					0.8				
	0.85	Bore discontinued at 0.85m. Refusal on bedrock							
	1								1
	2								2
	3								3
	4								4

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 101
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING: Generally comprising, light brown gravelly sandy clay with occasional brick fragments, plastic and star picket		A	0.3				
		- from 0.4m depth, dark grey		A	0.5				
					0.6				
		- from 0.7m depth, brown		D					
					0.9				
	1	- concrete approx. 2.5m diameter at 1.2m depth							
	1.7	SANDY GRAVELLY CLAY: Very stiff to hard, light brown, fine to medium sized sandy gravelly clay, M=Wp		D	2.0		PID= 0.4ppm		
	2								
	2.3	Pit discontinued at 2.3m. Limit of investigation							
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3 Tonne Excavator fitted with 300mm bucket with teeth
LOGGED: MPG
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	ASPHALTIC CONCRETE							
		FILLING: Brown silty gravel filling, humid							
	0.23	GRAVELLY CLAY: Hard, brown and orange brown gravelly caly (possibly filling), M<Wp		D	0.5		PID = 2.6 ppm		
				B	0.8				
	1.2	Bore discontinued at 1.2m. Limit of investigation							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 103
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0	FILLING: Generally comprising, dark brown sandy clay with traces of gravel, M<Wp (in a poorly compaction condition)		B	0.5				
					0.8				
	1.5	CLAY: Very stiff to hard, dark brown, mottled red brown clay with traces of sand and fine sized gravel, M<Wp		D	1.8				
	2.1	Pit discontinued at 2.1m. Excavator refusal on probable bedrock							

RIG: 3 Tonne Excavator fitted with 300mm bucket with teeth
LOGGED: MPG
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.02	ASPHALTIC CONCRETE		D	0.1		PID = 3.9 ppm		
	0.15	FILLING: Brown sandy gravel filling, dry - some crushed brick and coal from 0.08m							
	0.3	FILLING: Brown and grey slightly cemented gravelly sand filling, dry		D	0.4		PID = 2.5 ppm		
		CLAY: Very stiff to hard, orange and red brown clay with some sand, M<Wp			0.5				
				B					
		- light brown and gravelly from 0.8m			0.8				
	1								1
	1.2	Bore discontinued at 1.2m. Limit of investigation							
	2								2
	3								3
	4								4

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 105
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING: Generally comprising, brown gravelly sandy clay with traces of metal pieces, asphalt pieces on surface		A	0.1		PID= 0.8ppm		
					0.3				
				B					
					0.5				
				A	0.6		PID= 0.5ppm		
	0.7	GRAVELLY SANDY CLAY: Very stiff, light brown gravelly sandy clay, M<Wp							
	0.8	Pit discontinued at 0.8m. Excavator refusal on low to medium strength bedrock							
	1								
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 3 Tonne Excavator fitted with 300mm bucket with teeth

LOGGED: MPG

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SANDY CLAY: Very stiff, light brown, fine to medium grained sandy clay, M<Wp		A	0.1		PID= 0.6ppm		
				A(QA1)	0.5		PID= 0.2ppm		
	0.8	SILTSTONE: Very low strength, highly weathered, orange brown siltstone							
	1			S	1.0		20 refusal		1
	1.1	Bore discontinued at 1.1m. TC bit refusal			1.1				
	2								2
	3								3
	4								4

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: Solid Flight Auger to 1.1m
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 107
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.1	TOPSOIL/FILLING: Brown silty sand topsoil/filling, dry							
		FILLING: Brown/orange gravelly sandy clay filling with some brick and glass fragments, M<Wp		D	0.3		PID = 3.2 ppm		
	0.5	GRAVELLY SANDY CLAY: Hard, light grey brown gravelly sandy clay, M<WP		D	0.5		PID = 2.7 ppm		
				B	0.8				
	1.2	Bore discontinued at 1.2m. Limit of investigation							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0	FILLING: Generally comprising, dark brown silty clay with traces of plastic, timber and metal, M<Wp (in a poorly compacted condition)		A(QA2)	0.1		PID= 0.3ppm		
				A	0.5		PID= 0.		
	1	- from 1.0m depth, sandy clay filling, only, moist content increasing - metal piping and wire at 1.2m depth		S	1.0 1.45		1,2,2 N = 4		
	1.8	META - SILTSTONE: Very low strength, highly fractured light brown meta-siltstone							
	2 2.0	Bore discontinued at 2.0m. TC bit refusal auger refusal							
	3								
	4								

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:**
TYPE OF BORING: Solid Flight Auger to 1.9m
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 108A
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING: Generally comprising, dark brown silty sandy clay with traces of plastic, timber and metal		A	0.1				
				A	0.5				
	1	- metal piping and wire at 1.2m depth							1
	1.9	Pit discontinued at 1.9m. Excavator refusal on possible bedrock							
	2								2
	3								3
	4								4

RIG: 3 Tonne Excavator fitted with 300mm bucket with teeth
LOGGED: MPG
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Generally comprising, dark brown silty sandy clay with traces of gravel, M<Wp (in a poorly compacted condition)		D	0.1		PID= 0.6ppm		
				D	0.5		PID= 0.1ppm		
		- from 0.6m depth, becoming grey mottled brown							
	1	- from 1.0m depth, dark brown			1.0				1
				S			5,10,16 N = 26		
				D	1.45 1.5				
	2	- at 2.0m depth, brick fragments, ash & gravel			2.0				2
				S			6,5,5 N = 10		
					2.45				
	3	- from 3.0m depth, in a poorly compacted condition)			3.0				3
				S			4,3,3 N = 6		
					3.45				
	4				4.0				4
				S			2,2,2 N = 4 PID= 0.5ppm		
					4.45				
		- from 4.8m depth, predominantly grey silty clay with some gravel (possible cobble)							

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Generally comprising, dark brown silty sandy clay with traces of gravel, M<Wp (in a poorly compacted condition) *(continued)*			5.0				
		- at 5.0m depth, SPT little recovery		S			14,8,7 N = 15 PID= 0.2ppm		
		- from 5.0m depth, in a moderately compacted condition			5.45				
	6				6.0				6
				S			2,4,4 N = 8 PID= 0.4ppm		
					6.45				
	7				7.0				7
				S			3,4,4 N = 8 PID= 1.0ppm		
					7.45				
	8				8.0				8
				S			3,4,6 N = 10 PID= 0.5ppm		
					8.45				
	9								9

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil

TYPE OF BORING: Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Generally comprising, dark brown silty sandy clay with traces of gravel, M<Wp (in a poorly compacted condition) *(continued)*		S	10.0 10.45		4,5,21 N = 26		
	11								11
	11.3	- from 11.2m depth, hard drilling							
		Bore discontinued at 11.3m. TC bit refusal on probable bedrock							
	12								12
	13								13
	14								14

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 110
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.15	FILLING: Brown sandy clayey gravel filling, dry							
		SANDY CLAY: Very stiff to hard, grey and brown sandy clay with some gravel, M<Wp		D	0.3		PID = 2.4 ppm		
		- from 0.5m depth, hard		B	0.5				
	1				0.8				
	1.2	Bore discontinued at 1.2m							
	2								
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 111
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
	0.15	TOPSOIL/FILLING: Brown sandy silt topsoil/filling, dry							
		FILLING: Light brown gravelly sandy silt filling, dry		D	0.2		PID = 2.1 ppm		
	0.5	CLAY: Hard, orange and red brown clay with some sand, M<Wp		D	0.5				
				B	0.6		PID = 1.8 ppm		
	1				0.8				1
	1.2	Bore discontinued at 1.2m. Limit of investigation							
	2								2
	3								3
	4								4

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 112
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	2 COAT SPRAY SEAL							
	0.15	FILLING: Grey sandy gravel filling, moist							
		FILLING: Brown sandy gravel filling with some clay and cobbles, humid		D	0.3		PID = 2.9 ppm		
				B					
					0.6				
	0.7	Bore discontinued at 0.7m. Refusal on bedrock							
	1								
	2								
	3								
	4								

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**
TYPE OF BORING: 250mmϕ Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⊻	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 113
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	FILLING: Brown gravelly silty clay filling, M<Wp							
		GRAVELLY SANDY CLAY: Hard, orange and light brown gravelly sandy clay, M<Wp		D	0.5		PID = 4.4 ppm		
				B	0.8				
	1								1
	1.2	Bore discontinued at 1.2m. Limit of investigation							
	2								2
	3								3
	4								4

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 114A
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.02	2 COAT SPRAY SEAL							
	0.18	FILLING: Light brown and grey sandy gravel filling, dry							
		FILLING: Orange brown gravelly sandy clay filling, M<Wp			0.3				
				B	0.5		PID = 2.2 ppm		
				D(QA3)	0.6				
	0.7	CLAY: Hard, brown clay with some gravel and sand, M<Wp			0.7				
				D	0.8		PID = 2.4 ppm		
				B	1.0				
	1.2	Bore discontinued at 1.2m. Limit of investigation							

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**

TYPE OF BORING: 250mmϕ Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 115
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Light brown sandy gravel filling, dry							
	0.5	FILLING: Brown gravelly sandy clay filling with some asphaltic concrete, M<Wp		B	0.6				
	1				1.0				
	2								
	3								
	3.0	Bore discontinued at 3.0m. Limit of investigation							
	4								

RIG: 3 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**
TYPE OF BORING: 250mmϕ Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 116
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Light brown sandy gravel filling, dry		D	0.5		PID = 2.9 ppm		
	0.8	FILLING: Dark grey and brown gravelly sandy clay filling with a trace of asphaltic concrete, M=Wp (in a moderately compacted condition)							
	1			S	1.5		8,8,7 N = 15 PID = 1.6 ppm		
	2				1.95				
	3	- from 3.0m depth, in a poorly compacted condition		S	3.0		1,2,2 N = 4 PID = 1.0 ppm		
	4				3.45				
	5								
	6			S	6.0		2,1,2 N = 3 PID = 1.2 ppm		
	7				6.45				
	8	- hard drilling and possibly highly fractured meta-siltstone from 8.2m							
	9								
	9.1	Bore discontinued at 9.1m. Refusal on bedrock							

RIG: Track Mounted **DRILLER:** SK **LOGGED:** TDM **CASING:**
TYPE OF BORING: 100mmϕ Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 200
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
	0.2	FILLING: Generally comprising, brown silty sand with some gravel and pieces of concrete							A			PID= 0.2ppm
		SANDY CLAY: Very stiff to hard, brown, fine to medium grained sandy clay, M<Wp							A			PID= 1.2ppm
	1								S			40 refusal
	1.2	SILTSTONE: Extremely low strength, extremely weathered, brown mottled orange siltstone (moderately fractured)										PID= 0.9ppm
	1.3							1.3m: CORE LOSS: 90mm	C	84	0	
	1.39	CORE LOSS from 1.3m to 1.39m										
		SILTSTONE: Very low strength, highly weathered, brown siltstone - from 1.56m depth, basalt band 50mm thick - from 1.65m depth, moderately strength, medium weathered highly fractured						1.81m: J15°,un,ro 1.86m: J20°,un,ro 1.95m: J, healed 60°,un 2m: J, healed 60°,un	C	100	60	PL(A) = 0.19
	2 2.0											
	2.16	CORE LOSS from 2.0m to 2.16m						CORE LOSS: 160mm				
		SILTSTONE: Medium strength, highly weathered, brown siltstone							C	57	0	PL(A) = 0.68 PL(D) = 0.32
	2.73	Bore discontinued at 2.73m. Limit of investigation										
	3											
	4											

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 1.1m

TYPE OF BORING: Solid Flight Auger to 1.1m, then NMLC coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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DOUGLAS PARTNERS PTY LTD

BORE 200 GEOTECHNICAL INVESTIGATION 19/3/12
TAMWORTH BASE HOSPITAL

1.15 – 2.73m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75393
	Geotechnical Investigation	PLATE No: 1
	Tamworth Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING: Generally comprising, brown sandy clay with traces of brick fragments, coal and gravel, dry							A			PID= 0.4ppm
									A			PID= 0.9ppm
	0.75	SANDY CLAY: Very stiff to hard, brown, fine to medium grained sandy clay, M<<Wp (clay content decreasing with depth)							A			PID= 0.2ppm
	1								S			7,14,18 N = 32 PID= 1.0ppm
		- grading into weathered bedrock at 1.8m depth										
	2.08	CORE LOSS						2.08m: CORE LOSS: 200mm	C	75	0	PL(A) = 0.21
	2.28	SILTSTONE: Medium strength, highly weathered, highly fractured brown siltstone						2.28m: 2.28m-3.46m J's at 0.05 to 0.1m spacing 15° to 70°, pl,ro,ir				
	3								C	72	0	PL(A) = 0.81
	3.26	CORE LOSS						3.26m: CORE LOSS: 200mm				
	3.46	SILTSTONE: Medium strength, highly weathered, highly fractured brown siltstone							C	85	0	
		- from 3.7m depth, very low strength										PL(A) = 0.58
		- from 3.8m depth, low strength							C	100	0	
	4 4.0	Bore discontinued at 4.0m. Limit of investigation										

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 2.08m

TYPE OF BORING: Solid Flight Auger to 2.28m, then NMLC coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

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BORE 201 GEOTECHNICAL INVESTIGATION 19/3/12
TAMWORTH BASE HOSPITAL

2.08 – 4.0m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT:	75393
	Geotechnical Investigation	PLATE No:	2
	Tamworth Base Hospital	REV:	A
	CLIENT: Health Infrastructure	DATE:	2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		TOPSOIL/FILLING: Brown silty sand topsoil/filling with some rootlets, dry							D			PID = 4.8 ppm
	0.15	FILLING: Brown gravelly sandy clay filling with some brick fragments, M=Wp							D			PID = 4.3 ppm
	0.8	CLAY: Hard, light brown and orange clay, M=Wp										
	1								S			3,6,11 N = 17 PID = 5.3 ppm
	2	START CORING AT 2.3M							S			14,Ref refusal ~~PID = 5.1 ppm~~
	2.3	META-SILTSTONE: Very low strength, highly weathered, highly fractured, brown, fine grained meta-siltstone - extremely low strength, clayey band from 2.6 - 2.75m							C	100	0	
	3											
	3.09	CORE LOSS						3.09m: CORE LOSS: 60mm				
	3.15	META-SILTSTONE: Extremely low to very low strength, highly weathered, highly fracturede, brown, fine grained meta-siltstone						3.31m: JT,60°, pl,ro 3.42m: JT,60°,pl,ro 3.44m: fractured zone (closely spaced) to 3.56 3.65m: fractured zone (closely spaced) to 3.73 3.76m: fractured zone (closely spaced) to 4.0	C	93	0	
	4											
	4.0	Bore discontinued at 4.0m. Limit of investigation										

RIG: Track Mounted **DRILLER:** Scott **LOGGED:** TDM **CASING:** HW to 2.3m

TYPE OF BORING: Solid Flight Auger to 2.3m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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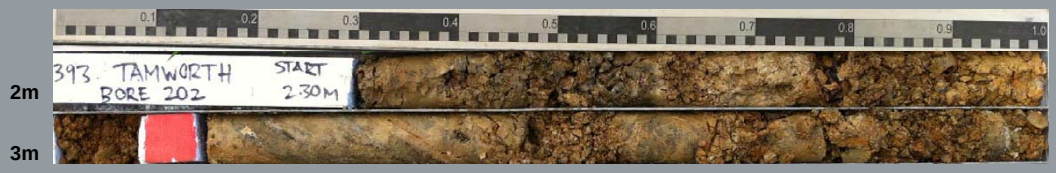
BORE 202 GEOTECHNICAL INVESTIGATION 22/3/12
TAMWORTH BASE HOSPITAL



2.3 – 4.0 m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT:	75393
	Geotechnical Investigation	PLATE No:	3
	Tamworth Base Hospital	REV:	A
	CLIENT: Health Infrastructure	DATE:	2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 203
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING: Generally comprising, brown gravelly silt		A	0.1		PID= 0.1ppm		
		CLAYEY SANDY SILT: Very stiff, brown mottled orange clayey sandy silt with traces of gravel, dry		A	0.5		PID= 0.5ppm		
	0.8	CLAY: Hard brown clay with traces of fine to medium grained sand, M<Wp							
1					1.0				1
				S			5,7,12 N = 19		
					1.45				
	1.9	SILTSTONE: Very low strength meta-siltstone		A	2.0		PID= 1.2ppm		
2									2
	2.6	Bore discontinued at 2.6m. Refusal							
3									3
4									4

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: Solid Flight Auger to 2.28m, then NMLC coring
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 204
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING: Generally comprising brown sandy gravelly clay filling, dry							A			PID= 0.4ppm
	0.2	SANDY CLAY: Stiff to very stiff, red brown, fine grained sand clay, M=Wp										
		- moisture content decreasing with depth							A			PID= 0.2ppm
	1								S			7,3,3 N = 6 PID= 1.0ppm
	2											
	2.0	META-SILTSTONE: Extremely low to very low strength, light brown meta-siltstone							S			25,Ref refusal PID= 0.4ppm
		- from 2.8m depth, very low strength, highly weathered, highly fractured							C	100	0	
	3	- from 3.35m depth, extremely low strength										
		- from 3.55m depth, very low strength, highly fragmented							C	100	0	
	4	- from 3.95m depth, low strength, highly weathered										
		- from 4.12m to 4.5m depth, with dark grey/black interbeds						4.2m: J,70°,pl,ro				
								4.48m: J,70°,pl,ro	C	100	20	
		- from 4.85m depth, medium to high strength, moderately							C	100	34	PL(D) = 0.22

RIG: Track Mounted **DRILLER:** Tracess **LOGGED:** MPG **CASING:** HW to 2.5m

TYPE OF BORING: Solid Flight Auger to 2.8m then NMLC from 2.8m to 9.0m

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 204
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low / Very Low / Low / Medium / High / Very High / Ex High		0.01 / 0.05 / 0.10 / 0.50 / 1.00	B - Bedding J - Joint S - Shear F - Fault				
		weathered META-SILTSTONE: Extremely low to very low strength, light brown meta-siltstone *(continued)*						4.95m: J,70°,pl,ro 5.15m: J,60°,pl,ro	C	100	34	PL(A) = 1.6 PL(D) = 2
	6								C	100	84	
								6.54m: J,60°,pl,ro 6.57m: J,sh,un,clay filled 20mm thick				
	7	7.0 META-SILTSTONE: Medium strength, highly weathered, light brown meta-siltstone						6.97m: J,45°,pl,ro 7.29m: J,15°,un,ro	C	100	10	PL(A) = 1.1 PL(D) = 0.47
		- from 7.45m depth, low strength, highly fragmented to 8.0m						7.45m: fragmented to 7.8	C	100	0	
	8							7.9m: J,70°,pl,ro,ir 8m: J,70°,pl,ro,ir	C	100	0	
								8.22m: J,70°,pl,ro,ir	C	100	50	PL(A) = 0.08 PL(D) = 0.04
		- from 8.5m depth, dark grey (meta-mudstone) to 8.85m depth						8.47m: J,45°,pl,ro 8.75m: J,60°,pl,ro 8.89m: J,70°,pl,ro	C	100	50	
	9	9.0 Bore discontinued at 9.0m										

RIG: Track Mounted **DRILLER:** Tracess **LOGGED:** MPG **CASING:** HW to 2.5m

TYPE OF BORING: Solid Flight Auger to 2.8m then NMLC from 2.8m to 9.0m

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

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BORE 204 GEOTECHNICAL INVESTIGATION 21/3/12
TAMWORTH BASE HOSPITAL

2.8 – 9.0m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75393
	Geotechnical Investigation	PLATE No: 4
	Tamworth Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 205
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: Generally comprising, brown mottled orange silty gravel, dry		A	0.1		PID= 0.1ppm		
	0.2	GRAVELLY SILT: Very stiff, orange brown, fine to medium sized subangular gravelly silt		A	0.5		PID= 0.5ppm		
				A	0.8		PID= 0.2ppm		
	1	- from 1.0m depth, grading to extremely weathered siltstone			1.0				1
				S			13,20 refusal		
	1.6	Bore discontinued at 1.6m. Limit of investigation			1.3				
	2								2
	3								3
	4								4

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: 100m diameter auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 206
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.1	TOPSOIL/FILLING: Brown sandy silty clay topsoil/filling with some rootlets							D			PID = 7.4 ppm
		FILLING: Red brown and dark grey clay filling with some coal fragments and gravel, M=Wp (n a poorly compacted condition)							D			PID = 6.7 ppm
									D			PID = 7.8 ppm
	1											
	1.2	CLAY: Stiff, red brown clay with a trace of sand, M=Wp							S			1,2,3 N = 5 PID = 8.6 ppm
		- orang brown and sandy, M<Wp from 1.8m										
	2								S			3,5,13 N = 18 PID = 7.7 ppm
	2.85	START CORING AT 2.85M										
	3	META-SILTSTONE: Very low strength, highly weathered, fractgured brown fine grained meta-siltstone - low strength from 2.93m						2.93m: JT,45°,pl,ro 3.04m: JT,60°,pl,ro,clay filled (10mm) 3.13m: JT,60°,pl,ro 3.2m: JT,20°,pl,ro 3.29m: JT,45°,pl,ro 3.33m: JT,45°,pl,ro,ironstained 3.42m: JT,45°,pl,ro,ironstained 3.5m: JT,45°,pl,ro,ironstained 3.55m: JT,45°,pl,ro,clay filled 3.6m: JT,60°,pl,ro,ironstained 3.73m: JT,30°,pl,ro 3.76m: JT,20°,pl,ro,ironstained 3.83m: JT,45°,pl,ro,ironstained 3.87m: JT,45°,pl,ro,ironstained 3.93m: JT,60°,pl,ro,ironstained	C	100	0	PL(D) = 0.25
	4											
	4.24	Bore discontinued at 4.24m. Limit of investigation										PL(D) = 0.21

RIG: Track Mounted **DRILLER:** SK **LOGGED:** TDM **CASING:** HW to 2.8m

TYPE OF BORING: Solid Flight Auger to 2.8m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE 206 GEOTECHNICAL INVESTIGATION 22/3/12
TAMWORTH BASE HOSPITAL

2.85– 4.24m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT:	75393
	Geotechnical Investigation	PLATE No:	5
	Tamworth Base Hospital	REV:	A
	CLIENT: Health Infrastructure	DATE:	2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 207
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING: Generally comprising, brown sandy clay, M<Wp		A	0.1				
		SANDY CLAY: Very stiff, brown sandy clay, lithic fragments, M<Wp		A	0.5				
	1	- from 1.0m depth, hard		S	1.0		13,13,16 N = 29		
					1.45				
	2	- from 2.2m depth, grading to meta-siltstone bedrock		S	2.0		2,20 refusal		
	2.6	Bore discontinued at 2.6m. TC bit refusal			2.3				
	3								
	4								

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil
TYPE OF BORING: Solid Flight Auger to 2.6m
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 208
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		CLAY: Very stiff, red brown clay with some fine to medium grained sand, M<Wp							A			PID= 1.5ppm
									A			
	1								S			6,10,17 N = 27 PID= 0.9ppm
									A			PID= 1.1ppm
	2											
	2.6	META-SILTSTONE: Very low strength, highly weathered, light brown meta-siltstone - from 2.79m depth, medium strength - from 2.89m depth, very low strength, dark brown/black (organic) - from 3.05m depth, extremely low strength, extremely weathered - from 3.35m depth, high strength, moderately weathered						2.67m: clay seam 25mm wide 2.76m: J,30°, un.ro 2.85m: J,45°,pl,clay filled 2.91m: J,70°,pl,clay lined 3m: J,60°,pl,ir 3.15m: clay seam, sh, 15mm wide 3.2m: J,70°,pl,ro 3.23m: J,40°,pl,ro 3.34m: J,45°,pl,ro 3.4m: clay seam,sh, 8mm wide 3.52m: J,15°,pl,ro 3.56m: J,sh,un,ro 3.83m: J,60°,pl,clay lined 3.92m: J,60°,pl,ro,ir 4.15m: J,60°,pl,ir,clay lined 4.22m: J,60°,pl,ir,clay lined 4.29m: J,60°,pl,ir,clay lined 4.34m: clay seam to 4.46 4.55m: J,15°,pl,st 4.75m: J,70°,pl,ro 4.93m: J,70°,pl,ro 4.99m: J,80°,pl,ro 5.23m: J,70°,pl,ro,ir 5.38m: J,60°,pl,ro,clay lined 5.46m: J,30°,pl,clay lined 5.57m: clay seam 30mm wide 5.75m: J,20°pl,ro,ir	C	100	20	PL(A) = 1.4 PL(D) = 0.31
	3											
	4	- at 4.34m depth, clay seam to 4.46m - at 4.75m depth, high strength, grey basalt to 4.93m (fractured)							C	100	0	
	5	- from 4.99m depth, basalt to 5.21m							C	100	0	
		- from 5.44m depth, low strength - from 5.62m depth, high strength, moderately weathered							C	100	50	

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 2.6m

TYPE OF BORING: Solid Flight Auger to 2.6m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics I Environment I Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 208
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		META-SILTSTONE: Very low strength, highly weathered, light brown meta-siltstone *(continued)*						6m: J,60°,pl,ro				
		= from 6.0m depth, high to very high strength, slightly weathered						6.24m: J,60°,pl,ro,ir 6.29m: J,60°,pl,ro	C	100	50	
								6.76m: J,15°				PL(A) = 2.7 PL(D) = 3.2
	7								C	100	60	
		- at 7.9m depth, extremely low strength, seam to 7.94m										PL(A) = 1.6 PL(D) = 3.1
	8							8.32m: J,15°,pl,ro				
								8.47m: J,80°,pl,ro,clay filled 3mm wide 8.55m: clay seam 15mm wide 8.62m: J,45°,pl,ro 8.74m: J,70°,pl,ro	C	100	45	
	9							9.35m: J,15°,pl, ro				
									C	100	90	
								9.81m: J,10°,pl,un				PL(A) = 3.1 PL(D) = 2.2
	10 10.0	Bore discontinued at 10.0m. Limit of investigation										
	11											

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 2.6m

TYPE OF BORING: Solid Flight Auger to 2.6m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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BORE 208 GEOTECHNICAL INVESTIGATION 19/3/12
TAMWORTH BASE HOSPITAL

2.6– 10m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75393
	Geotechnical Investigation	PLATE No: 6
	Tamworth Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 209
PROJECT No: 75393.00
DATE: 20/3/2012
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.02	2 COAT SPRAY SEAL							A			PID= 0.2ppm
	0.15 0.22	FILLING: Generally comprising dark brown sandy grvel filling with some clay										
		FILLING: Generally comprising light grey, fine to medium grained, subangular gravel with some sand (possibly stabilised)							A			PID= 0.5ppm
	1	FILLING: Generally comprising dark brown fine to medium grained sandy silty clay filling with occasional gravel and timber, M<WP							S			4,7,9 N = 16 PID= 0.3pp,
	1.5	SANDY CLAY: Hard, light brown, fine to medium grained sandy clay, M<wP										
	1.8	META-SILTSTONE: Very low strength, highly weathered, light brown meta-siltstone										
	2								S			25/50,Ref refusal
	3	- from 2.95m depth, very low strength, highly weathered - from 3.03m depth, low strength						3.04m: clay seam, 20mm thick 3.21m: J,sh,un,ro				PL(D) = 0.93
		- from 3.35m depth, very low strength						3.35m: J,45°,pl,ro 3.44m: J,40°,pl,ro 3.5m: J,60°,pl,clay filled, 15mm thick 3.66m: J,70°,pl,ro 3.71m: J,10°,pl,clay filled 12mm wide 3.87m: J,60°,pl,ro 3.93m: J,45°,pl,ro	C	100	28	
	4	- from 4.0m depth, low strength						4.2m: J,70°,pl,ro 4.32m: J,45°,pl,ro 4.43m: J,15°,un,clay filled 8mm wide 4.6m: J,60°,pl,clay filled 40mm wide 4.78m: J,70°,pl,ro 4.84m: J,70°,pl,ro				PL(D) = 0.08
	4.8	META-MUDSTONE: Medium to high strength, highly weathered, highly fractured, dark grey meta-mudstone							C	100	67	
	5							5.2m: J,60°,pl,clay filled 30mm wide 5.4m: J's, 45°, to 70°, at 5mm to 50oomm spacing to 6.16m				
									C	100	0	PL(A) = 0.69
									C	100	0	

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 2.5m

TYPE OF BORING: Solid Flight Auger to 2.5m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 209
PROJECT No: 75393.00
DATE: 20/3/2012
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		META-MUDSTONE: Medium to high strength, highly weathered, highly fractured, dark grey meta-mudstone *(continued)*							C	100	0	
								6.25m: J,60°,pl,ro,ir 6.35m: J,60°,pl,ro,ir 6.4m: J,60°,pl,ro,ir 6.48m: J,60°,pl,ro,ir 6.55m: J,60°,pl,ro,ir 6.6m: J's at 5mm to 50mm spacing, 45°, to 70°, pl,ro,ir	C	100	0	PL(A) = 1.2
	7	- from 7.0m depth, medium to high strength, highly fractured and fragmented						7m: J's at 5mm to 50mm spacing, 70°, pl,ro,ir to 9.15m	C	100	0	
									C	100	0	
	8								C	100	0	
									C	100	0	
									C	100	0	PL(A) = 2.6
	9											
		- at 9.34m depth, high strength, meta-siltstone to 9.6m depth						9.45m: J,70°,pl,ro				PL(A) = 0.62 PL(D) = 0.16
		- from 9.8m depth, low strength						9.67m: J,70°,pl,ro 9.72m: J,70°,pl,ro,ir 9.74m: J,70°,pl,ro,ir 9.8m: J,70°,pl,ir 9.9m: J,70°,pl,ro,ir 10.08m: J,70°,pl,ro,ir	C	100	60	
	10											
	10.1	GRANITE: High strength, slightly weathered grey granite										PL(D) = 5.2
								10.52m: J,5°,pl,ro,clay filled 5mm wide 10.55m: J,60°,pl,ro 10.66m: J,70°,pl,ro 10.87m: J,45°,pl,ro	C	100	90	
	11 11.0	Bore discontinued at 11.0m. Limit of investigation										

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** HW to 2.5m

TYPE OF BORING: Solid Flight Auger to 2.5m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

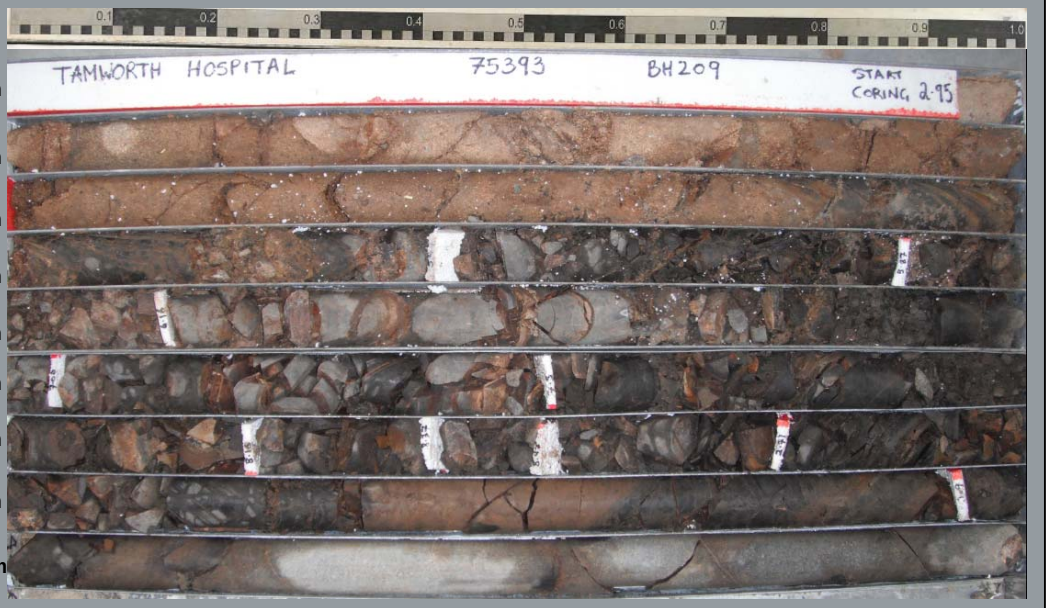
SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

BORE 209 GEOTECHNICAL INVESTIGATION 20/3/12
TAMWORTH BASE HOSPITAL



2.95– 11m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT: 75393
	Geotechnical Investigation	PLATE No: 7
	Tamworth Base Hospital	REV: A
	CLIENT: Health Infrastructure	DATE: 2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 210
PROJECT No: 75393.00
DATE: 19/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	TWO COAT SPRAY SEAL							
	0.1	FILLING: Generally comprising, grey and light brown gravel filling		A	0.1		PID= 0.1ppm		
		GRAVELLY CLAY: Very stiff to hard, brown, fine to medium sized gravelly clay, M<Wp		A	0.5				
	0.8	META-SILTSTONE: Low strength, highly weathered light brown meta-siltstone							
1				S	1.0		25,50		1
	1.05	Bore discontinued at 1.05m. TC bit refusal			1.05		refusal		
2									2
3									3
4									4

RIG: Track Mounted **DRILLER:** MPG **LOGGED:** MPG **CASING:** Nil

TYPE OF BORING: Solid Flight Auger

WATER OBSERVATIONS: No Free Groundwater Observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 211
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.02	ASPHALTIC CONCRETE										
		FILLING: Generally comprising, grey sandy gravel filling, dry							D			PID = 4.8 ppm
	0.3	SANDY CLAY: Very stiff, orange and red brown clay with some sand, M=Wp							D			PID = 4.8 ppm
		- from 0.8m depth, M<Wp										
	1								S			4,5,8 N = 13 PID = 5.3 ppm
		- from 1.8m depth, grading into meta-siltstone										
	2								S			9,24,Ref refusal PID = 4.5 ppm
	2.45	START CORING AT 2.45M										
		META-SILTSTONE: Very low strength, highly weathered, highly fractured, light brown, fine grained meta-siltstone							C	100	0	
	3 3.0	CORE LOSS						3m: CORE LOSS: 150mm				
	3.15	META-SILTSTONE: Very low strength, highly weathered, fractured, brown fine grained meta-siltstone						3.22m: JT,60°,pl,ro,clay lined 3.26m: JT,45°,pl,ro,clay lined				PL(D) = 0.03
		- from 3.45m depth, medium strength						3.53m: JT,45°,pl,ro,clay lined	C	85	55	PL(D) = 0.64
		- from 3.68m depth, high strength, slightly weathered						3.65m: clay band, 10mm thick 3.73m: JT,30°,pl,ro 3.82m: JT,60°,pl,ro 3.94m: JT,30°,pl,ro				PL(A) = 1.5
	4 4.0	Bore discontinued at 4.0m. Limit of investigation										

RIG: Track Mounted **DRILLER:** SK **LOGGED:** TDM **CASING:** HW to 2.45m

TYPE OF BORING: Solid Flight Auger to 2.45m, then NMCL coring

WATER OBSERVATIONS: No Free Groundwater Observed whilst auger drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE 211 GEOTECHNICAL INVESTIGATION 22/3/12
TAMWORTH BASE HOSPITAL

2m

3m

2.45– 4m

Douglas Partners Geotechnics / Environment / Groundwater	**Rock Core Photograph**	PROJECT:	75393
	Geotechnical Investigation	PLATE No:	8
	Tamworth Base Hospital	REV:	A
	CLIENT: Health Infrastructure	DATE:	2/4/12

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 212
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	2 COAT SPRAY SEAL		D	0.1		PID = 8.2 ppm		
		FILLING: Grey and brown sandy gravel filling - grey, possibly stabilised from 0.15m							
	0.28	FILLING: Brown and grey gravelly sandy clay filling with some brick fragments, M<Wp (in a moderately compacted condition)		D	0.5		PID = 6.4 ppm		
	1				1.0				1
				S			3,3,6 N = 9 PID = 4.7 ppm		
					1.45				
	2				2.0				2
	2.1	SANDY CLAY: Hard, light brown sandy clay with some gravel, M<Wp		S			3,9,14 N = 23 PID = 5.7 ppm		
					2.45				
	3				3.0				3
				S			26,Ref refusal PID = 6.2 ppm		
	3.15	Bore discontinued at 3.15m. Refusal on bedrock (meta-siltstone)			3.15				
	4								4

RIG: Track Mounted **DRILLER:** SK **LOGGED:** TDM **CASING:**
TYPE OF BORING: 100m diameter Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 213
PROJECT No: 75393.00
DATE: 21/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	2 COAT SPRAY SEAL							
	0.2	FILLING: Grey and brown sandy gravel filling, damp							
		FILLING: Dense, light brown sandy gravel filling with some clay, dry		D	0.3		PID = 1.8 ppm		
	0.5	GRAVELLY CLAYEY SAND: Dense, light brown/orange gravelly clayey sand, dry							
	1								1
	1.4	Bore discontinued at 1.4m. Refusal on bedrock							
	2								2
	3								3
	4								4

RIG: 3.5 Tonne excavator **DRILLER:** Colin **LOGGED:** TDM **CASING:**
TYPE OF BORING: 250mmϕ Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Tamworth Hospital Redevelopment
LOCATION: Tamworth Hospital

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 214
PROJECT No: 75393.00
DATE: 22/3/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	2 COAT SPRAY SEAL		D	0.1		PID = 9.4 ppm		
		FILLING: Orange brown sandy gravel filling with a trace of clay							
	0.3	Bore discontinued at 0.3m. Refusal on bedrock							
	1								
	2								
	3								
	4								

RIG: Track Mounted **DRILLER:** SK **LOGGED:** TDM **CASING:**
TYPE OF BORING: 100m diameter Solid Flight Auger
WATER OBSERVATIONS: No Free Groundwater Observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix D

Results of Laboratory Testing

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

CERTIFICATE OF ANALYSIS 71013

Client:
Douglas Partners Tuggerah
Unit D, 7 Donaldson St
Wyong North
NSW 2259

Attention: Michael Gawn

Sample log in details:

Your Reference:	**75393, Tamworth Hospital**
No. of samples:	32 Soils, 1 Waters
Date samples received / completed instructions received	28/03/2012 / 28/03/2012

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:	4/04/12 / 4/04/12
Date of Preliminary Report:	Not Issued

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

Results Approved By:

Nancy Zhang
Chemist

Hinoko Miyazaki
Chemist

Giovanni Agosti
Technical Manager

Paul Ching
Approved Signatory

Jeremy Faircloth
Chemist

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	113	110	107	106

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	109	107	101	108	108

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	109	110	110	107	105

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	116	115	107	107	105

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	113	115	114	112	116

vTRH & BTEX in Soil						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	114	113	111	110

vTRH & BTEX in Soil			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012
vTRH C_6 - C_9	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	112	113

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	93	91	79	95	95

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	93	95	93	96	98

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	190	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	110	<100	<100
Surrogate o-Terphenyl	%	117	94	100	95	93

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	31/03/2012	31/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	97	95	96	95	110

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	106	105	103	103	104

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/03/2012	30/03/2012	30/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	104	105	103	97	100

sTRH in Soil (C10-C36)			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100
Surrogate o-Terphenyl	%	102	102

PAHs in Soil						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.2	<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	0.7	0.2	0.7	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.9	0.5	1.2	<0.1	<0.1
Pyrene	mg/kg	1.0	0.5	1.5	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.4	0.3	0.7	<0.1	<0.1
Chrysene	mg/kg	0.5	0.3	0.8	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.8	0.6	1.0	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.56	0.39	0.71	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	0.3	0.7	<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	0.6	0.3	0.9	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	113	109	101	109	107

PAHs in Soil						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
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	0.6
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.1	0.7
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.9
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.07	0.56
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.5
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	0.5
Surrogate p-Terphenyl-d_{14}	%	103	107	101	105	100

PAHs in Soil						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.07	<0.05	<0.05	<0.05	0.09
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	100	102	107	105	102

PAHs in Soil						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.07	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	101	107	91	89	131

PAHs in Soil						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	118	115	113	110	108

PAHs in Soil						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012	31/03/2012	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	113	109	107	103	113

PAHs in Soil Our Reference: Your Reference Depth Type of sample	UNITS ---------- ----------	71013-31 QA2 - Soil	71013-32 QA3 - Soil
Date extracted	-	29/03/2012	29/03/2012
Date analysed	-	31/03/2012	31/03/2012
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1
Pyrene	mg/kg	0.3	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.2	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.20	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	<0.1
Surrogate p-Terphenyl-d_{14}	%	104	112

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	100	102	101	103	100

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	102	101	100	101	106

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	96	96	99	99	98

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	103	97	103	99	100

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	97	112	108	103	104

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
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	%	100	92	104	103	97

Organochlorine Pesticides in soil			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	104	107

PCBs in Soil						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
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	%	100	102	101	103	100

PCBs in Soil						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
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	%	102	101	100	101	106

PCBs in Soil						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
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	%	96	98	99	99	98

PCBs in Soil						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
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	%	130	97	103	99	100

PCBs in Soil						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	112	108	103	104

PCBs in Soil						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
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	%	100	92	104	103	97

PCBs in Soil			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date extracted	-	29/03/2012	29/03/2012
Date analysed	-	29/03/2012	29/03/2012
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	104	107

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	11	16	15	8	6
Copper	mg/kg	34	31	27	33	26
Lead	mg/kg	10	47	27	6	4
Mercury	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Nickel	mg/kg	9	16	10	6	5
Zinc	mg/kg	54	130	58	64	59

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	4	25	22	23	10
Copper	mg/kg	13	34	28	28	32
Lead	mg/kg	3	9	10	10	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	24	18	22	9
Zinc	mg/kg	56	45	52	46	60

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	15	12	12	9	12
Copper	mg/kg	39	27	23	14	18
Lead	mg/kg	36	11	10	4	40
Mercury	mg/kg	<0.1	0.4	<0.1	<0.1	0.1
Nickel	mg/kg	12	6	9	4	8
Zinc	mg/kg	92	55	62	73	58

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	9	11	9	14	8
Copper	mg/kg	21	19	23	21	27
Lead	mg/kg	6	13	9	29	4
Mercury	mg/kg	<0.1	<0.1	<0.1	1.4	<0.1
Nickel	mg/kg	5	11	6	7	4
Zinc	mg/kg	56	84	54	48	69

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	11	6	9	10	4
Copper	mg/kg	23	25	18	23	10
Lead	mg/kg	7	3	7	7	2
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	5	6	11	3
Zinc	mg/kg	38	39	38	40	9

Acid Extractable metals in soil						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	22	5	7	11	5
Copper	mg/kg	29	18	27	19	15
Lead	mg/kg	5	3	9	16	4
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	13	3	7	10	3
Zinc	mg/kg	50	66	71	110	65

Acid Extractable metals in soil			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date digested	-	30/03/2012	30/03/2012
Date analysed	-	30/03/2012	30/03/2012
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.5	<0.5
Chromium	mg/kg	22	8
Copper	mg/kg	34	17
Lead	mg/kg	9	6
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	20	6
Zinc	mg/kg	45	33

Moisture						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	6.0	8.0	11	10	8.5

Moisture						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	11	15	15	14	5.9

Moisture						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	8.8	13	9.3	9.8	13

Moisture						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	15	5.1	13	14	12

Moisture						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	11	12	7.6	14	2.9

Moisture						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	29/03/2012	29/03/2012	29/03/2012	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012	30/03/2012	30/03/2012	30/03/2012
Moisture	%	10	5.9	12	6.2	9.2

Moisture			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date prepared	-	29/03/2012	29/03/2012
Date analysed	-	30/03/2012	30/03/2012
Moisture	%	11	6.9

Asbestos ID - soils						
Our Reference:	UNITS	71013-1	71013-2	71013-3	71013-4	71013-5
Your Reference	----------	BH101	BH101	BH103	BH105	BH105
Depth	----------	0.3	0.6	0.5	0.1	0.6
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown coarse-grained soil	Brown coarse-grained soil	Brown coarse-grained soil	Brown coarse-grained soil	Brown coarse-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71013-6	71013-7	71013-8	71013-9	71013-10
Your Reference	----------	BH106	BH108	BH108	BH109	BH109
Depth	----------	0.5	0.1	1.0	0.1	1.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown coarse-grained soil	Brown clayey soil	Brown clayey soil	Brown clayey soil	Brown coarse-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71013-11	71013-12	71013-13	71013-14	71013-15
Your Reference	----------	BH200	BH200	BH201	BH201	BH202
Depth	----------	0.1	0.5	0.1	0.8	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown coarse-grained soil	Brown coarse-grained soil	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71013-16	71013-17	71013-18	71013-19	71013-20
Your Reference	----------	BH203	BH205	BH205	BH206	BH206
Depth	----------	1.0	0.1	0.5	0.5	2-2.45
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown clayey soil	Brown coarse-grained soil & rocks	Brown clayey soil	Brown clayey soil	Brown clayey soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71013-21	71013-22	71013-23	71013-24	71013-25
Your Reference	----------	BH110	BH113	BH114A	BH114A	BH212
Depth	----------	0.3	0.5	0.5	0.8	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown clayey soil	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71013-26	71013-27	71013-28	71013-29	71013-30
Your Reference	----------	BH212	BH214	BH102	BH208	QA1
Depth	----------	1.0-1.45	0.1	0.5	0.1	-
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	02/04/2012	02/04/2012	02/04/2012	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g	Approx 35g	Approx 35g	Approx 35g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils			
Our Reference:	UNITS	71013-31	71013-32
Your Reference	----------	QA2	QA3
Depth	----------	-	-
Type of sample		Soil	Soil
Date analysed	-	02/04/2012	02/04/2012
Sample mass tested	g	Approx 35g	Approx 35g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected

vTRH & BTEX in Water		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date extracted	-	28/03/2012
Date analysed	-	29/03/2012
TRHC$_6$ - C$_9$	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	125
Surrogate toluene-d8	%	97
Surrogate 4-BFB	%	91

sTRH in Water (C10-C36)		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date extracted	-	29/03/2012
Date analysed	-	30/03/2012
$TRHC_{10}$ - C_{14}	µg/L	<50
$TRHC_{15}$ - C_{28}	µg/L	<100
$TRHC_{29}$ - C_{36}	µg/L	<100
Surrogate o-Terphenyl	%	88

PAHs in Water		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date extracted	-	29/03/2012
Date analysed	-	31/03/2012
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Surrogate p-Terphenyl-d_{14}	%	89

OCP in water		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date extracted	-	29/03/2012
Date analysed	-	29/03/2012
HCB	µg/L	<0.2
alpha-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
beta-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endosulfan II	µg/L	<0.2
pp-DDT	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Surrogate TCLMX	%	93

PCBs in Water		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date extracted	-	29/03/2012
Date analysed	-	29/03/2012
Arochlor 1016	µg/L	<2
Arochlor 1221	µg/L	<2
Arochlor 1232	µg/L	<2
Arochlor 1242	µg/L	<2
Arochlor 1248	µg/L	<2
Arochlor 1254	µg/L	<2
Arochlor 1260	µg/L	<2
Surrogate TCLMX	%	93

Metals in Water - Dissolved		
Our Reference:	UNITS	71013-33
Your Reference	----------	Rinsate 1
Depth	----------	-
Type of sample		Water
Date digested	-	29/03/2012
Date analysed	-	29/03/2012
Arsenic - Dissolved	mg/L	<0.05
Cadmium - Dissolved	mg/L	<0.01
Chromium - Dissolved	mg/L	<0.01
Copper - Dissolved	mg/L	<0.01
Lead - Dissolved	mg/L	<0.03
Mercury - Dissolved	mg/L	<0.0001
Nickel - Dissolved	mg/L	<0.02
Zinc - Dissolved	mg/L	<0.02

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Date analysed	-			30/03/2012	71013-1	30/03/2012 || 30/03/2012	LCS-5	30/03/2012
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	71013-1	<25 || <25	LCS-5	96%
Benzene	mg/kg	0.2	Org-016	<0.2	71013-1	<0.2 || <0.2	LCS-5	89%
Toluene	mg/kg	0.5	Org-016	<0.5	71013-1	<0.5 || <0.5	LCS-5	95%
Ethylbenzene	mg/kg	1	Org-016	<1	71013-1	<1 || <1	LCS-5	92%
m+p-xylene	mg/kg	2	Org-016	<2	71013-1	<2 || <2	LCS-5	102%
o-Xylene	mg/kg	1	Org-016	<1	71013-1	<1 || <1	LCS-5	101%
Surrogate aaa-Trifluorotoluene	%		Org-016	113	71013-1	104 || 110 || RPD: 6	LCS-5	107%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Date analysed	-			30/03/2012	71013-1	30/03/2012 || 30/03/2012	LCS-5	30/03/2012
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	71013-1	<50 || <50	LCS-5	96%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	71013-1	<100 || <100	LCS-5	102%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	71013-1	<100 || <100	LCS-5	99%
Surrogate o-Terphenyl	%		Org-003	97	71013-1	93 || 93 || RPD: 0	LCS-5	100%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Date analysed	-			31/03/2012	71013-1	31/03/2012 || 31/03/2012	LCS-5	31/03/2012
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	LCS-5	113%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	LCS-5	105%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.7 || 0.6 || RPD: 15	LCS-5	106%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.9 || 0.9 || RPD: 0	LCS-5	110%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	1.0 || 1.1 || RPD: 10	LCS-5	116%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.4 || 0.5 || RPD: 22	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.5 || 0.6 || RPD: 18	LCS-5	121%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	71013-1	0.8 || 0.8 || RPD: 0	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	71013-1	0.56 || 0.55 || RPD: 2	LCS-5	117%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.5 || 0.5 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	71013-1	0.6 || 0.6 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	108	71013-1	113 || 105 || RPD: 7	LCS-5	101%
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	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Date analysed	-			30/03/2012	71013-1	30/03/2012 || 30/03/2012	LCS-5	30/03/2012
HCB	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	106%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	132%
Heptachlor	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	103%
delta-BHC	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	98%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	107%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	123%
Dieldrin	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	115%
Endrin	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	107%
pp-DDD	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	132%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	LCS-5	110%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-005	102	71013-1	100 || 102 || RPD: 2	LCS-5	96%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Date analysed	-			29/03/2012	71013-1	29/03/2012 || 29/03/2012	LCS-5	29/03/2012
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	LCS-5	105%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	71013-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	102	71013-1	100 || 102 || RPD: 2	LCS-5	91%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			30/03/2012	71013-1	30/03/2012 || 30/03/2012	LCS-1	30/03/2012
Date analysed	-			30/03/2012	71013-1	30/03/2012 || 30/03/2012	LCS-1	30/03/2012
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	71013-1	<4 || <4	LCS-1	105%
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	71013-1	<0.5 || <0.5	LCS-1	110%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	71013-1	11 || 13 || RPD: 17	LCS-1	107%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	71013-1	34 || 39 || RPD: 14	LCS-1	107%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	71013-1	10 || 12 || RPD: 18	LCS-1	108%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	71013-1	<0.1 || <0.1	LCS-1	95%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	71013-1	9 || 11 || RPD: 20	LCS-1	109%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	71013-1	54 || 62 || RPD: 14	LCS-1	108%

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

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

QUALITY CONTROL vTRH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			28/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
TRHC$_6$ - C$_9$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	120%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	118%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	118%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	120%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	123%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	124%
Surrogate Dibromofluoromethane	%		Org-016	123	[NT]	[NT]	LCS-W1	107%
Surrogate toluene-d8	%		Org-016	99	[NT]	[NT]	LCS-W1	97%
Surrogate 4-BFB	%		Org-016	89	[NT]	[NT]	LCS-W1	101%

QUALITY CONTROL sTRH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	[NT]	[NT]	LCS-W2	29/03/2012
Date analysed	-			30/03/2012	[NT]	[NT]	LCS-W2	30/03/2012
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W2	89%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	106%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W2	102%
Surrogate o-Terphenyl	%		Org-003	90	[NT]	[NT]	LCS-W2	135%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Date analysed	-			31/03/2012	[NT]	[NT]	LCS-W1	31/03/2012
Naphthalene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	74%
Acenaphthylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	81%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Phenanthrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	81%
Anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	67%
Pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	69%
Benzo(a)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	100%
Benzo(b+k)fluoranthene	µg/L	2	Org-012 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	101%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	87	[NT]	[NT]	LCS-W1	70%

QUALITY CONTROL OCP in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
HCB	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	71%
gamma-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	62%
Heptachlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	60%
delta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	83%
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	76%
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	67%
Dieldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	68%
Endrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	66%
pp-DDD	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	70%
Endosulfan II	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDT	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL OCP in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W1	67%
Methoxychlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-005	111	[NT]	[NT]	LCS-W1	124%
QUALITY CONTROL PCBs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Arochlor 1016	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	µg/L	2	Org-006	<2	[NT]	[NT]	LCS-W1	88%
Arochlor 1260	µg/L	2	Org-006	<2	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	111	[NT]	[NT]	LCS-W1	78%
QUALITY CONTROL Metals in Water - Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Date analysed	-			29/03/2012	[NT]	[NT]	LCS-W1	29/03/2012
Arsenic - Dissolved	mg/L	0.05	Metals-020 ICP-AES	<0.05	[NT]	[NT]	LCS-W1	102%
Cadmium - Dissolved	mg/L	0.01	Metals-020 ICP-AES	<0.01	[NT]	[NT]	LCS-W1	103%
Chromium - Dissolved	mg/L	0.01	Metals-020 ICP-AES	<0.01	[NT]	[NT]	LCS-W1	103%
Copper - Dissolved	mg/L	0.01	Metals-020 ICP-AES	<0.01	[NT]	[NT]	LCS-W1	102%
Lead - Dissolved	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	100%
Mercury - Dissolved	mg/L	0.0001	Metals-021 CV-AAS	<0.0001	[NT]	[NT]	LCS-W1	80%
Nickel - Dissolved	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	LCS-W1	101%
Zinc - Dissolved	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Date analysed	-	71013-11	30/03/2012 || 30/03/2012	LCS-7	30/03/2012
vTRH C_6 - C_9	mg/kg	71013-11	<25 || <25	LCS-7	103%
Benzene	mg/kg	71013-11	<0.2 || <0.2	LCS-7	100%
Toluene	mg/kg	71013-11	<0.5 || <0.5	LCS-7	105%
Ethylbenzene	mg/kg	71013-11	<1 || <1	LCS-7	101%
m+p-xylene	mg/kg	71013-11	<2 || <2	LCS-7	105%
o-Xylene	mg/kg	71013-11	<1 || <1	LCS-7	103%
Surrogate aaa-Trifluorotoluene	%	71013-11	109 || 109 || RPD: 0	LCS-7	116%
QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Date analysed	-	71013-11	30/03/2012 || 30/03/2012	LCS-7	31/03/2012
TRH C_{10} - C_{14}	mg/kg	71013-11	<50 || <50	LCS-7	86%
TRH C_{15} - C_{28}	mg/kg	71013-11	190 || 190 || RPD: 0	LCS-7	110%
TRH C_{29} - C_{36}	mg/kg	71013-11	<100 || <100	LCS-7	98%
Surrogate o-Terphenyl	%	71013-11	117 || 121 || RPD: 3	LCS-7	106%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Date analysed	-	71013-11	31/03/2012 || 31/03/2012	LCS-7	03/04/2012
Naphthalene	mg/kg	71013-11	<0.1 || <0.1	LCS-7	110%
Acenaphthylene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	71013-11	<0.1 || <0.1	LCS-7	103%
Phenanthrene	mg/kg	71013-11	0.1 || 0.1 || RPD: 0	LCS-7	104%
Anthracene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	71013-11	0.1 || <0.1	LCS-7	107%
Pyrene	mg/kg	71013-11	0.1 || 0.1 || RPD: 0	LCS-7	112%
Benzo(a)anthracene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	71013-11	0.1 || <0.1	LCS-7	120%
Benzo(b+k)fluoranthene	mg/kg	71013-11	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	71013-11	0.07 || 0.05 || RPD: 33	LCS-7	114%
Indeno(1,2,3-c,d)pyrene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	71013-11	100 || 102 || RPD: 2	LCS-7	99%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Date analysed	-	71013-11	30/03/2012 || 30/03/2012	LCS-7	30/03/2012
HCB	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	71013-11	<0.1 || <0.1	LCS-7	112%
gamma-BHC	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	71013-11	<0.1 || <0.1	LCS-7	116%
Heptachlor	mg/kg	71013-11	<0.1 || <0.1	LCS-7	114%
delta-BHC	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	71013-11	<0.1 || <0.1	LCS-7	111%
Heptachlor Epoxide	mg/kg	71013-11	<0.1 || <0.1	LCS-7	119%
gamma-Chlordane	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	71013-11	<0.1 || <0.1	LCS-7	110%
Dieldrin	mg/kg	71013-11	<0.1 || <0.1	LCS-7	127%
Endrin	mg/kg	71013-11	<0.1 || <0.1	LCS-7	118%
pp-DDD	mg/kg	71013-11	<0.1 || <0.1	LCS-7	117%
Endosulfan II	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	71013-11	<0.1 || <0.1	LCS-7	122%
Methoxychlor	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-11	96 || 99 || RPD: 3	LCS-7	108%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Date analysed	-	71013-11	29/03/2012 || 29/03/2012	LCS-7	29/03/2012
Arochlor 1016	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	71013-11	<0.1 || <0.1	LCS-7	101%
Arochlor 1260	mg/kg	71013-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-11	96 || 99 || RPD: 3	LCS-7	96%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	71013-11	30/03/2012 || 30/03/2012	LCS-2	30/03/2012
Date analysed	-	71013-11	30/03/2012 || 30/03/2012	LCS-2	30/03/2012
Arsenic	mg/kg	71013-11	<4 || <4	LCS-2	99%
Cadmium	mg/kg	71013-11	<0.5 || <0.5	LCS-2	106%
Chromium	mg/kg	71013-11	15 || 15 || RPD: 0	LCS-2	104%
Copper	mg/kg	71013-11	39 || 54 || RPD: 32	LCS-2	104%
Lead	mg/kg	71013-11	36 || 41 || RPD: 13	LCS-2	101%
Mercury	mg/kg	71013-11	<0.1 || <0.1	LCS-2	98%
Nickel	mg/kg	71013-11	12 || 11 || RPD: 9	LCS-2	104%
Zinc	mg/kg	71013-11	92 || 94 || RPD: 2	LCS-2	104%
QUALITY CONTROL Metals in Water - Dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	71013-33	29/03/2012
Date analysed	-	[NT]	[NT]	71013-33	29/03/2012
Arsenic - Dissolved	mg/L	[NT]	[NT]	71013-33	100%
Cadmium - Dissolved	mg/L	[NT]	[NT]	71013-33	102%
Chromium - Dissolved	mg/L	[NT]	[NT]	71013-33	99%
Copper - Dissolved	mg/L	[NT]	[NT]	71013-33	99%
Lead - Dissolved	mg/L	[NT]	[NT]	71013-33	98%
Mercury - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Nickel - Dissolved	mg/L	[NT]	[NT]	71013-33	100%
Zinc - Dissolved	mg/L	[NT]	[NT]	71013-33	99%

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-20	29/03/2012 || 29/03/2012	71013-2	29/03/2012
Date analysed	-	71013-20	30/03/2012 || 30/03/2012	71013-2	30/03/2012
vTRH C_6 - C_9	mg/kg	71013-20	<25 || <25	71013-2	90%
Benzene	mg/kg	71013-20	<0.2 || <0.2	71013-2	85%
Toluene	mg/kg	71013-20	<0.5 || <0.5	71013-2	90%
Ethylbenzene	mg/kg	71013-20	<1 || <1	71013-2	87%
m+p-xylene	mg/kg	71013-20	<2 || <2	71013-2	95%
o-Xylene	mg/kg	71013-20	<1 || <1	71013-2	94%
Surrogate aaa-Trifluorotoluene	%	71013-20	105 || 110 || RPD: 5	71013-2	105%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-20	30/03/2012 || 30/03/2012	71013-2	29/03/2012
Date analysed	-	71013-20	31/03/2012 || 31/03/2012	71013-2	30/03/2012
TRH C_{10} - C_{14}	mg/kg	71013-20	<50 || <50	71013-2	87%
TRH C_{15} - C_{28}	mg/kg	71013-20	<100 || <100	71013-2	98%
TRH C_{29} - C_{36}	mg/kg	71013-20	<100 || <100	71013-2	118%
Surrogate o-Terphenyl	%	71013-20	110 || 88 || RPD: 22	71013-2	135%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-20	29/03/2012 || 29/03/2012	71013-2	29/03/2012
Date analysed	-	71013-20	31/03/2012 || 31/03/2012	71013-2	31/03/2012
Naphthalene	mg/kg	71013-20	<0.1 || <0.1	71013-2	106%
Acenaphthylene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	71013-20	<0.1 || <0.1	71013-2	102%
Phenanthrene	mg/kg	71013-20	<0.1 || <0.1	71013-2	114%
Anthracene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	71013-20	<0.1 || <0.1	71013-2	125%
Pyrene	mg/kg	71013-20	<0.1 || <0.1	71013-2	127%
Benzo(a)anthracene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	71013-20	<0.1 || <0.1	71013-2	123%
Benzo(b+k)fluoranthene	mg/kg	71013-20	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	71013-20	<0.05 || <0.05	71013-2	138%
Indeno(1,2,3-c,d)pyrene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	71013-20	131 || 101 || RPD: 26	71013-2	89%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-20	29/03/2012 || 29/03/2012	71013-2	29/03/2012
Date analysed	-	71013-20	30/03/2012 || 30/03/2012	71013-2	30/03/2012
HCB	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	71013-20	<0.1 || <0.1	71013-2	105%
gamma-BHC	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	71013-20	<0.1 || <0.1	71013-2	130%
Heptachlor	mg/kg	71013-20	<0.1 || <0.1	71013-2	102%
delta-BHC	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	71013-20	<0.1 || <0.1	71013-2	94%
Heptachlor Epoxide	mg/kg	71013-20	<0.1 || <0.1	71013-2	106%
gamma-Chlordane	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	71013-20	<0.1 || <0.1	71013-2	121%
Dieldrin	mg/kg	71013-20	<0.1 || <0.1	71013-2	115%
Endrin	mg/kg	71013-20	<0.1 || <0.1	71013-2	107%
pp-DDD	mg/kg	71013-20	<0.1 || <0.1	71013-2	129%
Endosulfan II	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	71013-20	<0.1 || <0.1	71013-2	108%
Methoxychlor	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-20	100 || 85 || RPD: 16	71013-2	99%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-20	29/03/2012 || 29/03/2012	71013-2	29/03/2012
Date analysed	-	71013-20	29/03/2012 || 29/03/2012	71013-2	29/03/2012
Arochlor 1016	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	71013-20	<0.1 || <0.1	71013-2	103%
Arochlor 1260	mg/kg	71013-20	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-20	100 || 85 || RPD: 16	71013-2	87%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	71013-20	30/03/2012 || 30/03/2012	71013-2	30/03/2012
Date analysed	-	71013-20	30/03/2012 || 30/03/2012	71013-2	30/03/2012
Arsenic	mg/kg	71013-20	<4 || <4	71013-2	87%
Cadmium	mg/kg	71013-20	<0.5 || <0.5	71013-2	94%
Chromium	mg/kg	71013-20	8 || 8 || RPD: 0	71013-2	96%
Copper	mg/kg	71013-20	27 || 23 || RPD: 16	71013-2	104%
Lead	mg/kg	71013-20	4 || 5 || RPD: 22	71013-2	87%
Mercury	mg/kg	71013-20	<0.1 || <0.1	71013-2	123%
Nickel	mg/kg	71013-20	4 || 4 || RPD: 0	71013-2	91%
Zinc	mg/kg	71013-20	69 || 58 || RPD: 17	71013-2	85%
QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Date analysed	-	71013-30	30/03/2012 || 30/03/2012	71013-21	30/03/2012
vTRH C_6 - C_9	mg/kg	71013-30	<25 || <25	71013-21	98%
Benzene	mg/kg	71013-30	<0.2 || <0.2	71013-21	89%
Toluene	mg/kg	71013-30	<0.5 || <0.5	71013-21	96%
Ethylbenzene	mg/kg	71013-30	<1 || <1	71013-21	95%
m+p-xylene	mg/kg	71013-30	<2 || <2	71013-21	102%
o-Xylene	mg/kg	71013-30	<1 || <1	71013-21	102%
Surrogate aaa-Trifluorotoluene	%	71013-30	110 || 108 || RPD: 2	71013-21	112%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Date analysed	-	71013-30	31/03/2012 || 31/03/2012	71013-21	31/03/2012
TRHC$_{10}$ - C$_{14}$	mg/kg	71013-30	<50 || <50	71013-21	88%
TRHC$_{15}$ - C$_{28}$	mg/kg	71013-30	<100 || <100	71013-21	110%
TRHC$_{29}$ - C$_{36}$	mg/kg	71013-30	<100 || <100	71013-21	96%
Surrogate o-Terphenyl	%	71013-30	100 || 102 || RPD: 2	71013-21	105%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Date analysed	-	71013-30	31/03/2012 || 31/03/2012	71013-21	03/04/2012
Naphthalene	mg/kg	71013-30	<0.1 || <0.1	71013-21	120%
Acenaphthylene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	71013-30	<0.1 || <0.1	71013-21	112%
Phenanthrene	mg/kg	71013-30	<0.1 || <0.1	71013-21	117%
Anthracene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	71013-30	<0.1 || <0.1	71013-21	113%
Pyrene	mg/kg	71013-30	<0.1 || <0.1	71013-21	121%
Benzo(a)anthracene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	71013-30	<0.1 || <0.1	71013-21	131%
Benzo(b+k)fluoranthene	mg/kg	71013-30	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	71013-30	<0.05 || <0.05	71013-21	135%
Indeno(1,2,3-c,d)pyrene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d$_{14}$	%	71013-30	113 || 108 || RPD: 5	71013-21	113%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Date analysed	-	71013-30	30/03/2012 || 30/03/2012	71013-21	30/03/2012
HCB	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	71013-30	<0.1 || <0.1	71013-21	108%
gamma-BHC	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	71013-30	<0.1 || <0.1	71013-21	114%
Heptachlor	mg/kg	71013-30	<0.1 || <0.1	71013-21	112%
delta-BHC	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	71013-30	<0.1 || <0.1	71013-21	110%
Heptachlor Epoxide	mg/kg	71013-30	<0.1 || <0.1	71013-21	119%
gamma-Chlordane	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	71013-30	<0.1 || <0.1	71013-21	112%
Dieldrin	mg/kg	71013-30	<0.1 || <0.1	71013-21	129%
Endrin	mg/kg	71013-30	<0.1 || <0.1	71013-21	119%
pp-DDD	mg/kg	71013-30	<0.1 || <0.1	71013-21	121%
Endosulfan II	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	71013-30	<0.1 || <0.1	71013-21	125%
Methoxychlor	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-30	97 || 105 || RPD: 8	71013-21	103%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Date analysed	-	71013-30	29/03/2012 || 29/03/2012	71013-21	29/03/2012
Arochlor 1016	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	71013-30	<0.1 || <0.1	71013-21	112%
Arochlor 1260	mg/kg	71013-30	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71013-30	97 || 105 || RPD: 8	71013-21	103%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	71013-30	30/03/2012 || 30/03/2012	71013-21	30/03/2012
Date analysed	-	71013-30	30/03/2012 || 30/03/2012	71013-21	30/03/2012
Arsenic	mg/kg	71013-30	<4 || <4	71013-21	#
Cadmium	mg/kg	71013-30	<0.5 || <0.5	71013-21	83%
Chromium	mg/kg	71013-30	5 || 4 || RPD: 22	71013-21	90%
Copper	mg/kg	71013-30	15 || 15 || RPD: 0	71013-21	97%
Lead	mg/kg	71013-30	4 || 4 || RPD: 0	71013-21	81%
Mercury	mg/kg	71013-30	<0.1 || <0.1	71013-21	112%
Nickel	mg/kg	71013-30	3 || 3 || RPD: 0	71013-21	83%
Zinc	mg/kg	71013-30	65 || 65 || RPD: 0	71013-21	90%

Report Comments:

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

Acid Extractable Metals in Soil: #Low spike recovery was obtained for this sample. The sample was re-digested and re-spiked and the low recovery was confirmed. This is due to matrix interferences. However, an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

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.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project Name: Tamworth Hospital Redevelopment
Project No: 75393
DP Contact Person: Michael Gawn
Prior Storage: esky / fridge / shelved (circle)

To: Envirolab Services
12 Ashley Street
Chatswood NSW
Ph: 9910 6200
Attn: Sample Reciept

Sample ID	Sample Type S-soil W-water	Lab ID	Analytes: Package 5A												Notes
BH101 0.3		1	√												
BH101/0.6		2	√												
BH103/0.5		3	√												
BH105/0.1		4	√												
BH105/0.6		5	√												
BH106/0.5		6	√												
BH108/0.1		7	√												
BH108/1.0		8	√												
BH109/0.1		9	√												
BH109/1.5		10	√												
BH200/0.1		11	√												
PQL (S)	mg/kg														
PQL (W)	mg/L														

ENVIROLAB Envirolab Servic
12 Ashley
Chatswood NSW 20
Ph: (02) 9910 62

Job No: 71013

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

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

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax

Signature: PT
Date: 28/3/12 Lab Ref:

Send results to: Brent Kerry
Douglas Partners Pty Ltd
Address:
Unit D, 7 Donaldson Street
Wyong North NSW 2259

Email: brent.kerry@douglaspartners.com.au

Date Received: 28/3/12
Time Received: 11:30
Received by: PT
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project Name: Tamworth Hospital Redevelopment
Project No: 75393
DP Contact Person: Michael Gawn
Prior Storage: esky / fridge / shelved (circle)

To: Envirolab Services
12 Ashley Street
Chatswood NSW
Ph: 9910 6200
Attn: Sample Reciept

Sample ID	Sample Type S-soil W-water	Lab ID	Analytes: Package 5A												Notes
BH200/0.5		12	√												
BH201/0.1		13	√												
BH201/0.8		14	√												
BH202/0.5		15	√												
BH203/1.0		16	√												
BH205/0.1		17	√												
BH205/0.5		18	√												
BH206/0.5		19	√												
BH206/2 (2-2.45)		20	√												
BH110/0.3		21	√												
BH113/0.5		22	√												
PQL (S)	mg/kg														
PQL (W)	mg/L														

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

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

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax

Signature: PT
Date: 28/3/12 Lab Ref:

Send results to: Brent Kerry
Douglas Partners Pty Ltd
Address:
Unit D, 7 Donaldson Street
Wyong North NSW 2259

Email: brent.kerry@douglaspartners.com.au

Job no: 71013

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project Name: Tamworth Hospital Redevelopment
Project No: 75393
DP Contact Person: Michael Gawn
Prior Storage: esky / fridge / shelved (circle)

To: Envirolab Services
12 Ashley Street
Chatswood NSW
Ph: 9910 6200
Attn: Sample Reciept

Sample ID	Sample Type S-soil W-water	Lab ID	Analytes: Package 5A	Package 3											Notes
BH114A/0.5		23	√												
BH114A/0.8		24	√												
BH212/0.1		25	√												
BH212/1.0 (1.0-1.45)		26	√												
BH214/0.1		27	√												
BH102/0.5		28	√												
BH208/0.1		29	√												
QA1		30	√												
QA2		31	√												
QA3		32	√												
Rinsate 1		33	√												
PQL (S)	mg/kg														
PQL (W)	mg/L														

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

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

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax

Signature: PT
Date: 28/3/17 Lab Ref:

Send results to: Brent Kerry
Douglas Partners Pty Ltd
Address:
Unit D, 7 Donaldson Street
Wyong North NSW 2259

Email:
brent.kerry@douglaspartners.com.au

Appendix E

Groundwater Bore Desktop Information

NSW OFFICE OF WATER
Work Summary

GW965054

Licence :90BL250216

Licence Status Converted

Authorised Purpose(s): DOMESTIC

Intended Purpose(s): INDUSTRIAL

Work Type :Bore
Work Status :(Unknown)
Construct. Method :(Unknown)
Owner Type :

Commenced Date :
Completion Date :01-May-1995

Final Depth : 22.86 m
Drilled Depth :

Contractor Name :
Driller : eacott, g
Assistant Driller's Name :

Property : - LOT 2 DP 519841
GWMA : -
GW Zone : -

Standing Water Level : 13.70 m
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :		
	Licensed :INGLIS	TAMWORTH	2 519841

Region :90 - BARWON
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :6560072
Easting :302074

Latitude (S) :31° 4' 35"
Longitude (E) :150° 55' 31"

GS Map :
MGA Zone :56
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;

H-Hole,P-Pipe,OD-Outside Diameter,ID-Inside Diameter,C-Cemented;SL-Slot Length;A-Aperture,GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component Type		From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	22.86	152			(Unknown)
1	1	Casing	PVC Class 6	0.00	22.86	152			

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

Remarks

*** End of GW965054 ***

NSW OFFICE OF WATER
Work Summary

GW057928

Converted From HYDSYS

Licence :90BL125593

Licence Status Converted

	Authorised Purpose(s)	Intended Purpose(s)
Work Type :Bore	INDUSTRIAL (LOW SECURITY)	GENERAL USE
Work Status :(Unknown)	IRRIGATION	
Construct. Method :Rotary Air		
Owner Type :Private		

Commenced Date :
Completion Date :01-Mar-1983
Final Depth : 38.00 m
Drilled Depth : 38.00 m

Contractor Name :
Driller :1547 MANNION, Leonard George
Assistant Driller's Name :

Property : - N/A
GWMA :005 - PEEL VALLEY
GW Zone :002 - PEEL CATCHMENT MISCELLANEOUS FR

Standing Water Level :
Salinity : 1001-3000 ppm
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :INGLIS	TAMWORTH	99
	Licensed :INGLIS	TAMWORTH	99 753848

Region :90 - BARWON
River Basin :419 - NAMOI RIVER
Area / District :

CMA Map :9035-1N TAMWORTH
Grid Zone :56/1
Scale :1:25,000

Elevation :
Elevation Source :(Unknown)

Northing :6560256
Easting :302017

Latitude (S) :31° 4' 29"
Longitude (E) :150° 55' 29"

GS Map :0033D1 MGA Zone :56

Coordinate Source :GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe,OD-Outside Diameter,ID-Inside Diameter,C-Cemented;SL-Slot Length;A-Aperture,GS-Grain Size,Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Threaded Steel	0.00	27.40	150			Driven into Hole
1	1	Opening	Slots - Vertical	25.00	27.40	150		1	Oxy-Acetylene Slotted; SL: 0mm; A: 5mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
26.20	26.50	0.30	Fractured	15.20		1.25			1001-3000 ppm

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Soil	Soil	
1.00	18.60	17.60	Shale Yellow	Shale	
18.60	26.20	7.60	Shale Hard	Shale	
26.20	26.50	0.30	Basalt Water Supply	Basalt	
26.50	38.00	11.50	Basalt Hard	Basalt	

Remarks

***** End of GW057928 *****

NSW OFFICE OF WATER
Work Summary

GW052834

Converted From HYDSYS

Licence : 90BL115058
Licence Status Converted
Work Type : Bore
Work Status : (Unknown)
Construct. Method : Cable Tool
Owner Type : Private

Authorised Purpose(s)	Intended Purpose(s)
IRRIGATION	GENERAL USE

Commenced Date :
Completion Date : 01-Aug-1980
Final Depth : 34.50 m
Drilled Depth : 34.50 m

Contractor Name :
Driller : 1429 FRANCIS, David William
Assistant Driller's Name :

Property : - N/A
GWMA : 005 - PEEL VALLEY
GW Zone : 002 - PEEL CATCHMENT MISCELLANEOUS FR
Standing Water Level :
Salinity : 7001-10000 ppm
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A : INGLIS	TAMWORTH	395
	Licensed : INGLIS	TAMWORTH	395 753848

Region : 90 - BARWON
River Basin : 419 - NAMOI RIVER
Area / District :
CMA Map : 9035-1N TAMWORTH
Grid Zone : 56/1
Scale : 1:25,000

Elevation :
Elevation Source : (Unknown)
Northing : 6560252
Easting : 301832
Latitude (S) : 31° 4' 29"
Longitude (E) : 150° 55' 22"

GS Map : 0033D1 **MGA Zone :** 56
Coordinate Source : GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1	1	Casing	Corrugated	-0.40	22.50	160			Driven into Hole
1	1	Casing	Galvanised Iron	22.50	34.50	125			Seated on Bottom
1	1	Opening	Slots - Horizontal	29.50	34.00	125		1	Mechanically Slotted; SL: 0mm; A: 2mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
24.50	34.00	9.50	Fractured	17.00		1.25			(Unknown)

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	0.60	0.60	Topsoil	Topsoil	
0.60	7.50	6.90	Clay Sandy	Clay	
7.50	22.00	14.50	Clay Some Shale	Clay	
22.00	34.00	12.00	Shale Water Supply	Shale	
34.00	34.50	0.50	Basalt Black	Basalt	

Remarks

*** End of GW052834 ***