Amendment A
30 August 2016

Indicative site access/egress

WALHALLOW STREET

EXISTING TAMS (PUBLIC) CAR PARK

HAWKER
BLOCK 9 SECTION 3

POTENTIAL
BUILDING
FOOTPRINT
900m2
(120-130 CHILDREN)

18.0m

50.0m

6.00

POTENTIAL
PLAY AREA

1,330m2

37.5m

35.5m

Notes:

Indicative site access/egress subject to detailed design at DA stage.

No subdivision required.

0 7.5 12.5 25

SCALE: 1:500

N

CHILD CARE CENTRE CONCEPT PLAN
BLOCK 9 SECTION 3
HAWKER

Purdon Planning Pty Ltd
Unit 2 Cooyong Centre, 1 Torrens St Braddon ACT 2612
ABN 14 659 841 354
Tel 02 6257 1511 Fax 02 6248 8347
Email purdons@purdon.com.au Web www.purdon.com.au

DWG: PP-DLS-000-01
REV: 1 04/03/2016
DWN: TF APPD:TF
AIR PHOTO SOURCE: ACTMAPi 2015

PURDON PLANNING



0 7.5 12.5 25

SCALE: 1:500

CHILD CARE CENTRE CONCEPT PLAN

BLOCK 9 SECTION 3 HAWKER

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DWG: PP-DLS-000-01
REV: 1 04/03/2016
DWN: TF APPD:TF
AIR PHOTO SOURCE: ACTMAPi 2015

PURDON PLANNING

Development Application payment Receipt / Tax invoice

Your payment has been successful. Please keep a copy of this receipt for your records.

Date and time	Form submission ID	Payment receipt number	Tracking code
30 Jun 2016 10:17:00 AM	99100720160630101190	1755014998	TY9F57

Quantity	Description of service	Unit value	GST	Total
1	Completeness Check Fee ABN 31 432 729 493	$163.64	$16.36	$180.00
1	Crown Lease Variation Fee ABN 66 893 463 785	$2,018.00		$2,018.00
1	Public Notification Fee ABN 31 432 729 493	$1,109.00		$1,109.00
1	Dial a Search ABN 31 432 729 493	$33.64	$3.36	$37.00

Total amount paid	$3,344.00
Total amount includes GST of	$19.73

To save a copy of the completed form and receipt / tax invoice, from the File menu select "Save a copy". To print a copy use the Print icon.

Environment and Planning Directorate
GPO Box 1908
Canberra ACT 2601
Telephone: 132281

Payer contact details

Organisation name: Purdon Planning Pty Ltd

Title	Given name *	Family name *
Ms	Sue	Cutler

Address line 1 *: Unit 2, Cooyong Centre

Address line 2: 1-3 Torrens Street

Suburb *	State *	Postcode
Braddon	ACT	2612

Contact phone number *
6257 1511

Development application details

Proposal number *
201629661

Suburb/District * | Section * | Block * | Unit
HAWKER | 3 | 9 |

If you require help with suburb/disctrict, section or block details, visit ACTMAPi.

Fee details

Please enter at least one value *

Completeness check fee
$180.00

Development fee

Crown lease variation fee
$2,018.00

Public notification fee
$1,109.00

Lease search fee
$37.00

Home business fee

Total fee
$3,344.00

Planning and Development Act 2007

Development Application

Application Number: **201629661S165B**

Type of Application

The type of application you are applying for is a S165 Amendment

Lease/Site Details

Site Number: 1

Suburb	Section	Block Number	Unit Number
HAWKER	3	9	

Street Address

19 WALHALLOW STREET, HAWKER

Applicant Details

ACN or ABN

14659841354

Company Name	Position held / Title
Purdon Planning Pty Ltd	Office Manager

Salutation	First Name	Surname
None	Sue	Cutler

Postal Address 1	Postal Address 2
Unit 4	1-3 Torrens St

Postal Address 3

Suburb	State/Territory	Postcode	Country
BRADDON	ACT	2612	Australia

Phone Number	Fax Number	Mobile Number
62571511		

Email

purdons@purdon.com.au

Lessee (Property Owners) Details

Lessee Number: 1

Is the Lessee a

◉ Company

Australian Company Number (ACN)

124775211

Company Name

Pelle Projects Pty Ltd

Position held / Title

Director

Salutation

None

First Name

Dominic

Surname

Pelle

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418475501

Fax Number

Mobile Number

0418475501

Email

Lessee Number: 2

Is the Lessee a

◉ Company

Australian Company Number (ACN)

166091228

Company Name

Regional Investments Pty Ltd

Position held / Title

Director

Salutation

None

First Name

John

Surname

Krnc

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418633119

Fax Number

Mobile Number

0418633119

Email

List Amendments Being Satisfied

Satisfying Condition A1 (a) & (b)

Applicant Declaration

I/we declare that this application is accompanied by all of the required information or documents that address the relevant rules and/or relevant criteria for it to be considered for approval;

I /we understand that this application will be considered lodged once any relevant application fees have been paid;

I/we understand that the documentation provided on CD/DVD or via the electronic lodgment process will be considered to be the relevant documentation associated with this application. All development application documentation will be made available for public inspection including via the Internet unless exclusion has been approved;I/we understand that an amendment may be notified in accordance with the requirements of the Planning and Development Act 2007.

I/we declare that all the information given on this form and its attachments is true and complete;

If signing on behalf of a company, organisation or Government agency: -

I/we the undersigned, declare I/we have the appropriate delegation or authority to sign on behalf of the company, organisation or Government agency.

I accept the above declarations:

☑ Accept

Acceptance Date

1/12/2016

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Detailed Site Investigation

Proposed Residential Development
Part Block 9 Section 3, Hawker, ACT

Prepared for
Pelle Projects Pty Ltd and
Regional Investments Pty Ltd

Project 88376.00
November 2016

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	88376.00	Document No.	2R.001.Rev1
Document title	Report on Detailed Site Investigation Proposed Child Care Centre		
Site address	Part Block 9 Section 3, Hawker, ACT		
Report prepared for	Pelle Projects Pty Ltd and Regional Investments Pty Ltd		
File name	88376.00.R.001.Rev1		

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Status	Electronic	Paper	Issued to
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Revision 1	1	0	Purdon Planning Pty Ltd
Revision 1	1	1	Environmental Protection Authority

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.

	Signature	Date
Author		17 November 2016
Reviewer	For J.M. Nash	17 November 2016

bsi. ISO 9001 Quality Management

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Executive Summary

This report describes the methodology and results of a Detailed Site Investigation (DSI), conducted by Douglas Partners Pty Ltd (DP) for Part Block 9 Section 3, Hawker, ACT (henceforth 'the site'). The work was commissioned through Purdon Planning Pty Ltd (Purdon) by Pelle Planning Pty Ltd (Pelle) and Regional Investments Pty Ltd (Regional Investments) in an email dated 18 October 2016.

The DSI has been requested to address further works recommended in a Preliminary Site Investigation completed by DP entitled: *Preliminary Site Investigation, Proposed Child Care Centre, Block 9 Section 3, Hawker, ACT*, dated May 2016 (DP, 2016) for a part of Block 9 Section 3 to be developed as a child care centre. Details of the proposed development include a building, play area and car park.

The DSI described herein was conducted to further assess possible soil contamination impacts on site from the potential sources of contamination identified in DP (2016) and to comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site with its intended us as a child care centre.

The site comprises an irregular shaped area of approximately 3,000 m^2 occupied by tennis courts.

Based on site history and walkover observations made during DP (2016) the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with the tennis courts, disturbed ground (historical) and dirt tracks (historical). Potential contaminants associated with fill from unknown and potentially contaminated sources can include: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochlorine pesticides (OCP); phenols and asbestos.
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are asbestos containing materials (ACM).

For the purpose of this DSI grid-based and targeted sampling of the site was considered appropriate. 9 test locations (Bores 1 to 7 and Pits 8 to 9) were selected for the grid-based sampling and targeting of the filling associated with the tennis courts, historical disturbed ground and historical dirt tracks (Drawing 1, Appendix B). Samples were selected for analysis in order to gain a general representation of the soil/fill conditions across the site.

Areas that may be impacted by potential contamination were identified on the basis of the available site information and subsurface investigation. Based on the findings of the assessment, the potential for gross contamination to be present within the defined site is considered to be low.

The results of the investigation indicate that the site is generally suitable for the proposed child care centre development subject to:

- Implementation of an unexpected finds protocol (UFP) to address potential contamination, including any ACM which is encountered during site works, and a "safe working methodology" if disturbance of any underground infrastructure occurs.

Douglas Partners
Geotechnics | Environment | Groundwater

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Report on Detailed Site Investigation
Proposed Residential Development
Part Block 9 Section 3, Hawker, ACT

1. Introduction

This report describes the methodology and results of a Detailed Site Investigation (DSI), conducted by Douglas Partners Pty Ltd (DP) for Part Block 9 Section 3, Hawker, ACT (henceforth 'the site'). The work was commissioned through Purdon Planning Pty Ltd (Purdon) by Pelle Planning Pty Ltd (Pelle) and Regional Investments Pty Ltd (Regional Investments) in an email dated 18 October 2016.

The DSI has been requested to address further works recommended in a Preliminary Site Investigation completed by DP entitled: *Preliminary Site Investigation, Proposed Development, Block 9 Section 3, Hawker, ACT*, dated May 2016 (DP, 2016) for Part Block 9 Section 3 to be developed as a child care centre. Details of the proposed development include a building, play area and car park.

The DSI described herein was conducted to further assess possible soil contamination impacts on site from the potential sources of contamination identified in DP (2016) and to comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site with its intended us as a child care centre.

This report must be read in conjunction with the notes *About this Report* which are included in Appendix A.

2. Scope of Work

The following scope of work was conducted for the assessment:

- A subsurface investigation with sampling and laboratory testing as outlined in Sections 9 and 10; and
- Preparation of this DSI report presenting the findings of the DSI and an assessment of the need for further investigations and/or management.

3. Site Identification and Description

3.1 Site Identification

The site identification information is summarised as follows:

Table 1: Site Identification Details

Item	Details
Site Owner/ Occupiers	Pelle Projects Pty Ltd Regional Investments Pty Ltd
Site Address	19 Walhallow Street, Hawker
Current land use	Tennis Courts
Block and Section Number (see Drawing 1, Appendix B)	Part Block 9 Section 3
Territory Plan Zoning	PRZ2: Restricted Access Recreation Zone
District	Belconnen District
Approximate Site Area	3,000 m^2
Proposed future land-use	Child care centre

3.2 Site Layout and Description

The general layout of the site is provided on Drawing 1, Appendix B. The site comprises an irregular shaped area occupied by tennis courts. The site is accessed from a car park off Walhallow Street. The site slopes generally to the west from 630 m ADH to 626 m AHD.

The site is bounded by a car park to the north, Belconnen Bowling Club to the east, sporting field to the south, and the remaining areas of Block 9 Section 3 occupied by a residence and tennis courts to the west. The surrounding land uses are residential to the north and east and sporting fields to the south and west.

4. Preliminary Site Investigation (DP, 2016)

A Preliminary Site Investigation (PSI) was completed for all of Block 9 Section 3, Hawker by DP in May 2016 (DP 2016). The work was commissioned by Mr Rob Purdon of Purdon Planning Pty Ltd (Purdon) in an email dated 2 May 2016. The following summary relates only to the area of the current site.

The objectives of the PSI were to:

- Assess the potential for contamination at the site based on past and present site uses;
- Determine the contaminants of concern, identify potential areas of environmental concern (PAEC); and
- Identify potential human and ecological receptors and comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site for its intended child care land use.

The PSI comprised a review of historical information and a site walkover.

The site history review and walkover indicated that the site was arable farmland until residential development occurred in the area during the years 1968 and 1975. Tennis courts were constructed on the easternmost portion of the site during the years 1975 and 1983.

The ACT Directorate of Environment and Planning's Environment Protection Authority (EPA) contaminated land search did not have any records of contaminated land on the contaminated sites management or geographic information system for Block 9 Section 3, Hawker.

The site walkover noted that possible source of contaminants could be associated with fill for the construction of the tennis courts. It was noted that weeds had established in some sections of the site, indicating that the application of herbicides had not occurred in recent times. Buried services were identified at the boundaries of the site with electricity, stormwater and water noted within the site during the site walkover.

Areas that may be impacted by potential contamination were identified on the basis of the available site information and site walkover. Based on the findings of the PSI, the potential for gross contamination to be present within the site was considered to be low.

The results of the PSI indicated that the site was generally suitable for the intended low density residential use subject to an intrusive subsurface investigation to determine the extent (if any) of potential contamination at the site targeting the unknown filling.

5. Soil Landscape, Regional Geology and Hydrogeology

5.1 Soil Landscape

Reference to the 1:100 000 Canberra Soil Landscape Series Sheet 8727 (Ref 1) indicated that the site is mapped as being on the Williamsdale Soil Group.

The Williamsdale Soil Group is characterised by undulating rises, fans and depressions on Silurian Volcanics of the Canberra Lowlands. Includes areas of pediplain. Soils are moderately deep, moderately well-drained Yellow Chromosols (Yellow Podzolic Soil) on Red and Brown Kandosols (Red and Yellow Earth) on upper rises and fan elements. Moderately to very deep, poorly to imperfectly drained Sodosols (Solodic Soils and Solodized Soils) on lower rises and fan elements. Limitations include hardsetting, erodible, dispersible soils (localised), acidic topsoils, seasonal waterlogging, complex terrain flood hazard (localised), run-on and dieback.

5.2 Regional Geology

Reference to the Canberra 1:100 000 Geological Series Sheet 8727 (Ref 2) indicates that the site is underlain with Walker Volcanics. This unit typically comprises of purple and greenish-grey dacitic ignimbrite.

5.3 Hydrogeology

The nearest surface water receptor is Lake Ginninderra, approximately 2.5 km to the north east of the site. However, it is considered likely the groundwater would flow towards to the west, conforming to the topographic slope.

The 1:100,000 map Hydrogeology of the Australian Capital Territory and Environs (Ref 3) indicates that the site is underlain by late Middle Silurian andesitic, dacitic, ryhodacitic ignimbrite, minor ashstone, shale, limestone and disseminated sulphides. The unit is usually fractured, higher yielding zones are associated with the upper and lower portions of the individual ash-flow tuffs and interbedded sediments. The water quality tends to be tends to be poor. The likely yield of the groundwater aquifer is indicated to be less than 0.5 L/s with a total dissolved solid (TDS) of between 500 and 1000 mg/L.

6. Potential for Contamination

Based on site history and walkover observations made during DP (DP 2016) the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with tennis courts, disturbed ground (historical) and dirt tracks (observed and historical). Potential contaminants associated with fill from unknown and contaminated sources are: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochlorine pesticides (OCP); phenols and asbestos.
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are asbestos containing materials (ACM).

Potential sources of contamination observed on site are shown on Drawing 1, Appendix B. However, it should be noted that other fill areas not identifiable on aerial photographs or via surface walkover, could be present.

7. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding potential contamination sources, receptors and exposure pathways between those sources and receptors (linkages). The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages.

7.1 Potential Contamination Sources

Based on Section 6 the potential contamination sources are as follows:
S1 – Filling.
S2 – Buried service infrastructure (asbestos).

7.2 Potential Receptors

7.2.1 Human Health Receptors

Potential human health receptors include the following:
R1 – Current users (general public).
R2 – Construction and maintenance workers.
R3 – Final end users (child care centre).
R4 – Land users in adjacent areas (open space, commercial and residential).

7.2.2 Environmental Receptors

Potential environmental receptors include the following:
R5 – Groundwater.
R6 – Terrestrial ecology.
R7 – Surface water.

Groundwater quality (R5) tends to be poor in the area (Section 5.3) therefore leachability testing will be undertaken only if a viable complete pathway between on-site soil contamination and groundwater is identified.

The closest down gradient surface water (R7) receptor is Lake Ginninderra located approximately 2.5 km to the north east of the site. Should testing indicate a viable complete pathway between on-site soil contamination and surface water, an investigation is required to assess the impacts on the surface water.

7.3 Potential Pathways

Potential pathways for contamination present include the following:
P1 –Ingestion and dermal contact.
P2 – Inhalation of dust and/or vapours.
P3 – Surface water run-off.
P4 – Leaching of contaminants and vertical mitigation into groundwater.
P5 – Lateral migration of groundwater providing baseflow to watercourses.
P6 – Direct contact with terrestrial ecology.

It is considered that the sewer is unlikely to be preferential pathway for contamination as there are no sources of mobile contamination such as hydrocarbons or gas substances that would migrate offsite along this pathway.

7.4 Summary of Potential Complete Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (potential complete pathways). The possible pathways between the above sources (S1 and S2) and receptors (R1 to R7) are provided below in Table 2.

Table 2: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor	Comments
S1 –Filling: metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (general public). R2 – Construction and maintenance workers. R3 – Final end users (child care centre).	An intrusive investigation is required to assess possible contamination including chemical testing of the soils across the site.
	P2 – Inhalation of dust and/or vapours.	R4 – Land users in adjacent areas (residential, community and open space).	
	P4 – Leaching of contaminants and vertical mitigation into groundwater.	R5 – Groundwater.	An intrusive investigation is required to assess groundwater if the site is found to be contaminated. See Note 1.
	P3 – Surface water run-off. P5 – Lateral migration of groundwater providing base flow to watercourses.	R7 – Surface water (Lake Ginninderra)	An investigation is required to assess the impacts on surface water if the site is found to be contaminated. See Note 2
	P6 – Direct contact with terrestrial ecology.	R6 – Terrestrial ecology.	An intrusive investigation is required to assess possible contamination including chemical testing of the soils.
S2 –Buried service infrastructure . Asbestos.	P1 – Direct contact with soil (ingestion and dermal). P2 – Inhalation of dust.	R2 – Construction and maintenance workers.	For any future development an unexpected finds protocol (UFP) is recommended to address potential bonded ACM encountered and a “safe working methodology” if disturbance of the underground infrastructure is proposed

1. Leachability testing is not proposed at this stage. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then leachability testing (ASLP) may be required.
2. The nearest surface water receptor is Lake Ginninderra, approximately 2.5km to the north east of the site. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then groundwater testing may be required.

8. Site Assessment Criteria

The site is proposed to be developed into a child care centre which is classified under low density residential properties. It is assumed that any land use at the site would have soil access, i.e. outdoor play areas.

The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM (refer to Section 7*)* which identified human and ecological receptors to potential contamination on the site. Analytical results will be assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). The NEPC guidelines are endorsed by the ACT EPA under the *Environment Protection Act* 1997. Petroleum based health screening levels for direct contact from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013) have not been considered in this assessment as these values are significantly higher than the soil vapour HSLs adopted.

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g. Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial/industrial land use scenario.

8.1 Health Investigation and Screening Levels

The health investigation levels (HIL) and health screening levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HIL are applicable to assessing health risk arising *via* all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HIL apply for other land uses.

HSL are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSL have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HIL and HSL are:

- HIL A/HSL A – Low density residential area, includes children's day care centers.

In addition, the HSL adopted are predicated on the inputs summarised in Table 3.

Table 3: Inputs to the Derivation of HSL

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation)	Potential exposure pathways include vapour intrusion through concrete slabs from potentially contaminated fill material beneath the slab. There is also the risk of soil vapours during any excavation of potentially contaminated fill material.
Soil Type	Sand	The DSI encountered clay, silt and sand (Section 11). A conservative approach has been adopted for this DSI.
Depth to contamination	0 m to <1 m	A conservative approach has been adopted for this DSI.

The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 4.

Table 4: Health Investigation and Screening Levels (HIL and HSL) in mg/kg unless otherwise indicated

Contaminants		HIL-A	HSL-A Vapour Intrusion
Metals	**Arsenic**	100	NC
	Cadmium	20	NC
	Chromium (VI)	100	NC
	Copper	6000	NC
	Lead	300	NC
	Mercury (inorganic)	40	NC
	Nickel	400	NC
	Zinc	7400	NC
PAH	**Benzo(a)pyrene TEQ[1]**	3	NC
	Naphthalene	NC	3
	Total PAH	300	NC
TRH	**C6 – C10 (less BTEX) [F1]**	NC	45
	>C10-C16 (less Naphthalene) [F2]	NC	110
	>C16-C34 [F3]	NC	NC
	>C34-C40 [F4]	NC	NC
BTEX	**Benzene**	NC	0.5
	Toluene	NC	160
	Ethylbenzene	NC	55

Contaminants		HIL-A	HSL-A Vapour Intrusion
	Xylenes	NC	40
Phenol	**Pentachlorophenol (used as an initial screen)**	100	NL
OCP	**Aldrin + Dieldrin**	6	NC
	Chlordane	50	NC
	DDT+DDE+DDD	240	NC
	Endosulfan	270	NC
	Endrin	10	NC
	Heptachlor	6	NC
	HCB	10	NC
	Methoxychlor	300	NC
OPP	**Chlorpyrifos**	160	NC
PCB [2]		1	NC

Notes:

1 *sum of carcinogenic PAH*

2 *non dioxin-like PCBs only.*

3 *NC: No Criteria*

8.2 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow*

estimation of heavy metal background concentrations in soils, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, which will be derived from the *Interactive (Excel) Calculation Spreadsheet,* are shown in the following Table 6. The following site specific data and assumptions have been used to determine the EIL:

- A protection level of 80% for urban residential areas and public open space has been adopted;
- The EIL will apply to the top 2m of the soil profile;
- Given the likely source of soil contaminants (i.e. unknown historical fill) the contamination is considered as “aged” (>2 years);
- ABCs will be derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters NSW for the closest state to which the site is located and high for traffic volumes. No background concentration is assumed for lead (conservative);
- Site specific pH, CEC and clay content values will be used as input parameters in the *Interactive (Excel) Calculation Spreadsheet*. Based on average pH, CEC and clay content values for soils collected across the site, the following values have been used for the soil profile: pH = 7.4 (range 6.9 to 7.9), CEC = 15 $cmol_c$/kg (range 12 to 18) and clay content = 12% (range 7 to 18). The Calculation Spreadsheets are included in Appendix E.

Table 5: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL	Comments
Metals	**Arsenic**	100	Adopted pH of 7.4, CEC of 15 $cmol_c$/kg and clay content 12%
	Copper	230	
	Nickel	220	
	Chromium III	440	
	Lead	1100	
	Zinc	680	
PAH	**Naphthalene**	170	
OCP	**DDT**	180	

8.3 Ecological Screening Levels – Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and Benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Urban residential and public open space	A conservative approach has been adopted for this DSI.
Soil Texture	Coarse	The DSI encountered clay, silt and sand (Section 11). A conservative approach has been adopted for this DSI.

Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

8.4 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B(7),

Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential, parkland and public open space apply; and
- The DSI encountered clay silt and sand (Section 11). A conservative approach has been adopted for this investigation.

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	$C_6 – C_{10}$ (F1) #	700
	$>C_{10}$-C_{16} (F2) #	1000
	$>C_{16}$-C_{34} (F3)	2500
	$>C_{34}$-C_{40} (F4)	10000

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

8.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of these works as asbestos was not an identified as a contaminant of concern at the time of writing the proposal. Therefore the presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted for this assessment as an initial screen.

9. Fieldwork

9.1 Sampling Rationale

The site area is understood to be approximately 3,000 m^2. For the purpose of this DSI a grid-based and targeted sampling of the site was considered appropriate. Nine test locations (Boreholes 1 to 7 and Pits 8 to 9) were selected for the grid-based sampling with Bores 1 to 7 also targeting the potential filling beneath the tennis court and historical disturbed ground/dirt tracks (Drawing 1, Appendix B). The number of sampling locations meets Table A of NSW EPA Sampling Density Guidelines (NSW EPA, 1995) for a site of 3,000 m^2. Samples were selected for analysis in order to gain a general representation of the soil/fill conditions across the site.

9.2 Methods and Sampling Locations

The fieldwork comprised the drilling of seven boreholes (Bores 1 to 7) to depths of between 0.6 m and 1.1 m bgl and the excavation of two test pits (Pits 8 to 9) of depths of between 0.7 m and 1.0 m using a Kubota U17-3 mini-excavator fitting with a 110mm solid flight augur for boring and a 300mm bucket for test pitting. Samples were collected directly from excavated soil during the auguring process and from the walls of the test pits and boreholes at regular intervals.

Fieldwork was undertaken on 26 October 2016 by an environmental engineer and environmental scientist who undertook the following:

- Setting out of the test locations;
- Logging of the subsurface profile; and
- Collection of samples to assist in strata identification and for laboratory testing purposes.

A calibrated photo-ionisation detector (PID) was used during the fieldwork to screen the collected soil samples to assess whether volatile organic compounds were present. The approximate test pit and borehole locations are shown on Drawing 1 in Appendix B.

9.3 Soil Sampling Procedure

All sample locations were checked for underground services by a review of dial before you dig (DBYD) plans and by a services locator.

All sampling data was recorded on DP test pit and borehole logs with essential information included on the chain-of-custody sheets. The general sampling procedure adopted for the collection of environmental samples is summarised below:

- Decontamination of sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and tap water prior to collecting each sample;
- The use of disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately;
- Collection of replicate soil samples in zip-lock plastic bags at each depth for PID screening;

- Collection of replicate samples for QA/QC purposes;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain of custody (C-O-C) documentation so that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory.

Samples were generally collected from the near surface, and at regular depth intervals or changes in strata within each test location.

Soil samples were collected directly from the side walls of the test pits or from the excavator bucket. Care was taken whilst collecting the samples to remove any extraneous material deposited on the pit walls or soil removed from the pits during the excavation process.

Soil samples were collected directly from the solid flight augers using stainless steel sampling equipment. Augers were screwed into the ground at discrete depths and retracted without rotation to minimise sample disturbance and loss of volatiles.

Envirolab Services Pty Ltd (Envirolab, NATA accreditation number: 2901) was used for the analysis of the primary and replicate soil samples. The laboratory is required to carry out routine in-house QC procedures.

Field replicates were recovered, and analysed for a limited suite of contaminants with reference to standard industry practice and guidelines. The comparative results are outlined in Appendix C together with other QA/QC evaluations of the assessment, C-O-C documentation (Field and Laboratory) and sample receipt information.

10. Laboratory Testing

The analytical scheme was designed to obtain an indication of the presence of contaminants of potential concern (COPC) that may be attributable to past and present activities and features within the site, as discussed in Section 6. Selected primary soil samples were analysed for the COPC comprising: metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.

Laboratory analytical methods were as stated in the Envirolab certificate of analysis in Appendix E.

Selected soil samples were also tested for cation exchange capacity (CEC), pH and clay content to assist with the calculation of ecological investigation levels (EIL) as presented below.

11. Results of the Investigation

11.1 Subsurface Observations

Details of the subsurface conditions encountered during the test pit excavation and borehole drilling are provided in the logs included in Appendix D which must be read in conjunction with the included explanatory notes that define classification methods and terms used to describe the soils. In summary, the test pits and boreholes encountered variable subsurface conditions underlying the site with the principal succession of strata broadly summarised as follows:

- TENNIS COURT SURFACE: hard tennis court surface in Bores 1 to 4 to depths of between 0.01 m and 0.07 m bgl and grass turf surface in Bores 5 and 6 to depths of between 0.05 m and 0.01 bgl m.
- TOPSOIL: moist to wet, dark grey sandy silt topsoil remnant with some clay and gravels in Bore 2 at depths of between 0.45 m and 0.6 m bgl.
- FILLING: dense/soft to very stiff, dry to saturated, light and orange brown, fine to coarse grained/ low plasticity sand/silty sand/sandy clay in Bores 1 to 3 and 5 to 7 and Pits 8 and 9 from depths of between 0.05 m and 0.17 m bgl to depths of between 0.15 m and 0.6 m bgl. Gravel filling was noted in Bores 1 to 4 from depths of 0.07 m to between 0.1 m and 0.17 m bgl directly underneath the hard tennis court surface.
- GRAVELLY SILTY SAND: dense, dry to wet, orange brown, fine to coarse gravelly silty sand in Bores 1to 6 and Test Pit 8 from depths of between 0.15 m and 1.1 m bgl to depths of between 0.3 m and 0.7 m bgl.
- SANDY CLAY: soft to very stiff, dry to moist, brown, orange brown and grey white, low plasticity, fine to coarse grained sandy clay in Bores 1 and 2 and Pit 9 from depths of between 0.25 m and 0.3 m bgl to depths of between 0.6 m and 1.0 m bgl.

Fast groundwater seepage was observed in Bore 2 at 0.15 m bgl. No free groundwater was observed in the remaining boreholes and test pits. The boreholes and test pits were backfilled immediately following excavation precluding longer term monitoring of groundwater levels.

Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature and soil permeability. For these reasons, it is noted that the moisture condition of the site soils can vary considerably from the time of the investigation compared to at the time of any future construction.

The results of the PID screening testing are included on the test pit and borehole logs (Appendix D). The screening tests indicated that the subsurface conditions were generally absent of volatile organic compounds with all recorded values less than 1ppm.

11.2 Contamination Observations

There was no visual or olfactory evidence (i.e. staining, odours) to suggest the presence of gross contamination within the soils investigated.

There were no visual observations of anthropogenic inclusions (e.g. building material/rubble) in the test locations.

11.3 Analytical Results

A summary of the results of the laboratory analysis undertaken on the soil samples is presented in Tables E1 to E3 in Appendix E along with the laboratory certificates.

11.4 Assessment of Laboratory Results

All soil results for TRH, BTEX, PAH, PCB, OCP, OPP, phenols and asbestos were below the laboratory's practical quantitation limit (PQL) and therefore below the SAC.

All soil results for metals were above the PQL with the exception of cadmium and mercury. All soil results for metals were below the SAC.

12. Revised Conceptual Site Model

The preliminary CSM in Section 7 has been updated to incorporate the findings of this DSI.

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (complete pathways).

The results of the subsurface investigation and laboratory analysis indicate an absence of gross contamination within the soil encountered with the concentrations of COPC all less than the adopted SAC. Therefore the risk to human and environmental receptors based on the results is considered to be low.

Groundwater testing has not been undertaken as part of this DSI, however, the results of the subsurface investigation and laboratory analysis indicate an absence of gross contamination within the soil encountered. Therefore the risk to groundwater and surface water is considered to be low.

However, an unexpected finds protocol (UFP) is recommended for any future development to address any potential contamination encountered e.g. fragments of ACM.

13. Conclusions and Recommendations

Areas that may be impacted by potential contamination were identified on the basis of the available site information and subsurface investigation. Based on the findings of the assessment, the potential for gross contamination to be present within the site is considered to be low.

The results of the investigation indicate that the site is generally suitable for the proposed low density residential development, including child care uses, subject to:

- Implementation of an unexpected finds protocol (UFP) to address potential contamination, including any ACM which is encountered during site works, and a “safe working methodology” if disturbance of any underground infrastructure occurs.

If soil is proposed to be removed from the site it must be sampled, analysed for contaminants of concern and subjected to a formal waste classification assessment with reference to the ACT’s *Environmental Standards: Assessment, Clarification & Management of Liquid & Non-Liquid Wastes* (Ref 4).

14. References

1 NSW Department of Land and Water Conservation (2000): *Canberra Soil Landscape Series Sheet 8727* 1:100 000 scale map.

2 Bureau of Mineral Resources (1985): *Geology of Central Canberra Geological Series Sheet 8727*, *1:10 000 scale map.*

3 Bureau of Mineral Resources, Geology and Geophysics (1984): *Hydrogeology of the Australian Capital Territory and Environs* 1:100,000 scale map.

4 ACT’s *Environmental Standards: Assessment, Classification & Management of Liquid & Non-Liquid Wastes*, June 2000.

15. Limitations

Douglas Partners (DP) has prepared this report for Part Block 9 Section 3, Hawker, ACT in accordance with DP's proposal dated 18 October 2016, and acceptance from Pelle Projects Pty Ltd and Regional Investments Pty Ltd dated 18 October 2016. This report is provided for the exclusive use of Pelle Projects Pty Ltd and Regional Investments Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. 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 on the site only at the specific sampling 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 human 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 affected by undetected variations in surface conditions across the site. The advice may also be limited by budget constraints imposed by others or by site accessibility.

Asbestos-containing materials (ACM) have been detected by observation and laboratory within one of the test locations. The possible presence of hazardous building materials (HBM) including ACM, cannot be precluded in unobserved or untested parts of the site and hence no warranty can be given that HBM are not present.

This report must be read in conjunction with all of the attached 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 stated 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.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition

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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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.

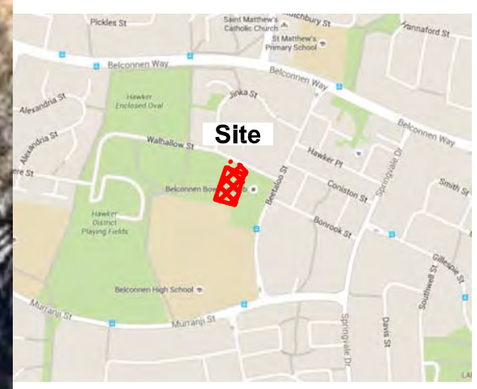
Site Inspection

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.

Appendix B

Drawing 1 – Site Features and Test Location Plan





Locality Plan

LEGEND

- Approximate Site Boundary
- 1 Borehole Locations
- 8 Test Pit Locations
- Approximate Location of Dirt Track noted in the 1975 Aerial Photograph
- Approximate Location of major ground disturbance noted in the 1975 Aerial Photograph

0 10 20 30

Approximate Scale (m)

NOTE: Base drawing from nearmap.com

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Pelle Projects Pty Ltd and Regional Investments Pty Ltd		TITLE: **Site Features and Test Location Plan**	PROJECT No: 88376.00
OFFICE: Canberra	DRAWN BY: ESS	**Detailed Site Investigation**	DRAWING No: 1
SCALE: As shown	DATE: 7.11.2016	**Part Block 9 Section 3, Hawker, ACT**	REVISION: 0

Appendix C

Data Quality Assessment
Chain of Custody (Field and Laboratory)
Sample Receipt

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The detailed site investigation report was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S13 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S3 Site Identification and Description S4 Preliminary Site Investigation S5 Regional Soils, Geology and Hydrogeology S6 Potential for Contamination S7 Preliminary Conceptual Site Model S8 Site Assessment Criteria S11 Results of Investigation S12 Revised Conceptual Site Model
Define the Boundary of the Assessment	S3 Site Identification and Description Drawing 1 – Appendix B
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S8 Site Assessment Criteria S9 Fieldwork QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Work S7 Preliminary Conceptual Site Model S9 Fieldwork QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork procedures in Section 10 and the laboratory certificate (Appendix H) for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	>10% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]

NOTES: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagant Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	<5xPQL – any RPD; >5xPQL – 0-50%RPD	yes
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics)	yes

In summary, the QC data is considered to be of sufficient quality to be acceptable for the assessment.

Q2.1 Intra-Laboratory Replicates

An intra-laboratory replicate was analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services Pty Ltd (Envirolab) and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate sample are summarised in Table Q4.

Note that, where both samples are below LOR/PQL the difference and RPD have been given as a zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals								PAH				TRH			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total	BaP TEQ	BaP	Naphthalene	C6-C10	>C10-C16	>C16-C34	>C34-C40
Envirolab	Bore 4/0.2-0.3	26/10/2016	soil	mg/kg	<PQL	<PQL	27	16	19	<PQL	10	51	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Envirolab	R1/26102016	26/10/2016	soil	mg/kg	<PQL	<PQL	26	13	19	<PQL	10	52	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Difference				mg/kg	0	0	1	3	0	0	0	1	0	0	0	0	0	0	0	
RPD				%	0	0	4	21	0	0	0	2	0	0	0	0	0	0	0	

Notes: - not applicable, not tested

Table Q4 continued: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	BTEX				Phenol	OCPs									OPPs	PCBs
					Benzene	Toluene	Ethylbenzene	xylene	Phenol	DDT +DDD +DDE	Aldrin + Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Total OCPs	Total	Total
Envirolab		26/10/2016	soil	mg/kg	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Envirolab		26/10/2016	soil	mg/kg	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Difference				Difference	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RPD				RPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: - not applicable, not tested

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and± 50% for organics.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following Table Q5.

Table Q5: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned targeted and grid locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified as in the Conceptual Site Model (Section 7); Completion of COC documentation; NATA endorsed laboratory certificate provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs;

	Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

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CHAIN OF CUSTODY FIELD SHEET

Project No:	88376	**Client Project Name:**	Proposed Child Care Centre
Client:	Pelle Projects Pty Ltd	**Location:**	Part Block 9 Section 3 Hawker
Project Manager:	Elyse Storr	**DP Lab Received**	By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
BORE 1	0.1-0.2		S	G			26/10/16		fridge	✓			
BORE 1	0.5-0.6		"	"									
BORE 1	0.9-1.0		"	"									
BORE 2	0.2-0.3		"	"						✓			
BORE 2	0.5-0.6		"	"									
BORE 2	0.9-1.0		"	"									
BORE 3	0.2-0.3		"	"						✓			
BORE 3	0.5-0.6		"	"									
BORE 3	0.9-1.0		"	"									
BORE 4	0.2-0.3	R_1	"	"						✓✓			
BORE 4	0.4-0.5		"	"									
BORE 5	0.01-0.05		"	"									
BORE 5	0.1-0.2		"	"						✓			
BORE 5	0.5-0.6		"	"									
BORE 6	0.01-0.05	R_2	"	"						✓			
BORE 6	0.1-0.2		"	"									
BORE 6	0.3-0.4		"	"									

*** Default storage:** glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

A Provide name of Lab 1, Envirolab B Provide name of Lab 2 C Provide name of Lab 3

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No:	88376	**Client Project Name:**	Proposed Child Care Centre
Client:	Pelle Projects Pty Ltd	**Location:**	Part Block 9 Section 3 Hawker
Project Manager:	Elyse Storr	**DP Lab Received**	By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
BORE 6	0.5-0.6		S	G			26/10/16		fridge				
BORE 7	0.01-0.05		"	"									
BORE 7	0.4-0.5		"	"									
BORE 7	0.9-1.0		"	"						✓			
PIT 8	0.05-0.1		"	"									
PIT 8	0.2-0.3	R3	"	"						✓			
PIT 8	0.5-0.6		"	"									
PIT 9	0.01-0.05		"	"									
PIT 9	0.1-0.2		"	"						✓			
PIT 9	0.4-0.5		"	"									
PIT 9	0.9-1.0		"	"									

*** Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge**

A Provide name of Lab 1

B Provide name of Lab 2

C Provide name of Lab 3

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Proposed Child Care Centre
Project No: 88376.00 DP Order No:
DP Contact Person: SHANNON GOODSELL
Prior Storage: (esky) / fridge / shelved (circle)

To: Envirolab Services Pty Ltd
12 Ashley Street
CHATSWOOD NSW 2067
Ph: (02) 9910 6200
Attn: Jacinta Hurst

Sample ID	Date Sampled	Sample Type S-soil W-water	Lab ID	Analytes: Contamination & Sa				CEC	Clay Content	pH							TCLP	Notes
PIT 9/ 0.1-0.2	26/10/16	S	1	X														
BORE 1/ 0.1-0.2		S	2	X				X	X	X								
BORE 2/ 0.2-0.3			3	X														
BORE 3/ 0.2-0.3			4	X														
BORE 4/ 0.2-0.3			5	X				X	X	X								
R_1			6	X														
BORE 5/ 0.1-0.2			7	X														
BORE 6/ 0.01-0.05			8	X														
BORE 7/ 0.4-0.5			9	X														
PIT 8/ 0.2-0.3			10	X				X	X	X								
PQL (S)		mg/kg																
PQL (W)		mg/L																

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 156231
Date Received: 26·10·2016
Time Received: 10:30
Received by: VA
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit *As per Laboratory Method (Detection Limit)
# - Metals to Analyse (Please circle): As Cd Cr Cu Pb Zn Hg Ni Mn Fe
Date relinquished: 27/10/16
Total number of samples in container: 10
Results required by:
TAT (Circle): (Standard) 72 hr 48hr 24hr

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 26/10/2016 Lab Ref: 156231

Send results to:
Douglas Partners Pty Ltd
Address:
PO BOX 1487 FYSHWICK
ACT 2609
Fax: (02) 6260 1147

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Douglas Partners Canberra
Attention	Shannon Goodsell

Sample Login Details	
Your Reference	88376.00, Proposed Child Care Centre
Envirolab Reference	**156231**
Date Sample Received	28/10/2016
Date Instructions Received	28/10/2016
Date Results Expected to be Reported	**04/11/2016**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	10 Soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	8.6
Cooling Method	Ice Pack
Sampling Date Provided	NO

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

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

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

Sample Id	*vTRH(C6-C10)/BTEXN in Soil*	*svTRH (C10-C40) in Soil*	*PAHs in Soil*	*Organochlorine Pesticides in soil*	*Organophosphorus Pesticides*	*PCBs in Soil*	*Acid Extractable metals in soil*	*Total Phenolics (as Phenol)*	*Asbestos ID - soils*	*pH 1:5 soil:water*	*CEC*	*Clay 50-120g*
Pit 9-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 1-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bore 2-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 3-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 4-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 5-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 6-0.01-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 7-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Pit 8-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Appendix D

Explanatory Notes
Borehole Logs (Bores 1 to 7)
Test Pit Logs (Pits 8 and 9)

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

Sampling Methods

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.

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

BOREHOLE LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 1
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-gravels (base of court)							
	0.1	FILLING-dense, dry to moist, brown orange silty sand		E	0.1		PID<1		
					0.2				
	0.25	SANDY CLAY-stiff to very stiff, dry to moist, brown orange, medium to high plasticity sandy clay, fine to coarse grained sand							
	0.3	SILTY GRAVELLY SAND-dense, dry to moist, orange brown, fine to coarse grained, sand silty gravelly,							
				E	0.5		PID<1		
					0.6				
				E	0.9		PID<1		
1	1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 2
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.17	FILLING-soft, wet to saturated, light brown, low plasticity sandy silty clay		E	0.2		PID<1		
					0.3				
	0.45	TOPSOIL-moist to wet, dark grey sandy silt, some clay and gravels		E	0.5		PID<1		
	0.6	GRAVELLY SILTY SAND- dense, dry to moist, light orange brown, fine to coarse grained gravelly silty sand			0.6				
				E	0.9		PID<1		
1	1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm solid flight auger
WATER OBSERVATIONS: Fast groundwater seepage observed, 150mm
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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 3
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.15	FILLING-stiff to very stiff, dry to moist, some pockets wet, red/orange brown, low plasticity sandy clay, some gravels		E	0.2		PID<1		
	0.3	GRAVELLY SILTY SAND-dense, dry to moist, orange brown gravelly silty sand, fine to coarse grain		E	0.3		PID<1		
	0.8	SANDY CLAY-stiff, grey white, low plasticity sandy clay, grading to dacite		E	0.9		PID<1		
1	1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 4
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.15	GRAVELLY SILTY SAND-dense, dry to moist, orange brown, fine to coarse grained silty sand, some gravel		E	0.2		PID<1		
					0.3				
				E	0.4		PID<1		
					0.5				
	0.6	Bore discontinued at 0.6m -limit of investigation							
	1								1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 5
PROJECT No: 88376.00
DATE: 26/10/2016
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
	0.01	GRASS TURF MAT		E	0.01		PID<1		
	0.05	FILLING-light brown, medium to coarse grained sand			0.05				
		FILLING-stiff, dry to moist, orange brown, low plasticity sandy clay			0.1				
				E			PID<1		
					0.2				
	0.5	SILTY SAND-dense, dry to moist, light red brown, fine to coarse grained gravelly silty sand			0.5				
				E			PID<1		
					0.6				
	0.7	Bore discontinued at 0.7m -limit of investigation							
	1								1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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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BOREHOLE LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 6
PROJECT No: 88376.00
DATE: 26/10/2016
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
	0.01	GRASS TURF MAT		E	0.01		PID<1		
	0.05	FILLING-dry to moist, red brown sand, medium to coarse grain			0.05				
		FILLING-stiff, dry to moist, orange brown, low plasticity sandy clay			0.1				
				E			PID<1		
					0.2				
					0.3				
				E			PID<1		
	0.4	GRAVELLY SILTY SAND-dense, dry to moist, orange brown gravelly silty sand, fine to coarse grained			0.4				
					0.5				
				E			PID<1		
					0.6				
1	1.0	Bore discontinued at 1.0m -limit of investigation							1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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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BOREHOLE LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 7
PROJECT No: 88376.00
DATE: 26/10/2016
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
	0.01	GRASS TURF MAT		E	0.01		PID<1		
		FILLING-dry to moist, brown sand, medium to coarse grain			0.05				
	0.08	FILLING-stiff, dry to moist, light brown, orange brown sandy clay, low plasticity							
					0.4				
				E			PID<1		
					0.5				
	0.6	GRAVELLY SILTY SAND-dense, dry to moist, light brown, fine to coarse grained gravelly silty sand							
					0.9				
				E			PID<1		
1					1.0				1
	1.1	Bore discontinued at 1.1m -limit of investigation							

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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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TEST PIT LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: --
EASTING:
NORTHING:

PIT No: 8
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TOPSOIL FILLING-dry to moist, grey brown sandy silt, some gravel and abundent rootlets		E	0.05		PID<1		
	0.1	FILLING-stiff, dry to moist, orange brown sandy clay, low plasticity, some gravel, some rootlets			0.1				
				E	0.2		PID<1		
	0.3	GRAVELLY SILTY SAND-dense, dry to moist, orange brown gravelly sandy silt, grading to weathering dacite			0.3				
				E	0.5		PID<1		
	0.7	Pit discontinued at 0.7m -limit of investigation			0.6				
	1								1

RIG: Kubota U17-3 mini-excavator fitted with a 30mm bucket

LOGGED: SDG

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)

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TEST PIT LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: --
EASTING:
NORTHING:

PIT No: 9
PROJECT No: 88376.00
DATE: 26/10/2016
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)
	0.05	TOPSOIL FILLING-loose, dry to moist, brown silty sand, some gravel, abundant rootlets		E	0.01		PID<1		
		FILLING-loose, dry to moist, grey brown silty sand			0.05				
				E	0.1		PID<1		
	0.2	SANDY SILT CLAY-soft, dry to moist, some wet pockets, grey brown sandy silty clay, some rootlets			0.2				
				E	0.4		PID<1		
					0.5				
	0.6	SANDY CLAY-soft, dry to moist, orange brown, low plasticity sandy clay, some roots							
				E	0.9		PID<1		
1	1.0	Pit discontinued at 1.0m -limit of investigation			1.0				1

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

RIG: Kubota U17-3 mini-excavator fitted with a 30mm bucket

LOGGED: SDG

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)

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Appendix E

EIL Calculation Spreadsheets
Tables E1 to E3 (Summary of Laboratory Test Results)
Laboratory Certificates of Analysis

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TABLE E1
SUMMARY OF LABORATORY TEST RESULTS - INORGANICS (mg/kg)

Sample ID	Depth (m)	Sample Date	Material Type	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Bore 1/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	25	11	8	<PQL	10	38
Bore 2/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	26	11	14	<PQL	10	49
Bore 3/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	33	15	13	<PQL	11	61
Bore 4/0.2-0.3	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	27	16	19	<PQL	10	51
R1	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	26	13	19	<PQL	10	52
Bore 5/0.1-0.2	0.1 - 0.2	26/10/2016	Sand (Filling)	<PQL	<PQL	25	8	14	<PQL	6	27
Bore 6/0.01-0.05	0.01 - 0.05	26/10/2016	Sand (Filling)	8	<PQL	35	15	13	<PQL	10	60
Bore 7-0.4-0.5	0.4 - 0.5	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	27	11	12	<PQL	8	36
Pit 8/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	29	13	16	<PQL	10	51
Pit 9/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	30	12	14	<PQL	11	52
PQL				4	0.4	1	1	1	0.1	1	1
HIL				100	20	100	6000	300	40	400	7400
EIL				100	NC	500	230	1100	NC	230	670

Notes:

HIL - Health Based Soil Investigation Levels for Low Density Residential Landuse Values
EIL - Environmental Soil Investigation Levels for lower bound Low Density Residential Landuse Values
PQL - Practical Quantitation Limit
NC - No Criteria
NT - Not Tested
R1 - Replicate of Bore 4/0.2-0.3

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TABLE E2
SUMMARY OF LABORATORY TEST RESULTS - ORGANICS (PETROLEUM HYDROCARBONS - mg/kg)

Sample ID	Depth (m)	Sample Date	Material Type	Benzene	Toluene	Ethylbenzene	Xylene	F1	F2	F3	F4
Bore 1/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 2/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 3/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 4/0.2-0.3	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
R1	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 5/0.1-0.2	0.1 - 0.2	26/10/2016	Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 6/0.01-0.05	0.01 - 0.05	26/10/2016	Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 7-0.4-0.5	0.4 - 0.5	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 8/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 9/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
PQL				0.2	0.5	1	3	25	50	100	100
HSL				0.5	160	55	40	45	110	NC	NC
ESL				50	85	70	105	180	120	300	2800
ML				NC	NC	NC	NC	700	1000	2500	10000

Notes:
HSL - Health Based Soil Screening Levels for Low Density Residential Landuse Values
ESL - Environmental Soil Screening Levels for lower bound Low Density Residential Landuse Values
ML - Management Limits for petroleum hydrocarbons
PQL - Practical Quantitation Limit
NC - No Criteria
NT - Not Tested
R1 - Replicate of Bore 4/0.2-0.3

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TABLE E3
SUMMARY OF LABORATORY TEST RESULTS - ORGANICS (PAH, Phenol, OCP, OPP, PCB - mg/kg) and ASBESTOS

Sample ID	Depth (m)	Sample Date	Material Type	BaP	BaP TEQ	Naphthalene	Total PAHs	Phenol	DDT+ DDE+ DDD	Aldrin+ dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Total OCPs	Total OPPs	Total PCBs	Asbestos ID in soil <0.1g/kg
Bore 1/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 2/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 3/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 4/0.2-0.3	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
R1	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 5/0.1-0.2	0.1 - 0.2	26/10/2016	Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 6/0.01-0.05	0.01 - 0.05	26/10/2016	Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 7-0.4-0.5	0.4 - 0.5	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 8/0.2-0.3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 9/0.1-0.2	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
PQL				0.05	0.5	0.1	1.55	5	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	2	0.8	0.7	0.1
HIL/HSL				NC	3	3	300	100	240	6	50	270	10	6	10	300	160	NC	NC	1	NC
EIL/ESL				0.7	NC	170	NC	NC	180#	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
HIL - Health Based Soil Investigation/Screening Levels for Low Density Residential Landuse Values
EIL - Environmental Soil Investigation/Screening Levels for lower bound Low Density Residential Landuse Values
PQL - Practical Quantitation Limit
- Generic EIL for fresh DDT only
NC - No Criteria
NT - Not Tested
ND - Not Detected
R1 - Replicate of Bore 4/0.2-0.3

EIL Calculation Spreadsheet - Arsenic

Inputs
Select contaminant from list below
As
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Arsenic generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	20	40
Urban residential and open public spaces	50	100
Commercial and industrial	80	160

EIL Calculation Spreadsheet - DDT

Inputs
Select contaminant from list below
DDT
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	DDT generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	3	3
Urban residential and open public spaces	180	180
Commercial and industrial	640	640

EIL Calculation Spreadsheet - Naphthalene

Inputs
Select contaminant from list below
Naphthalene
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Naphthalene generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	10	10
Urban residential and open public spaces	170	170
Commercial and industrial	370	370

EIL Calculation Spreadsheet - Copper

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
7.4
Enter organic carbon content (%OC) (values from 0 to 50%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	70	95
Urban residential and open public spaces	130	230
Commercial and industrial	180	320

EIL Calculation Spreadsheet - Nickel

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	35	40
Urban residential and open public spaces	95	220
Commercial and industrial	160	380

EIL Calculation Spreadsheet - Chromium

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
12
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	130	150
Urban residential and open public spaces	240	440
Commercial and industrial	360	720

EIL Calculation Spreadsheet - Zinc

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
7.4
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	90	240
Urban residential and open public spaces	250	680
Commercial and industrial	370	980

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
15
Enter soil pH (calcium chloride method) (values from 1 to 14)
7.4
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	90	240
Urban residential and open public spaces	250	680
Commercial and industrial	370	980

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CERTIFICATE OF ANALYSIS 156231

Client:
Douglas Partners Canberra
PO Box 1487
Fyshwick
ACT 2609

Attention: Shannon Goodsell

Sample log in details:

Your Reference:	**88376.00, Proposed Child Care Centre**
No. of samples:	10 Soils
Date samples received / completed instructions received	28/10/16 / 28/10/16

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:	4/11/16 / 4/11/16
Date of Preliminary Report:	Not Issued

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

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	83	60	97	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	94	96	96	99

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	91	88	88	90	92

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	92	88	88	95	91

PAHs in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	98	107	111	109	111

PAHs in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	111	113	113	120	113

Organochlorine Pesticides in soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	- ----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	83	81	82	82

Organochlorine Pesticides in soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	81	80	84	80	84

Organophosphorus Pesticides						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	83	81	82	82

Organophosphorus Pesticides						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	81	80	84	80	84

PCBs in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	83	81	82	82

PCBs in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	81	80	84	80	84

Acid Extractable metals in soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	- ----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	30	25	26	33	27
Copper	mg/kg	12	11	11	15	16
Lead	mg/kg	14	8	14	13	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	11	10	10	11	10
Zinc	mg/kg	52	38	49	61	51

Acid Extractable metals in soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	- ----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Arsenic	mg/kg	<4	<4	8	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	26	25	35	27	29
Copper	mg/kg	13	8	15	11	13
Lead	mg/kg	19	14	13	12	16
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	6	10	8	10
Zinc	mg/kg	52	27	60	36	51

Misc Soil - Inorg						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Moisture						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
Moisture	%	11	12	14	18	7.3

Moisture						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
Moisture	%	6.5	15	16	14	8.7

Asbestos ID - soils						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date analysed	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Sample mass tested	g	Approx 40g	Approx 35g	Approx 50g	Approx 35g	Approx 40g
Sample Description	-	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date analysed	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Sample mass tested	g	Approx 40g	Approx 40g	Approx 45g	Approx 35g	Approx 45g
Sample Description	-	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil				
Our Reference:	UNITS	156231-2	156231-5	156231-10
Your Reference	----------	Bore 1	Bore 4	Pit 8
	-			
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016
Date prepared	-	02/11/2016	02/11/2016	02/11/2016
Date analysed	-	02/11/2016	02/11/2016	02/11/2016
pH 1:5 soil:water	pH Units	7.5	7.9	6.9

CEC Our Reference: Your Reference	UNITS ---------- -	156231-2 Bore 1	156231-5 Bore 4	156231-10 Pit 8
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016
Date prepared	-	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	1.3	3.0	8.0
Exchangeable K	meq/100g	0.1	0.2	0.2
Exchangeable Mg	meq/100g	17	9.3	6.7
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	18	12	15

Clay 50-120g Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- 	156231-2 Bore 1 0.1-0.2 Soil 26/10/2016	156231-5 Bore 4 0.2-0.3 Soil 26/10/2016	156231-10 Pit 8 0.2-0.3 Soil 26/10/2016
Date prepared	-	01/11/2016	01/11/2016	01/11/2016
Date analysed	-	02/11/2016	02/11/2016	02/11/2016
Clay in soils <2um	% (w/w)	11	7	18

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. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2um reported.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			01/11/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	01/11/2016
$TRHC_6$ - C_9	mg/kg	25	Org-016	<25	156231-1	<25 || <25	LCS-1	100%
$TRHC_6$ - C_{10}	mg/kg	25	Org-016	<25	156231-1	<25 || <25	LCS-1	100%
Benzene	mg/kg	0.2	Org-016	<0.2	156231-1	<0.2 || <0.2	LCS-1	94%
Toluene	mg/kg	0.5	Org-016	<0.5	156231-1	<0.5 || <0.5	LCS-1	102%
Ethylbenzene	mg/kg	1	Org-016	<1	156231-1	<1 || <1	LCS-1	102%
m+p-xylene	mg/kg	2	Org-016	<2	156231-1	<2 || <2	LCS-1	102%
o-Xylene	mg/kg	1	Org-016	<1	156231-1	<1 || <1	LCS-1	107%
naphthalene	mg/kg	1	Org-014	<1	156231-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	156231-1	98 || 90 || RPD: 9	LCS-1	104%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
$TRHC_{10}$ - C_{14}	mg/kg	50	Org-003	<50	156231-1	<50 || <50	LCS-1	84%
$TRHC_{15}$ - C_{28}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	84%
$TRHC_{29}$ - C_{36}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	110%
$TRH>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	156231-1	<50 || <50	LCS-1	84%
$TRH>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	84%
$TRH>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	110%
Surrogate o-Terphenyl	%		Org-003	77	156231-1	91 || 92 || RPD: 1	LCS-1	80%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	96%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	92%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	100%
Anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
Pyrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	85%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	156231-1	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	156231-1	<0.05 || <0.05	LCS-1	99%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	105	156231-1	98 || 95 || RPD: 3	LCS-1	99%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
HCB	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
Heptachlor	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	88%
delta-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	84%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	89%
Dieldrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	90%
Endrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	95%
pp-DDD	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	94%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	87%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	85	156231-1	84 || 85 || RPD: 1	LCS-1	106%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	112%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	106%
Dimethoate	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	112%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	115%
Malathion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	108%
Parathion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	114%
Ronnel	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	133%
Surrogate TCMX	%		Org-008	85	156231-1	84 || 85 || RPD: 1	LCS-1	84%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	LCS-1	121%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	85	156231-1	84 || 85 || RPD: 1	LCS-1	84%

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 prepared	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Arsenic	mg/kg	4	Metals-020	<4	156231-1	<4 || <4	LCS-1	108%
Cadmium	mg/kg	0.4	Metals-020	<0.4	156231-1	<0.4 || <0.4	LCS-1	100%
Chromium	mg/kg	1	Metals-020	<1	156231-1	30 || 30 || RPD: 0	LCS-1	102%
Copper	mg/kg	1	Metals-020	<1	156231-1	12 || 11 || RPD: 9	LCS-1	103%
Lead	mg/kg	1	Metals-020	<1	156231-1	14 || 14 || RPD: 0	LCS-1	98%
Mercury	mg/kg	0.1	Metals-021	<0.1	156231-1	<0.1 || <0.1	LCS-1	85%
Nickel	mg/kg	1	Metals-020	<1	156231-1	11 || 10 || RPD: 10	LCS-1	96%
Zinc	mg/kg	1	Metals-020	<1	156231-1	52 || 51 || RPD: 2	LCS-1	99%

QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	156231-1	<5 || <5	LCS-1	105%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			02/11/2016	[NT]	[NT]	LCS-1	02/11/2016
Date analysed	-			02/11/2016	[NT]	[NT]	LCS-1	02/11/2016
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			04/11/2016	[NT]	[NT]	LCS-1	04/11/2016
Date analysed	-			04/11/2016	[NT]	[NT]	LCS-1	04/11/2016
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	106%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	94%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	103%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	84%

QUALITY CONTROL Clay 50-120g	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Clay in soils <2um	% (w/w)		AS1289.3.6.3	[NT]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
TRHC$_6$ - C$_9$	mg/kg	[NT]	[NT]	156231-2	95%
TRHC$_6$ - C$_{10}$	mg/kg	[NT]	[NT]	156231-2	95%
Benzene	mg/kg	[NT]	[NT]	156231-2	91%
Toluene	mg/kg	[NT]	[NT]	156231-2	96%
Ethylbenzene	mg/kg	[NT]	[NT]	156231-2	95%
m+p-xylene	mg/kg	[NT]	[NT]	156231-2	97%
o-Xylene	mg/kg	[NT]	[NT]	156231-2	102%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	156231-2	101%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	[NT]	[NT]	156231-2	87%
TRHC$_{15}$ - C$_{28}$	mg/kg	[NT]	[NT]	156231-2	84%
TRHC$_{29}$ - C$_{36}$	mg/kg	[NT]	[NT]	156231-2	96%
TRH>C$_{10}$-C$_{16}$	mg/kg	[NT]	[NT]	156231-2	87%
TRH>C$_{16}$-C$_{34}$	mg/kg	[NT]	[NT]	156231-2	84%
TRH>C$_{34}$-C$_{40}$	mg/kg	[NT]	[NT]	156231-2	96%
Surrogate o-Terphenyl	%	[NT]	[NT]	156231-2	88%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Naphthalene	mg/kg	[NT]	[NT]	156231-2	92%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	156231-2	83%
Phenanthrene	mg/kg	[NT]	[NT]	156231-2	86%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	156231-2	71%
Pyrene	mg/kg	[NT]	[NT]	156231-2	78%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(b,j+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	156231-2	90%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	156231-2	95%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	156231-2	79%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	156231-2	80%
Heptachlor	mg/kg	[NT]	[NT]	156231-2	84%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	156231-2	81%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	156231-2	80%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	156231-2	86%
Dieldrin	mg/kg	[NT]	[NT]	156231-2	87%
Endrin	mg/kg	[NT]	[NT]	156231-2	91%
pp-DDD	mg/kg	[NT]	[NT]	156231-2	90%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	156231-2	82%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	156231-2	101%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	156231-2	115%
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	[NT]	[NT]	156231-2	100%
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	156231-2	109%
Fenitrothion	mg/kg	[NT]	[NT]	156231-2	117%
Malathion	mg/kg	[NT]	[NT]	156231-2	97%
Parathion	mg/kg	[NT]	[NT]	156231-2	117%
Ronnel	mg/kg	[NT]	[NT]	156231-2	125%
Surrogate TCMX	%	[NT]	[NT]	156231-2	82%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Aroclor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	[NT]	[NT]	156231-2	116%
Aroclor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	156231-2	82%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Arsenic	mg/kg	[NT]	[NT]	156231-2	94%
Cadmium	mg/kg	[NT]	[NT]	156231-2	91%
Chromium	mg/kg	[NT]	[NT]	156231-2	89%
Copper	mg/kg	[NT]	[NT]	156231-2	106%
Lead	mg/kg	[NT]	[NT]	156231-2	83%
Mercury	mg/kg	[NT]	[NT]	156231-2	93%
Nickel	mg/kg	[NT]	[NT]	156231-2	84%
Zinc	mg/kg	[NT]	[NT]	156231-2	81%

QUALITY CONTROL Misc Soil - Inorg	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	156231-2	100%

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.
Note: Samples 156231-1 to 10 were sub-sampled from jars provided by the client.

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

ACT Government
Chief Minister, Treasury and Economic Development

File Ref: new file

Ms Elyse Storr
Douglas Partners Pty Ltd
PO Box 1487
Fyshwick ACT 2609

Dear Ms Storr

ENDORSEMENT OF DETAILED SITE INVESTIGATION REPORT - BLOCK 9 SECTION 3 HAWKER BELCONNEN

The Environment Protection Authority (EPA) has reviewed the report titled "Report on Detailed Site Investigation Proposed Residential Development Part Block 9 Section 3, Hawker, ACT" dated 17 November 2016 by Douglas Partners Pty Ltd.

The EPA has assessed the report and supports the consultant's findings that "the site is generally suitable for the proposed child care centre development" from a contamination perspective, subject to the following condition:

- a site specific unexpected finds protocol (UFP) must be prepared by a suitably qualified environmental consultant to manage potentially contaminated material identified during future development of the site. The UFP must be implemented during redevelopment works at the site.

The works have been undertaken to the satisfaction of the EPA in accordance with the Contaminated Sites Environment Protection Policy 2009 and associated guidelines.

This letter of endorsement must be read in conjunction with the above report.

This should not be taken as a warranty by the Environment Protection Authority or the Territory that the land is fit for any particular purpose.

Please note that where the above documents have been submitted in accordance with a condition of a development approval, the documents along with this letter of endorsement must be lodged with the ACT Environment and Planning Directorate using their eDevelopment system.

Yours sincerely

Greg Jones

Greg Jones
Environment Protection Authority

25 November 2016

Planning and Development Act 2007

Development Application

Application Number: **201629661S165C**

Type of Application

The type of application you are applying for is a S165 Amendment

Lease/Site Details

Site Number: 1

Suburb	Section	Block Number	Unit Number
HAWKER	3	9	

Street Address

19 WALHALLOW STREET, HAWKER

Applicant Details

ACN or ABN

14659841354

Company Name	Position held / Title
Purdon Planning Pty Ltd	Planner

Salutation	First Name	Surname
None	Emma	Conant

Postal Address 1	Postal Address 2
Unit 4	1-3 Torrens St

Postal Address 3

Suburb	State/Territory	Postcode	Country
BRADDON	ACT	2612	Australia

Phone Number	Fax Number	Mobile Number
62571511		

Email

purdons@purdon.com.au

Lessee (Property Owners) Details

Lessee Number: 1

Is the Lessee a

◉ Company

Australian Company Number (ACN)

124775211

Company Name

Pelle Projects Pty Ltd

Position held / Title

Director

Salutation

None

First Name

Dominic

Surname

Pelle

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418475501

Fax Number

Mobile Number

0418475501

Email

Lessee Number: 2

Is the Lessee a

◉ Company

Australian Company Number (ACN)

166091228

Company Name

Regional Investments Pty Ltd

Position held / Title

Director

Salutation

None

First Name

John

Surname

Krnc

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418633119

Fax Number

Mobile Number

0418633119

Email

List Amendments Being Satisfied

Contamination report, hazmat report and EPA endorsement.

Applicant Declaration

I/we declare that this application is accompanied by all of the required information or documents that address the relevant rules and/or relevant criteria for it to be considered for approval;

I /we understand that this application will be considered lodged once any relevant application fees have been paid;

I/we understand that the documentation provided on CD/DVD or via the electronic lodgment process will be considered to be the relevant documentation associated with this application. All development application documentation will be made available for public inspection including via the Internet unless exclusion has been approved;I/we understand that an amendment may be notified in accordance with the requirements of the Planning and Development Act 2007.

I/we declare that all the information given on this form and its attachments is true and complete;

If signing on behalf of a company, organisation or Government agency: -

I/we the undersigned, declare I/we have the appropriate delegation or authority to sign on behalf of the company, organisation or Government agency.

I accept the above declarations:

☑ Accept

Acceptance Date

18/10/2018

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Detailed Site Investigation

Proposed Residential Development
Part Block 9 Section 3 Hawker

Prepared for
Purdon Planning Pty Ltd and
Regional Investments Pty Ltd

Project 88376.02
May 2017

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	88376.02	Document No.	R.001.Rev0
Document title	Report on Detailed Site Investigation Proposed Child Care Centre		
Site address	Part Block 9 Section 3 Hawker		
Report prepared for	Purdon Planning Pty Ltd and Regional Investments Pty Ltd		
File name	88376.02.R.001.Rev0		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Elyse Storr	J. M. Nash	17 May 2017

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Purdon Planning Pty Ltd

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.

	Signature		Date
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Executive Summary

This report describes the methodology and results of a Detailed Site Investigation (DSI), conducted by Douglas Partners Pty Ltd (DP) for Part Block 9 Section 3, Hawker, ACT (henceforth 'the site'). The DSI has been requested to address further works recommended in a Preliminary Site Investigation completed by DP entitled: *Preliminary Site Investigation, Proposed Development, Block 9 Section 3, Hawker, ACT*, dated May 2016 (DP, 2016a) for Part Block 9 Section 3 to be developed as a child care centre.

A DSI was completed by DP in November 2016 for an area that included part of the current site (the eastern portion of the site) and presented in the report entitled: *Detailed Site Investigation, Proposed Development, Part Block 9 Section 3, Hawker, ACT*, dated November 2016 (DP, 2016b). Five of the test locations completed in DP (2016b) are within the current site and therefore incorporated into this report.

The DSI described herein was conducted to further assess possible soil contamination impacts on site from the potential sources of contamination identified in DP (2016a). The DSI also provides comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site with its intended us as a child care centre.

Based on site history and walkover observations made during DP (2016a) the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with building, paved areas, tennis courts, disturbed ground (historical) and dirt track (historical). Potential contaminants associated with fill from unknown and contaminated sources are: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochlorine pesticides (OCP); phenols and asbestos.
- Potential impacts from hazardous building materials associated with buildings on the site. Potential contaminants associated with hazardous building materials are: asbestos, Pb, PCB and synthetic mineral fibres (SMF).
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are asbestos-containing materials (ACM).

For the purpose of this DSI a grid-based and targeted sampling of the western portion of the site was considered appropriate. Five test locations (Boreholes 101 and 102 and Pits 103 to 105) were selected for the grid-based sampling with Bores 101, Pits 103 to 105 also targeting the historical disturbed ground/dirt tracks (Drawing 1, Appendix B). Bores 1 to 4 and Pit 8 were completed on the eastern portion of the site as part of DP (2016b), refer to Drawing 1, Appendix B.

The results of the investigation indicate that the site is generally suitable for the proposed land use as a child care centre which is included in the Residential A land use settings category defined in NEPM (2013), subject to:

- Validation of the building footprint following demolition and removal of demolition wastes from the site; and

- Implementation of an unexpected finds protocol (UFP) to address potential contamination, including any ACM which may be encountered during site works, and a “safe working methodology” if disturbance of any underground infrastructure occurs.

If soil is proposed to be removed from the site it must be sampled, analysed for contaminants of concern and subjected to a formal waste classification assessment with reference to the ACT’s *Environmental Standards: Assessment, Clarification & Management of Liquid & Non-Liquid Wastes* (Ref 4).

Douglas Partners
Geotechnics | Environment | Groundwater

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Report on Detailed Site Investigation
Proposed Residential Development
Part Block 9 Section 3 Hawker

1. Introduction

This report describes the methodology and results of a Detailed Site Investigation (DSI), conducted by Douglas Partners Pty Ltd (DP) for Part Block 9 Section 3, Hawker, ACT (henceforth 'the site'). The work was commissioned through Purdon Planning Pty Ltd (Purdon) by Pelle Planning Pty Ltd (Pelle) and Regional Investments Pty Ltd (Regional Investments) in an email dated 5 April 2017.

The DSI has been requested to address further works recommended in a Preliminary Site Investigation completed by DP entitled: *Preliminary Site Investigation, Proposed Development, Block 9 Section 3, Hawker, ACT*, dated May 2016 (DP, 2016a) for Part Block 9 Section 3 to be developed as a child care centre. Details of the proposed development include a building, play area and car park and will include the demolition of the existing building. DP understands that a pre-demolition hazardous building materials survey has been commissioned for the site, however DP has not reviewed this document.

A DSI was completed by DP in November 2016 for an area that included part of the current site (the eastern portion of the site) and presented in the report entitled: *Detailed Site Investigation, Proposed Development, Part Block 9 Section 3, Hawker, ACT*, dated November 2016 (DP, 2016b). Five of the test locations completed in DP (2016b) are within the current site and therefore incorporated into this report.

The DSI was conducted to further assess possible soil contamination impacts from the potential sources of contamination identified in DP (2016a) and to comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site with its intended us as a child care centre.

This report must be read in conjunction with the notes *About this Report* which are included in Appendix A.

2. Scope of Work

The following scope of work was conducted for the assessment:

- Review of previous investigations (DP 2016a and 2016b) at the site;
- A subsurface investigation with sampling and laboratory testing as outlined in Sections 9 and 10; and
- Preparation of this DSI report presenting the findings of the DSI and an assessment of the need for further investigations and/or management.

3. Site Identification and Description

3.1 Site Identification

The site identification information is summarised as follows:

Table 1: Site Identification Details

Item	Details
Site Owner/ Occupiers	Pelle Projects Pty Ltd Regional Investments Pty Ltd
Site Address	19 Walhallow Street, Hawker
Current land use	Residence and tennis centre
Block and Section Number (see Drawing 1, Appendix B)	Part Block 9 Section 3
Territory Plan Zoning	PRZ2: Restricted Access Recreation Zone
District	Belconnen District
Approximate Site Area	3,000 m^2
Proposed future land-use	Child care centre

3.2 Site Layout and Description

The general layout of the site is provided on Drawing 1, Appendix B. The site comprises an irregular shaped area occupied by a building containing a residence and tennis centre with associated driveway on the western portion, and tennis courts on the eastern portion. The site is accessed from a car park and a driveway off Walhallow Street. The site slopes generally to the west from 630 m ADH to 628 m AHD.

The site is bounded by a car park and Walhallow Street to the north, Belconnen Bowling Club to the east, and the remaining areas of Block 9 Section 3 occupied by a residence and tennis courts to the south and west. The surrounding land uses are residential to the north and east and sporting fields to the south and west.

4. Background Information

4.1 Preliminary Site Investigation (DP, 2016a)

A Preliminary Site Investigation (PSI) was completed for all of Block 9 Section 3, Hawker by DP in May 2016 (DP 2016a). The PSI comprised a review of historical information and a site walkover. The following summary relates only to the area of the current site.

The site history review and walkover indicated that the site was arable farmland until residential development occurred in the area during the years 1968 and 1975. Between 1968 and 1975 the building was constructed along with the tennis courts.

The ACT Directorate of Environment and Planning's Environment Protection Authority (EPA) contaminated land search did not have any records of contaminated land on the contaminated sites management or geographic information system for Block 9 Section 3, Hawker.

The PSI noted that possible source of contaminants could be associated with filling used for the construction of the building, paved areas and tennis courts, and with the hazardous building materials used within the building fabric. It was noted that weeds had established in some sections of the site, indicating that the application of herbicides had not occurred in recent times. Buried services were identified at the boundaries of the site with electricity, stormwater and water noted within the site during the site walkover.

Areas that may be impacted by potential contamination were identified on the basis of the available site information and site walkover. Based on the findings of the PSI, the potential for gross contamination to be present within the site was considered to be low.

The results of the PSI indicated that the site was generally suitable for the intended child care centre subject to an intrusive subsurface investigation to determine the extent (if any) of potential contamination at the site targeting the unknown filling.

4.2 Detailed Site Investigation (DP, 2016b)

A Detailed Site Investigation (DSI) was conducted by Douglas Partners Pty Ltd (DP) for an area that included part of the current site. The DSI was requested to address further works recommended in DP (2016a). The investigation comprised a subsurface investigation with sampling and laboratory testing targeting the potential impacts as noted in DP (2016a) from filling associated with the tennis courts and disturbed ground (historical). The following summary relates only to the area of the current site.

For the purpose of the DSI grid-based and targeted sampling of the site was considered appropriate. Five test locations (Bores 1 to 4 and Pit 8) were selected (Drawing 1, Appendix B). Samples were selected for analysis in order to gain a general representation of the soil/fill conditions across the site. The soil results were all below the site assessment criteria for the intended use as a child care centre.

Areas that may be impacted by potential contamination were identified on the basis of the available site information and subsurface investigation. Based on the findings of the assessment, the potential for gross contamination to be present within the site was considered to be low.

The results of the investigation indicate that the site was generally suitable for the proposed child care centre development subject to:

- Implementation of an unexpected finds protocol (UFP) to address potential contamination, including any ACM which is encountered during site works, and a "safe working methodology" if disturbance of any underground infrastructure occurs.

5. Soil Landscape, Regional Geology and Hydrogeology

5.1 Soil Landscape

Reference to the 1:100 000 Canberra Soil Landscape Series Sheet 8727 (Ref 1) indicated that the site is mapped as being on the Williamsdale Soil Group.

The Williamsdale Soil Group is characterised by undulating rises, fans and depressions on Silurian Volcanics of the Canberra Lowlands and includes areas of pediplain. Soils are moderately deep, moderately well-drained Yellow Chromosols (Yellow Podzolic Soil) on Red and Brown Kandosols (Red and Yellow Earth) on upper rises and fan elements. Soils are moderately to very deep, poorly to imperfectly drained Sodosols (Solodic Soils and Solodized Soils) on lower slopes and fan elements. Associated limitations include; hardsetting, erodible, dispersible soils (localised), acidic topsoils, seasonal waterlogging, complex terrain flood hazard (localised), run-on and dieback.

5.2 Regional Geology

Reference to the Canberra 1:100 000 Geological Series Sheet 8727 (Ref 2) indicates that the site is underlain with Walker Volcanics. This unit typically comprises of purple and greenish-grey dacitic ignimbrite.

5.3 Hydrogeology

The nearest surface water receptor is Lake Ginninderra, approximately 2.5 km to the north east of the site. However, it is considered likely the groundwater would flow towards to the west, conforming to the topographic slope.

The 1:100,000 map Hydrogeology of the Australian Capital Territory and Environs (Ref 3) indicates that the site is underlain by late Middle Silurian andesitic, dacitic, ryhodacitic ignimbrite, minor ashstone, shale, limestone and disseminated sulphides. The unit is usually fractured, higher yielding zones are associated with the upper and lower portions of the individual ash-flow tuffs and interbedded sediments. The water quality tends to be tends to be poor. The likely yield of the groundwater aquifer is indicated to be less than 0.5 L/s with a total dissolved solid (TDS) of between 500 and 1000 mg/L.

6. Potential for Contamination

Based on site history and walkover observations made during DP (2016a) the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with building, paved areas, tennis courts, disturbed ground (historical) and dirt track (historical). Potential contaminants associated with fill from unknown and contaminated sources are: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), manganese (Mn), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic

hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochlorine pesticides (OCP); phenols and asbestos.

- Potential impacts from hazardous building materials associated with building on the site. Potential contaminants associated with hazardous building materials are: asbestos, Pb, PCB and synthetic mineral fibres (SMF).
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are asbestos-containing materials (ACM).

Potential sources of contamination observed on site are shown on Drawing 1, Appendix B. However, it should be noted that other fill areas not identifiable on aerial photographs or via surface walkover, could be present.

7. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding potential contamination sources, receptors and exposure pathways between those sources and receptors (linkages). The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages.

7.1 Potential Contamination Sources

Based on Section 6 the potential contamination sources are as follows:
S1 – Filling.
S2 – Hazardous building materials and buried service infrastructure (asbestos, Pb, PCB and SMF).

7.2 Potential Receptors

7.2.1 Human Health Receptors

Potential human health receptors include the following:
R1 – Current users (general public).
R2 – Construction and maintenance workers.
R3 – Final end users (child care centre).
R4 – Land users in adjacent areas (open space, commercial and residential).

7.2.2 Environmental Receptors

Potential environmental receptors include the following:
R5 – Groundwater.
R6 – Terrestrial ecology.
R7 – Surface water.

Groundwater quality (R5) tends to be poor in the area (Section 5.3) therefore leachability testing will be undertaken only if a viable complete pathway between on-site soil contamination and groundwater is identified.

The closest down gradient surface water (R7) receptor is Lake Ginninderra located approximately 2.5 km to the north east of the site. Should testing indicate a viable complete pathway between on-site soil contamination and surface water, an investigation would be required to assess the impacts on the surface water.

7.3 Potential Pathways

Potential pathways for contamination present include the following:
P1 –Ingestion and dermal contact.
P2 – Inhalation of dust and/or vapours.
P3 – Surface water run-off.
P4 – Leaching of contaminants and vertical mitigation into groundwater.
P5 – Lateral migration of groundwater providing baseflow to watercourses.
P6 – Direct contact with terrestrial ecology.

It is considered that the sewer is unlikely to be preferential pathway for contamination as there are no sources of mobile contamination such as hydrocarbons or gas substances that would migrate offsite along this pathway.

7.4 Summary of Potential Complete Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (potential complete pathways). The possible pathways between the above sources (S1 and S2) and receptors (R1 to R7) are provided below in Table 2.

Table 2: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor	Comments
S1 –Filling: metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (general public). R2 – Construction and maintenance workers. R3 – Final end users (child care centre).	An intrusive investigation is required to assess possible contamination including chemical testing of the soils across the site which has now been completed as part of DP (2016b) and this DSI.
	P2 – Inhalation of dust and/or vapours.	R4 – Land users in adjacent areas (residential, community and open space).	
	P4 – Leaching of contaminants and vertical mitigation into groundwater.	R5 – Groundwater.	An intrusive investigation would be required to assess groundwater if the site is found to be contaminated. It is noted that contamination has not been identified within DP (2016b) and this DSI so is not required See Note 1.
	P3 – Surface water run-off. P5 – Lateral migration of groundwater providing base flow to watercourses.	R7 – Surface water (Lake Ginninderra)	An investigation would be required to assess the impacts on surface water if the site is found to be contaminated. It is noted that contamination has not been identified within DP (2016b) and this DSI so is not required. See Note 2
	P6 – Direct contact with terrestrial ecology.	R6 – Terrestrial ecology.	An intrusive investigation is required to assess possible contamination including chemical testing of the soils which has now been completed as part of DP (2016b) and this DSI.
S2 – Hazardous building materials and buried service infrastructure Asbestos, lead, PCB and SMF.	P1 – Direct contact with soil (ingestion and dermal). P2 – Inhalation of dust.	R2 – Construction and maintenance workers.	As the building is to be demolished a pre-demolition hazardous building materials survey of the building is recommended prior to the demolition of the building. It is understood that a pre-hazardous building materials survey has been commissioned however this has not been reviewed by DP. For any future development an unexpected finds protocol (UFP) is recommended to address potential bonded ACM encountered and a “safe working methodology” if disturbance of the underground infrastructure is proposed

1. Leachability testing is not proposed at this stage. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then leachability testing (ASLP) may be required.
2. The nearest surface water receptor is Lake Ginninderra, approximately 2.5km to the north east of the site. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then groundwater testing may be required.

8. Site Assessment Criteria

The site is proposed to be developed into a child care centre which for contamination assessment purposes is classified in the same land use category as low density residential properties (Residential A). It is assumed that any land use at the site would have soil access, i.e. outdoor play areas.

The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM (refer to Section 7*)* which identified human and ecological receptors to potential contamination on the site. Analytical results will be assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). The NEPC guidelines are endorsed by the ACT EPA under the *Environment Protection Act* 1997. Petroleum based health screening levels for direct contact from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013) have not been considered in this assessment as these values are significantly higher than the soil vapour HSLs adopted.

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g. Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial/industrial land use scenario.

8.1 Health Investigation and Screening Levels

The health investigation levels (HIL) and health screening levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HIL are applicable to assessing health risk arising *via* all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HIL apply for other land uses.

HSL are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSL have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HIL and HSL are:

- HIL A/HSL A – Low density residential area, includes children's day care centers.

In addition, the HSL adopted are predicated on the inputs summarised in Table 3.

Table 3: Inputs to the Derivation of HSL

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation)	Potential exposure pathways include vapour intrusion through concrete slabs from potentially contaminated fill material beneath the slab. There is also the risk of soil vapours during any excavation of potentially contaminated fill material.
Soil Type	Sand	The DSI encountered clay, silt and sand (Section 11). A conservative approach has been adopted for this DSI.
Depth to contamination	0 m to <1 m	A conservative approach has been adopted for this DSI.

The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 4.

Table 4: Health Investigation and Screening Levels (HIL and HSL) in mg/kg unless otherwise indicated

Contaminants		HIL-A	HSL-A Vapour Intrusion
Metals	**Arsenic**	100	NC
	Cadmium	20	NC
	Chromium (VI)	100	NC
	Copper	6000	NC
	Lead	300	NC
	Mercury (inorganic)	40	NC
	Nickel	400	NC
	Zinc	7400	NC
PAH	**Benzo(a)pyrene TEQ[1]**	3	NC
	Naphthalene	NC	3
	Total PAH	300	NC
TRH	**C6 – C10 (less BTEX) [F1]**	NC	45
	>C10-C16 (less Naphthalene) [F2]	NC	110
	>C16-C34 [F3]	NC	NC
	>C34-C40 [F4]	NC	NC
BTEX	**Benzene**	NC	0.5
	Toluene	NC	160
	Ethylbenzene	NC	55

Contaminants		HIL-A	HSL-A Vapour Intrusion
	Xylenes	NC	40
Phenol	**Pentachlorophenol (used as an initial screen)**	100	NL
OCP	**Aldrin + Dieldrin**	6	NC
	Chlordane	50	NC
	DDT+DDE+DDD	240	NC
	Endosulfan	270	NC
	Endrin	10	NC
	Heptachlor	6	NC
	HCB	10	NC
	Methoxychlor	300	NC
OPP	**Chlorpyrifos**	160	NC
PCB [2]		1	NC

Notes:

1 *sum of carcinogenic PAH*

2 *non dioxin-like PCBs only.*

3 *NC: No Criteria*

8.2 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow*

estimation of heavy metal background concentrations in soils, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, which will be derived from the *Interactive (Excel) Calculation Spreadsheet,* are shown in the following Table 6. The following site specific data and assumptions have been used to determine the EIL:

- A protection level of 80% for urban residential areas and public open space has been adopted;
- The EIL will apply to the top 2m of the soil profile;
- Given the likely source of soil contaminants (i.e. unknown historical fill) the contamination is considered as “aged” (>2 years);
- ABCs will be derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters NSW for the closest state to which the site is located and high for traffic volumes. No background concentration is assumed for lead (conservative);
- Site specific pH, CEC and clay content values will be used as input parameters in the *Interactive (Excel) Calculation Spreadsheet*. Based on average pH, CEC and clay content values for soils collected from DP (2016b) and during this assessment, the following values have been used for the soil profile: pH = 6.9 (range 5.3 to 7.9), CEC = 13.7 $cmol_c$/kg (range 9.9 to 18) and clay content = 16% (range 7 to 18). The Calculation Spreadsheets are included in Appendix E.

Table 5: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL	Comments
Metals	**Arsenic**	100	Adopted pH of 6.9, CEC of 13.7 $cmol_c$/kg and clay content 16%
	Copper	230	
	Nickel	210	
	Chromium III	480	
	Lead	1100	
	Zinc	640	
PAH	**Naphthalene**	170	
OCP	**DDT**	180	

8.3 Ecological Screening Levels – Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and Benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Urban residential and public open space	A conservative approach has been adopted for this DSI.
Soil Texture	Coarse	The DSI encountered clay, silt and sand (Section 11). A conservative approach has been adopted for this DSI.

Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

8.4 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B(7),

Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential, parkland and public open space apply; and
- The DSI encountered clay silt and sand (Section 11). A conservative approach has been adopted for this investigation.

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	$C_6 - C_{10}$ (F1) #	700
	$>C_{10}-C_{16}$ (F2) #	1000
	$>C_{16}-C_{34}$ (F3)	2500
	$>C_{34}-C_{40}$ (F4)	10000

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

8.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of these works as asbestos was not an identified as a contaminant of concern at the time of writing the proposal. Therefore the presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted for this assessment as an initial screen.

9. Fieldwork

9.1 Sampling Rationale

The site area is understood to be approximately 3,000 m^2. For the purpose of this DSI a grid-based and targeted sampling of the western portion of the site was considered appropriate. Five test locations (Boreholes 101 and 102 and Pits 103 to 105) were selected for the grid-based sampling with Bores 101, Pits 103 to 105 also targeting the historical disturbed ground/dirt tracks (Drawing 1, Appendix B). Bores 1 to 4 and Pit 8 were completed on the eastern portion of the site as part of DP (2016b), refer to Drawing 1, Appendix B. The number of sampling locations meets Table A of NSW EPA Sampling Density Guidelines (NSW EPA, 1995) for a site of 3,000 m^2 which is 9 locations when incorporating the test locations completed in DP (2016b) within the eastern portion of the site (i.e. a total of 10 locations within the site). Samples were selected for analysis in order to gain a general representation of the soil/fill conditions across the site.

9.2 Methods and Sampling Locations

The fieldwork comprised the drilling of two boreholes (Bores 101 and 102) to depths of 1.2 m bgl and the excavation of three test pits (Pits 103 to 105) of depths of between 0.35 m and 1.2 m using a Kubota U17-3 mini-excavator fitting with a 110mm solid flight augur for boring and a 300mm bucket for test pitting. Samples were collected directly from excavated soil during the auguring process and from the walls of the test pits and boreholes at regular intervals.

Fieldwork was undertaken on 20 April 2017 by an environmental scientist who undertook the following:

- Setting out of the test locations;
- Logging of the subsurface profile; and
- Collection of samples to assist in strata identification and for laboratory testing purposes.

A calibrated photo-ionisation detector (PID) was used during the fieldwork to screen the collected soil samples to assess whether volatile organic compounds were present. The approximate test pit and borehole locations are shown on Drawing 1 in Appendix B.

9.3 Soil Sampling Procedure

All sample locations were checked for underground services by a review of dial before you dig (DBYD) plans and by a services locator.

All sampling data was recorded on DP test pit and borehole logs with essential information included on the chain-of-custody sheets. The general sampling procedure adopted for the collection of environmental samples is summarised below:

- Decontamination of sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and tap water prior to collecting each sample;
- The use of disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately;

- Collection of replicate soil samples in zip-lock plastic bags at each depth for PID screening;
- Collection of replicate samples for QA/QC purposes;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain of custody (C-O-C) documentation so that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory.

Samples were generally collected from the near surface, and at regular depth intervals or changes in strata within each test location.

Soil samples were collected directly from the side walls of the test pits or from the excavator bucket. Care was taken whilst collecting the samples to remove any extraneous material deposited on the pit walls or soil removed from the pits during the excavation process.

Soil samples were collected directly from the solid flight augers using stainless steel sampling equipment. Augers were screwed into the ground at discrete depths and retracted without rotation to minimise sample disturbance and loss of volatiles.

Envirolab Services Pty Ltd (Envirolab, NATA accreditation number: 2901) was used for the analysis of the primary and replicate soil samples. The laboratory is required to carry out routine in-house QC procedures.

Field replicates were recovered, and analysed for a limited suite of contaminants with reference to standard industry practice and guidelines. The comparative results are outlined in Appendix C together with other QA/QC evaluations of the assessment, C-O-C documentation (Field and Laboratory) and sample receipt information.

10. Laboratory Testing

The analytical scheme was designed to obtain an indication of the presence of contaminants of potential concern (COPC) that may be attributable to past and present activities and features within the site, as discussed in Section 6. Selected primary soil samples were analysed for the COPC comprising: metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.

Laboratory analytical methods were as stated in the Envirolab certificate of analysis in Appendix E.

A selected soil sample was also tested for cation exchange capacity (CEC), pH and clay content to assist with the calculation of ecological investigation levels (EIL) as presented below.

11. Results of the Investigation

11.1 Subsurface Observations

Details of the subsurface conditions encountered during the test pit excavation and borehole drilling are provided in the logs included in Appendix D which must be read in conjunction with the included explanatory notes that define classification methods and terms used to describe the soils. In summary, the test pits and boreholes encountered variable subsurface conditions underlying the site with the principal succession of strata broadly summarised as follows:

- TOPSOIL/TOPSOIL FILLING: dry to moist, brown sandy silt and silty sand topsoil and topsoil filling in all Bores and Pits 103 and 104 to depths of between 0.05 m and 0.1 m bgl. Mulch was noted to 0.01 m bgl in Pit 105.
- FILLING: compacted, dry to moist, yellow brown sandy silty clay in Pit 105 from 0.01 m to 0.55 m bgl.
- SANDY SILT/SAND: firm/medium dense, dry to moist, brown and orange brown sandy silt and sand in Pit 104 from depths of between 0.05 m to 0.1 m bgl to between 0.1 m and 0.2 m bgl.
- SANDY SILTY CLAY/SANDY CLAY: firm to very stiff, dry to moist, light grey brown/orange brown/red brown, low to medium plasticity sandy silt in all Bores and Pits 103 and 104 from depths of between 0.05 m to 0.2 m bgl to between 0.2 m and 0.6 m bgl.
- DACITE: low to medium strength, highly to moderately weathered, orange brown dacite in all Bores and Pits from depths of between 0.2 and 0.6 m to the limit of the investigation at between 0.35 m and 1.2 m.

No free groundwater was observed in the boreholes and test pits. The boreholes and test pits were backfilled immediately following excavation precluding longer term monitoring of groundwater levels.

Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature and soil permeability. For these reasons, it is noted that the moisture condition of the site soils can vary considerably from the time of the investigation compared to at the time of any future construction.

The results of the PID screening testing are included on the test pit and borehole logs (Appendix D). The screening tests indicated that the subsurface conditions were generally absent of volatile organic compounds with all recorded values less than 1ppm.

11.2 Contamination Observations

There was no visual or olfactory evidence (i.e. staining, odours) to suggest the presence of gross contamination within the soils investigated.

There were no visual observations of anthropogenic inclusions (e.g. building material/rubble) in the test locations.

11.3 Analytical Results

A summary of the results of the laboratory analysis undertaken on the soil samples from this DSI and DP (2016b) within the site is presented in Tables E1 to E4 in Appendix E along with the laboratory certificates.

11.4 Assessment of Laboratory Results

All soil results for TRH, BTEX, PAH, PCB, OCP, OPP, phenols and asbestos were below the laboratory's practical quantitation limit (PQL) and therefore below the SAC with the exception of TRH F3 (850 mg/kg) which is above the ESL (300 mg/kg) and TRH F4 (250 mg/kg) above the PQL at Bore 101/0.05-0.1.

Considering that the sample from Bore 101/0.05-0.1 was collected from the topsoil it is likely that the elevated levels of F3 and F4 at this location are due to organic matter within the sample. Therefore silica gel clean up was undertaken on the sample. The results of the silica gel clean up indicated that F3 and F4 were below the PQL.

All soil results for metals were above the PQL with the exception of arsenic, cadmium and mercury, but all results were below the SAC.

12. Revised Conceptual Site Model

The preliminary CSM in Section 7 has been updated to incorporate the findings of this DSI.

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (complete pathways).

The results of the subsurface investigation and laboratory analysis indicate an absence of gross contamination within the soil encountered with the concentrations of COPC all less than the adopted SAC (after the silica gel clean up on Bore 101/0.05-0.1). Therefore the risk to human and environmental receptors based on the results is considered to be low and therefore further testing is not considered to be required.

Groundwater testing has not been undertaken as part of this DSI, however, the results of the subsurface investigation and laboratory analysis indicate an absence of gross contamination within the soil encountered. Therefore the risk to groundwater and surface water is considered to be low and as a consequent groundwater testing is not considered to be required.

However, an unexpected finds protocol (UFP) is recommended for any future development to address any potential contamination encountered e.g. fragments of ACM.

13. Conclusions and Recommendations

Areas that may be impacted by potential contamination were identified on the basis of the available site information and subsurface investigation. Based on the findings of the assessment, the potential for gross contamination to be present within the site is considered to be low.

The results of the investigation indicate that the site is generally suitable for the proposed land use as a child care centre which is included in the Residential A land use settings category defined in NEPM (2013), subject to:

- Validation of the building footprint following demolition and removal of demolition wastes from the site; and
- Implementation of an unexpected finds protocol (UFP) to address potential contamination, including any ACM which may be encountered during site works, and a "safe working methodology" if disturbance of any underground infrastructure occurs.

If soil is proposed to be removed from the site it must be sampled, analysed for contaminants of concern and subjected to a formal waste classification assessment with reference to the ACT's *Environmental Standards: Assessment, Clarification & Management of Liquid & Non-Liquid Wastes* (Ref 4).

14. References

1 NSW Department of Land and Water Conservation (2000): *Canberra Soil Landscape Series Sheet 8727* 1:100 000 scale map.

2 Bureau of Mineral Resources (1985): *Geology of Central Canberra Geological Series Sheet 8727*, *1:10 000 scale map.*

3 Bureau of Mineral Resources, Geology and Geophysics (1984): *Hydrogeology of the Australian Capital Territory and Environs* 1:100,000 scale map.

4 ACT's *Environmental Standards: Assessment, Classification & Management of Liquid & Non-Liquid Wastes*, June 2000.

15. Limitations

Douglas Partners (DP) has prepared this report for Part Block 9 Section 3, Hawker, ACT in accordance with DP's proposal dated 4 April 2017, and acceptance from Pelle Projects Pty Ltd and Regional Investments Pty Ltd dated 5 April 2017. This report is provided for the exclusive use of Pelle Projects Pty Ltd and Regional Investments Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. 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 on the site only at the specific sampling 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 human 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 affected by undetected variations in surface conditions across the site. The advice may also be limited by budget constraints imposed by others or by site accessibility.

Asbestos-containing materials (ACM) have not been detected by observation and laboratory within the test locations or on the surface of the site. However DP (2016a) noted that there is the possibility of hazardous building materials used in the construction of the existing building. The possible presence of hazardous building materials (HBM) including ACM, cannot be precluded in unobserved or untested parts of the site and hence no warranty can be given that HBM are not present.

This report must be read in conjunction with all of the attached 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 stated 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.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition

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.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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

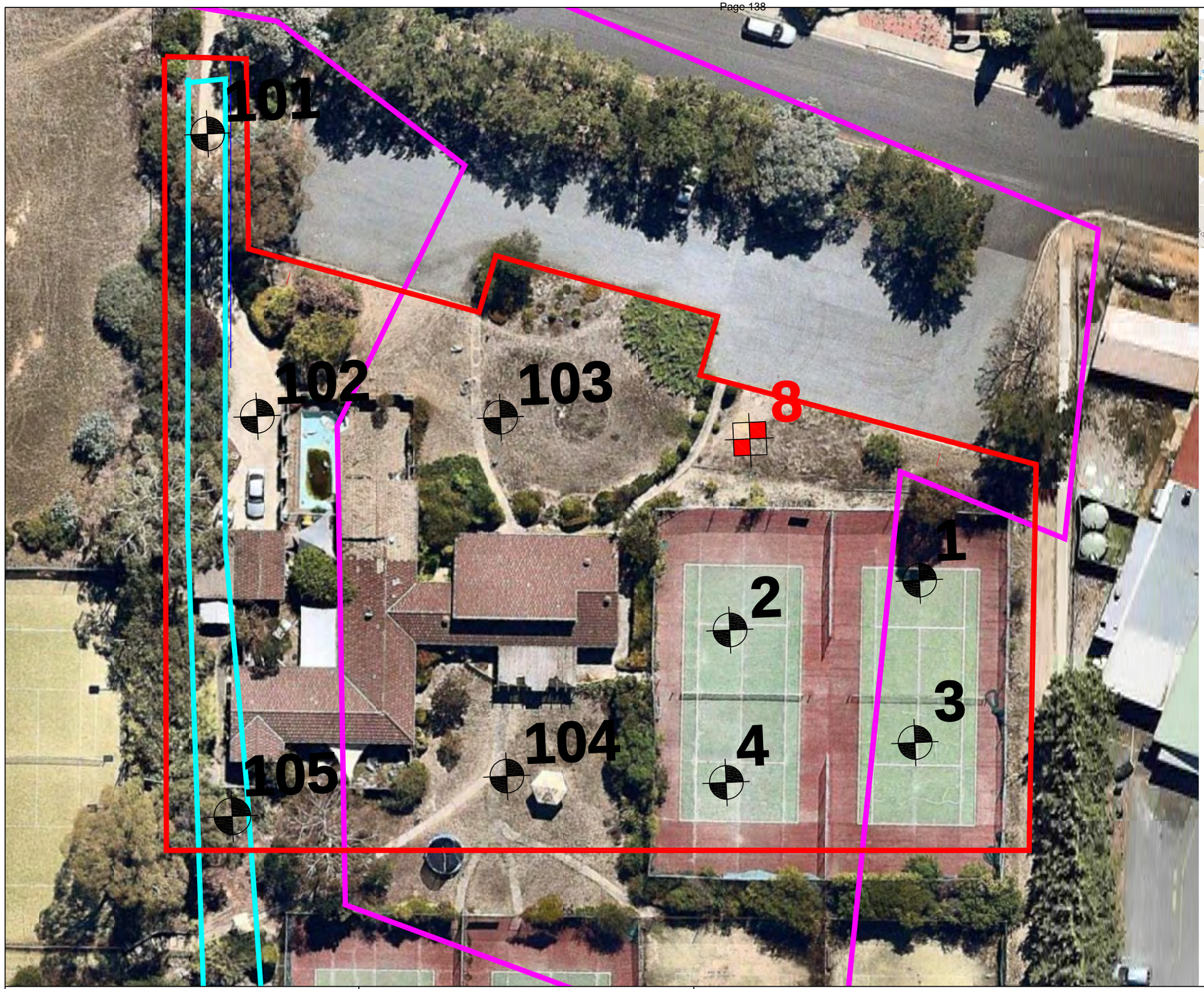
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate 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.

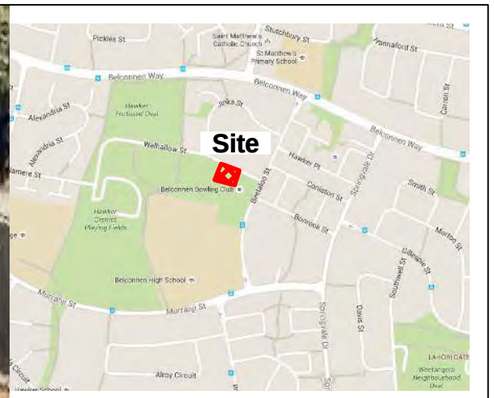
Site Inspection

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.

Appendix B

Drawing 1 – Site Features and Test Location Plan





Locality Plan

LEGEND

- Approximate Site Boundary
- 101 Borehole Locations
- 1 Borehole Locations (DP, 2016b)
- 8 Test Pit Locations (DP, 2016b)
- Approximate Location of Dirt Track noted in the 1975 Aerial Photograph
- Approximate Location of major ground disturbance noted in the 1975 Aerial Photograph

0 10 20 30

Approximate Scale (m)

NOTE: Base drawing from nearmap.com

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CLIENT: Pelle Projects Pty Ltd and Regional Investments Pty Ltd	TITLE: **Site Features and Test Location Plan**		PROJECT No: 88376.02
OFFICE: Canberra / DRAWN BY: ESS	**Detailed Site Investigation**	N	DRAWING No: 1
SCALE: As shown / DATE: 7.11.2016	**Part Block 9 Section 3, Hawker, ACT**		REVISION: 0

Appendix C

Data Quality Assessment
Chain of Custody (Field and Laboratory)
Sample Receipt

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The detailed site investigation report was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S13 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S3 Site Identification and Description S4 Background Information S5 Regional Soils, Geology and Hydrogeology S6 Potential for Contamination S7 Preliminary Conceptual Site Model S8 Site Assessment Criteria S11 Results of Investigation S12 Revised Conceptual Site Model
Define the Boundary of the Assessment	S3 Site Identification and Description Drawing 1 – Appendix B
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S8 Site Assessment Criteria S9 Fieldwork QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Work S7 Preliminary Conceptual Site Model S9 Fieldwork QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork procedures in Section 10 and the laboratory certificate (Appendix H) for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	>10% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]

NOTES: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagant Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	<5xPQL – any RPD; >5xPQL – 0-50%RPD	yes
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics)	yes

In summary, the QC data is considered to be of sufficient quality to be acceptable for the assessment.

Q2.1 Intra-Laboratory Replicates

An intra-laboratory replicate was analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services Pty Ltd (Envirolab) and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate sample are summarised in Table Q4.

Note that, where both samples are below LOR/PQL the difference and RPD have been given as a zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals								PAH				TRH			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total	BaP TEQ	BaP	Naphthalene	C6-C10	>C10-C16	>C16-C34	>C34-C40
Envirolab	Bore 102/0.2	20/04/2017	soil	mg/kg	<PQL	<PQL	27	12	32	<PQL	8	44	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Envirolab	R1/20042017	20/04/2017	soil	mg/kg	<PQL	<PQL	27	13	15	<PQL	10	62	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Difference				mg/kg	0	0	0	1	17	0	2	18	0	0	0	0	0	0	0	
RPD				%	0	0	0	8	**72**	0	22	**34**	0	0	0	0	0	0	0	

Notes: - not applicable, not tested

Table Q4 continued: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	BTEX				Phenol	OCPs									OPPs	PCBs
					Benzene	Toluene	Ethylbenzene	xylene	Phenol	DDT +DDD +DDE	Aldrin + Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Total OCPs	Total	Total
Envirolab		20/04/2017	soil	mg/kg	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Envirolab	R1/20042017	20/04/2017	soil	mg/kg	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Difference				Difference	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RPD				RPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: - not applicable, not tested

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and± 50% for organics with the exception of those in bold.

The RPD exceedences are not considered signification as following:

- Most of the recorded concentrations are at/ close to the practical quantitation limit;
- The replicate pair were collected from fill soils which were heterogeneous in nature;
- The majority of RPDs within a replicate pair were within the acceptable limits [the result for Pb of 72% is above the recommended RPD but the difference between results is minimal 32 mg/kg and 15 mg/kg respectively, and the result for Zn of 34% is above the recommended RPD but the difference between results is minimal 44 mg/kg and 62 mg/kg, respectively]; and
- All other QA/QC parameters met the DQIs.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following Table Q5.

Table Q5: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned targeted and grid locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified as in the Conceptual Site Model (Section 7); Completion of COC documentation; NATA endorsed laboratory certificate provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs;

Data Quality Indicator	Method(s) of Achievement
	Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

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CHAIN OF CUSTODY FIELD SHEET

Client: Ruvden Planning
Project: Proposed Childcare Centre Project No: 88376.02
Location: Hawker, ACT

Field								DP Office	Despatch	Notes
Sample ID	Depth (m)	Duplicate/ Replicate Sample	Sample Type S-soil W-water	Container Type G-glass P-plastic	Sampling By	Sampling Date	Sampling Time	Received by: ..... Date: ..... Storage Location*	☐ Envirolab ..... Date: 20/4/17	
PIT 103	0.05		S	G	SDG	20/4/17		Fridge	✓	
PIT 103	0.2									
PIT 103	0.5									
PIT 104	0.05								✓	
PIT 104	0.2									
PIT 104	0.3									
PIT 105	0.05									
PIT 105	0.2									
PIT 105	0.5								✓	
PIT 105	0.7	R2								
BORE 102	0.05									
BORE 102	0.2	R1							✓✓	
BORE 102	0.5									
BORE 102	1.0									
BORE 101	0.05								✓	
BORE 101	0.2									
BORE 101	0.5									
BORE 101	1.0		↓	↓	↓	↓		↓		

Default containers for soil: glass = clear 125/250 mL with teflon liner, plastic =press seal bag
*Default storage: Glass containers in fridge, plastic containers shelved, all water samples in fridge

Douglas Partners
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CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Proposed Childcare Centre, Hawker ACT
Project No: 86376.02 DP Order No: 130508
DP Contact Person: Shannon Goodsell
Prior Storage: esky / fridge / shelved (circle)

To: Envirolab Services Pty Ltd
12 Ashley Street
CHATSWOOD NSW 2067
Ph: (02) 9910 6200
Attn: Jacinta Hurst

Sample ID	Date Sampled	Sample Type S-soil W-water	Lab ID	Analytes: Combination 8a														TCLP	Notes
Pit 103/0.05	20/4/17	S	1																
PIT 104/0.05	"	"	2																
PIT 105/0.5	"	"	3																
BORE 101/0.05	"	"	4																
BORE 102/0.2	"	"	5																
B1	"	"	6																
PQL (S)		mg/kg																	
PQL (W)		mg/L																	

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 165659
Date Received: 21/4/2017
Time Received: 10:00
Received by: JA
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None
8.2

PQL = practical quantitation limit *As per Laboratory Method (Detection Limit)
# - Metals to Analyse (Please circle): As Cd Cr Cu Pb Zn Hg Ni Mn Fe
Date relinquished: 20/4/17
Total number of samples in container: 6
Results required by:
TAT (Circle): Standard 72 hr 48hr 24hr

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 21/4/16 Lab Ref: 165659

Send results to:
Douglas Partners Pty Ltd
Address:
PO BOX 1487 FYSHWICK
ACT 2609
Fax: (02) 6260 1147

Aileen Hie

From: Elyse Storr <Elyse.Storr@douglaspartners.com.au>
Sent: Wednesday, 3 May 2017 5:23 PM
To: SydneyMailbox
Subject: Reference 165659 - 88376.02
Attachments: 165659-%5bR00%5d.pdf

165659-B
Due: 10/5/17
Std TAT

Hi,

Could I please request pH, CEC and clay content for Pit 103/0.05 (165659-1).

Thanks,
Elyse

Elyse Storr | Environmental Engineer
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
Unit 2 73 Sheppard Street Hume ACT 2620 | PO Box 1487 Fyshwick ACT 2609
P: 02 6260 2788 | F: 02 6260 1147 | E: Elyse.Storr@douglaspartners.com.au

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Aileen Hie

From: Elyse Storr <Elyse.Storr@douglaspartners.com.au>
Sent: Wednesday, 3 May 2017 5:13 PM
To: SydneyMailbox
Subject: Fw: 88376.02 - 165659
Attachments: 165659-%5bR00%5d.pdf

Hi,

Could I please request silica gel clean up and chromogram for the sample Bore 1/0.05 (165659-4)?

Thanks,
Elyse

ES ELS 165659-B 030517
5day TAT

Elyse Storr | Environmental Engineer
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
Unit 2 73 Sheppard Street Hume ACT 2620 | PO Box 1487 Fyshwick ACT 2609
P: 02 6260 2788 | F: 02 6260 1147 | E: Elyse.Storr@douglaspartners.com.au

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Douglas Partners Canberra
Attention	Shannon Goodsell

Sample Login Details	
Your Reference	88376.02, Proposed Child Care Centre
Envirolab Reference	**165659**
Date Sample Received	21/04/2017
Date Instructions Received	21/04/2017
Date Results Expected to be Reported	**01/05/2017**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	6 Soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	8.2
Cooling Method	Ice
Sampling Date Provided	NO

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

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

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

Sample Id	*vTRH(C6-C10)/BTEXN in Soil*	*svTRH (C10-C40) in Soil*	*PAHs in Soil*	*Organochlorine Pesticides in soil*	*Organophosphorus Pesticides*	*PCBs in Soil*	*Acid Extractable metals in soil*	*Total Phenolics (as Phenol)*	*Asbestos ID - soils*
Pit 103-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pit 104-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pit 105-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bore 101-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bore 102-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓
R1	✓	✓	✓	✓	✓	✓	✓	✓	✓

The '✓' indicates the testing you have requested. ***THIS IS NOT A REPORT OF THE RESULTS****.*

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No:	88376	**Client Project Name:**	Proposed Child Care Centre
Client:	Pelle Projects Pty Ltd	**Location:**	Part Block 9 Section 3 Hawker
Project Manager:	Elyse Storr	**DP Lab Received**	By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
BORE 1	0.1-0.2		S	G			26/10/16		fridge	✓			
BORE 1	0.5-0.6		"	"									
BORE 1	0.9-1.0		"	"									
BORE 2	0.2-0.3		"	"						✓			
BORE 2	0.5-0.6		"	"									
BORE 2	0.9-1.0		"	"									
BORE 3	0.2-0.3		"	"						✓			
BORE 3	0.5-0.6		"	"									
BORE 3	0.9-1.0		"	"									
BORE 4	0.2-0.3	R_1	"	"						✓✓			
BORE 4	0.4-0.5		"	"									
BORE 5	0.01-0.05		"	"									
BORE 5	0.1-0.2		"	"						✓			
BORE 5	0.5-0.6		"	"									
BORE 6	0.01-0.05	R_2	"	"						✓			
BORE 6	0.1-0.2		"	"									
BORE 6	0.3-0.4		"	"									

* **Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge**

A Provide name of Lab 1, Envirolab B Provide name of Lab 2 C Provide name of Lab 3

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No:	88376	**Client Project Name:**	Proposed Child Care Centre
Client:	Pelle Projects Pty Ltd	**Location:**	Part Block 9 Section 3 Hawker
Project Manager:	Elyse Storr	**DP Lab Received**	By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
BORE 6	0.5-0.6		S	G			26/10/16		fridge				
BORE 7	0.01-0.05		"	"									
BORE 7	0.4-0.5		"	"									
BORE 7	0.9-1.0		"	"						✓			
PIT 8	0.05-0.1		"	"									
PIT 8	0.2-0.3	R3	"	"						✓			
PIT 8	0.5-0.6		"	"									
PIT 9	0.01-0.05		"	"									
PIT 9	0.1-0.2		"	"						✓			
PIT 9	0.4-0.5		"	"									
PIT 9	0.9-1.0		"	"									

* **Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge**

A Provide name of Lab 1 B Provide name of Lab 2 C Provide name of Lab 3

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project Name: Proposed Child Care Centre
Project No: 88376.00 DP Order No:
DP Contact Person: SHANNON GOODSELL
Prior Storage: (esky) / fridge / shelved (circle)

To: Envirolab Services Pty Ltd
12 Ashley Street
CHATSWOOD NSW 2067
Ph: (02) 9910 6200
Attn: Jacinta Hurst

Sample ID	Date Sampled	Sample Type S-soil W-water	Lab ID	Analytes: Contamination				CEC	Clay Content	pH							TCLP	Notes
PIT 9/ 0.1-0.2	26/10/16	S	1	X														
BORE 1/ 0.1-0.2		S	2	X				X	X	X								
BORE 2/ 0.2-0.3			3	X														
BORE 3/ 0.2-0.3			4	X														
BORE 4/ 0.2-0.3			5	X				X	X	X								
R1			6	X														
BORE 5/ 0.1-0.2			7	X														
BORE 6/ 0.01-0.05			8	X														
BORE 7/ 0.4-0.5			9	X														
PIT 8/ 0.2-0.3			10	X				X	X	X								
PQL (S)		mg/kg																
PQL (W)		mg/L																

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

ENVIROLAB GROUP

Job No: 156231
Date Received: 26.10.2016
Time Received: 10:30
Received by: JAG
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit *As per Laboratory Method (Detection Limit)
# - Metals to Analyse (Please circle): As Cd Cr Cu Pb Zn Hg Ni Mn Fe
Date relinquished: 27/10/16
Total number of samples in container: 10
Results required by:
TAT (Circle): (Standard) 72 hr 48hr 24hr

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples and return by fax
Signature:
Date: 26/10/2016 Lab Ref: 156231

Send results to:
Douglas Partners Pty Ltd
Address:
PO BOX 1487 FYSHWICK
ACT 2609
Fax: (02) 6260 1147

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Douglas Partners Canberra
Attention	Shannon Goodsell

Sample Login Details	
Your Reference	88376.00, Proposed Child Care Centre
Envirolab Reference	**156231**
Date Sample Received	28/10/2016
Date Instructions Received	28/10/2016
Date Results Expected to be Reported	**04/11/2016**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	10 Soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	8.6
Cooling Method	Ice Pack
Sampling Date Provided	NO

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

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

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

Sample Id	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides	PCBs in Soil	Acid Extractable metals in soil	Total Phenolics (as Phenol)	Asbestos ID - soils	pH 1:5 soil:water	CEC	Clay 50-120g
Pit 9-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 1-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bore 2-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 3-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 4-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 5-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 6-0.01-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Bore 7-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Pit 8-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Appendix D

Explanatory Notes
Borehole Logs (Bores 1 to 4, 101 and 102)
Test Pit Logs (Pits 8, 103 to 105)

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

Sampling Methods

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

BOREHOLE LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 1
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-gravels (base of court)							
	0.1	FILLING-dense, dry to moist, brown orange silty sand			0.1				
				E			PID<1		
					0.2				
	0.25	SANDY CLAY-stiff to very stiff, dry to moist, brown orange, medium to high plasticity sandy clay, fine to coarse grained sand							
	0.3	SILTY GRAVELLY SAND-dense, dry to moist, orange brown, fine to coarse grained, sand silty gravelly,							
					0.5				
				E			PID<1		
					0.6				
					0.9				
				E			PID<1		
	1 1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 2
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.17	FILLING-soft, wet to saturated, light brown, low plasticity sandy silty clay		E	0.2		PID<1		
					0.3				
	0.45	TOPSOIL-moist to wet, dark grey sandy silt, some clay and gravels		E	0.5		PID<1		
	0.6	GRAVELLY SILTY SAND- dense, dry to moist, light orange brown, fine to coarse grained gravelly silty sand			0.6				
				E	0.9		PID<1		
1	1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm solid flight auger
WATER OBSERVATIONS: Fast groundwater seepage observed, 150mm
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: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 3
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.15	FILLING-stiff to very stiff, dry to moist, some pockets wet, red/orange brown, low plasticity sandy clay, some gravels		E	0.2		PID<1		
	0.3	GRAVELLY SILTY SAND-dense, dry to moist, orange brown gravelly silty sand, fine to coarse grain		E	0.5		PID<1		
					0.6				
	0.8	SANDY CLAY-stiff, grey white, low plasticity sandy clay, grading to dacite		E	0.9		PID<1		
1	1.0	Bore discontinued at 1.0m -limit of investigation			1.0				1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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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BOREHOLE LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

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

BORE No: 4
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TENNIS COURT SURFACE							
	0.07	FILLING-stiff, gravel (base of court)							
	0.15	GRAVELLY SILTY SAND-dense, dry to moist, orange brown, fine to coarse grained silty sand, some gravel		E	0.2		PID<1		
					0.3				
				E	0.4		PID<1		
					0.5				
	0.6	Bore discontinued at 0.6m -limit of investigation							
	1								1

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 110mm 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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BOREHOLE LOG

CLIENT: Purdon Planning Pty Ltd
PROJECT: Proposed Child Care Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: 628 AHD
EASTING: 202632.54
NORTHING: 608078.65
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 88376.02
DATE: 19/4/2017
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
628		TOPSOIL-dry to moist, brown sandy silt with roots and rootlets			0.05				
				E			PID<1		
	0.1	SANDY CLAY-stiff to very stiff, dry to moist, red brown and orange brown, medium plasticity sandy clay			0.1				
					0.2				
				E			PID<1		
					0.3				
					0.5				
				E			PID<1		
	0.6	DACITE-low to medium strength, high to moderately weathered, orange brown dacite, fine to coarse grained			0.6				
627	1								1
					1.0				
				E			PID<1		
					1.1				
	1.2	Bore discontinued at 1.2m -limit of investigtaion							

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 300mm 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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BOREHOLE LOG

CLIENT: Purdon Planning Pty Ltd
PROJECT: Proposed Child Care Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: 629 AHD
EASTING: 202626.53
NORTHING: 608046.82
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 88376.02
DATE: 19/4/2017
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
629									
	0.05	TOPSOIL FILLING-dry to moist, dark brown sandy silt, with abundant rootlets and plastic sheeting and some pebbles		E	0.01 0.05		PID<1		
	0.1	SANDY CLAY-firm, dry to moist, light brown grey, low plasticity sandy silt with rootlets							
		SANDY SILTY CLAY-stiff to very stiff, dry to moist, brown, medium plasticity sandy silty clay		E	0.2		PID<1		
					0.3				
				E	0.4		PID<1		
					0.5				
	0.55	DACITE-low to medium strength, highly weathered dacite, fine to coarse grained							
628	1			E	1.0		PID<1		1
					1.1				
	1.2	Bore discontinued at 1.2m -limit of investigtaion							

RIG: Kubota U17-3 mini-excavator **DRILLER:** Muddy's Contracting **LOGGED:** SDG **CASING:**
TYPE OF BORING: 300mm 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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TEST PIT LOG

CLIENT: Pelle Projects P/L & Regional Investments P/L
PROJECT: Proposed Childcare Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: --
EASTING:
NORTHING:

PIT No: 8
PROJECT No: 88376.00
DATE: 26/10/2016
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
		TOPSOIL FILLING-dry to moist, grey brown sandy silt, some gravel and abundent rootlets		E	0.05		PID<1		
	0.1	FILLING-stiff, dry to moist, orange brown sandy clay, low plasticity, some gravel, some rootlets			0.1				
				E	0.2		PID<1		
	0.3	GRAVELLY SILTY SAND-dense, dry to moist, orange brown gravelly sandy silt, grading to weathering dacite			0.3				
				E	0.5		PID<1		
	0.7	Pit discontinued at 0.7m -limit of investigation			0.6				
	1								1

RIG: Kubota U17-3 mini-excavator fitted with a 30mm bucket

LOGGED: SDG

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)

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TEST PIT LOG

CLIENT: Purdon Planning Pty Ltd
PROJECT: Proposed Child Care Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: 629.5 AHD
EASTING: 202652.55
NORTHING: 608045.69

PIT No: 103
PROJECT No: 88376.02
DATE: 19/4/2017
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)
629	0.1	TOPSOIL FILLING-dry to moist, brown silty sand with abundant rootlets		E	0.05		PID<1		
	0.2	SAND-medium dense, dry to moist, orange brown sand, fine to coarse grained with some rootlets		E	0.1		PID<1		
	0.35	SANDY CLAY-stiff to very stiff, dry to moist, orange brown, low to medium plasticity sandy clay			0.2				
	0.6	DACITE-low to medium strength, highly weathered, orange brown dacite, fine to coarse grained, slightly fractured		E	0.5		PID<1		
628		Pit discontinued at 0.6m -slow progress			0.6				

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

RIG: Kubota U17-3 mini-excavator

LOGGED: SDG

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)

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TEST PIT LOG

CLIENT: Purdon Planning Pty Ltd
PROJECT: Proposed Child Care Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: 629 AHD
EASTING: 202647.49
NORTHING: 608011.58

PIT No: 104
PROJECT No: 88376.02
DATE: 19/4/2017
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)
629									5 10 15 20
		TOPSOIL FILLING-dry to moist, brown silty sand with rootlets		E	0.01		PID<1		
	0.05				0.05				
	0.1	SANDY SILT-firm, dry to moist, light grey brown, low plasticity sandy silt			0.1		PID<1		
		SANDY SILTY CLAY-stiff, dry to moist, orange brown, medium plasticity sandy silty clay		E					
	0.2				0.2		PID<1		
		DACITE-low to medium strength, high to moderately weathered, orange brown dacite, fine to coarse grained, slightly fractured		E					
					0.3				
	0.35								
		Pit discontinued at 0.35m -slow progress							
628	1								1

RIG: Kubota U17-3 mini-excavator

LOGGED: SDG

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)

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TEST PIT LOG

CLIENT: Purdon Planning Pty Ltd
PROJECT: Proposed Child Care Centre
LOCATION: Part Block 9 Section 3, Hawker

SURFACE LEVEL: 629 AHD
EASTING: 202620.01
NORTHING: 608009.37

PIT No: 105
PROJECT No: 88376.02
DATE: 19/4/2017
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)
629	0.01	MULCH/LEAF LITTER							
		FILLING-compacted, dry to moist, yellow brown, medium plasticity sandy silty clay with rootlets		E	0.05		PID<1		
					0.1				
				E	0.2		PID<1		
					0.3				
				E	0.4		PID<1		
					0.5				
	0.55	DACITE-medium strength, moderately weathered, orange brown dacite, fine to coarse grained		E	0.7		PID<1		
	0.8	Pit discontinued at 0.8m -slow progress			0.8				
628	1								1

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

RIG: Kubota U17-3 mini-excavator

LOGGED: SDG

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)

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Appendix E

EIL Calculation Spreadsheets
Tables E1 to E4 (Summary of Laboratory Test Results)
Laboratory Certificates of Analysis

Inputs
Select contaminant from list below
As
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Arsenic generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	20	40
Urban residential and open public spaces	50	100
Commercial and industrial	80	160

Inputs
Select contaminant from list below
DDT
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	DDT generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	3	3
Urban residential and open public spaces	180	180
Commercial and industrial	640	640

Inputs
Select contaminant from list below
Naphthalene
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Naphthalene generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	10	10
Urban residential and open public spaces	170	170
Commercial and industrial	370	370

Inputs
Select contaminant from list below
Pb
Below needed to calculate fresh and aged ACLs
Below needed to calculate fresh and aged ABCs
or for fresh ABCs only
or for aged ABCs only

Outputs		
Land use	Lead generic EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	110	470
Urban residential and open public spaces	270	1100
Commercial and industrial	440	1800

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
13.7
Enter soil pH (calcium chloride method) (values from 1 to 14)
6.9
Enter organic carbon content (%OC) (values from 0 to 50%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	70	95
Urban residential and open public spaces	130	230
Commercial and industrial	180	320

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
13.7
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	35	40
Urban residential and open public spaces	90	210
Commercial and industrial	160	360

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
16
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background concentration
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	140	160
Urban residential and open public spaces	260	480
Commercial and industrial	390	790

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
13.7
Enter soil pH (calcium chloride method) (values from 1 to 14)
6.9
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method)
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
high

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	85	230
Urban residential and open public spaces	230	640
Commercial and industrial	350	920

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TABLE E1
SUMMARY OF LABORATORY TEST RESULTS - INORGANICS (mg/kg)

Sample ID	Depth (m)	Sample Date	Material Type	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Bore 1	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	25	11	8	<PQL	10	38
Bore 2	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	26	11	14	<PQL	10	49
Bore 3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	33	15	13	<PQL	11	61
Bore 4	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	27	16	19	<PQL	10	51
Bore 101	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	27	12	32	<PQL	8	44
Bore 102	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	23	12	14	<PQL	9	64
R1	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	27	13	15	<PQL	10	62
Pit 8	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	29	13	16	<PQL	10	51
Pit 103	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	20	11	12	<PQL	8	47
Pit 104	0.01-0.05	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	6	4	4	<PQL	2	12
Pit 105	0.4-0.5	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	34	16	18	<PQL	14	66
PQL				4	0.4	1	1	1	0.1	1	1
HIL				100	20	100	6000	300	40	400	7400
EIL				100	NC	480	230	1100	NC	210	640

Notes:

HIL - Health Based Soil Investigation Levels for Low Density Residential Landuse Values
EIL - Environmental Soil Investigation Levels for lower bound Low Density Residential Landuse Values
PQL - Practical Quantitation Limit
NC - No Criteria
NT - Not Tested
R1 - Replicate of Bore 102/0.2

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TABLE E2
SUMMARY OF LABORATORY TEST RESULTS - ORGANICS (PETROLEUM HYDROCARBONS - mg/kg)

Sample ID	Depth (m)	Sample Date	Material Type	Benzene	Toluene	Ethylbenzene	Xylene	F1	F2	F3	F4
Bore 1	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 2	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 4	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Bore 101	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	**850**	250
Bore 102	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
R1	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 8	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 103	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 104	0.01-0.05	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
Pit 105	0.4-0.5	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL
PQL				0.2	0.5	1	3	25	50	100	100
HSL				0.5	160	55	40	45	110	NC	NC
ESL				50	85	70	105	180	120	300	2800
ML				NC	NC	NC	NC	700	1000	2500	10000

Notes:

HSL - Health Based Soil Screening Levels for Low Density Residential Landuse Values
ESL - Environmental Soil Screening Levels for lower bound Low Density Residential Landuse Values
ML - Management Limits for petroleum hydrocarbons
PQL - Practical Quantitation Limit

Bold	- Exceeds the Environmental Soil Screnning Levels for Low Density Residential Landuse Values
NC	- No Criteria
NT	- Not Tested

R1 - Replicate of Bore 102/0.2

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TABLE E3
SUMMARY OF LABORATORY TEST RESULTS - ORGANICS (PAH, Phenol, OCP, OPP, PCB - mg/kg) and ASBESTOS

Sample ID	Depth (m)	Sample Date	Material Type	BaP	BaP TEQ	Naphthalene	Total PAHs	Phenol	DDT+ DDE+ DDD	Aldrin+ dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Total OCPs	Total OPPs	Total PCBs	Asbestos ID in soil <0.1g/kg
Bore 1	0.1 - 0.2	26/10/2016	Silty Sand (Filling)	<PQL	<PQL	<PQL	<PQL	10	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 2	0.2 - 0.3	26/10/2016	Sandy Silty Clay (Filling)	<PQL	<PQL	<PQL	<PQL	10	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 3	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	10	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 4	0.2 - 0.3	26/10/2016	Gravelly Silty Sand	<PQL	<PQL	<PQL	<PQL	10	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 101	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	10	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Bore 102	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
R1	0.2-0.3	20/04/2017	Sandy Silty Clay	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 8	0.2 - 0.3	26/10/2016	Sandy Clay (Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 103	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 104	0.01-0.05	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
Pit 105	0.4-0.5	20/04/2017	Silty Sand (Topsoil Filling)	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	ND
PQL				0.05	0.5	0.1	1.55	5	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	2	0.8	0.7	0.1
HIL/HSL				NC	3	3	300	100	240	6	50	270	10	6	10	300	160	NC	NC	1	NC
EIL/ESL				0.7	NC	170	NC	NC	180#	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:

HIL - Health Based Soil Investigation/Screening Levels for Low Density Residential Landuse Values
EIL - Environmental Soil Investigation/Screening Levels for lower bound Low Density Residential Landuse Values
PQL - Practical Quantitation Limit
- Generic EIL for fresh DDT only
NC - No Criteria
NT - Not Tested
ND - Not Detected
R1 - Replicate of Bore 102/0.2

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TABLE E4
SUMMARY OF LABORATORY TEST RESULTS - RESULTS OF TRH – SILICA GEL CLEANUP ANALYSIS - (mg/kg)

Sample ID	Depth (m)	Sample Date	Material Type	F3	F4
Bore 101	0.05-0.1	20/04/2017	Sandy Silt (Topsoil Filling)	<PQL	<PQL
PQL				100	100
HSL				NC	NC
ESL				300	2800
ML				2500	10000

Notes:
HSL - Health Based Soil Screening Levels for Low Density Residential Landuse Values
ESL - Environmental Soil Screening Levels for lower bound Low Density Residential Landuse Values
ML - Management Limits for petroleum hydrocarbons
PQL - Practical Quantitation Limit
NC - No Criteria
R1 - Replicate of Bore 102/0.2

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CERTIFICATE OF ANALYSIS 165659

Client:
Douglas Partners Canberra
PO Box 1487
Fyshwick
ACT 2609

Attention: Shannon Goodsell

Sample log in details:

Your Reference:	**88376.02, Proposed Child Care Centre**
No. of samples:	6 Soils
Date samples received / completed instructions received	21/04/17 / 21/04/17

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:	1/05/17 / 1/05/17
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	---------- -	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	25/04/2017	25/04/2017	25/04/2017	25/04/2017	25/04/2017
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	98	98	95	96

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	165659-6
Your Reference	---------- -	R1
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	25/04/2017
TRHC6 - C9	mg/kg	<25
TRHC6 - C10	mg/kg	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	94

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	---------- -	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	25/04/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	85	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	480	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	550	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	86	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	86	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	850	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	250	<100
Surrogate o-Terphenyl	%	81	81	82	91	81

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	165659-6
Your Reference	---------- -	R1
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	25/04/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100
Surrogate o-Terphenyl	%	80

PAHs in Soil Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- -	165659-1 Pit 103 0.05 Soil 20/04/2017	165659-2 Pit 104 0.05 Soil 20/04/2017	165659-3 Pit 105 0.5 Soil 20/04/2017	165659-4 Bore 101 0.05 Soil 20/04/2017	165659-5 Bore 102 0.2 Soil 20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	26/04/2017	26/04/2017	26/04/2017	26/04/2017	26/04/2017
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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	111	116	120	97	108

PAHs in Soil		
Our Reference:	UNITS	165659-6
Your Reference	----------	R1
	-	
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	26/04/2017
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE
Surrogate p-Terphenyl-d14	%	107

Organochlorine Pesticides in soil						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	----------	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
	-					
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	89	90	96	91

Organochlorine Pesticides in soil		
Our Reference:	UNITS	165659-6
Your Reference	----------	R1
	-	
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	24/04/2017
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Surrogate TCMX	%	87

Organophosphorus Pesticides Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- 	165659-1 Pit 103 0.05 Soil 20/04/2017	165659-2 Pit 104 0.05 Soil 20/04/2017	165659-3 Pit 105 0.5 Soil 20/04/2017	165659-4 Bore 101 0.05 Soil 20/04/2017	165659-5 Bore 102 0.2 Soil 20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	89	90	96	91

Organophosphorus Pesticides Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- 	165659-6 R1 - Soil 20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	24/04/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	87

PCBs in Soil						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	----------	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
	-					
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date extracted	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	90	89	90	96	91

PCBs in Soil		
Our Reference:	UNITS	165659-6
Your Reference	----------	R1
	-	
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date extracted	-	24/04/2017
Date analysed	-	24/04/2017
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Surrogate TCLMX	%	87

Acid Extractable metals in soil						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	---------- -	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date prepared	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	6	34	27	23
Copper	mg/kg	11	4	16	12	12
Lead	mg/kg	12	4	18	32	14
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	2	14	8	9
Zinc	mg/kg	47	12	66	44	64

Acid Extractable metals in soil		
Our Reference:	UNITS	165659-6
Your Reference	---------- -	R1
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date prepared	-	24/04/2017
Date analysed	-	24/04/2017
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	27
Copper	mg/kg	13
Lead	mg/kg	15
Mercury	mg/kg	<0.1
Nickel	mg/kg	10
Zinc	mg/kg	62

Misc Soil - Inorg						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	----------	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
	-					
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date prepared	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	10	<5

Misc Soil - Inorg		
Our Reference:	UNITS	165659-6
Your Reference	----------	R1
	-	
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date prepared	-	24/04/2017
Date analysed	-	24/04/2017
Total Phenolics (as Phenol)	mg/kg	<5

Moisture						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	----------	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
	-					
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date prepared	-	24/04/2017	24/04/2017	24/04/2017	24/04/2017	24/04/2017
Date analysed	-	26/04/2017	26/04/2017	26/04/2017	26/04/2017	26/04/2017
Moisture	%	6.7	7.1	5.3	8.3	8.5

Moisture		
Our Reference:	UNITS	165659-6
Your Reference	----------	R1
	-	
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date prepared	-	24/04/2017
Date analysed	-	26/04/2017
Moisture	%	8.6

Asbestos ID - soils						
Our Reference:	UNITS	165659-1	165659-2	165659-3	165659-4	165659-5
Your Reference	---------- -	Pit 103	Pit 104	Pit 105	Bore 101	Bore 102
Depth	----------	0.05	0.05	0.5	0.05	0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		20/04/2017	20/04/2017	20/04/2017	20/04/2017	20/04/2017
Date analysed	-	28/04/2017	28/04/2017	28/04/2017	28/04/2017	28/04/2017
Sample mass tested	g	Approx. 35g	Approx. 35g	Approx. 35g	Approx. 35g	Approx. 35g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils		
Our Reference:	UNITS	165659-6
Your Reference	---------- -	R1
Depth	----------	-
Type of sample		Soil
Date Sampled		20/04/2017
Date analysed	-	28/04/2017
Sample mass tested	g	Approx. 35g
Sample Description	-	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

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. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			25/04/2017	[NT]	[NT]	LCS-5	25/04/2017
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	104%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	104%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-5	104%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-5	91%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	106%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-5	110%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	107%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	101	[NT]	[NT]	LCS-5	98%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	98%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	121%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	98%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	121%
Surrogate o-Terphenyl	%		Org-003	81	[NT]	[NT]	LCS-5	94%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			26/04/2017	[NT]	[NT]	LCS-5	26/04/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	90%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	86%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	97%
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	90%
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	87%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	78%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	LCS-5	91%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	119	[NT]	[NT]	LCS-5	101%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	91%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	88%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	91%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	80%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	90%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	101%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	95%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	94%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	103%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	75%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	92	[NT]	[NT]	LCS-5	118%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	90%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	77%
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	103%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	80%
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	81%
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	98%
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-5	82%
Surrogate TCMX	%		Org-008	92	[NT]	[NT]	LCS-5	90%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-5	104%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	92	[NT]	[NT]	LCS-5	90%

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 prepared	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-5	24/04/2017
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	LCS-5	115%
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	LCS-5	106%
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-5	110%
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-5	110%
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-5	100%
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	LCS-5	98%
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-5	100%
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-5	102%

QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/04/2017	[NT]	[NT]	LCS-1	24/04/2017
Date analysed	-			24/04/2017	[NT]	[NT]	LCS-1	24/04/2017
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	LCS-1	102%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	25/04/2017
TRH C_6 - C_9	mg/kg	[NT]	[NT]	165659-1	102%
TRH C_6 - C_{10}	mg/kg	[NT]	[NT]	165659-1	102%
Benzene	mg/kg	[NT]	[NT]	165659-1	102%
Toluene	mg/kg	[NT]	[NT]	165659-1	90%
Ethylbenzene	mg/kg	[NT]	[NT]	165659-1	103%
m+p-xylene	mg/kg	[NT]	[NT]	165659-1	107%
o-Xylene	mg/kg	[NT]	[NT]	165659-1	104%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	165659-1	99%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	24/04/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	[NT]	[NT]	165659-1	103%
TRHC$_{15}$ - C$_{28}$	mg/kg	[NT]	[NT]	165659-1	97%
TRHC$_{29}$ - C$_{36}$	mg/kg	[NT]	[NT]	165659-1	82%
TRH>C$_{10}$-C$_{16}$	mg/kg	[NT]	[NT]	165659-1	103%
TRH>C$_{16}$-C$_{34}$	mg/kg	[NT]	[NT]	165659-1	97%
TRH>C$_{34}$-C$_{40}$	mg/kg	[NT]	[NT]	165659-1	82%
Surrogate o-Terphenyl	%	[NT]	[NT]	165659-1	81%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	26/04/2017
Naphthalene	mg/kg	[NT]	[NT]	165659-1	87%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	165659-1	79%
Phenanthrene	mg/kg	[NT]	[NT]	165659-1	83%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	165659-1	81%
Pyrene	mg/kg	[NT]	[NT]	165659-1	82%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	165659-1	73%
Benzo(b,j+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	165659-1	87%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	165659-1	93%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	24/04/2017
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	165659-1	95%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	165659-1	92%
Heptachlor	mg/kg	[NT]	[NT]	165659-1	94%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	165659-1	84%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	165659-1	94%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	165659-1	105%
Dieldrin	mg/kg	[NT]	[NT]	165659-1	99%
Endrin	mg/kg	[NT]	[NT]	165659-1	97%
pp-DDD	mg/kg	[NT]	[NT]	165659-1	106%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	165659-1	81%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	165659-1	112%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	24/04/2017
Azinphos-methyl (Guthion)	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	165659-1	89%
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	[NT]	[NT]	165659-1	75%
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	165659-1	120%
Fenitrothion	mg/kg	[NT]	[NT]	165659-1	102%
Malathion	mg/kg	[NT]	[NT]	165659-1	81%
Parathion	mg/kg	[NT]	[NT]	165659-1	95%
Ronnel	mg/kg	[NT]	[NT]	165659-1	80%
Surrogate TCMX	%	[NT]	[NT]	165659-1	91%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	24/04/2017
Aroclor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	[NT]	[NT]	165659-1	106%
Aroclor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	165659-1	91%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	165659-1	24/04/2017
Date analysed	-	[NT]	[NT]	165659-1	24/04/2017
Arsenic	mg/kg	[NT]	[NT]	165659-1	101%
Cadmium	mg/kg	[NT]	[NT]	165659-1	105%
Chromium	mg/kg	[NT]	[NT]	165659-1	109%
Copper	mg/kg	[NT]	[NT]	165659-1	112%
Lead	mg/kg	[NT]	[NT]	165659-1	98%
Mercury	mg/kg	[NT]	[NT]	165659-1	99%
Nickel	mg/kg	[NT]	[NT]	165659-1	100%
Zinc	mg/kg	[NT]	[NT]	165659-1	98%

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.
Note: Samples 165659-1 to 6 were sub-sampled from jars provided by the client.

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

INS: Insufficient sample for this test
NR: 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 batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

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Envirolab Services Pty Ltd Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 165659-B

Client:
Douglas Partners Canberra
PO Box 1487
Fyshwick
ACT 2609

Attention: Shannon Goodsell

Sample log in details:

Your Reference:	**88376.02, Proposed Child Care Centre**
No. of samples:	Additional testing 2 soils
Date samples received / completed instructions received	21/04/17 / 03/05/17

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:	10/05/17 / 10/05/17
Date of Preliminary Report:	Not Issued

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Results Approved By:

David Springer
General Manager

sTPH in Soil (C10-C40)-Silica		
Our Reference:	UNITS	165659-B-4
Your Reference	----------	Bore 101
	-	
Depth	----------	0.05
Date Sampled		20/04/2017
Type of sample		Soil
Date extracted	-	04/05/2017
Date analysed	-	05/05/2017
$TPHC_{10}$ - C_{14}	mg/kg	<50
$TPHC_{15}$ - C_{28}	mg/kg	<100
$TPHC_{29}$ - C_{36}	mg/kg	<100
$TPH{>}C_{10}$-C_{16}	mg/kg	<50
$TPH{>}C_{16}$-C_{34}	mg/kg	<100
$TPH{>}C_{34}$-C_{40}	mg/kg	<100
Surrogate o-Terphenyl	%	107

Misc Inorg - Soil		
Our Reference:	UNITS	165659-B-1
Your Reference	----------	Pit 103
	-	
Depth	----------	0.05
Date Sampled		20/04/2017
Type of sample		Soil
Date prepared	-	07/05/2017
Date analysed	-	07/05/2017
pH 1:5 soil:water	pH Units	5.3

CEC		
Our Reference:	UNITS	165659-B-1
Your Reference	----------	Pit 103
	-	
Depth	----------	0.05
Date Sampled		20/04/2017
Type of sample		Soil
Date prepared	-	08/05/2017
Date analysed	-	08/05/2017
Exchangeable Ca	meq/100g	4.2
Exchangeable K	meq/100g	0.2
Exchangeable Mg	meq/100g	5.3
Exchangeable Na	meq/100g	0.11
Cation Exchange Capacity	meq/100g	9.9

Clay 50-120g		
Our Reference:	UNITS	165659-B-1
Your Reference	----------	Pit 103
	-	
Depth	----------	0.05
Date Sampled		20/04/2017
Type of sample		Soil
Date prepared	-	05/05/2017
Date analysed	-	08/05/2017
Clay in soils <2µm	% (w/w)	16

Method ID	Methodology Summary
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2µm reported.

QUALITY CONTROL sTPH in Soil (C10-C40)-Silica	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/05/2017	[NT]	[NT]	LCS-5	04/05/2017
Date analysed	-			04/05/2017	[NT]	[NT]	LCS-5	04/05/2017
TPH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	96%
TPH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TPH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	106%
TPH >C_{10}-C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	96%
TPH >C_{16}-C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TPH >C_{34}-C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	106%
Surrogate o-Terphenyl	%		Org-003	102	[NT]	[NT]	LCS-5	86%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			07/05/2017	[NT]	[NT]	LCS-5	07/05/2017
Date analysed	-			07/05/2017	[NT]	[NT]	LCS-5	07/05/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-5	102%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			08/05/2017	[NT]	[NT]	LCS-5	08/05/2017
Date analysed	-			08/05/2017	[NT]	[NT]	LCS-5	08/05/2017
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-5	100%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-5	126%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-5	97%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-5	130%

QUALITY CONTROL Clay 50-120g	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Clay in soils <2µm	% (w/w)		AS1289.3.6.3	[NT]

Report Comments:

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

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

Quality Control Definitions

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

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

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Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

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Envirolab Services Pty Ltd Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 156231

Client:
Douglas Partners Canberra
PO Box 1487
Fyshwick
ACT 2609

Attention: Shannon Goodsell

Sample log in details:

Your Reference:	**88376.00, Proposed Child Care Centre**
No. of samples:	10 Soils
Date samples received / completed instructions received	28/10/16 / 28/10/16

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:	4/11/16 / 4/11/16
Date of Preliminary Report:	Not Issued

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Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	83	60	97	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	94	96	96	99

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	91	88	88	90	92

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	92	88	88	95	91

PAHs in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	- ----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	98	107	111	109	111

PAHs in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	111	113	113	120	113

Organochlorine Pesticides in soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	83	81	82	82

Organochlorine Pesticides in soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	81	80	84	80	84

Organophosphorus Pesticides						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	83	81	82	82

Organophosphorus Pesticides						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	81	80	84	80	84

PCBs in Soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	83	81	82	82

PCBs in Soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date extracted	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	81	80	84	80	84

Acid Extractable metals in soil						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	- ----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	30	25	26	33	27
Copper	mg/kg	12	11	11	15	16
Lead	mg/kg	14	8	14	13	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	11	10	10	11	10
Zinc	mg/kg	52	38	49	61	51

Acid Extractable metals in soil						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	- ----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Arsenic	mg/kg	<4	<4	8	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	26	25	35	27	29
Copper	mg/kg	13	8	15	11	13
Lead	mg/kg	19	14	13	12	16
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	6	10	8	10
Zinc	mg/kg	52	27	60	36	51

Misc Soil - Inorg						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Moisture						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	----------	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
Moisture	%	11	12	14	18	7.3

Moisture						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	----------	R1	Bore 5	Bore 6	Bore 7	Pit 8
	-					
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date prepared	-	31/10/2016	31/10/2016	31/10/2016	31/10/2016	31/10/2016
Date analysed	-	01/11/2016	01/11/2016	01/11/2016	01/11/2016	01/11/2016
Moisture	%	6.5	15	16	14	8.7

Asbestos ID - soils						
Our Reference:	UNITS	156231-1	156231-2	156231-3	156231-4	156231-5
Your Reference	---------- -	Pit 9	Bore 1	Bore 2	Bore 3	Bore 4
Depth	----------	0.1-0.2	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date analysed	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Sample mass tested	g	Approx 40g	Approx 35g	Approx 50g	Approx 35g	Approx 40g
Sample Description	-	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	156231-6	156231-7	156231-8	156231-9	156231-10
Your Reference	---------- -	R1	Bore 5	Bore 6	Bore 7	Pit 8
Depth	----------	-	0.1-0.2	0.01-0.05	0.4-0.5	0.2-0.3
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016	26/10/2016	26/10/2016
Date analysed	-	3/11/2016	3/11/2016	3/11/2016	3/11/2016	3/11/2016
Sample mass tested	g	Approx 40g	Approx 40g	Approx 45g	Approx 35g	Approx 45g
Sample Description	-	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks	Orange coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil				
Our Reference:	UNITS	156231-2	156231-5	156231-10
Your Reference	----------	Bore 1	Bore 4	Pit 8
	-			
Depth	----------	0.1-0.2	0.2-0.3	0.2-0.3
Type of sample		Soil	Soil	Soil
Date Sampled		26/10/2016	26/10/2016	26/10/2016
Date prepared	-	02/11/2016	02/11/2016	02/11/2016
Date analysed	-	02/11/2016	02/11/2016	02/11/2016
pH 1:5 soil:water	pH Units	7.5	7.9	6.9

CEC Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- 	156231-2 Bore 1 0.1-0.2 Soil 26/10/2016	156231-5 Bore 4 0.2-0.3 Soil 26/10/2016	156231-10 Pit 8 0.2-0.3 Soil 26/10/2016
Date prepared	-	04/11/2016	04/11/2016	04/11/2016
Date analysed	-	04/11/2016	04/11/2016	04/11/2016
Exchangeable Ca	meq/100g	1.3	3.0	8.0
Exchangeable K	meq/100g	0.1	0.2	0.2
Exchangeable Mg	meq/100g	17	9.3	6.7
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	18	12	15

Clay 50-120g Our Reference: Your Reference Depth Type of sample Date Sampled	UNITS ---------- - ---------- 	156231-2 Bore 1 0.1-0.2 Soil 26/10/2016	156231-5 Bore 4 0.2-0.3 Soil 26/10/2016	156231-10 Pit 8 0.2-0.3 Soil 26/10/2016
Date prepared	-	01/11/2016	01/11/2016	01/11/2016
Date analysed	-	02/11/2016	02/11/2016	02/11/2016
Clay in soils <2um	% (w/w)	11	7	18

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. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2um reported.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			01/11/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	01/11/2016
$TRHC_6$ - C_9	mg/kg	25	Org-016	<25	156231-1	<25 || <25	LCS-1	100%
$TRHC_6$ - C_{10}	mg/kg	25	Org-016	<25	156231-1	<25 || <25	LCS-1	100%
Benzene	mg/kg	0.2	Org-016	<0.2	156231-1	<0.2 || <0.2	LCS-1	94%
Toluene	mg/kg	0.5	Org-016	<0.5	156231-1	<0.5 || <0.5	LCS-1	102%
Ethylbenzene	mg/kg	1	Org-016	<1	156231-1	<1 || <1	LCS-1	102%
m+p-xylene	mg/kg	2	Org-016	<2	156231-1	<2 || <2	LCS-1	102%
o-Xylene	mg/kg	1	Org-016	<1	156231-1	<1 || <1	LCS-1	107%
naphthalene	mg/kg	1	Org-014	<1	156231-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	156231-1	98 || 90 || RPD: 9	LCS-1	104%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
$TRHC_{10}$ - C_{14}	mg/kg	50	Org-003	<50	156231-1	<50 || <50	LCS-1	84%
$TRHC_{15}$ - C_{28}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	84%
$TRHC_{29}$ - C_{36}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	110%
$TRH>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	156231-1	<50 || <50	LCS-1	84%
$TRH>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	84%
$TRH>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	156231-1	<100 || <100	LCS-1	110%
Surrogate o-Terphenyl	%		Org-003	77	156231-1	91 || 92 || RPD: 1	LCS-1	80%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	96%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	92%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	100%
Anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
Pyrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	LCS-1	85%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	156231-1	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	156231-1	<0.05 || <0.05	LCS-1	99%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	105	156231-1	98 || 95 || RPD: 3	LCS-1	99%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
HCB	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
Heptachlor	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	88%
delta-BHC	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	84%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	83%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	89%
Dieldrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	90%
Endrin	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	95%
pp-DDD	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	94%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	LCS-1	87%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	85	156231-1	84 || 85 || RPD: 1	LCS-1	106%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	112%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	106%
Dimethoate	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	112%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	115%
Malathion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	108%
Parathion	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	114%
Ronnel	mg/kg	0.1	Org-008	<0.1	156231-1	<0.1 || <0.1	LCS-1	133%
Surrogate TCMX	%		Org-008	85	156231-1	84 || 85 || RPD: 1	LCS-1	84%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	LCS-1	121%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	156231-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	85	156231-1	84 || 85 || RPD: 1	LCS-1	84%

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 prepared	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Arsenic	mg/kg	4	Metals-020	<4	156231-1	<4 || <4	LCS-1	108%
Cadmium	mg/kg	0.4	Metals-020	<0.4	156231-1	<0.4 || <0.4	LCS-1	100%
Chromium	mg/kg	1	Metals-020	<1	156231-1	30 || 30 || RPD: 0	LCS-1	102%
Copper	mg/kg	1	Metals-020	<1	156231-1	12 || 11 || RPD: 9	LCS-1	103%
Lead	mg/kg	1	Metals-020	<1	156231-1	14 || 14 || RPD: 0	LCS-1	98%
Mercury	mg/kg	0.1	Metals-021	<0.1	156231-1	<0.1 || <0.1	LCS-1	85%
Nickel	mg/kg	1	Metals-020	<1	156231-1	11 || 10 || RPD: 10	LCS-1	96%
Zinc	mg/kg	1	Metals-020	<1	156231-1	52 || 51 || RPD: 2	LCS-1	99%

QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Date analysed	-			31/10/2016	156231-1	31/10/2016 || 31/10/2016	LCS-1	31/10/2016
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	156231-1	<5 || <5	LCS-1	105%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			02/11/2016	[NT]	[NT]	LCS-1	02/11/2016
Date analysed	-			02/11/2016	[NT]	[NT]	LCS-1	02/11/2016
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			04/11/2016	[NT]	[NT]	LCS-1	04/11/2016
Date analysed	-			04/11/2016	[NT]	[NT]	LCS-1	04/11/2016
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	106%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	94%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	103%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	84%

QUALITY CONTROL Clay 50-120g	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Clay in soils <2um	% (w/w)		AS1289.3.6.3	[NT]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
TRHC$_6$ - C$_9$	mg/kg	[NT]	[NT]	156231-2	95%
TRHC$_6$ - C$_{10}$	mg/kg	[NT]	[NT]	156231-2	95%
Benzene	mg/kg	[NT]	[NT]	156231-2	91%
Toluene	mg/kg	[NT]	[NT]	156231-2	96%
Ethylbenzene	mg/kg	[NT]	[NT]	156231-2	95%
m+p-xylene	mg/kg	[NT]	[NT]	156231-2	97%
o-Xylene	mg/kg	[NT]	[NT]	156231-2	102%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	156231-2	101%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	[NT]	[NT]	156231-2	87%
TRHC$_{15}$ - C$_{28}$	mg/kg	[NT]	[NT]	156231-2	84%
TRHC$_{29}$ - C$_{36}$	mg/kg	[NT]	[NT]	156231-2	96%
TRH>C$_{10}$-C$_{16}$	mg/kg	[NT]	[NT]	156231-2	87%
TRH>C$_{16}$-C$_{34}$	mg/kg	[NT]	[NT]	156231-2	84%
TRH>C$_{34}$-C$_{40}$	mg/kg	[NT]	[NT]	156231-2	96%
Surrogate o-Terphenyl	%	[NT]	[NT]	156231-2	88%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Naphthalene	mg/kg	[NT]	[NT]	156231-2	92%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	156231-2	83%
Phenanthrene	mg/kg	[NT]	[NT]	156231-2	86%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	156231-2	71%
Pyrene	mg/kg	[NT]	[NT]	156231-2	78%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(b,j+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	156231-2	90%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	156231-2	95%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	156231-2	79%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	156231-2	80%
Heptachlor	mg/kg	[NT]	[NT]	156231-2	84%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	156231-2	81%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	156231-2	80%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	156231-2	86%
Dieldrin	mg/kg	[NT]	[NT]	156231-2	87%
Endrin	mg/kg	[NT]	[NT]	156231-2	91%
pp-DDD	mg/kg	[NT]	[NT]	156231-2	90%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	156231-2	82%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	156231-2	101%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Azinphos-methyl (Guthion)	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	156231-2	115%
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	[NT]	[NT]	156231-2	100%
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	156231-2	109%
Fenitrothion	mg/kg	[NT]	[NT]	156231-2	117%
Malathion	mg/kg	[NT]	[NT]	156231-2	97%
Parathion	mg/kg	[NT]	[NT]	156231-2	117%
Ronnel	mg/kg	[NT]	[NT]	156231-2	125%
Surrogate TCMX	%	[NT]	[NT]	156231-2	82%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Aroclor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	[NT]	[NT]	156231-2	116%
Aroclor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	156231-2	82%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Arsenic	mg/kg	[NT]	[NT]	156231-2	94%
Cadmium	mg/kg	[NT]	[NT]	156231-2	91%
Chromium	mg/kg	[NT]	[NT]	156231-2	89%
Copper	mg/kg	[NT]	[NT]	156231-2	106%
Lead	mg/kg	[NT]	[NT]	156231-2	83%
Mercury	mg/kg	[NT]	[NT]	156231-2	93%
Nickel	mg/kg	[NT]	[NT]	156231-2	84%
Zinc	mg/kg	[NT]	[NT]	156231-2	81%

QUALITY CONTROL Misc Soil - Inorg	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	156231-2	31/10/2016
Date analysed	-	[NT]	[NT]	156231-2	31/10/2016
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	156231-2	100%

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.
Note: Samples 156231-1 to 10 were sub-sampled from jars provided by the client.

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Hazardous Materials Survey & Management Plan
Prior to Future Demolition

19 Walhallow Street Hawker
Block 9 Section 3
ACT 2614

November 2017



This report MUST NOT be used as a removal specification

Client: Regional Investments Pty Ltd,

PO Box 4104, Hawker, ACT 2614

Accredited for compliance with ISO/IEC 17020

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CERTIFICATE OF APPROVAL FOR ISSUE OF DOCUMENTS

Document No: T-03710
Title: Hazardous Materials Survey
19 Walhallow Street Hawker
Block 9 Section 3
ACT 2614

Revision Status:
Date of Issue: 1/12/2017

Client: Regional Investments Pty Ltd

Copy No: One

	Assessor	Position	Signature
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1 PREFACE

This Hazardous Materials Survey and Management Plan (HMSMP) was commissioned by Regional Investments Pty Ltd in order to assure the occupants of the site the highest standards of occupational health and safety in relation to hazardous materials. The safe removal of hazardous materials must be undertaken by appropriately licensed and skilled personnel prior to the demolition of the premises.

We have been advised that the premises are currently vacant and will be demolished. Until this time however, legislation requires all recommendations contained in this report to be observed. Prior to demolition it is essential that a destructive survey of all brick or block walls to wet areas be conducted to determine the exact extent of friable hot water pipe lagging. Additionally, any areas not currently fully accessible must also be inspected. Our office should be contacted prior to demolition. It is further recommended that all ACM removal be completed prior to any demolition commencing.

The HMSMP contains sections covering the identification, evaluation and control of hazardous materials including asbestos containing materials (ACM), Lead Paint, Polychlorinated Biphenyls (PCB), Synthetic Mineral Fibre (SMF), Ozone Depleting Substances (ODS) and fuel storage above and underground storage tanks (A/UST).

Robson Environmental Pty Ltd commenced the hazardous material survey on 20 November 2017. The information contained in this document will assist the PMCW (person with control or management of a workplace) in fulfilling their obligations under the latest editions of the following regulations/Acts:

- *How To Manage and Control Asbestos In The Workplace Code of Practice*
- *How To Safely Remove Asbestos Code of Practice*
- *Dangerous Substances (General) Regulation 2004*
- *Dangerous Substances Act 2004*
- *Work Health and Safety Act 2011*
- *Work Health and Safety Regulations 2011*
- *National Code of Practice for the Safe Use of Synthetic Mineral Fibre* [NOHSC:2006(1990)]
- *National Standard for Synthetic Mineral Fibres* [NOHSC:1004(1990)]
- *Guide to Lead Paint Management, Part 2: Residential and Commercial Buildings* Standards Australia, AS 4361.2 - 1998
- *Identification of PCB-Containing Capacitors; An information Booklet for Electricians and Electrical Contractors* ANZECC 1997 and
- *The Australian Refrigeration and Air-conditioning Code of Good Practice* Standards Australia, HB 40.1 – 2001

2 EXECUTIVE SUMMARY

2.1 Purpose

This report presents the findings of a Hazardous Materials survey conducted at the site on 20 November 2017 at the request of the client. The survey was undertaken to assess the extent and condition of hazardous materials and document safe management procedures in accordance with current legislation. The safe removal of hazardous materials must be undertaken by appropriately licensed and skilled personnel prior to refurbishment or demolition of the premises or where the risk assessment recommends removal. This report includes information which must be known and acted upon prior to the commencement of any demolition, refurbishment, or hazardous material removal or remediation. It also details responsibilities that the PMCW (person with management or control of a workplace) and occupier must address to ensure safe occupation of the premises.

2.2 Scope

The Hazardous Materials survey was intrusive in nature with the extent limited to the following areas:

- Interior and exterior of the building
- Roof, amenities and immediate surrounding land
- A/UST filler points and breather vents

The survey did not include the inspection or assessment of the following areas:

- Subterranean areas (e.g. infill/soil)
- Concealed cavities
- Formwork and subterranean electrical cable ducts and water pipe ducts

2.3 Survey Methodology

The survey involved the visual inspection of accessible, representative, construction materials and the collection and analysis of sampled materials suspected of being potentially hazardous to human health.

Hazardous materials assessed included ACM, SMF, PCBs, lead containing paint, ODS and A/UST.

The site inspection included the sampling of representative materials suspected of being hazardous, was undertaken in accordance with Robson's NATA ISO/IEC 17020 accreditation, ISO9001, ISO14001, AS4801 and current legislation. The particular sampling methodology used for each hazardous materials type is provided below:

Asbestos: The asbestos materials survey was conducted in accordance with the current legislation. It involved a visual inspection of accessible representative construction materials suspected of containing asbestos. Materials were not sampled from all areas due to the uniformity of the materials used throughout the building(s). Samples were analysed in Robson Environmental's National Association of Testing Authorities (NATA) accredited laboratory for the presence of asbestos by polarising light microscopy and dispersion staining.

Note that electrical switchboards and other similar areas were only inspected where they were isolated by a qualified electrician. Live switchboards were not inspected, and accordingly are presumed to be ACM until conclusively proven otherwise.

Lead (Pb) Based Paints: In accordance with AS4361.2-1998 representative paint samples were collected from various paint coated surfaces identified on site.

A sample consisting of a 25mm square of paint coating was removed using a knife to expose the base substrate. All scrapings and portions of the paint from within the square's area were collected and placed in a sealed and marked container. A total of three spot samples were collected for each suspected paint coating.

Samples were analysed for their lead (Pb) content by Envirolab Services Pty Ltd – NATA accreditation number: 2901 using ICP/AES techniques and in house Method No.4.

Within the same building, wherever a paint coating had a similar surface texture, colour etc. to a paint coating that had already been sampled because of its suspected lead content, it was presumed that these paint coatings were identical.

SMF: Synthetic Mineral Fibre (SMF) materials were visually identified and a determination made as to whether they were bonded or un-bonded.

PCBs: The information (make, type, capacitance etc.) recorded for each representative fluorescent light fitting capacitor suspected of containing PCB was cross-referenced against *ANZECC Identification of PCB Containing Capacitors – Information Booklet for Electricians and Electrical Contractors - 1997*.

This identification booklet provides a list of electrical equipment that is known to contain PCBs, and a list of electrical equipment known not to contain PCBs. Where the information recorded from the capacitor case(s) correlated exactly with the information listed in the ANZECC Information Booklet for known PCB-containing capacitors it was determined that PCBs were present in the capacitor under analysis.

Wherever a capacitor could not be identified in either list, this was noted in the PCB register as being a capacitor suspected to contain PCBs.

Note that light fittings were only inspected where they were isolated by a qualified electrician. Live light fittings were not inspected, and accordingly no determination about whether or not they contain PCB is included in this report.

Ozone Depleting Substances: A visual examination was made of refrigerant gas labels affixed to representative air-conditioning and refrigeration units. Information concerning the ASHRAE/ARI refrigerant designated R number was noted for later cross-reference to relevant air-conditioning and refrigeration industry Codes of Practice and Guidelines. In addition, the condition of the plant was noted and comment made as to possible refrigerant or lubricant leaks.

Where refrigerant gas labels were absent from representative air-conditioning and refrigeration plant, an assessment was made as to the likelihood of the plant using an ozone depleting substance based on its age and condition.

Fuel Storage Facilities: The survey included a visual inspection for above ground storage tanks (AST) and underground storage tank (UST) filler points and breather vents.

2.4 Key Findings

Asbestos

Table 1A: ACM locations and required actions

19 Walhallow Street Hawker		
ACM	**Locations**	**Action to be taken**
Sheet (Non-Friable)	Ground floor bathroom - wall	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Ground floor ensuite bathroom - wall	Label and maintain Remove prior to demolition
Pipe lagging (fibrous) (Friable)	Ground floor female toilets - hot water pipes embedded in solid masonry walls. Presume to brick/block walls in all wet areas	Further investigation required
Sheet (Non-Friable)	Ground floor female toilets - cubicle walls	Label and maintain Remove prior to demolition
Vinyl floor covering (Non-Friable)	Ground floor kitchen - flooring	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Ground floor laundry - wall	Label and maintain Remove prior to demolition
Pipe lagging (fibrous) (Friable)	Ground floor male toilets - hot water pipes embedded in solid masonry walls	Prohibit access Remove prior to demolition
Sheet (Non-Friable)	Ground floor male toilets - cubicle walls	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Ground floor tennis clubhouse canteen storeroom - ceiling	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Exterior eaves soffits	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Exterior external south side of clubhouse - Hardiplank walls	Label and maintain Remove prior to demolition

19 Walhallow Street Hawker		
ACM	**Locations**	**Action to be taken**
Sheet (Non-Friable)	Exterior gable end - infill	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Exterior garage - ceiling	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Exterior garage - eave soffits	Label and maintain Remove prior to demolition
Sheet (Non-Friable)	Exterior roof - verge undercloaking	Label and maintain Remove prior to demolition
Insulating board (Non-Friable)	Exterior switchboard mains - backing board	Label and maintain Remove prior to demolition

Refer to Section 2.4 - Table 1B for presumed ACM and Section 3.2 for exclusions

Table 1B: Presumed ACM, concealed locations and required actions

Type	ACM	Locations	Action to be taken
The materials listed below while not identified on site, should be presumed to be present until a destructive survey confirms otherwise			
Presumed ACM	Insulation/pipe lagging	Inaccessible ducts, risers and ceiling and wall space cavities	Destructive survey under controlled conditions prior to any refurbishment which is likely to disturb possible ACM in these areas. Until these areas are surveyed they should be presumed to contain asbestos. No access to unauthorised personnel should be given
	Asbestos millboard lining	Interior of air conditioning ductwork adjacent to heater elements	
	Asbestos insulation and gaskets/joints	Within mechanical equipment concealed by outer metal cladding, structure or housing	
	Asbestos vinyl floor tiles, covering, cushioning underlay and adhesive	Found beneath carpets and vinyl flooring	
	Asbestos sheeting	Backing material to ceramic tiles (roofs, floors and walls) and packers to building construction joints, such as gable end verge undercloaking	
	Asbestos cement sheet formwork and electrical cable duct / water pipe	Subterranean areas	

Prior to any planned demolition, refurbishment or maintenance, its effect upon any in situ asbestos must be established by reference to this document including amendments.

Lead Paint

It should be assumed that all similar paints throughout the building contain comparable percentages of lead.

First Schedule Paint (> 0.25%) - 19 Walhallow Street Hawker		
Location	**Paint Colour**	**Required action**
External, window shutters	White	Manage during occupation, demolition or refurbishment

Lead Free Paint (<0.25%) - 19 Walhallow Street Hawker		
Location	**Paint Colour**	**Required action**
Ground floor throughout, internal doors and door frames	Cream	No action required
External, fascias and pergola timber frame	Brown	No action required

Synthetic Mineral Fibre (SMF)

It should be presumed that SMF materials may be present to inaccessible areas.

19 Walhallow Street Hawker		
Material	**Location & Material**	**Required action**
Insulation	Ground floor lounge room stud wall	Manage during occupation, demolition or refurbishment
Insulation	Ground floor residential premises internal stud walls throughout	Manage during occupation, demolition or refurbishment
Insulation inside hot water heater	Ground floor hallway cupboard	Manage during occupation, demolition or refurbishment
Sisilation to roof throughout	Ground floor residential premises under roof tiles	Manage during occupation, demolition or refurbishment
Sisilation to roof throughout	Ground floor tennis clubhouse under roof tiles	Manage during occupation, demolition or refurbishment
Insulation inside hot water heater	Exterior tennis clubhouse storeroom hot water service	Manage during occupation, demolition or refurbishment

19 Walhallow Street Hawker		
Material	**Location & Material**	**Required action**
Roof	Exterior pergola	Manage during occupation, demolition or refurbishment
Insulation	Throughout	Manage during occupation, demolition or refurbishment

Polychlorinated Biphenyls (PCB)

Make - Type	Location	Total	Required action
No PCBs located			

Non-PCB - 19 Walhallow Street Hawker			
Make - Type	**Location**	**Total**	**Required action**
Ferguson - Unknown	Ground floor kitchen	2 no	No action required
MSP - Unknown	Ground floor tennis clubhouse canteen	6 no	No action required
MSP - Unknown	Ground floor tennis clubhouse main room	4 no	No action required

* Note that light fittings were only inspected where they were isolated by a qualified electrician. Live light fittings were not inspected, and accordingly no determination about whether or not they contain PCB is included in this report.

Ozone Depleting Substances (ODS)

R Number	Location	Total	Required action
No ozone depleting substances located			

Non – Ozone Depleting Substances

R Number	Location	Total	Required action
No non-ozone depleting substances located			

Above Ground Storage Tanks (AST) & Underground Storage Tanks (UST)

A/UST	Location	Total	Required action
No storage tanks located			

2.5 Key Recommendations

Asbestos

- Friable asbestos pipe lagging was found to the hot water pipes embedded in the masonry walls of the tennis clubhouse male toilets. It should be presumed that friable lagging is present to the hot water pipes embedded in masonry walls throughout the tennis clubhouse male, female toilet areas and all other similar wet areas unless conclusively proven otherwise. Prior to demolition, Robson Environmental should be contacted to conduct pipe chasing of all hot water pipes embedded in the masonry walls of the tennis clubhouse male and female toilet areas to determine the exact location and extent of friable ACM lagging.

- All other identified asbestos containing materials present in the residential premises and tennis clubhouse sections of the property must be removed prior to commencement of demolition of those buildings.

- ACM must not be drilled, cut, sanded, damaged or abraded and a good paint finish maintained. Asbestos work on non friable ACM may be undertaken by a licensed Class A or B Asbestos Removalist. Any works on, or in the vicinity of friable ACM must only be undertaken by a licensed Class A Asbestos Removalist.

- Any ACM identified in this report that is to remain in situ should be inspected by a licensed Asbestos Assessor at the intervals stated in Section 4.5 Table 3A Asbestos Register.

- As access could not be gained to all areas of the building, it should be presumed that any similar materials located within these areas could contain asbestos until proven otherwise. Strict controls should be put in place to brief all contractors.

- ACM should be labelled with approved asbestos warning labels or signs. Due to the stigma associated with asbestos and to avoid malicious damage to ACM, labelling can be kept to discrete areas. Where labelling cannot be undertaken, the PMCW must adopt strict administrative controls to ensure ACM is not subject to accidental damage.

Asbestos Removal

Removal of ACM must be undertaken by a licensed Asbestos Removalist in accordance with current legislation. The removal/remediation of friable ACM must be undertaken by a licensed Class A Asbestos Removalist. Removal or remediation of non friable asbestos may be undertaken by either an A or B Class Asbestos Removalist.

Prior to the commencement of any removal or remediation works associated with any amount of friable or non friable asbestos a building certifier must be engaged and building approval granted. An application must be submitted to WorkSafe ACT and ComCare (where applicable) at least 5 days prior to removal works commencing. An asbestos removal contractor must supply an Asbestos Removal Control Plan (ARCP) and a Safe Work Method Statement (SWMS). An independent licensed Asbestos Assessor should be

engaged to ensure that the ARCP addresses all safety issues relating to the planned asbestos works.

Air monitoring is mandatory during the removal or remediation of friable asbestos and should be considered during the removal or remediation of non friable asbestos. Air sampling is to be undertaken in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd* Edition and test certificates should be NATA endorsed.

An independent Asbestos Assessor must also be employed to undertake a Clearance Inspection of both friable and non friable asbestos removal or remediation works. A satisfactory clearance certificate for the remediated areas must ensure that no visible asbestos or presumed asbestos remains. Additionally no asbestos fibres should be detected by laboratory analysis if any validation samples are taken. All surfaces within the remediated area must be free of general dust and debris.

Lead Paint

- The First Schedule white paint on the external window shutters of the tennis clubhouse were found to be flaking and deteriorated. If the timber shutters are to be recycled or reused after demolition it is recommended that the flaking paint be appropriately remediated by either painting over or sealing the flaking areas of paint. If the First Schedule lead paint is to be removed this should be undertaken by a suitably qualified person.
- It should be assumed that all similar paint applications throughout the building would contain similar percentages of lead.
- Refer to Appendix D for further general information on lead paint.

SMF

- During demolition appropriate PPE should be worn. SMF materials should be removed using effective dust control procedures.
- Refer to Appendix D for further general information on SMF.

PCBs

- No PCB containing capacitors, ballasts or equipment were identified on site during the hazardous materials survey.
- Refer to Appendix D for information on PCB containing capacitors.
- Refer to Appendix D for further general information on PCB.

ODS

- No ozone depleting substances were identified on site during the hazardous materials survey.
- Refer to Appendix D for information on ODS.
- Refer to Appendix D for further general information on ODS.

A/UST

- No above ground or underground storage tanks were identified on site during the hazardous materials survey.
- Refer to Appendix D for information on A/UST.
- Refer to Appendix D for further general information on A/UST.

Legislation and Guidelines (UST): Section 3.2 of AS4976 (2008) *The Removal and Disposal of Underground Petroleum Storage Tanks*, states that the out-of-service period for a A/UST should not exceed that laid down in any applicable regulation and should not normally be greater than twelve (12) months. Also, Section 6 (Decommissioning) of the ACT EPA (2009) *Environmental Guidelines for Service Station Sites and Hydrocarbon Storage* indicates that all decommissioned tanks must be removed unless there are specific operational or structural reasons as to why they must remain. These reasons must be outlined or substantiated by an experienced and competent person.

Demolition and Refurbishment

Robson Environmental Pty Ltd recommends that prior to any demolition our office be contacted. Our licensed Asbestos Assessors can attend the site to observe the demolition process, advise as necessary and in the event of previously inaccessible hazardous materials being located, assist with assessing the extent, type and removal or abatement of materials as required.

Robson Environmental Pty Ltd provides a range of occupational hygiene services in relation to the safe remediation or abatement of hazardous materials as well as contaminated land advice in relation to hydrocarbon contamination.

To assist with the tendering process Robson Environmental could be engaged to attend the walkthrough to show the extent of ACM and to respond to questions of clarification.

3 INTRODUCTION

The following Hazardous Materials Survey and Management Plan (HMSMP) has been designed to address the safe control of hazardous materials. It covers current requirements for hazardous material management as at 20/11/2017 only and must therefore be updated to comply with any future changes to legislative requirements. The safe removal of hazardous materials must be undertaken by appropriately licensed and skilled personnel prior to any renovation or demolition of the premises.

This HMSMP includes the following:

- a register of all identified hazardous materials
- extent, form, condition and risks associated with nominated hazardous materials
- labelling requirements for identified hazardous materials
- a timetable for managing risks including priorities for removal or control of ACM and for reviewing risk assessments
- responsibilities of all persons involved in hazardous materials management
- procedures to address incidents or spillage involving ACM
- safe work and removal methods
- guidelines on reviewing and updating the HMSMP and hazardous materials register

3.1 Requirements for the HMSMP

This HMSMP must be held on site for ready access. All personnel undertaking any repair or maintenance work must be provided with a copy of the HMSMP before commencement of work.

Maintenance, trade and other personnel must be instructed not to remove or damage identified hazardous materials if hazardous material is identified in the area where work will be undertaken it must be removed or remediated before work begins.

Removal of hazardous material must be undertaken by suitably qualified persons in accordance with relevant Regulations and Codes of Practice.

3.2 Exclusions

The HMSMP commissioned by the client was intrusive in nature.

The survey undertaken was limited to those areas available for access at the time of building inspection. Only the areas accessible to the surveyors at the time of the building inspection are included in this HMSMP.

Unless specifically noted, the survey did not cover exterior ground surfaces and sub-surfaces (e.g. infill/soil) or materials other than normal building fabric such as materials in laboratories or special purpose facilities.

At the time of survey no access was gained to materials and / or void areas located behind, above, or attached to any sampled or assumed hazardous materials.

The HMSMP does not include the areas, locations and equipment items to which the surveyors could not gain access at the time of inspection.

Some other areas which *may* conceal asbestos include:

Material	Location
Asbestos millboard lining	Air conditioning duct work adjacent to heater elements
Asbestos insulation and gaskets/joints	Within mechanical equipment concealed by outer metal cladding
Asbestos insulation	Walls and cavities (e.g. as lagging to hot water pipes set into and sealed within masonry walls)
Vinyl floor tiles and floor covering	Beneath carpets
Sheeting	Backing material to ceramic tiles and as packers to building construction joints
Asbestos cement sheet formwork and electrical cable/water pipe duct	Sub-ground floor slab

No absolute determination can be made regarding the possibility of concealed or inaccessible hazardous materials or items in the areas, locations and equipment listed in the table above until access is gained to allow for inspection.

Materials and equipment in any non-accessed area should therefore be assumed to contain ACM, SMF, lead paint, PCB, ODS and A/UST (the nominated hazardous materials) and be treated appropriately until assessment and sample analysis confirm otherwise.

Samples were not taken where the act of sampling would endanger the surveyor or affect the structural integrity of the item concerned.

This HMSMP, although extensive, is not intended for and must not be used as a specification or method statement for any future hazardous material removal project. In this instance detailed plans, quantities etc. would be required.

Before any refurbishment or hazardous material removal projects, the contractor(s) carrying out the work must fully acquaint themselves with the extent of the hazardous materials, particularly in those areas which may need full or partial demolition in order to determine the exact extent and location of such materials.

Care should be taken when demolishing or excavating to determine the existence or otherwise of hazardous materials. For example subsurface pipes and drains, revealed through excavation may be constructed of asbestos cement. Wherever a material is uncovered or revealed and it is suspected to be hazardous, it should be assumed to be hazardous and treated appropriately until such time as assessment and sample analysis of the material confirms otherwise.

Until this confirmation occurs the building work must cease in the immediate vicinity of the suspect material and a suitably qualified person must issue a clearance certificate or report before the building work can recommence in the affected area.

To ensure contextual integrity, this HMSMP must always be read in its entirety and should never be referred to in part only.

3.3 Limitations

This report is based on the information obtained by Robson Environmental Pty Ltd at the time of inspection. Robson Environmental Pty Ltd will not update this report; nor take into account any event(s) occurring after the time that its assessment was conducted.

As both the range and use of manufactured products containing hazardous materials was extremely widespread, Robson Environmental Pty Ltd cannot accept responsibility for any consequential loss or damage that results from non-recognition of a material that may later be established to contain hazardous material. For example, certain textured wall and ceiling finishes may contain small traces of asbestos fibre. In situ, textured finishes are often composed of assorted batches of product, or may have been repaired/patched at various times. It is therefore always a possibility that the samples collected may not always be representative of the entire material.

While Robson Environmental Pty Ltd has taken all care and attention to ensure that this report includes the most accurate information available, it has been unable to examine any inaccessible materials or materials hidden from view.

Under normal construction practices some materials are “built in” or “randomly applied”. These materials are therefore not readily accessible and can only be exposed through demolition or damage to the structure or finishes. Access to a material may also be prevented or restricted by “in service” or operational equipment, or where to obtain access contravenes a relevant statutory requirement or code of practice. (e.g. electrical switchboards) Consequently, while all reasonable care and attention was taken in compiling this report no guarantee to its completeness can be given.

Robson Environmental Pty Ltd has taken all care to ensure that this report includes the most accurate information available, where it uses test results prepared by other persons it relies on the accuracy of the test results in preparing this report. In providing this report Robson Environmental Pty Ltd does not warrant the accuracy of such third party test results.

4 ASBESTOS SURVEY RESULTS

4.1 Survey Details

The survey of the site included all accessible areas of the building(s) except where stated otherwise. For further asbestos management information, refer to Appendix D.

4.2 Survey Methodology

The survey involved a visual inspection of the premises and a condition assessment of identified ACM. Samples were analysed in Robson Environmental's National Association of Testing Authorities (NATA) laboratory using polarising light microscopy (PLM) and dispersion staining. Samples were a representative selection of materials suspected of containing asbestos. Samples were not taken from all areas due to the uniformity of the materials used throughout the building. Laboratory analysis certificates are presented in Appendix A.

4.3 Sample Analysis

Table 2: Mineralogical Analysis of Samples for Asbestos using PLM

19 Walhallow Street Hawker			
Sample reference	**Sample location**	**Sample type**	**Composition Asbestos type**
W1223	Ground floor kitchen - flooring	Vinyl floor covering	Chrysotile Asbestos Detected
W1224	Ground floor laundry - wall	Sheet	Chrysotile Asbestos Detected
W1225	Ground floor bathroom - wall	Sheet	Chrysotile Asbestos Detected
W1226	Ceiling void - batts (throughout building)	Insulation	No Asbestos Detected
W1227	Ground floor ensuite bathroom - wall	Sheet	Chrysotile Asbestos Detected
W1228	Ground floor switchboard in hallway - backing board	Insulating board	No Asbestos Detected
W1229	Ground floor tennis clubhouse canteen storeroom - ceiling	Sheet	Amosite, Chrysotile Asbestos Detected
W1230	Exterior eaves soffits - ceiling	Sheet	Amosite, Chrysotile Asbestos Detected
W1231	Exterior external south side of clubhouse - hardiplank walls	Sheet	Chrysotile Asbestos Detected
W1232	Exterior external south side of clubhouse - window mastic	Mastic	No Asbestos Detected

19 Walhallow Street Hawker			
Sample reference	**Sample location**	**Sample type**	**Composition Asbestos type**
W1233	Exterior roof - verge undercloaking	Sheet	Amosite, Chrysotile Asbestos Detected
W1234	Exterior practice wall area adjacent to court 3 - sealant between concrete slab floor	Bituminous product	No Asbestos Detected
W1235	Exterior switchboard mains - backing board	Insulating board	Chrysotile Asbestos Detected
W1236	Exterior garage - ceiling	Sheet	Amosite, Chrysotile Asbestos Detected
W1237	Exterior garage - eave soffits	Sheet	Chrysotile Asbestos Detected
W1238	Ground floor male toilets - cubicle walls	Sheet	Chrysotile Asbestos Detected
W1239	Ground floor male toilets - hot water pipes embedded in solid masonry walls	Pipe lagging (fibrous)	Amosite Asbestos Detected

Chrysotile	**=**	**white asbestos**
Amosite	**=**	**grey or brown asbestos**
Crocidolite	**=**	**blue asbestos**

It should be noted that the above samples were a representative selection of materials suspected of containing asbestos.

On-site inspections and an examination of the Asbestos Register within this report should be undertaken prior to the commencement of any asbestos removal programme.

4.4 Risk Assessment

The purpose of the risk assessment is to enable informed decisions to be made concerning the control of ACM.

The risk assessment should take account of the identification information in the Asbestos Register, including:

- type of ACM (non-friable or friable)
- condition and location of ACM
- whether the ACM is likely to be disturbed due to its condition and location
- the likelihood of exposure

Types of ACM

Non-friable ACM	Non-friable ACM is any material that contains asbestos bound into a stable matrix. It may consist of cement or various resins/binders and cannot be reduced to a dust by hand pressure. As such it does not present an exposure hazard unless cut, abraded, sanded or otherwise disturbed. Therefore, the exposure risk from non-friable ACM is negligible during normal building occupation. *Note: If non-friable ACM is damaged or otherwise deteriorated, the risk assessment may be reviewed to reflect a higher potential for exposure to asbestos fibres. A licensed Asbestos Assessor should perform the risk assessment.*
Friable ACM	Friable ACM can be crumbled or reduced to a dust by hand pressure when dry and can represent a significant exposure hazard. Examples of friable asbestos are hot water pipe lagging, severely damaged asbestos cement sheet, limpet spray to structural beams and electrical duct heater millboard.

ACM CONDITION RATING

1	**Severe**	Deteriorated surface in extremely poor condition
2	**Poor**	Deteriorated material
3	**Normal**	Stable asbestos with little damage
4	**Good**	Well sealed stable surfaces in accessible locations

ACM RISK RATING

A	**Very High**	Exposure to airborne asbestos as a consequence of extremely minor disturbance
B	**High**	Exposure to airborne asbestos likely as a consequence of significant disturbance
C	**Medium**	Exposure to airborne asbestos unlikely during normal building use
D	**Low**	No exposure to airborne asbestos during normal building use

4.5 Asbestos Register

The Asbestos Register details the type, location, risk assessment and action required for all identified ACM. The Register should be accessed to inform all decisions made concerning control of ACM. Action taken to control ACM must be recorded in this Register in order to comply with current legislation.

Table 3A: Asbestos Register

19 Walhallow Street Hawker								
Sample No.	**Item No.**	**Material Description & Location**	**Condition Rating**	**Risk Rating**	**Approx Quantity**	**Recommended Management Action**	**Action Undertaken**	**Assessor/ Date assessed**
W1225	22527	Ground floor bathroom - Sheet - wall (Non-Friable)	3	D	8 m²	Label and maintain Remove prior to demolition		
W1227	22535	Ground floor ensuite bathroom - Sheet - wall (Non-Friable)	3	D	6 m²	Label and maintain Remove prior to demolition		
RA W1239	22537	Ground floor female toilets - Pipe lagging (fibrous) - hot water pipes embeded in solid masonry walls (Friable)	1	A	6 lin m	Further investigation required		
VA001	22792	Presumed to all other wet areas with masonry walls	-	-	-	Further investigation required		
RA W1238	22533	Ground floor female toilets - Sheet - cubicle walls (Non-Friable)	3	D	6 m²	Label and maintain Remove prior to demolition		
W1223	22534	Ground floor kitchen - Vinyl floor covering - flooring	3	D	10 m²	Label and maintain Remove prior to demolition		

19 Walhallow Street Hawker								
Sample No.	**Item No.**	**Material Description & Location**	**Condition Rating**	**Risk Rating**	**Approx Quantity**	**Recommended Management Action**	**Action Undertaken**	**Assessor/ Date assessed**
		(Non-Friable)						
W1224	22526	Ground floor laundry - Sheet - wall (Non-Friable)	2	C	10 m²	Label and maintain Remove prior to demolition		
W1239	22536	Ground floor male toilets - Pipe lagging (fibrous) - hot water pipes embedded in solid masonry walls (Friable)	1	A	6 lin m	Prohibit access Remove prior to demolition		
W1238	22538	Ground floor male toilets - Sheet - cubicle walls (Non-Friable)	3	D	6 m²	Label and maintain Remove prior to demolition		
W1229	22543	Ground floor tennis clubhouse canteen storeroom - Sheet - ceiling (Non-Friable)	4	D	5 m²	Label and maintain Remove prior to demolition		
W1230	22529	Exterior eaves soffits - Sheet - ceiling (Non-Friable)	3	D	50 m²	Label and maintain Remove prior to demolition		
W1231	22544	Exterior external south side of clubhouse - Sheet - hardiplank walls (Non-Friable)	3	D	14 m²	Label and maintain Remove prior to demolition		
RA W1230	22531	Exterior gable end - Sheet - infill (Non-Friable)	3	D	<1 m²	Label and maintain Remove prior to demolition		
W1237	22539	Exterior garage - Sheet - eave soffits	3	D	10 m²	Label and maintain Remove prior to demolition		

19 Walhallow Street Hawker								
Sample No.	**Item No.**	**Material Description & Location**	**Condition Rating**	**Risk Rating**	**Approx Quantity**	**Recommended Management Action**	**Action Undertaken**	**Assessor/ Date assessed**
		(Non-Friable)						
W1236	22532	Exterior garage - Sheet - ceiling (Non-Friable)	3	D	30 m²	Label and maintain Remove prior to demolition		
W1233	22530	Exterior roof - Sheet - verge undercloaking (Non-Friable)	3	D	6 m²	Label and maintain Remove prior to demolition		
W1235	22540	Exterior switchboard mains - Insulating board - backing board (Non-Friable)	4	D	1 m²	Label and maintain Remove prior to demolition		

Refer to Section 2.4 Table 1B for presumed ACM and Section 3.2 for exclusions

Table 3B: Register of sampled materials which have been confirmed as non ACM

19 Walhallow Street Hawker		
Sample number	**Type**	**Locations**
W1226	Insulation	Ceiling void - batts (throughout building)
W1228	Insulating board	Ground floor switchboard in hallway - backing board
W1232	Mastic	Exterior external south side of clubhouse - window mastic
W1234	Bituminous product	Exterior practice wall area adjacent to court 3 - sealant between concrete slab floor

5 LEAD PAINT SURVEY RESULTS

5.1 Introduction

Lead paint is defined by the Australian Standard (AS 4361.2 – 1998 Guide to lead paint management Part 2: Residential and Commercial buildings) as a paint or component coat of a paint system containing lead or lead compounds, in which the lead content (calculated as lead metal) is in excess of 1.0% by weight of the dry film as determined by laboratory testing.

Further, the Standard for the Uniform Scheduling of Drugs and Poisons (National Drugs and Poisons Schedule Committee July 2000) classifies paints having more than 0.25% lead as First Schedule Paint and prohibits their manufacture, supply or use.

It has been shown that the dust generated from dry sanding or abrasive blast cleaning of paints with a lead concentration of > 0.25% can have sufficient content to produce exposure levels that exceed those that define a 'lead task' in NOHSC 1012.

Therefore, paints with a lead concentration greater than 0.25% (if they are to be removed) must be treated as a lead paint (i.e. subject to the regulations in NOHSC 1012).

Analytical values of <0.25% Pb allow the sample to be categorised as being lead free paint.

5.2 Results

Paint samples were collected from and analysed for lead content. Where paints were collected, samples were analysed by Envirolab – NATA accreditation number: 2901.

Table 4 presents lead composition in paints, with results presented as a percentage concentration of lead contained within the sampled materials. Despite the fact that sampling methodologies require that three (3) paint sub-samples be taken for each sampled product, only maximum values are presented below. Due to the inherent heterogeneity of lead concentrations in applied liquids this maximum reading is presented as it represents an upper level of lead concentrations throughout a heterogeneous product and aids in interpretation of risk assessment and management recommendations. For detailed results of analysed paint samples refer to Appendix A.

Table 4: Lead Composition in Paint by Inductively-Coupled Plasma Spectroscopy

19 Walhallow Street Hawker				
Sample No.	**Item No.**	**Sample location**	**Colour**	**Lead in Paint %**
Pb1	PB591	Ground floor throughout, internal doors and door frames	Cream	0.09
Pb2	PB590	External, window shutters	White	0.4
Pb3	PB592	External, fascias and pergola timber frame	Brown	0.05

Notes:

Lead Paint (> 1.0% Pb)

First Schedule Paint (> 0.25% Pb)

Lead-free Paint (≤ 0.25% Pb)

5.3 Discussion and Conclusion

The analytical result(s) of paint sampling revealed that the white paint on the external window shutters of the tennis clubhouse were found to contain lead content greater than 0.25% but less than 1.0% which classifies it as First Schedule Paint.

The analytical result(s) of paint sampling for the cream painted internal doors and doors frames and the external brown fascias revealed that the sampled paints contained amounts of lead sufficiently low to place them in the lead free paint category.

The First Schedule white paint on the external window shutters of the tennis clubhouse were found to be flaking and deteriorated. If the timber shutters are to be recycled or reused after demolition it is recommended that the flaking paint be appropriately remediated by either painting over or sealing the flaking areas of paint. If the First Schedule lead paint is to be removed this should be undertaken by a suitably qualified person. It should be assumed that all similar paint(s) throughout the premises contains comparable percentages of lead.

6 Synthetic Mineral Fibre (SMF) Survey Results

6.1 Introduction

SMF is a generic term used to collectively describe a number of amorphous (non-crystalline) fibrous materials including glass fibre, mineral wool (Rockwool and Slagwool) and ceramic fibre. Generally referred to as SMF, these materials are also known as 'Man-Made Mineral Fibres' (MMMF).

SMF products are used extensively in commercial and residential buildings for thermal and acoustic insulation, and as a reinforcing agent in cement, plaster and plastic materials. In some specialised instances, SMF materials have also been used as alternatives to asbestos, especially where high temperature insulation properties are required.

There are two basic forms of SMF insulation **bonded** and **unbonded.**

The **bonded form** is where adhesives, binding agents, facing/cladding, cement or other sealants have been applied to the SMF before delivery and the SMF product has a specific shape (e.g. a binding or sealing agents hold the SMF in a batt or blanket form). Some bonded SMF materials may also be clad in various coverings on one or more sides (e.g. a silver foil backing).

The **unbonded form** has no adhesives, binding agents, facing/cladding or sealants applied, and the SMF is a loose material (e.g. wet spray and loose fill).

6.2 Results

Table 5: Visual Assessment of Samples

19 Walhallow Street Hawker			
Item No	**Location**	**Sample Type**	**Form**
SMF550	Ground floor lounge room stud wall	Insulation	Unbonded
SMF548	Ground floor residential premises internal stud walls throughout	Insulation	Unbonded
SMF546	Ground floor hallway cupboard	Insulation inside hot water heater	Unbonded
SMF549	Ground floor residential premises under roof tiles	Sisilation to roof throughout	Bonded
SMF547	Ground floor tennis clubhouse under roof tiles	Sisilation to roof throughout	Bonded
SMF545	Exterior tennis clubhouse storeroom hot water service	Insulation inside hot water heater	Unbonded
SMF544	Exterior pergola	Roof	Bonded
SMF543	Throughout	Insulation	Unbonded

6.3 Conclusion

It should be presumed that SMF materials may be present to inaccessible areas including the ceiling space of areas which are inaccessible. If building work is likely to significantly disturb the insulation, the SMF materials should be removed using effective dust control procedures.

Refer to Appendix D for safe SMF handling.

7 POLYCHLORINATED BIPHENYLS (PCB) SURVEY RESULTS

7.1 Introduction

PCB is the common name for polychlorinated biphenyls. PCBs range in appearance from colourless, oily liquids to more viscous and increasingly darker liquids, to yellow then black resins, depending on the chlorine content of the PCB.

PCBs are chemically stable synthetic compounds that do not degrade appreciably over time or with exposure to high temperatures. The major use of PCBs was as an insulating fluid inside transformers and capacitors. Capacitors containing PCBs were installed in various types of equipment including domestic appliances, motors and fluorescent light fittings during the 1950s, 60s and 70s.

These applications generally do not present an immediate risk to human health or the environment as the equipment is sealed and contains relatively small amounts of PCB. The equipment can continue to be used safely provided that the capacitors do not leak.

The Australian and New Zealand Environment and Conservation Council (ANZECC) in its *PCB Management Plan* of *2003* stipulate cessation dates for the generation of PCB scheduled waste, the use of articles containing PCB scheduled waste, and the disposal of PCB scheduled waste*.

* PCB scheduled waste means any PCB material that has no further use that contains PCBs at levels at, or in excess of 50mg/kg and is of a quantity of 50g or more.

Small equipment items and capacitors found in households and commercial buildings that contain scheduled PCBs (i.e. at or in excess of 50mg/kg) are to be disposed of as scheduled PCB waste. Where the aggregate weight of the items or capacitors exceeds 10kg, they must be notified to the relevant Commonwealth, State or Territory Government agency prior to their disposal.

7.2 Results

Table 6: PCB and non PCB Containing Capacitors Identified on fluorescent light fittings

Item No.	Location	Make - Type	Capacitance (µF)
No PCB capacitors located			

Non-PCB - 19 Walhallow Street Hawker			
Item No.	**Location**	**Make - Type**	**Capacitance (µF)**
PCB261	Ground floor kitchen	Ferguson - Unknown	
PCB262	Ground floor tennis clubhouse canteen	MSP - Unknown	
PCB263	Ground floor tennis clubhouse main room	MSP - Unknown	

* Note that light fittings were only inspected where they were isolated by a qualified electrician. Live light fittings were not inspected, and accordingly no determination about whether or not they contain PCB is included in this report.

For further PCB management information refer to Appendix D.

8 OZONE DEPLETING SUBSTANCES SURVEY RESULTS

The site was surveyed for the presence of air conditioning and refrigeration units that contain ozone depleting substances.

ODS are used for heat transfer in refrigeration and air conditioning systems, absorbing or releasing heat according to vapour pressure. Release of these substances to the atmosphere has the ability to cause long term atmospheric pollution that can lead to ozone depletion, global warming, petrochemical smog and acid rain.

The ozone depletion potential (ODP) of a fluorocarbon refrigerant gas, its global warming potential (GWP) and estimated atmospheric life (EAL) all contribute to its potential to deplete the stratospheric ozone layer and enhance the greenhouse effect leading to global warming.

Chlorofluorocarbons (CFCs) contain chlorine and possess a large ODP, high GWP and long EAL. They are generally found in refrigeration and air-conditioning systems e.g. centrifugal chillers.

Hydrochlorofluorocarbons (HCFCs) are less saturated with chlorine than are CFCs and the hydrogen within these compounds give the HCFCs a much shorter EAL and lower ODP. They are generally found in refrigeration systems that are used for food display, cold stores and self contained, split, multi-split and central plant chillers used for building air-conditioning.

Hydrofluorocarbons (HFCs) are a class of replacement gases for CFCs. They do not contain chlorine or bromine and therefore do not deplete the ozone layer. While all HFCs have an ODP of zero, some do have a high GWP (e.g. R-404A, R-407B, R-125 etc).

Halons are synthetic chemical compounds that contain one or two carbon atoms, bromine and other halogens. They have a long atmospheric lifetime and cause very aggressive ozone depletion when breaking down in the stratosphere. Halons were introduced into Australia as fire-extinguishing agents in the early 1970s and quickly replaced many previously accepted fire-fighting products because of their superior fire-extinguishing characteristics and ease of use.

Halon 1211 was commonly used in portable fire extinguishers, while fixed fire protection systems, such as those that protect computer rooms and ship engine rooms, commonly contained Halon 1301.

Halon 1301 has an ODP that is 10 times greater that of CFCs, while Halon 1211 has an ODP 3 times greater than that of CFCs.

8.1 Results

Table 7: Chemical properties of ODS located during survey

ODS Item No	Location	R Number	Chemical name	ODP	GWP	EAL
No ozone depleting substances located						

Chemical properties of non ODS located during survey

Non ODS	Location	R Number	Chemical name	ODP	GWP	EAL
No non-ozone depleting substances located						

For further refrigerant management information refer to Appendix D.

9 FUEL STORAGE FACILITIES

It is important to note that prior to the introduction of natural gas in the ACT in the 1980s commercial premises generally utilised heating systems where boilers were fuelled by diesel or heating oils which were stored in A/USTs.

9.1 Results

A/UST Type	Item No	Location	Recommendations
No storage tanks located			

10 ASBESTOS MANAGEMENT

10.1 Management of ACM

General requirements

- ACM identified as representing an exposure risk (see Table 3A Asbestos Register) should be removed or otherwise controlled.
- Any ACM that is not scheduled for immediate removal should be labelled with appropriate warnings and maintained in good condition.
- The location of ACM must be entered into the Asbestos Register.
- Maintenance and other personnel must be made aware of the location of ACM.
- The Asbestos Register must be freely available.
- Unless they have valid ACT Asbestos Removal licence, maintenance workers, trades or occupants shall not remove or knowingly damage identified ACM.
- Before any planned demolition, refurbishment or maintenance, its effect upon any in situ asbestos must be established by reference to this document, including amendments.

10.2 Management of Contractors

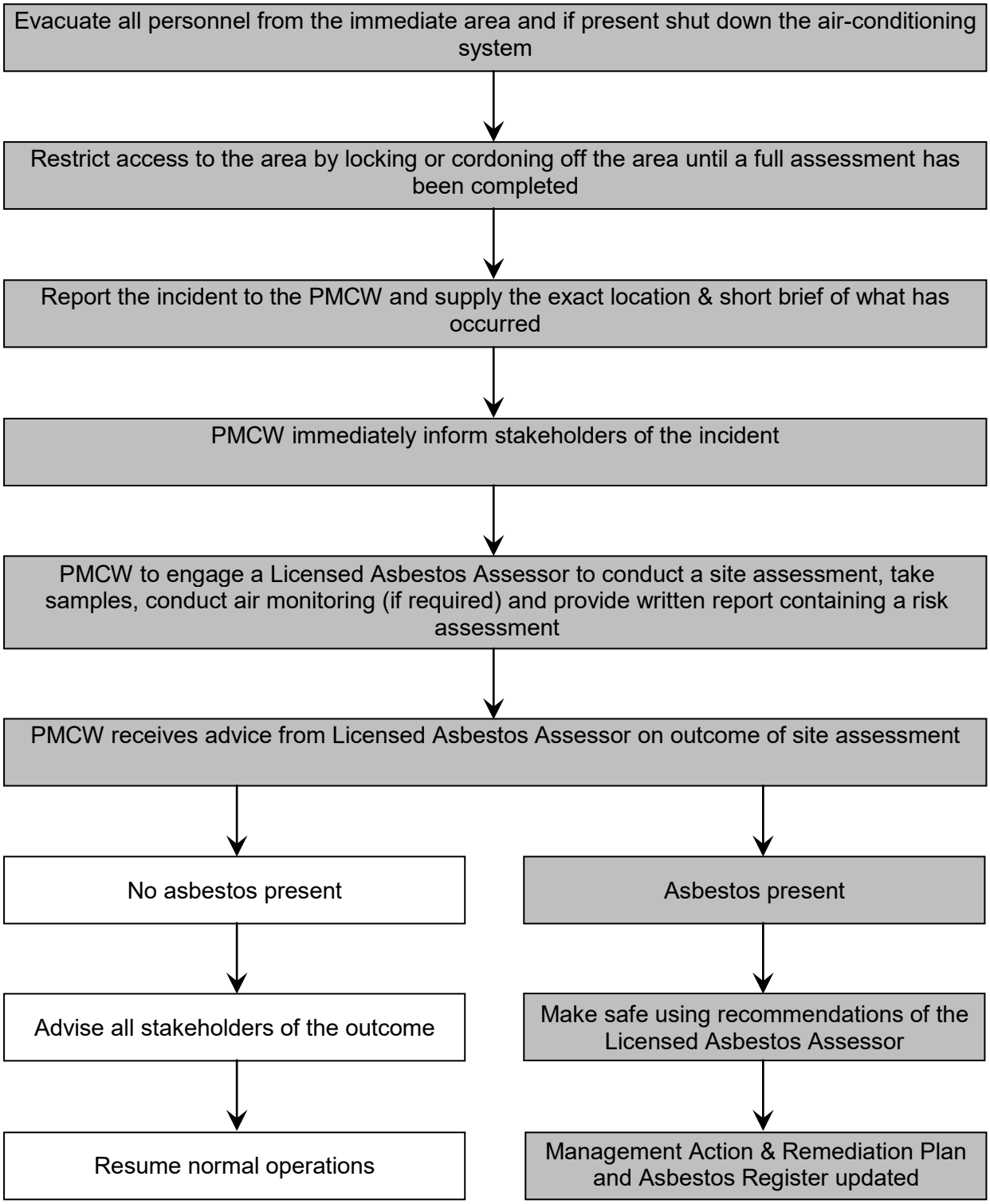
Before any contractor is engaged to carry out work on a site, the Asbestos Register, site plan and photographs should be checked to ensure the work will not interfere with, or disturb asbestos containing materials (ACM).

The chart below should be used by the PMCW to induct contractors onto sites:

Contractor arrives on site	Check Safe Work Method Statement (SWMS) and Trade Licenses (including Asbestos Awareness training) of all personnel involved in the work
Induct contractor	Conduct contractor's induction for the personnel involved in the work and ensure they are aware of any special requirements for ACM, security, no smoking, etc.
Check the Asbestos Register	The Asbestos Register and plan should be readily accessible (i.e. front office/reception) and in colour. Check the Asbestos Register with the contractor for ACM in the proposed work area.
Is asbestos present in the work area?	
No	**Yes**
Contractor may proceed with work	
Will the asbestos be disturbed?	
No	**Yes**
Contractor may proceed with work	**No work to be conducted – contact the PMCW immediately informing them of the problem.**

10.3 Asbestos Emergency Procedures

The following course of action should be taken **immediately** if ACM or suspected ACM is disturbed, or is accidentally damaged.



10.4 PMCW Decision Record

Option 1: Defer action

Item no.	ACM and Location	Reason	Authorisation	Date

Option 2: Encapsulate or seal

Item no.	ACM and Location	Reason	Authorisation	Date

Option 3: Removal

Item no.	ACM and Location	Reason	Authorisation	Date

10.5 Timetable for Action

The timetable for action should be administered to ensure the PMCW has a clear plan for all works which may affect ACM in the workplace. This includes maintenance work, scheduled removal work and risk assessment reviews, which may impact ACM.

Table 8: Timetable for action

ACM removal/ work	Date of scheduled works	Details	Authorisation	Date
Asbestos review/audit	**Date of scheduled review**	**Details**	**Authorisation**	**Date**

11 RESPONSIBILITIES

11.1 Asbestos - Provision of Information

The PMCW must:

- ensure the ACM register and all relevant information pertaining to asbestos in the workplace is freely available upon request
- provide occupants with up-to-date information relating to the condition and relative risk of ACM in the workplace
- provide information on the control measures in place to contain ACM-related risk and
- provide information to staff and contractors on measures to be taken to ensure that they are not exposed to asbestos in the workplace, either through accident or negligence

PMCW Action Record

Record all communication activities undertaken to inform staff/occupants of ACM in the workplace.

Action	Authorisation	Date

11.2 Updating the Risk Assessment

The register of ACM, including any risk assessments, should be reviewed every 12 months or earlier where:

- a risk assessment indicates the need for reassessment; or
- any ACM has been disturbed or moved

A visual inspection of identified ACM should be undertaken as part of any review.

Each review should critically assess all asbestos management procedures and their effectiveness in:

- preventing exposure to asbestos fibres
- controlling access to asbestos
- highlighting the need for action to maintain or remove ACM
- maintaining the accuracy of the ASMP

Details of any mitigating actions must be recorded in the Asbestos Register (refer Table 3A).

11.3 Key Personnel

This section outlines the responsibilities of all persons involved in the safe management of ACM.

1. PMCW

Name:	
Contact details:	
Responsibilities:	*e.g. provision of information*

2. Occupational Health and Safety Representative

Name:	
Contact details:	
Responsibilities:	*e.g. keeping occupants informed of any changes to the status of ACM in the workplace*

3. Facilities Management (if applicable)

Name:	
Contact details:	
Responsibilities:	*e.g. arrange removal and repair works as required; maintaining the HMSMP*

4. Other

Name:	
Contact details:	
Responsibilities:	

12 ASBESTOS REMOVAL WORKS

12.1 PMCW Responsibilities

Where it has been determined that ACM is to be removed, the PMCW must ensure that a risk assessment is performed before the removal work commences and that the removalist takes this risk assessment into account. The risk assessment must include the possibility of uncovering previously concealed ACM, and that concealed ACM is subsequently identified by a licensed Asbestos Assessor.

The PMCW should provide a detailed scope of works prepared by a licensed Asbestos Assessor for the removalist, including potential hazards, details on areas, which contain asbestos and arrangements for clearance inspections and airborne fibre monitoring.

12.2 Removalist Responsibilities

Before the commencement of removal work, the licensed removal contractor must:

- Provide a site-specific Asbestos Removal Control Plan(ARCP)
- Ensure the removal is adequately supervised and carried out in a safe manner
- Ensure that the equipment used in the project is appropriate for the task
- Ensure all persons carrying out the removal are competent and trained for the type of work being carried out
- Demonstrate that they have a health surveillance program in accordance with the requirements of Code Of Practice: How To Safely Remove Asbestos

12.3 Licensing Requirements

All Asbestos Removalists in the ACT are licensed by WorkSafe ACT

As a minimum the holder of an ACT Asbestos Removal Licence is required to demonstrate practical experience in the industry for at least three years and possess a full and complete understanding of the requirements of:

- *How to Manage and Control Asbestos in the Workplace Code of Practice*
- *How to Safely Remove Asbestos Code of Practice*
- *Work Health and Safety Act 2011*
- *Work Health and Safety Regulations 2011*

Environment and Planning Directorate (EPD) specify requirements for authorising certifiers and WorkSafe ACT and ACT NOWaste for the removal and transport of ACM.

12.4 Approval to Begin Asbestos Removal Works

- All removal methods and procedures are required to be undertaken in accordance with current legislation.
- The PMCW in conjunction with a licensed Asbestos Assessor where required, will inform the asbestos removalist of the 'Scope of Works'.
- The licensed Asbestos Assessor will be required to provide a clearance certificate on satisfactory completion of the works.

12.5 Emergency Work in Areas Containing Asbestos

- If emergency access is required contact the PMCW.
- If the PMCW determines that asbestos is likely to be disturbed, all works must be undertaken in accordance with current legislation - that is, a licensed Asbestos Removalist must be contracted to undertake any asbestos removal works.
- A licensed Asbestos Assessor will be required to provide a clearance certificate on satisfactory completion of the works.

12.6 Monitoring Arrangements

Control air monitoring should be performed when indicated by a Risk Assessment to ensure the control measures are effective.

All air monitoring must be performed by a licensed Asbestos Assessor accredited to perform air sampling for asbestos. Sampling should be performed in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC: 3003 (2005)].

It is the Asbestos Removalist's responsibility to ensure that the maximum fibre levels throughout asbestos removal and associated works does not equal or exceed the minimum practical detection limit of 0.01 fibres per millilitre of air (F/ml). If the airborne fibre levels are observed at or exceeding those specified below, the licensed Asbestos Assessor will instruct the contractor to take the appropriate control /action as per current legislation.

Table 9: Control levels and required actions

Control Level (airborne asbestos fibres/ml)	Control/Action
< 0.01	Continue with control measures
≥ 0.01	Review control measures
≥ 0.02	Stop removal work and find the cause

12.7 Clearance Inspections

Following removal work, a licensed Asbestos Assessor must undertake a clearance inspection before re-occupation of an asbestos work area.

All barriers and warning signs should remain in place until the area has been cleared.

12.8 ACM removal/maintenance record

The Asbestos Register, Section 4.5, Table 3A is to be completed by the PMCW after receiving appropriate clearance certification from a licensed Asbestos Assessor.

The 'Work Performed' and 'Asbestos Control Measure' Tables are required to be completed by the PMCW.

1. Work Performed

Company name	Contact details	Date of work + job no.	Scope of work

2. Asbestos Control Measures

Work performed	Air monitoring/ decontamination	Clearance certificate issued	Other

3. Additional Information

13 FURTHER INFORMATION

13.1 Useful Contacts

Additional information on asbestos can be obtained from the following organisations and agencies.

Environment and Planning Directorate (EPD)	Dame Pattie Menzies House 16 Challis Street Dickson ACT 2602 Phone: 02 6207 1923 Internet: www.environment.act.gov.au
ACT Government	Phone: 13 22 81 Internet: www.asbestos.act.gov.au
WorkSafe ACT	255 Canberra Avenue Fyshwick ACT 2609 Phone: 02 6205 0200 Email: worksafe@act.gov.au Internet: www.WorkSafe.act.gov.au

14 APPENDICES

14.1 APPENDIX A – Laboratory Reports

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

CERTIFICATE OF ANALYSIS 180357

Client Details

Client	Robson Environmental Pty Ltd
Attention	Karen Patterson
Address	PO Box 112, Fyshwick, ACT, 2609

Sample Details

Your Reference	**T-03710**
Number of Samples	9 Paint
Date samples received	22/11/2017
Date completed instructions received	22/11/2017

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.

Report Details

Date results requested by	29/11/2017
Date of Issue	23/11/2017

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

Results Approved By
Long Pham, Team Leader, Metals

Authorised By

David Springer, General Manager

Envirolab Reference: 180357
Revision No: R00

Client Reference: T-03710

Lead in Paint						
Our Reference		180357-1	180357-2	180357-3	180357-4	180357-5
Your Reference	UNITS	Pb1-A	Pb1-B	Pb1-C	Pb2-A	Pb2-B
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Paint	Paint	Paint	Paint	Paint
Date prepared	-	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017
Date analysed	-	23/11/2017	23/11/2017	23/11/2017	23/11/2017	23/11/2017
Lead in paint	%w/w	0.09	0.09	0.06	0.3	0.4

Lead in Paint					
Our Reference		180357-6	180357-7	180357-8	180357-9
Your Reference	UNITS	Pb2-C	Pb3-A	Pb3-B	Pb3-C
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Paint	Paint	Paint	Paint
Date prepared	-	23/11/2017	23/11/2017	23/11/2017	23/11/2017
Date analysed	-	23/11/2017	23/11/2017	23/11/2017	23/11/2017
Lead in paint	%w/w	0.4	<0.05	<0.05	<0.05

Client Reference: T-03710

Method ID	Methodology Summary
Metals-004	Digestion of Paint chips/scrapings/liquids for Metals determination by ICP-AES/MS and or CV/AAS.

Client Reference: T-03710

QUALITY CONTROL: Lead in Paint						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/11/2017	8	23/11/2017	23/11/2017		23/11/2017	
Date analysed	-			23/11/2017	8	23/11/2017	23/11/2017		23/11/2017	
Lead in paint	%w/w	0.05	Metals-004	<0.05	8	<0.05	<0.05	0	104	

Client Reference: T-03710

Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Client Reference: T-03710

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Fibre Identification Certificate of Analysis

Report Number: T-03710 Date of Report: 24/11/2017 Samples Taken by: Robson Environmental Page 1 of 2

Client Details	Laboratory Details
Client: Regional Investments Pty Ltd	Address: 140 Gladstone Street, Fyshwick, Canberra 2609
Attention: John Krnc	Manager: John Robson
Received:	Telephone: 02 6239 5656
Client Reference: 19 Walhallow Street Hawker	Fax: 02 6239 5669
Email: john.krnc@krncgroup.com.au	Email: hazmat@robsonenviro.com.au

Test Specification(s) Employed: AS4964 (2004) & In-House Procedure No.2

Methodology Summary

Samples of material are examined to determine the presence of asbestos fibres using AS4964 (2004) & In-House Procedure No.2 i.e. Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by **Polarised Light Microscopy** (**PLM**) in conjunction with **Dispersion Staining** (**DS**). Unequivocal identification of asbestos minerals present is made by assessing fibre properties to see whether the values are typical and consistent with published data. This provides a reasonable degree of certainty to determine whether a fibre under investigation is asbestiform or not. Careful application of the test procedure provides sufficient diagnostic clues to allow unequivocal identification of asbestos types, and so, to determine whether a sample contains asbestos or not. If sufficient diagnostic clues are absent, then positive identification of fibrous asbestos is not possible.

Client Supplied Samples

Robson Environmental is not responsible for the accuracy or competence of sampling carried by third parties. Sample location(s) and/or sample type(s) of third party samples delivered to the laboratory are given by the client at the time of delivery. Under these circumstances, Robson Environmental cannot be held responsible for the interpretation of the results shown. When the test certificate indicates that bulk samples were taken by the client, they are outside the scope of our NATA Accreditation for sampling. Robson Environmental takes responsibility of information reported only when a staff member takes the sample(s).

Reporting of Results

'Asbestos Detected': Asbestos detected by **Polarised Light Microscopy** (PLM), including **Dispersion Staining** (**DS**)
'No Asbestos Detected': No Asbestos detected by **Polarised Light Microscopy** (PLM), including **Dispersion Staining** (**DS**)
'UMF Detected': Mineral fibres of unknown type detected by **Polarised Light Microscopy** (PLM), including **Dispersion Staining** (**DS**). Confirmation by another independent analytical technique may be necessary.
"Hand-picked" refers to small discrete amounts of asbestos unevenly distributed in a large body of non-asbestos material.
Non asbestos fibres such as "Organic" and "Synthetic Mineral Fibres" detected in samples will be marked with an *. Please refer to non asbestos fibre table beneath main table.

Limit of Detection & Reporting Limit

Known limitations of the test procedure using **Polarised Light Microscopy** (**PLM**) are:

- **PLM** is a qualitative technique only;
- It does not cover identification of airborne or water-borne asbestos;
- The less encountered asbestos mineral fibres actinolite, anthophyllite and tremolite exhibit a wide range of optical properties that preclude unequivocal identification by **PLM** and **Dispersion Staining** (DS). Thus, the method is used to positively identify the three major asbestos minerals: amosite ("brown"), chrysotile ("white") and crocidolite ("blue");
- Valid identification requires that the sample material contains a sufficient quantity of the unknown fibres in excess of the practical detection limit used (in this case, **PLM** and **Dispersion Staining**, which has a calculated practical detection limit of 0.01-0.1% equivalent to 0.1-1g/kg (AS4946-2004:App. A4).

Results relate only to the sample(s) submitted for testing.
Test report must not be reproduced except in full.
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19 Walhallow Street Hawker

Sample No.	Client Ref.	Location	Physical Structure	Sample Description	Analysis of Fibrous Content
W1223		kitchen - flooring	Vinyl floor covering	2g	Chrysotile Asbestos Detected
W1224		laundry - wall	Sheet	1g	Chrysotile Asbestos Detected
W1225		bathroom - wall	Sheet	<1g	Chrysotile Asbestos Detected
W1226		ceiling void - batts	Insulation	<1g	No Asbestos Detected*
W1227		ensuite bathroom - wall	Sheet	1g	Chrysotile Asbestos Detected
W1228		switchboard in hallway - backing board	Insulating board	1g	No Asbestos Detected*

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards

Robson Environmental Pty Ltd ~ ABN: 55 008 660 900 ~ www.robsonenviro.com.au
p: 02 6239 5656 ~ f: 02 6239 5669 ~ admin@robsonenviro.com.au
PO Box 112 Fyshwick ACT 2609 ~ 140 Gladstone Street Fyshwick ACT 2609

Client: Regional Investments Pty Ltd T-03710_19 Walhallow Street Hawker-Fibre Identification Certificate of Analysis_20171124

Fibre Identification Certificate of Analysis

Laboratory Report Number: T-03710 **Analyst:** Natasha Pearson **Page** Page **2** of **2**

19 Walhallow Street Hawker

Sample No.	Client Ref.	Location	Physical Structure	Sample Description	Analysis of Fibrous Content
W1229		tennis clubhouse canteen storeroom - ceiling	Sheet	1g	Amosite, Chrysotile Asbestos Detected
W1230		eaves soffits - ceiling	Sheet	1g	Amosite, Chrysotile Asbestos Detected
W1231		external south side of clubhouse - hardiplank walls	Sheet	1g	Chrysotile Asbestos Detected
W1232		external south side of clubhouse - window mastic	Mastic	3g	No Asbestos Detected*
W1233		roof - verge undercloaking	Sheet	4g	Amosite, Chrysotile Asbestos Detected
W1234		practice wall area adjacent to court 3 - sealant between concrete slab floor	Bituminous product	1g	No Asbestos Detected*
W1235		switchboard mains - backing board	Insulating board	<1g	Chrysotile Asbestos Detected
W1236		garage - ceiling	Sheet	1g	Amosite, Chrysotile Asbestos Detected
W1237		garage - eave soffits	Sheet	15g	Chrysotile Asbestos Detected
W1238		male toilets - cubicle walls	Sheet	1g	Chrysotile Asbestos Detected
W1239		male toilets - hot water pipes embedded in solid masonry walls	Pipe lagging (fibrous)	5g	Amosite Asbestos Detected

Non Asbestos Fibre Table
* W1226 - Synthetic Mineral Fibres Detected
* W1228 - Organic Fibres Detected
* W1232 - Organic Fibres Detected
* W1234 - Organic Fibres Detected

Robson Approved Identifier
Natasha Pearson

NATA
No. 3181
Accredited for compliance with ISO/IEC 17025

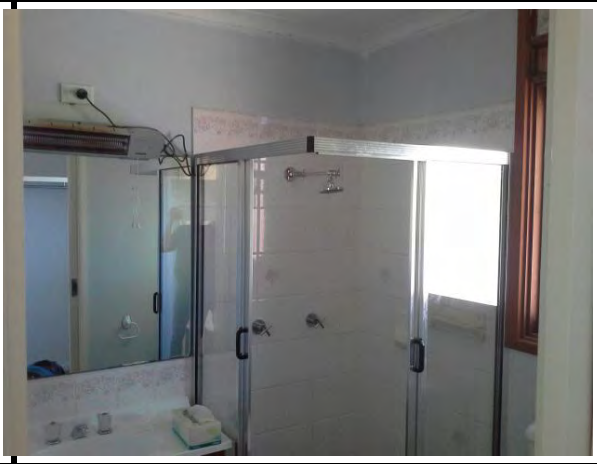
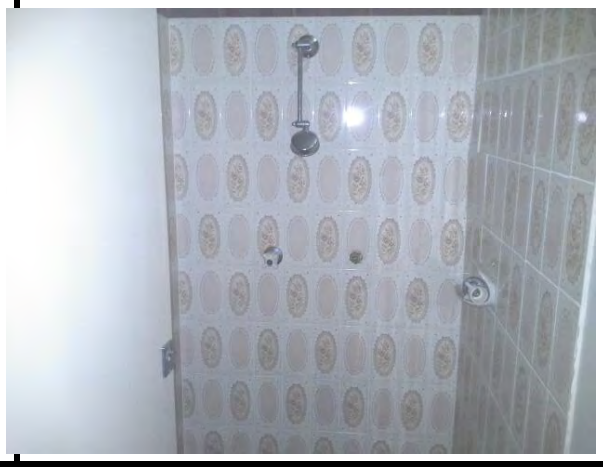
Robson Approved Signatory
Patrick Cerone

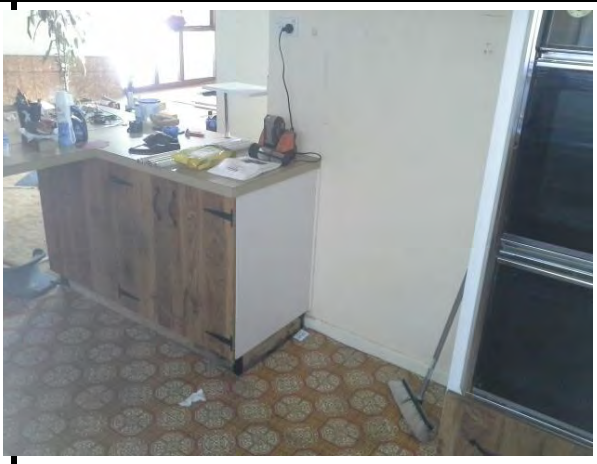
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards

14.2 APPENDIX B – Plans

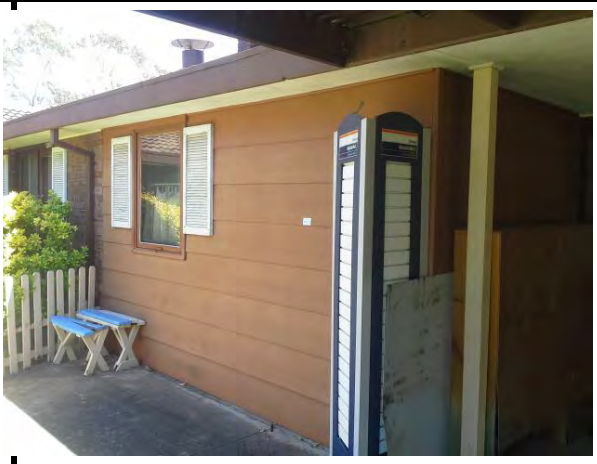
No plans required

14.3 APPENDIX C – HAZMAT Item locations & representative photographs

ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22527	Ground floor bathroom - wall	Sheet (Non-Friable)	
22535	Ground floor ensuite bathroom - wall	Sheet (Non-Friable)	
22537	Ground floor female toilets - hot water pipes embeded in solid masonry walls	Pipe lagging (fibrous) (Friable)	

ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22533	Ground floor female toilets - cubicle walls	Sheet (Non-Friable)	
22534	Ground floor kitchen - flooring	Vinyl floor covering (Non-Friable)	
22526	Ground floor laundry - wall	Sheet (Non-Friable)	

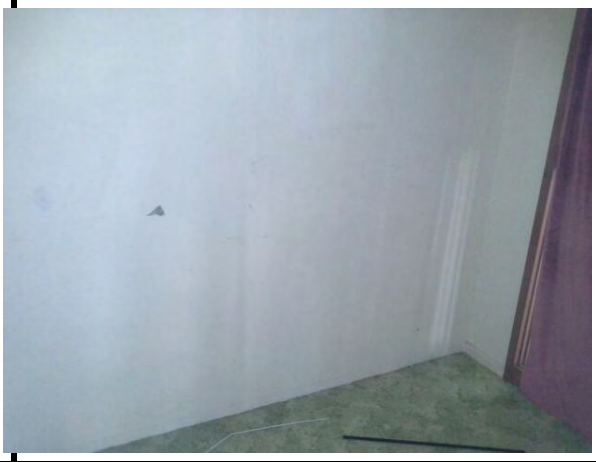
ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22536	Ground floor male toilets - hot water pipes embedded in solid masonry walls	Pipe lagging (fibrous) (Friable)	
22538	Ground floor male toilets - cubicle walls	Sheet (Non-Friable)	
22543	Ground floor tennis clubhouse canteen storeroom - ceiling	Sheet (Non-Friable)	

ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22529	Exterior eaves soffits - ceiling	Sheet (Non-Friable)	
22544	Exterior external south side of clubhouse - hardiplank walls	Sheet (Non-Friable)	
22531	Exterior gable end - infill	Sheet (Non-Friable)	

ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22539	Exterior garage - eave soffits	Sheet (Non-Friable)	
22532	Exterior garage - ceiling	Sheet (Non-Friable)	
22530	Exterior roof - verge undercloaking	Sheet (Non-Friable)	

ASBESTOS - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL DESCRIPTION**	**PHOTOGRAPH**
22540	Exterior switchboard mains - backing board	Insulating board (Non-Friable)	

LEAD PAINT - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**Lead %**	**PHOTOGRAPH**
PB590	Exterior, window shutters	0.4	

SMF - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL TYPE**	**PHOTOGRAPH**
SMF550	Ground floor lounge room stud wall	Insulation	
SMF548	Ground floor residential premises internal stud walls throughout	Insulation	
SMF546	Ground floor hallway cupboard	Insulation inside hot water heater	
SMF549	Ground floor residential premises under roof tiles	Sisilation to roof throughout	

SMF - 19 Walhallow Street Hawker			
ITEM NO	**LOCATION**	**MATERIAL TYPE**	**PHOTOGRAPH**
SMF547	Ground floor tennis clubhouse under roof tiles	Sisilation to roof throughout	
SMF545	Exterior tennis clubhouse storeroom hot water service	Insulation inside hot water heater	
SMF544	Exterior pergola	Roof	
SMF543	Throughout	Insulation	

14.4 APPENDIX D – Hazardous Material Management Information

ASBESTOS

Some 3000 products have been manufactured using asbestos, of which cement sheeting, pipe insulation, textiles, gaskets, vinyl floor tiles and fire door cores are the most commonly encountered. The mineral asbestos (i.e. Crocidolite, Chrysotile and Amosite and other forms) is classified by the National Occupational Health and Safety Commission as a Category 1 carcinogen. If respirable asbestos fibres are inhaled they may cause an inflammatory response, which in turn may lead to asbestosis (scarring of the lung), mesothelioma (cancer of the pleura or peritoneum) or lung cancer.

It is illegal under Commonwealth, State and Territory legislation to manufacture asbestos building materials or to reuse asbestos products.

Asbestos sheeting or 'fibro' is bonded into a stable matrix and as such does not present an exposure hazard unless it is cut, abraded, sanded or otherwise disturbed. This material is referred to as non friable ACM. Friable ACM has the potential to release fibre with only minor disturbance.

The health risks associated with asbestos exposure increase with the fibre type, level and frequency of exposure. Crocidolite (blue asbestos) is the most hazardous type. Amosite (brown asbestos) is not as hazardous as crocidolite but is significantly more hazardous than chrysotile (white asbestos). Exposure to all types of asbestos can result in diseases including asbestosis, lung cancer and mesothelioma. Smoking increases the risk of disease 50 fold. The often heard adage ' one fibre can kill you" is overly simplistic. Evidence indicates that risk increases with the level, type and frequency of exposure. Some individuals may be predisposed to disease at low and infrequent exposure, while others suffer no ill effect even after prolonged industrial exposure. We do not know what level can be considered safe nor what level may be considered hazardous. Asbestos may also be naturally present in the environment at very low levels. Therefore controls should be implemented to avoid exposure as far as practicable.

Asbestos is only hazardous if it becomes airborne and inhaled. When it is fully encapsulated within the structure it cannot become airborne. Simple engineering controls can ensure it remains encapsulated. These controls are detailed in the Required Actions and Recommendations detailed in this report.

Provided the site has been inspected by a licensed Asbestos Assessor and their recommendations adopted, normal occupation would not be hazardous. It is vital that any maintenance or renovation be in strict accordance with the Assessor's recommendations.

Any person employed to undertaken any maintenance or refurbishment must be informed of the presence of friable and/or non friable asbestos in the premises. The PMCW must ensure that if planned work may impact on any asbestos materials, the asbestos is removed or remediated by the appropriate class of removalist prior to commencement.

LEAD PAINT

Introduction

Lead in paint (as lead carbonate) is found extensively in homes and commercial and industrial buildings built pre-1970. Although Australian industry has generally phased out lead content in paint, levels of below 1 percent are still permitted and industrial application of high-lead paint to residential/commercial dwellings may still continue.

Lead-base paint may be a health issue if it becomes mobile in the environment or if ingested. For this reason sealing or safe removal of paint is strongly recommended particularly where it is flaking or exposed to the elements.

Assessment Criteria

Lead paint is defined by the Australian Standard (AS 4361.2 – 1998 *Guide to lead paint management Part 2: Residential and Commercial buildings*) as a paint or component coat of a paint system containing lead or lead compounds, in which the lead content (calculated as lead metal) is in excess of 1.0% by weight of the dry film as determined by laboratory testing. Further, the Standard for the Uniform Scheduling of Drugs and Poisons (National Drugs and Poisons Schedule Committee July 2000) classifies paints having more than 0.25% lead as First Schedule Paint and prohibits their manufacture, supply or use.

It has been shown that the dust generated from dry sanding or abrasive blast cleaning of paints with a lead concentration of 0.25% can have sufficient content to produce exposure levels that exceed those that define a 'lead task' in NOHSC 1012.

Therefore paints with a lead concentration greater than 0.25% (if they are to be removed) must be treated as a lead paint (i.e. subject to the regulations in NOHSC 1012).

Lead Paint Management and Recommendations

The following information uses Australian Standard (AS 4361.2 – 1998) as the primary reference. Lead paint and first schedule paints in residential and commercial premises may be managed in one of four ways:

- Leave undisturbed
- Stabilised (i.e. over painting or encapsulation)
- Abated (i.e. removed)
- A combination of the three management options may be required

Should removal be chosen, a high degree of skill, preparation and risk minimisation is required to avoid lead exposure, as dry sanding of lead levels as low as 0.25% can generate high lead dust. Therefore the Wet Scraping and Wet Sanding methods are amongst the safest methods available.

Strict adherence to the guidelines described in AS 4361.2 – 1998 will best ensure minimisation of risk. During this process personal protective equipment and waste containment equipment is essential and children, pregnant women and persons not directly engaged in the process should not be present. General workers may undertake this process providing they adhere strictly to the guidelines, however, a specialist lead paint removal contractor is recommended for extensive paint removal works.

Where remediation is required it is important to minimise ongoing maintenance costs by ensuring that the works are undertaken by a professional who is able to give a significant time guarantee of the painted surfaces at the completion of the works. The following website lists contactors by postcodes that have been included based on their indicated skills and training in working safely with lead paint. http://www.lead.org.au/paintersall.html. These contractors should however be assessed by current performance prior to engagement.

Responsibilities of Owners and Contractors

According to AS 4361.2 – 1998 owners of residences or commercial buildings that may contain lead should:

- Manage the property in such a manner as to effectively control any health risk to occupants, contractors or others
- Ensure occupants are sufficiently informed about and protected from the hazards associated with lead paint
- If management work is to be undertaken, inform immediate neighbours about the nature of the work

Contractors should:

- Obtain appropriate accreditation to undertake the proposed level of remedial work involving lead paint and have the required level of specialized training
- Undertake the contracted work in such a way as to protect the health and safety of employees, tenants and the general public

SYNTHETIC MINERAL FIBRE

SMF refers to man-made mineral fibrous materials commonly used for their insulating and reinforcing properties. The amorphous (non-crystalline) materials include glass fibre, mineral wool and ceramic fibre products.

Discussion

Although glass fibre is classified as an irritant, levels of airborne fibreglass during routine occupation of the premises would be insignificant. During any large-scale installation or removal of fibreglass insulation, providing SMF fibre suppression measures as defined below are employed, exposure standards for SMF fibre would not normally be exceeded.

The following Risk Assessment is based on the requirements of Worksafe Australia, WorkSafe Australia, Sydney 1990, *Synthetic Mineral Fibres: National Standard and National Code of Practice.*

SMF Risk Assessment

According to Worksafe Australia 1990 (p 9) health risks associated with SMF are "significantly less potent … than white asbestos (Chrysotile) fibres" and that "...the possibility of lung cancer is eliminated at an exposure standard (time weighted average) of 0.5 respirable fibres per millilitre of air for all types of synthetic mineral fibres...." (p V).

To reduce the possibility of skin, eye and upper respiratory tract irritation a maximum exposure standard of 2 milligrams per cubic metre of inspirable dust is recommended. These two standards are designed principally for the manufacture and end user industries in which significant dust clouds would be generated.

The same document also states: "The overall conclusion based on available animal experiments and epidemiology is that provided work is carried out in accordance with (NOHSC 1990), and compliance is maintained with the exposure standards, then there is a negligible health risk associated with exposure to SMF under present-day manufacturing and usage patterns."

PCB

PCB is the common name for Polychlorinated Biphenyls. PCBs range in appearance from colourless, oily liquids to more viscous and increasingly darker liquids, to yellow then black resins, depending on chlorine content of the PCB.

Discussion

The major use of PCBs in the electrical industry has been as an insulating fluid inside transformers and capacitors. These transformers and capacitors have ranged in size from the very large transformers typically used by electrical supply companies, to the small capacitors used in commercial products. Capacitors containing PCBs were installed in various types of equipment including fluorescent light fittings during the 1950s, 60s and 70s.

Risk Assessment

Small quantities of PCBs are usually found in sealed containers known as capacitors. PCB-containing capacitors are unlikely to pose a health risk, unless they become damaged and leak.

PCBs can enter the body in three ways:

- absorption through the skin
- inhalation of PCB vapour
- ingestion by contamination of food or drink

The most commonly observed symptom in people exposed to high levels of PCBs is a condition known as chloracne. This is a severe, persistent acne-like rash due to repeated and prolonged contact of PCBs with skin. This condition has also occurred in people who have accidentally ingested PCBs.

Very high exposure to PCBs may also cause liver damage and damage to the nervous system.

There is the possibility that PCBs may cause cancers.

The likelihood of becoming sick from PCB exposure increases with the length of time and the amount of material that a person might come in contact with.

OZONE DEPLETING SUBSTANCES

Introduction

Ozone depleting substances (ODS) are compounds that contribute to stratospheric ozone depletion. They are widely used in refrigerators, air-conditioners, fire extinguishers, in dry cleaning, as solvents for cleaning, electronic equipment and as agricultural fumigants.

Ozone depleting substances (ODS) include:

- Bromochloromethane (BCM)
- Carbontetrachloride (CCl_4)
- Chlorofluorocarbons (CFCs)
- Halons
- Hydrobromofluorocarbons (HBFCs)
- Hydrochlorofluorocarbons (HCFCs)
- Methylbromide (CH_3Br)
- Methylchloroform (CH_3CCl_3)

ODS are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they break down they release chlorine or bromine atoms which then deplete the ozone.

Ozone Protection Strategy

The Australian Strategy for Ozone Protection calls for personnel who handle, install, service, commission and decommission and maintain commercial and industrial refrigeration and air-conditioning equipment to be accredited, licensed, registered to work with ozone depleting substances.

Best Management Practices

In Australia a 'Code of Good Practice' has been drawn up with the objective of assisting the reduction of emissions into the atmosphere of substances that deplete the ozone layer and contribute to global warming.

The Australian Refrigeration and Air-conditioning Code of Good Practice (HB 40.1 – 2001) recommends best practice for the maintenance, design, servicing, labelling and manufacture of refrigeration and air conditioning systems towards this objective.

Legislation

Under the Federal Government's *Ozone Protection and Synthetic Gas Management Act 1989* and its *Ozone Protection and Synthetic Gas Legislation Amendment Bill 2003* it is illegal to vent an ODS (Scheduled Substances) to the atmosphere.

General Maintenance

- All refrigeration and air-conditioning plant should be regularly inspected for traces of leaking refrigerant and/or oil, and for signs of leak-indicating dye
- Whenever a system is charged with refrigerant and/or lubricant, the service person must clearly label the system with the refrigerant/lubrication type; name of service organization; and date of service. In addition, the ASHRAE/ARI refrigerant designated R number shall be clearly displayed
- A service person should be aware of the possibility that a refrigeration or air-conditioning system may have been incorrectly charged or incorrectly labelled. The type of refrigerant contained in the system must therefore be first established by checking the temperature/pressure relationship or by using other tests to verify that the labelling is correct

Advice to Equipment Users

- Users are advised that persons who service refrigeration and air-conditioning equipment are required by legislation to observe the Code of Good Practice and not to 'top-up' or 'charge' systems known to be leaking refrigerant, or to service equipment unless it can be returned into service in a leak-free condition
- If a user does not have trained staff to undertake service or maintenance work, then it is recommended that a routine maintenance agreement for their plant be undertaken with a reputable service organization
- All users should monitor the operation of their installation weekly and call the service person immediately if any abnormal condition is found
- When a refrigeration system contains in excess of 50 kg of refrigerant, that system should be leak tested on a quarterly basis

Leak Testing

- Various methods may be used for leak-testing, e.g. electronic leak detectors, halide lamp and or ultraviolet lamp
- Only a non-controlled refrigerant mixed with a pressurising substance such as dry nitrogen should be used to leak test refrigeration and air-conditioning systems
- Where an air-conditioning or refrigeration system is found to be leaking and needs to be repaired, the vapour and/or liquid must first be recovered from the leaking system
- Where pressurisation testing has determined that an air-conditioning or refrigeration system is not leaking, moisture and non-condensables must be evacuated from the system using dry nitrogen as the moisture absorber and either the deep or triple evacuation methods
- All refrigerants shall be recovered and either recycled, reclaimed or held for disposal in an approved manner
- It is highly recommended that a refrigerant charge monitor or leak detector be installed to alert equipment owners/operators of a refrigerant leak

Recovery, Recycling and Disposal of Refrigerants

- It is highly recommended, and in some cases mandatory, for recovery and/or recycling equipment to be used for the removal and recovery of refrigerant during service
- To avoid the danger of mixing different refrigerant types, the receiving containers shall be identified by the correct colour coding and labelling and shall only be used for the refrigerant type that is being transferred. The recovery containers shall conform to AS 4484-2004, '*Gas Cylinders for Industrial, Scientific and Refrigerant use – labelling and colour coding'*
- As chillers have large internal volume, it is important that all refrigerant vapour be recovered. A chiller at atmospheric pressure can still hold many kilograms of refrigerant vapour after the liquid has been removed
- When recovering refrigerant from a chiller the refrigerant should be recovered until the internal system pressure is reduced to 3 kPa absolute for low-pressure systems (e.g., R-11) and 70 kPa absolute for positive pressure systems (e.g., R-12 and R-22). The internal pressure should then be taken up to atmospheric pressure with dry nitrogen if the chiller is to be opened. This will prevent moisture–laden air entering the system, which could lead to contamination and corrosion

Disposal of Refrigerants

- Unusable or surplus fluorocarbon refrigerant shall not be discharged to the atmosphere, but shall be returned to a supplier
- Empty residual refrigerant in a disposable container shall be recovered and the container disposed of at a recycling centre
- The utmost care must be taken to avoid mixing different types of refrigerants, as separation may be impossible and large quantities of refrigerant may be rendered unusable

Handling and Storage

Losses of refrigerant to the atmosphere can occur during the handling and storage of refrigerant containers. Service persons have a duty of care to avoid such losses.

- There are numerous hazards associated with the storage of refrigerant. These include asphyxiation in confined space due to leakage from refrigerant containers; and fire, which may overheat and explode refrigerant containers or decompose refrigerant into toxic substances

Alternative Refrigerants and Lubricants

- With the introduction of HFC alternative refrigerants, alternative lubricants need to be considered to ensure system reliability. Some of these alternative lubricants tend to exhibit greater hygroscopicity than mineral oils, so care must be taken to ensure they are kept in sealed containers at all times
- Care must be taken to ensure that all components used in the refrigeration/air-conditioning system are compatible with the new refrigerant and lubricant

Recovery of Fluorocarbons Mixed with other Refrigerants

A number of different refrigerants and refrigeration mixtures have been used to replace or to 'top up' fluorocarbon based refrigerants in refrigeration and air-conditioning systems.

In many cases the equipment in question may not be labelled to indicate that hydrocarbon or hydrocarbon mixtures have been used and as the operating pressures of these replacement refrigerants are usually similar to those of the original refrigerant, their identification in the field is extremely difficult.

- It is not safe therefore to recover flammable refrigerant (hydrocarbon) using equipment designed only for non-flammable refrigerants such as R-12 and R-134a

- Should it be suspected that refrigeration or air-conditioning system contains an unidentified mixture or, if on asking the owner, examining the labels, and/or detecting instruments indicate that a hydrocarbon/fluorocarbon mixture or any other non-standard mixture of refrigerant may be present; the following procedure should be followed:
  - If a hydrocarbon or flammable mixture that contains hydrocarbon is suspected, use only equipment designed for the recovery of flammable gasses and recover the refrigerant into a specially marked container
  - In the case of refrigerant mixtures, it is not advisable to use recovery equipment as many mixtures have very high condensing pressures, which could result in equipment failure and/or injury to persons operating, or near the equipment
  - The safest method of recovery is to use an evacuated and preferably chilled container to depressurise the system
  - Label the container to show that it contains a mixture or the suspected composition, if known, and deliver it to a supplier for recycling
  - Purge the residual gas from the system with dry nitrogen before proceeding with any repairs

Health Effects

In addition to causing environmental degradation certain ozone depleting substances may present a risk to human health when they are improperly handled or released in to a poorly ventilated area.

Inhalation

The most significant exposure route for humans is through inhalation. Refrigerant gases displace oxygen in the air making breathing difficult.

Overexposure can cause central nervous system depression and oxygen deficiency. Effects of overexposure may include light-headedness, giddiness, shortness-of-breath, headaches, and in extreme cases, irregular heartbeats, cardiac arrest, asphyxiation and death.

Symptoms of overexposure at lower concentrations may include transient eye, nose and throat irritation.

Skin Contact

Contact with rapidly released refrigerant gas may cause frostbite. Symptoms of frostbite may include changes in skin colour to white or greyish yellow.

Other direct dermal contact may result in skin de-fatting, dryness, irritation or contact dermatitis.

Standard work clothes provide adequate protection of the skin but it is recommended that lined butyl gloves and goggles be used whenever handling liquid refrigerants.

Eye Contact

Eye contact with rapidly released refrigerant or air-conditioning gas may cause severe frostbite damage to eyes and eyelids. Eye irritation may occur if exposure occurs at lower concentrations.

FUEL STORAGE FACILITIES

In the ACT the management of fuel storage tanks is regulated by ACT WorkSafe who administers the *Dangerous Substances Act 2004* and the *Dangerous Substances (General) Regulation 2004.*

Heating oil and other petroleum products are classified as a Dangerous Substance under the ACT Dangerous Substances Act 2004.

The Dangerous Substances (General) Regulation 2004 – Division 2.4.2-233 *Decommissioning* (applies to a container used to store a dangerous substance) states the following:

'The container is thoroughly cleaned so that the container is in the condition it would be in if it had never contained the substance';

This would be difficult to achieve therefore it is advantageous to remove the tank.

In the ACT, Environment Protection and Heritage prefers underground fuel storage tanks be removed once they are no longer in use, unless there are extenuating circumstances i.e. their removal undermines permanent infrastructure. This is also emphasized in the Australian Standard *The Removal and Disposal of Underground Petroleum Storage Tanks* (AS 4976-2008).

Further, the ACT Environment Protection Authority (Environment Protection and Heritage) which administers the Environment Protection Act 1997 which contains contaminated land provisions responsible for the development of policy and guidelines to facilitate best practice when it comes to the management of contaminated land.

Environment Protection and Heritage deems all sites known to have had fuel storage facilities as potentially contaminated until investigated and assessed and shown to be free of contamination.

Based on this information and for the long-term management of the sites with fuel storage tanks, Robson Environmental Pty Ltd recommends that the USTs be removed in accordance with the requirements of ACT WorkSafe and Environment Protection and Heritage.

Removal of the UST does require approvals from relevant ACT Government agencies which include:

- ACT Planning and Land Authority (ACTPLA)
- ACT WorkSafe - Dangerous Goods Unit.

15 GLOSSARY

ACM	*See asbestos containing material*
Air monitoring	Air Monitoring means airborne asbestos fibre sampling to assist in assessing exposures and the effectiveness of control measures. Air monitoring includes exposure monitoring, control monitoring and clearance monitoring. *Note: Air monitoring should be undertaken in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003 (2005)]*
Airborne asbestos fibres	Any fibres of asbestos small enough to be made airborne. For the purposes of monitoring airborne asbestos fibres, only respirable asbestos fibres (those less than 3µm wide, more than 5µm long and with a length to width ratio of more than 3 to 1) are counted.
Amosite	Grey or brown asbestos
AR	*See Asbestos Register*
Asbestos Containing Material	Any material, object, product or debris that contains asbestos.
Asbestos Register	Inventory of ACM by type, form, location, risk and required action.
Asbestos Removalist	A competent person who performs asbestos removal work. *Note: an asbestos removal licence is required in all State and Territory jurisdictions.*
Asbestos Survey and Management Plan	Document covering the identification, risk evaluation, control and management of identified asbestos hazards, developed in accordance with current legislation.
Asbestos[2]	The fibrous form of mineral silicates belonging to the serpentine and amphibole groups of rock-forming minerals, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite or any mixture containing one or more of the mineral silicates belonging to the serpentine and amphibole groups.
Asbestos–cement (AC)	Products consisting of sand aggregate and cement reinforced with asbestos fibres (e.g. asbestos cement pipes and flat or corrugated asbestos cement sheets).
ASCC	*See Safe Work Australia Council*
Non-friable asbestos	ACM that is bonded into a stable matrix and cannot be reduced to a dust by hand pressure.
Chrysotile	White asbestos
Clearance inspection	An inspection, carried out by a licensed Asbestos Assessor, to verify that an asbestos work area is safe to be returned to normal use after work involving the disturbance of ACM has taken place. A clearance inspection must include a visual inspection, and may also include clearance monitoring and/or settled dust sampling.

Clearance monitoring	Air monitoring using static or positional samples to measure the level of airborne asbestos fibres in an area following work on ACM. An area is 'cleared' when the level of airborne asbestos fibres is measured as being below 0.01 fibres/mL.
Control monitoring	Air monitoring, using static or positional sampling devices to measure the level of airborne asbestos fibres in an area during work on ACM. Control monitoring is designed to assist in assessing the effectiveness of control measures. Its results are not representative of actual occupational exposures, and should not be used for that purpose.
Crocidolite	Blue asbestos
Exposure monitoring	Air monitoring in the breathing zone to determine a person's likely exposure to a hazardous substance. Exposure monitoring is designed to reliably estimate the person's exposure, so that it may be compared with the National Exposure Standard.
HMSMP	*See hazardous material survey re-inspection and management plan*
In situ[2]	Fixed or installed in its original position, not having been removed.
Inaccessible areas	Areas which are difficult to access, such as wall cavities and the interiors of plant and equipment.
Licensed Asbestos Assessor	Person who is qualified to undertake the identification and assessment of asbestos and provide recommendations on its safe management.
Membrane	A flexible or semi-flexible material, which functions as the waterproofing component in a roofing or waterproofing assembly.
NATA	National Association of Testing Authorities
NOHSC *(now SWA)*	National Occupational Health and Safety Commission (*now known as Safe Work Australia)*
PMCW	Person with management or control of a workplace
Safe Work Australia Council (SWAC)	A council that provides a national forum for State and Territory governments, employers and employees to consult and participate in the development of policies relating to OHS and workers' compensation matters, and promote national consistency in the OHS and workers' compensation regulatory framework.
SWMS	Safe Work Method Statement

16 REFERENCES

- *How To Manage and Control Asbestos In The Workplace Code of Practice*
- *How To Safely Remove Asbestos Code of Practice*
- *Work Health and Safety Act 2011*
- *Work Health and Safety Regulations 2011*
- *Australian Capital Territory Parliamentary Counsel (2006), Asbestos Legislation Amendment Act 2006 [A2006-16], Canberra, Australia*
- *ANZECC 1997, Identification of PCB-Containing Capacitors; An information Booklet for Electricians and Electrical Contractors*
- *Standards Australia, AS 4361.2 - 1998 Guide to lead paint management, Part 2: Residential and Commercial Buildings*
- *Standards Australia, HB 40.1 – 2001 The Australian Refrigeration and Air-conditioning Code of Good Practice*
- *WorkSafe Australia, Sydney 1990, Synthetic Mineral Fibres: National Standard and National Code of Practice*

ACT Government
Chief Minister, Treasury and Economic Development

File Ref: 2016/09066/1

Mr Colin Reid
Douglas Partners Pty Ltd
PO Box 1487
Fyshwick ACT 2609

Dear Mr Reid

**REVIEW OF DETAILED SITE INVESTIGATION REPORT -
PART BLOCK 9 SECTION 3 HAWKER BELCONNEN**

Environmental Quality has reviewed the report titled "Report on Detailed Site Investigation Proposed Residential Development Part Block 9 Section 3 Hawker" dated 17 May 2017 by Douglas Partners Pty Ltd.

Environmental Quality has assessed the report and as a result of the identified need for further assessment of the building footprint area following demolition works would not in a position to recommend to the Environment Protection Authority (EPA) that he support the consultant's findings with respect to site suitability at this time.

Further assessment (and remediation if necessary) of the site must be undertaken by a suitably qualified environmental consultant following demolition of structures at the site. To facilitate these additional assessment works Environmental Quality would support demolition works at the site.

All future assessment and remediation at the site must be in accordance with the guidelines endorsed by the EPA as listed in the ACT EPA Contaminated Sites Environment Protection Policy, 2009.

At the completion of these additional assessment works the environmental consultant must prepare a consolidated assessment report providing clear conclusions on the site's suitability for its proposed and permitted uses.

Prior to the site being used for other purposes or prior to the commencement of new construction works the EPA must review and endorse the findings of the consolidated assessment report.

Should you or your client wish to discuss the above comments please feel free to contact me on 02 6207 2151.

Please note that where the above documents have been submitted in accordance with a condition of a development approval, the documents along with this letter of endorsement must be lodged with the ACT Environment, Planning and Sustainable Development Directorate using their eDevelopment system.

Yours sincerely

Mark Heckenberg

Mark Heckenberg
Manager, Contaminated Sites
Construction, Environment and Workplace Protection

12/07/2017

Planning and Development Act 2007

Development Application

Application Number: **201629661**

Before Starting

PLEASE NOTE: This wizard will time out if left inactive for a period of more than two hours, after which time you will lose your application and be required to complete a new wizard. It is recommended you **save** this session if it is to be left inactive for an extended period of time.

Please ensure that your screen is set to the highest resolution (e.g. 1280 by 1024 pixels) to ensure all content in the wizard is visible.

Type of Application

The type of application you are applying for is a **New Application**

Are you applying for a:

◯ Development Application

Has a pre-application meeting been held in relation to this proposal?

◯ No

Lease/Site Details

Site Number: 1

If your rural property is identified by a Block/Section/Suburb, please select the "Urban" radio button.

◯ Urban

Suburb	Section	Block Number	Unit Number
HAWKER	3	9	

Street Address

19 WALHALLOW STREET, HAWKER

Applicant Details

What type of applicant are you:

◯ Business

ACN or ABN
14659841354

Company Name
Purdon Planning Pty Ltd

Position held / Title
Office Manager

Salutation
None

First Name
Sue

Surname
Cutler

Postal Address 1
Unit 2

Postal Address 2
1-3 Torrens St

Postal Address 3
BRADDON

Suburb
BRADDON

State/Territory
ACT

Postcode
2612

Country
Australia

Phone Number
62571511

Fax Number

Mobile Number

Email
purdons@purdon.com.au

Lessee (Property Owners) Details

Lessee Number: 1

Is the Lessee a:

○ Registered company

Australian Company Number (ACN)
124775211

Company Name
Pelle Projects Pty Ltd

Position held / Title
Director

Salutation
Mr

First Name
Dominic

Surname
Pelle

Postal Address 1
PO Box 112

Postal Address 2

Postal Address 3

Suburb
Campbell

State/Territory
ACT

Postcode
2612

Country
Australia

Phone Number
0418475501

Fax Number

Mobile Number
0418475501

Email
dominicpelle@bigpond.com

Lessee Number: 2

Is the Lessee a:

○ Registered company

Australian Company Number (ACN)
166091228

Company Name
Regional Investments Pty Ltd

Position held / Title
Director

Salutation
Mr

First Name
John

Surname
Krnc

Postal Address 1
PO Box 112

Postal Address 2

Postal Address 3

Suburb
Campbell

State/Territory
ACT

Postcode
2612

Country
Australia

Phone Number
0418633119

Fax Number

Mobile Number
0418633119

Email
John.Krnc@krncgroup.com.au

Notice of Decision and Plans

Please specify the delivery method for the return of plans. Unless otherwise specified, your Notice of Decision and/or plans will be returned via email.

☐ Email

Are you applying for an *Estate Development Plan* OR *Home Business*?

○ No

Zone

Please specify which zone applies to this application (please select one zone only). Please click *here* to access ACTMAPi and locate the zone.

☐ PRZ2 Restricted access recreation zone

If more than one zone is applicable to your application, please specify them below:

Development/Precinct Code

Please specify which development code applies to this application.

☐ Parks and Recreation Zone Development Code

Please specify all relevant precinct code/s applied to your proposal

Hawker Precinct Code and Plan

Fully Describe Your Proposal

Please provide a full description of your proposal

Lease variation to permit child care.

"To use the premises only for one or more of the following purposes:
i. tennis centre, the sale and hire of tennis equipment and subsidiary thereto a single unit private dwelling house
ii. COMMUNITY USE limited to Child Care Centre"

Proposed Use of the Land

Describe the use of the land or the use of a building or structure on the land. **Example:** Office, childcare facility, gymnasium

New child care centre and onsite car parking.

Is the proposed use consistent with the current Crown lease?

○ No

Assessment Track

Please indicate which assessment track applies to this Development Application: (If you are not sure which assessment track applies, please contact Environment and Planning Directorate on (02)62071923)

○ Merit

Has an Environmental Significance Opinion been sought for this proposal?

○ No

For more information about which track your development application will be assessed in, please click *here*. *Please note, the Environment and Planning Directorate may refuse to accept a development application made in an incorrect assessment track. If the Environment and Planning Directorate assesses an application made in the incorrect assessment track it must refuse the application (S.114 (3)).*

Type of Development

Please indicate which type of development applies to this development application.

☐ Lease Variation

Does this proposal involve a variation to a Units Plan?

○ No

Please select a *Lease Variation* sub type:

☐ Clause Changes

Community Consultation Summary

Is this proposal -

Please Note A development application cannot be lodged if the development proposal meets one of the triggers and the application does not include the pre-DA lodgement community consultation form.

Heritage

Heritage

Is the *Heritage* item relevant to your proposal?

○ No

Location Requirements, Plans of Management

Location Requirements

Plans of Management

Subdivision, National Capital Plan, Crime Prevention, Access & Mobility, Traffic Ge

Subdivision (other than residential zones)

National Capital Plan

Crime Prevention through Environmental Design

Access and Mobility

Traffic Generation

Site Access, Parking, Lighting

Site Access

Parking (Car)

Parking (Bicycle)

Lighting

Signs, Neighbourhood Plans, Environmental Effects, Water Sensitive Urban Design

Signs

Neighbourhood Plans

Assessment of Environmental Effects

Water Sensitive Urban Design (Mains Water Consumption)

To calculate the water consumption of commercial, Industrial or Institutional developments with and without water saving features, please click *here*

Water Sensitive Urban Design (Stormwater Quality)

To calculate the water consumption of commercial, Industrial or Institutional developments with and without water saving features, please click *here*

Water Sensitive Urban Design, Water Use

Water Sensitive Urban Design (Stormwater Quantity)

Water Use

Driveways (For works on verge only)

PLEASE NOTE: For proposals that include construction or modification of a driveway this application **MUST** be signed by the land custodian (Government Land Custodian - Asset Acceptance) as the works will be undertaken on unleased land **EXCEPT FOR DUAL OCCUPANCY DEVELOPMENT PROPOSALS.** For more information on driveways, garages and carports, please click here.

Survey Requirements - S.139(2)(i) - P & D Act 2007

If this application is for approval of a development that requires construction work to be carried out on land that has previously been developed and is not leased for rural purposes, a survey certificate for the land where the development is to be carried out (prepared and signed by a registered surveyor) must accompany this application unless exempt by Regulation 25 of the *Planning and Development Regulations 2008*

Development Undertaken Without Approval - S.205 - P & D Act 2007

*If YES - Under Section 139(j) of the Planning and Development Act 2007,plans of the development signed by a registered surveyor confirming the location and dimensions of the development **must** be submitted with this application. The plans need to confirm the height, width and length dimensions of the development and the setback dimensions of the development from*

the block boundaries. The information may be provided on one plan or on a series of plans provided each plan is signed by a registered surveyor. Note: For all unapproved development involving construction the location and nature of earthworks, utility connections, proposed buildings, pavements and landscape features must comply with utility standards, access provisions and asset clearance zones. For more information on development exempt from approval, please click here. For more information on development applications for developments undertaken without approval, please refer to S205 under the Planning and Development Act 2007

Exclusion from Public Inspection

In accordance with the requirements of Sections 28 and 30 of the *Planning and Development Act 2007*, the Environment and Planning Directorate must make the details and associated documents relevant to a development application available for public inspection.

If you wish to apply to have all or part of this development application excluded from public inspection, you must meet the requirements of Section 411(5) or 412(1) of the Planning and Development Act 2007

Are you requesting an exclusion from *Public Inspection*?

○ No

Conflict of Interest Declaration

Does the applicant or the lessee have any association with the Environment and Planning Directorate staff?

○ No

NOTE: There are penalties for deliberately giving false and misleading information. The Planning and Land Authority or Minister may revoke an approval if satisfied that the approval was obtained by fraud or misrepresentation

Applicant/Lessee Declaration

I/we hereby apply for approval to carry out the development described on the land specified in this application;

I/we declare that this application is accompanied by all of the required information or documents that address the relevant rules and/or relevant criteria for it to be considered for approval;

I/we understand that the information submitted with this application form will undergo a documentation check prior to the payment of fees and formal lodgement of the application. Further information may be required prior to the acceptance of the development application by the Authority;

I/we understand that this application will be considered lodged once the relevant application fees

have been paid;

I/we understand that if during the assessment of this application it is found to have been submitted in the incorrect assessment track the application will be refused and I/we will not be entitled to a refund or transfer of fees;

I/we understand that the documentation provided on CD/DVD or via the electronic lodgement process will be considered to be the relevant documentation associated with this application. All development application documentation will be made available for *public inspection* including via the Internet unless exclusion has been approved;

If the time for deciding the application (prescribed period) has ended and a decision has not been reached I/we understand that the application will be deemed refused and the Environment and Planning Directorate will not provide written advice of this decision. I/we also understand that the Environment and Planning Directorate is able to still consider the application and make a decision after the expiration of the prescribed period;

I/we hereby authorise the Environment and Planning Directorate its servants and agents to erect sign/s on the subject property(s) as required;

I/we hereby authorise ACT Government officers to access the subject property(s) for the purpose of evaluating the proposal(including the inspection of driveways and trees);

I/we (lessee) appoint the applicant whose signature appears in the attached *letter of appointment* to act on my/our behalf in relation to this Development Application. This authorises the applicant to pay all application fees, bonds and securities, liaise with the Environment and Planning Directorate when required, alter, amend or provide further information as necessary and receive any communications relating to this Development Application;

I understand that costs associated with the relocation of any engineering services (light poles, storm water, sumps etc) will be at my expense and that I will indemnify the ACT Government, its servants and agents against any claims arising during the relocation of these services;

I understand that construction of any driveway associated with this application may not commence until the contractor has received endorsement by the relevant government entity;

I understand that a Certificate of Design Acceptance and a Road Opening Permit and Temporary Management Plan must be obtained from the relevant government agencies prior to the start of construction works;

I/we declare that all the information given on this form and its attachments is true and complete;

If lodging on behalf of a company, organisation or Government agency: -

I/we declare I/we have the appropriate delegation or authority to sign on behalf of the company, organisation or Government agency.

I declare that I am the person shown in this eDA form as the Applicant, and by clicking the

ACCEPT button below I understand that this replaces my requirement to sign a hard copy of this application.

I accept the above declarations

○ Accept

Acceptance date

08 Jun 2016

Before Submitting

You have almost completed the first stage of your Development Application/Pre-Application request. **PLEASE ENSURE YOUR WIZARD SESSION IS SAVED BEFORE PROCEEDING**. This will enable you to resume your session in the event of a system outage or other interuption.

When you click on Finish below, you will be navigated to a new page which will enable you to upload any associated plans/documents prior to submitting to EPD for review.

Development applications (DAs) can be delayed unnecessarily because EPD does not have all the information it needs to undertake an assessment and make a decision.
To avoid delays ensure all required sections of the wizard are answered correctly and all required documentation is uploaded. In particular:
1. A signed appointment letter from all lessee's must be provided if works are to performed on the verge, a signed endorsement letter must be provided by the relevant Government Custodian;
2. Public register plans for residential applications are included;
3. You MUST include a statement against the criteria for development applications that will be assessed in the Merit track;
4. If the application is for a single unit on a unit titled block body corporate authorisation is required if there is works on a common property
If you are still not sure how to proceed or want to ensure you have everything you need for your application, you can visit the EPD Customer Service Centre, 16 Challis Street, Dickson, or call us on 6207 1923 and ask to speak with a technical officer.

Privacy Notice

The personal information on this form is provided to the Environment and Planning Directorate (EPD) to enable the processing of your application. The collection of personal information is authorised by the Planning and Development Act 2007. If all or some of the personal information is not collected EPD cannot process your application. The Planning and Development Act 2007 requires the details of applications, decisions and orders to be kept on a register and made available for public inspection. Information and documentation relevant to a development application may be made available via the Internet. The personal information you provide may be disclosed to Australian Bureau of Statistics, ACT Revenue Office, the Registrar General's Office, ACTEW Corporation, ActewAGL, Territory and Municipal Services Directorate and other Government agencies with a direct interest in the development assessment process. The information may also be disclosed where authorised by law or court order, or where the Directorate reasonably believes that the use or disclosure of the information is reasonably

necessary for enforcement-related activities conducted by, or on behalf of, an enforcement body. EPD's Information Privacy Policy contains information about how you may access or seek to correct your personal information held by EPD, and how you may complain about an alleged breach of the Territory Privacy Principles. The EPD Information Privacy Policy can be found at www.environment.act.gov.au

Does the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) affect your proposal?

The EPBC came into operation on 16 July 2000. It establishes an environmental assessment and approval system that is separate and distinct from the ACT system. It does not affect the validity of ACT development assessment and approval processes, but may affect the assessment track. The ACT cannot provide preliminary advice on whether a proposal falls within the definition of a controlled action, or requires referral to the Commonwealth. You should consult with the Commonwealth to determine if your proposal is a controlled action before seeking any approvals under the Planning and Development Act 2007. For information about the EPBC, including the referral process and when a referral should be made, contact: the Department of Sustainability, Environment, Water, Population and Communities, GPO Box 787, CANBERRA ACT 2601 Telephone: 62741111

Contact Details:

Environment and Planning Directorate
Customer Service Centre
GPO Box 1908, Canberra City 2601
16 Challis Street, Dickson ACT 2602
Business Hours: 8.30am to 4.30pm weekdays (excluding Public Holidays)
Phone: (02) 6207 1923
Fax: (02) 6207 1925
TTY: (02) 6207 2622
Email: epdcustomerservices@act.gov.au
Website: www.environment.act.gov.au

Planning and Development Act 2007

Development Application

Application Number: **201629661**

Type of Application

The type of application you are applying for is Further Information - S141

Lease/Site Details

Site Number: 1

Suburb	Section	Block Number	Unit Number
HAWKER	3	9	

Street Address

19 WALHALLOW STREET, HAWKER

Applicant Details

ACN or ABN

14659841354

Company Name	Position held / Title
Purdon Planning Pty Ltd	Office Manager

Salutation	First Name	Surname
None	Sue	Cutler

Postal Address 1	Postal Address 2
Unit 4, Cooyong Centre	1 Torrens Street

Postal Address 3

Suburb	State/Territory	Postcode	Country
Braddon	ACT	2612	Australia

Phone Number	Fax Number	Mobile Number
62571511		

Email

purdons@purdon.com.au

Lessee (Property Owners) Details

Lessee Number: 1

Is the Lessee a

◉ Company

Australian Company Number (ACN)

124775211

Company Name

Pelle Projects Pty Ltd

Position held / Title

Director

Salutation

Mr

First Name

Dominic

Surname

Pelle

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418475501

Fax Number

Mobile Number

0418475501

Email

dominicpelle@bigpond.com

Lessee Number: 2

Is the Lessee a

◉ Company

Australian Company Number (ACN)

166091228

Company Name

Regional Investments Pty Ltd

Position held / Title

Director

Salutation

Mr

First Name

John

Surname

Krnc

Postal Address 1

PO Box 112

Postal Address 2

Postal Address 3

Suburb

Campbell

State/Territory

ACT

Postcode

2612

Country

Australia

Phone Number

0418633119

Fax Number

Mobile Number

0418633119

Email

John.Krnc@krncgroup.com.au

Describe the Additional Information Being Provided

Revised concept plan

Supporting letter

Applicant Declaration

I/we declare that this application is accompanied by all of the required information or documents as requested by the Environment and Planning Directorate in accordance with Section 141 of the Planning and Development Act 2007;

I/we understand that the documentation provided via the electronic lodgment process will be considered to be the relevant documentation associated with this application. All development application documentation will be made available for public inspection including via the Internet unless exclusion has been approved;

I/we declare that all the information given on this form and its attachments is true and complete;

I declare that I am the person shown in this eDA form as the Applicant, and by clicking the ACCEPT button below I understand that this replaces my requirement to sign a hard copy of this application.

I accept the above declarations:

☑ Accept

Acceptance Date

21/09/2016

ACT Government
Environment and Planning

Planning and Development Act 2007, s425

Form 4 - LETTER OF AUTHORISATION

PRE APPLICATION MEETINGS **DEVELOPMENT APPLICATION**
APPLICATION FOR RECONSIDERATION

LEASE/SITE DETAILS (Please Print)

If more than two leases/sites please attach the following details for each additional lease/site on a separate sheet

Block	9	**Section**	3	**Suburb**	Hawker
Unit No.		**Street Address**			
Block		**Section**		**Suburb**	
Unit No.		**Street Address**			

Describe location where no block and section details are available (e.g. for outdoor dining area location)

LESSEE(s) DETAILS - if more than two lessees please provide details of each additional lessee (Please Print)

1st Lessee Name	Regional Investments P/L ACN 166 691 228	**2nd Lessee Name**	Pellc Projects Pty Ltd ACN 124 775 211

LESSEE AUTHORISATION

This appointment is made under the *Planning and Development Act 2007* and relates to: **(please tick)**

☑ **Pre - application meeting** ☑ **Development Application** ☑ **Application for Reconsideration**

I/we the lessee(s) authorise the person/company (to be known as *the Applicant)* detailed below:

- ☑ to obtain information in relation to this site through the pre-application process
- ☑ to act on my/our behalf in relation to a development application for the abovementioned site/s
- ☑ to act on my/our behalf in relation to an application for a reconsideration of a development application for the abovementioned site/s
- ☑ to pay all application fees, bonds and securities, liaise with the Planning and Land Authority when required, alter, amend or provide further information as necessary and receive any communications relating to the DA or Application for Reconsideration.

APPLICANT DETAILS (Please Print)

Applicant Name		**Email address**	
OR			
Company Name	Purdon Planning P/L	**Email address**	purdons@purdon.com.au

Company Nominees – a Company can list up to three nominees. The **first** nominee **must** be authorised to sign on behalf of the Company

Nominee 1	Kristi Jorgensen	**Nominee 2**	Sue Cutler	**Nominee 3**	Trevor Fitzpatrick

Approved form AF 2014-73 approved by Dorte Ekelund, Director-General, Environment and Planning Directorate on 29 August 2014 under the *Planning and Development Act 2007, s425* and revokes approved form AF2014-4
Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

LESSEE(s) DECLARATION if more than two lessees please provide details of each additional lessee on a separate sheet

- I/we declare that I am/we are the lessee(s) of the land described above;
- I/we have been made aware of the declaration clauses in the DA or Application for Reconsideration form; and
- I/we declare that all the information given on this form is true and complete.

1st Lessee's Signature: X [signature] Date: 18/12/15

2nd Lessee's Signature: [signature] Date: 22/12/15

APPLICANT DECLARATION

- I declare that I am the person authorised to sign/sign on behalf of the company described in this form
- I declare that all the information given on this form and its attachments are true and complete;

Applicant Name: Kristi Jorgensen
Sue Cutler

Company Name: Purdon Planning

Signature: [signature] Cutler

Date: 18/12/15

LAND CUSTODIAN AUTHORISATION

- I/we declare that I am/we are the land custodian(s) of the public land or unleased land as described above;
- I/we authorise the applicant to obtain information in relation to this site through the pre-application process and make an application for development approval.

Delegate Name:

Agency Name:

Signature:

Date:

Delegate Name:

Agency Name:

Signature:

Date:

THIS AUTHORISATION DOES NOT CONSTITUTE AN APPROVAL IN PRINCIPLE OR OTHERWISE BY THE LAND CUSTODIAN IN RELATION TO THE PROPOSED DEVELOPMENT.

Privacy Notice

The personal information on this form is provided to the Environment and Planning Directorate (EPD) to enable the processing of your application. The collection of personal information is authorised by the *Planning and Development Act 2007*. If all or some of the personal information is not collected EPD cannot process your application. The Planning and Development Act 2007 requires the details of applications, decisions and orders to be kept on a register and made available for public inspection. Information and documentation relevant to a development application may be made available via the Internet. The personal information you provide may be disclosed to Australian Bureau of Statistics, ACT Revenue Office, the Registrar General's Office, ACTEW Corporation, ActewAGL, Territory and Municipal Services Directorate and other Government agencies with a direct interest in the development assessment process. The information may also be disclosed where authorised by law or court order, or where the Directorate reasonably believes that the use or disclosure of the information is reasonably necessary for enforcement-related activities conducted by, or on behalf of, an enforcement body. EPD's Information Privacy Policy contains information about how you may access or seek to correct your personal information held by EPD, and how you may complain about an alleged breach of the Territory Privacy Principles. The EPD Information Privacy Policy can be found at www.environment@act.gov.au

Contact Details:

Environment and Planning Directorate
Customer Service Centres
GPO Box 158, Canberra City 2601
8 Darling Street Mitchell, ACT 2911
16 Challis Street Dickson ACT 2602

Business Hours: 8.30am to 4.30pm weekdays (excluding Public Holidays)
Phone: (02) 6207 1923 TTY: (02) 6207 2622
Email: epdcustomerservices@act.gov.au Website: www.environment@act.gov.au

& S. PELLE PTY LTD

Tuesday 7th June 2016

ACTPLA

LIST OF INTERESTED PARTIES

Scott Burkhart
Corporate & Business Bank
WPAC (St George)
Level 1, 60 Marcus Clarke St
Canberra City ACT 2601
Phone: 6243 5478

Regards,

John Krnc

& S. PELLE PTY LTD
Phone: 02 6255 3382
Mobile: 0418 633 119
Email: john.krnc@krncgroup.com.au
Office: 112/227 Flemington Road FRANKLIN ACT 2913
Mail: PO BOX 4104 HAWKER ACT 2614

PURDON PLANNING



Statement against Criteria
&
Planning Report

Block 9 Section 3 Hawker

8 June 2016

Prepared By:

Purdon Planning Pty Ltd
Unit 2 Cooyong Centre
1 Torrens Street
Braddon ACT 2612
Ph: 02 6257 1511
Email: purdons@purdon.com.au
Web: www.purdon.com.au
ABN 14 659 841 354

Any representation, statement, opinion or advice expressed or implied in this publication is made in good faith but on the basis that Purdon Planning, its agents and employees are not liable to any person for any damage or loss whatsoever which has occurred or may occur, in relation to that person taking or not taking (as the case may be) action, in respect of any representation, statement or advice referred to in this report.

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Attachments

Attachment A: Statement against Hawker Precinct Code

Attachment B: Statement against Parks & Recreation Zones Development Code

Attachment C: Statement against Lease Variations General Code

Attachment D: Statement against Community and Recreation Facilities Location Guidelines General Code

1.0 Purpose

This application has been prepared by Purdon Planning on behalf of Pelle Projects Pty Ltd and Regional Investments Pty Ltd, the lessees of Block 9 Section 3 Hawker (subject site) as a merit track assessment.

Statements Against Criteria (SAC) for the Hawker Precinct Code, Parks and Recreation Zones Development Code, Lease Variation General Code, and Community and Recreation Facilities Location Guidelines General Code are attached to this report.

2.0 Development Proposal

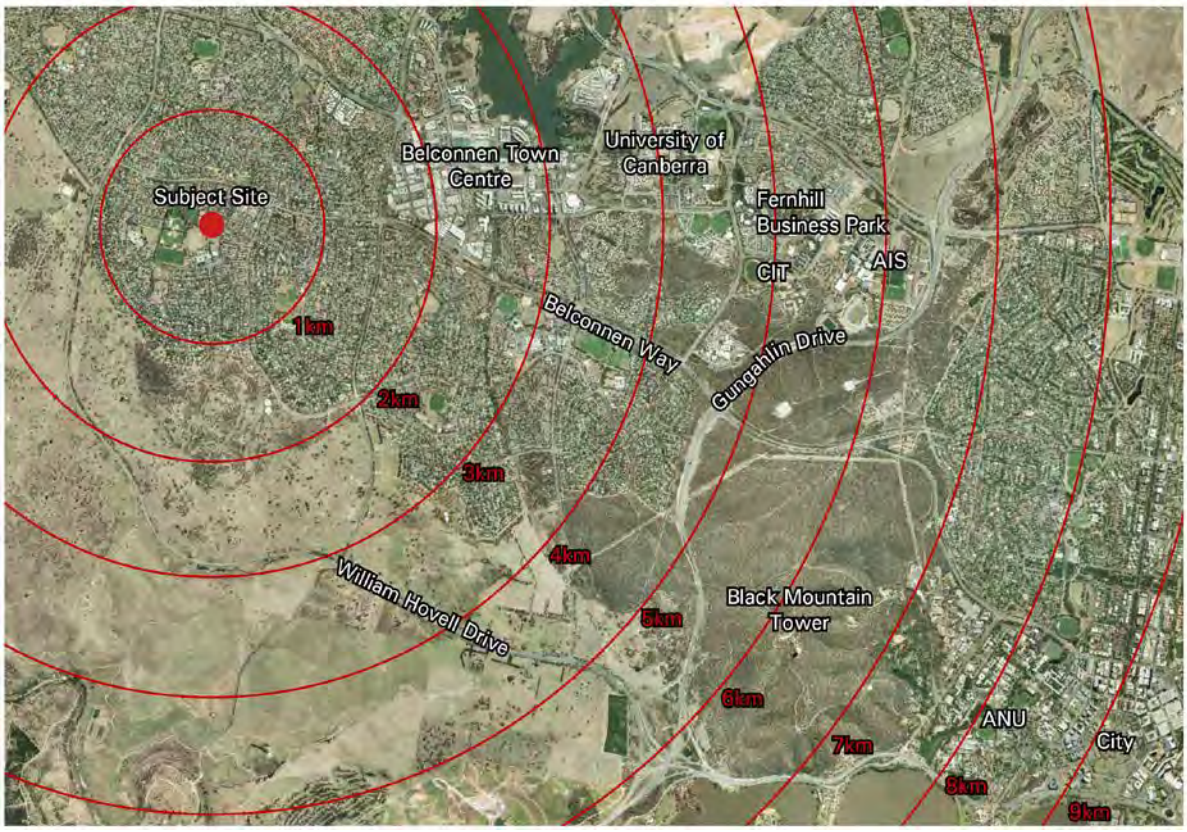
The application proposes to vary the lease for Block 9 Section 3 Hawker to add **COMMUNITY USE, limited to Child Care Centre** in the amended lease purpose clause. Details of the lease variation are provided at Section 5.0 below. A Site Concept Plan shows the appropriate location

3.0 The Site

Location:	The subject site has frontage to Walhallow Street, via a battle axe driveway, and adjoins the Belconnen Bowling Club and a narrow public walkway to the east, Belconnen High School and a narrow public walk way to the south and Hawker District Playing Fields to the west. There are two blocks of government owned land immediately adjacent to the northern site boundary, one of which has been developed as a public car park to support the Tennis Centre. Adjacent development on the northern side of Wallhallow Street comprises a mix of multi-unit residential and detached residential housing. The site is approximately 250 metres walking distance from the Hawker Group Centre (off Beetaloo Street) which offers a range of retail, commercial and community services. The site is approximately 2 kilometres from the Belconnen Town Centre which offers high level retail, commercial, entertainment and community services for the District of Belconnen.
Site Description:	Block 9 Section 3 Hawker
Area:	12,698m^2
Lessee:	Pelle Projects Pty Ltd; Regional Investments Pty Ltd
Current Land Use	Block 9 has been used as the Hawker Tennis Centre since the early to mid-1970s but ceased commercial operation in 2012. It accommodated 12 tennis courts, a brick club house, a caretaker residence and a private swimming pool.
Topography	Contour plans of Block 9 indicate a slight fall to the west. Terracing has occurred on the western side of Block 9 which results in a drop of approximately 1.5m to the tennis courts on this side.
Habitat	Native trees surround the eastern, southern and western boundaries of Block 9 and also dissect the middle of the block from north to south.

Easements	ACTMAPi confirms that there are no easements located on Block 9.
Contamination	There are no known contaminants on Block 9 (refer Douglas Partners Site Investigation Report, May 2016).
Utilities	Block 9 is connected to all utilities including water, sewer, electricity, telephone, and gas services.
Vehicle Access:	Vehicular access to Block 9 is provided from Walhallow Street, via a concrete driveway to a manager's residence. It is proposed to retain the existing vehicle access for the site. However, it is also proposed to provide a separate access to a car parking area for the Child Care via the existing public car park (Block 10) located between the site and Walhallow St.
Road Network	Walhallow St connects with both Delamere Street and Beetaloo Street (both of which serve as collector roads). Beetaloo Street connects to the sub-arterial and arterial road systems via Belconnen Way.
Pedestrian/Cycle Access	The site is well connected to adjacent pedestrian/bicycle paths.
Public Transport	There are several ACTION bus routes along Beetaloo Street (120m east of the site), which provide access to Belconnen bus station, and subsequently to other districts.
Car Parking	There is no existing car parking on Block 9. Block 10 (unleased Territory Land) was developed as a parking area for the Tennis Centre. However, since the tennis facility ceased commercial operation, Block 10 has effectively remained un-used with only occasional use by visitors to surrounding areas including some overflow for the Hawker Sporting Fields. It is estimated that Block 10 provides approximately 40 car spaces.

Figure 3-1: Wider Context



Source: ACTMAPi

Figure 3-2: Local Context



Source: ACTMAPi

Figure 3-3: Subject Site



Source: ACTMAPi

4.0 Planning Context

This section outlines the statutory and strategic planning context for the site.

4.1 National Capital Plan

The site is not located within a Designated Area nor is it subject to special requirements under the National Capital Plan.

4.2 Planning & Development Act (Section 120)

In deciding a development application for a development proposal in the merit track, the decision-maker must consider the following:

(a) the objectives for the zone in which the development is proposed to take place;

(b) the suitability of the land where the development is proposed to take place for a development of the kind proposed;

(c) if an environmental significance opinion is in force for the development proposal—the environmental significance opinion;

(d) each representation received by the authority in relation to the application that has not been withdrawn;

(e) if an entity gave advice on the application in accordance with section 149 (Requirement to give advice in relation to development applications)—the entity's advice;

(f) if the proposed development relates to land that is public land—the public land management plan for the land;

(g) the probable impact of the proposed development, including the nature, extent and significance of probable environmental impacts.

The above requirements have been satisfied as part of supporting documentation submitted with the Development Application, including:

(a) Section 4.3 of this report considers the objectives of the Zone.

(b) Section 6.0 of this report considers the suitability of the land.

(c) No ESO is required.

(d) Any representations to be considered by ACTPLA after public notification of the DA.

(e) Entity advice to be considered by ACTPLA after referral of the DA.

(f) The site is not public land

(g) Section 6.0 of this report considers the probable impact of the development

4.3 Territory Plan

The site is currently zoned PRZ2 Restricted Access Recreation under the Territory Plan. The relevant zone objectives are as follows:

a) Accommodate facilities that will meet the recreational needs and demands of the community and are appropriately located for the potential users of the facility

b) Make provision for a range of sport and recreation facilities, whether in public or private ownership that may be commercial in nature

c) Ensure the amenity of adjoining development is not unacceptably affected by the operation of sport and recreation facilities, particularly in terms of noise, traffic, parking, privacy and outside lighting at night

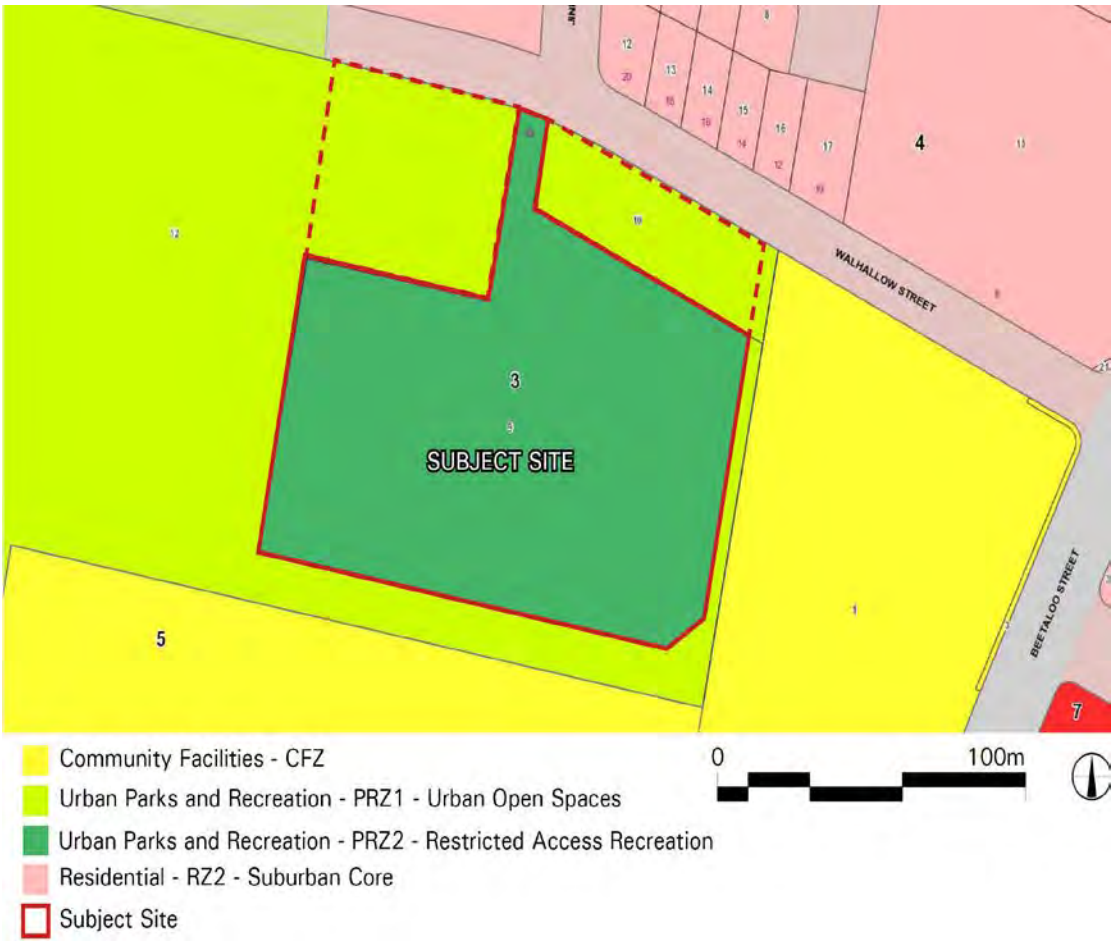
d) Design and landscaping of development is to be compatible with the surrounding landscape

It is considered that the proposed lease variation to add ***COMMUNITY USE, limited to Child Care Centre*** to the crown lease is consistent with the above objectives.

A **Child Care Centre** is a permitted use within the PRZ2 Restricted Access Recreation Zone.

Statements against Criteria for all relevant codes are provided in this report (Attachment A - D) and conclude that the proposed lease variation will not have any adverse impact on the surrounding area.

Figure 4-1: Territory Plan Extract



Source: ACTMAPi

5.0 Crown Lease Amendment

The Crown Lease for Block 9 was granted on 14 October 1977 for a period of 99 years, terminating on 13 October 2076.

The existing Lease Purpose Clause states that:

3(c) To use the premises only for the purpose of a tennis centre the sale and hire of tennis equipment and subsidiary thereto a single unit private dwelling house.

The proposed lease variation is to replace the existing lease purpose clause by inserting the following clause at 3(a):

> *"To use the premises only for one or more of the following purposes:*
>
> i. *tennis centre, the sale and hire of tennis equipment and subsidiary thereto a single unit private dwelling house*
>
> ii. *COMMUNITY USE limited to Child Care Centre"*

A Concept Plan (Figure 5-1) shows access/egress from an existing driveway cross-over. A Parking Plan shows existing, and proposed parking to accommodate the proposed development.

Figure 5-1: Concept Plan



Source: Purdon Planning, 2016

6.0 Impact Assessment

This section discusses the impact of the proposed lease variation for the subject site and confirms the suitability of the site for the proposed use.

Land Use:	The proposed development is consistent with existing land use zoning and would be consistent with the urban fabric of the surrounding area.
Car Parking:	The concept site plans submitted with the application demonstrate that sufficient car parking for the child care centre can be provided on-site.
Access:	Access/egress of an existing cross-over on Wallhallow Street.
Traffic:	The proposed development will not have any adverse impact on adjacent land uses or street capacity.
Noise:	The proposed development will not have any adverse noise impact on adjacent land uses.
Contamination:	A Contamination Report has been prepared by Douglas Partners (May 2016) and confirms that the site is not contaminated and is suitable for use as a Child Care Centre. (Refer separate report submitted with the DA).
Trees:	This proposal is for a lease variation only there will be no impact on trees as a result of this DA.

7.0 Conclusion

This report is submitted as part of a DA for lease variation for Block 3 Section 9 Hawker.

The Planning Report describes the proposed lease variation, outlines the planning context for, together with its impact on adjacent areas and assesses the proposal against relevant Codes in the Territory Plan.

The current DA has been lodged as a merit track proposal.

The application is consistent with the relevant aspects of the Hawker Precinct Map and Code, Parks and Recreation Zones Development Code, Lease Variation General Code, and Community and Recreation Facilities Location Guidelines General Code.

The site Concept Plan demonstrates that a child care centre could be located on the site with access/egress, parking, building footprint and outdoor play area consistent with current planning and design provisions for a child care centre

It is **recommended** that EPD support the proposed Crown Lease Variation.

Purdon Planning
June 2016

Attachments

Attachment A: Statement against Hawker Precinct Code

Attachment B: Statement against Parks & Recreation Zones Development Code

Attachment C: Statement against Lease Variations General Code

Attachment D: Statement against Community and Recreation Facilities Location Guidelines General Code

Attachment A: Hawker Precinct Code

The Hawker Precinct Code applies to the subject site. However, the Code's rules and criteria predominantly provide planning controls for new building development within the Hawker Group Centre. No relevant rules and criteria are applicable to the proposed lease variation.

Attachment B: Parks & Recreation Zones Development Code

The Parks & Recreation Zones Development Code applies to the subject site. However, the Code's rules and criteria predominantly provide planning controls for new building development. No relevant rules and criteria are applicable to the proposed lease variation.

Attachment C: Lease Variation General Code

Rule	Criteria
1.1 Varying leases – general	
There is no applicable rule.	C1 A lease is varied only where all of the following are achieved: i) the varied lease is consistent with the Territory Plan including all relevant codes ii) the land to which the lease applies is suitable for the development or use authorised by the varied lease.
Response: The proposed Lease Variation to include Community Use limited to Child Care Centre complies with Criterion C1. The use is a permissible use under the Parks and Recreation Zone Development Table. The subject site has an overall area of 1.27ha. A child care centre would occupy only part of the subject site (approximately 2,500-3,000m^2, or 20-25% of the site). The remaining area would remain available for use in accordance with the lease and zoning. The land is considered suitable for the proposed Child care centre use as demonstrated through the responses to Criterion C3 of the Lease Variation Code and the general response to the Community and Recreation Facilities Location Guidelines General Code.	
2.1 Increasing rights	
There is no applicable rule	C2 A right under a lease is increased only when all of the following are achieved if the additional rights are granted and activated: i) sufficient car parking is provided on site or is available off site in accordance with the Parking and Vehicular Access General Code ii) any increase in traffic flow is within the capacity of the surrounding road network iii) adequate post occupancy waste management and disposal can be provided to the relevant Territory standard iv) no unreasonable increase in the level of noise for the occupants of dwellings on the block or on adjoining land. *Note: examples of rights are the maximum gross floor area, the maximum floor area allocated to a particular use, building heights.*
Response: Not Applicable as the Lease Variation Application does not propose any change to any "rights" under the lease (such as maximum gross floor area, the maximum floor area allocated to a particular use, building heights).	
3.1 Adding uses generally	
There is no applicable rule.	C3 An additional use is authorised by a lease only when all of the following are achieved if the additional use is granted and activated: i) sufficient car parking is provided on site or is available off site in accordance with the Parking and Vehicular Access General Code ii) any increase in traffic flow is within the capacity of the surrounding road network iii) adequate post occupancy waste management and disposal can be provided to the relevant Territory standard

Rule	Criteria
	iv) no unreasonable increase in level of noise for the occupants of dwellings on the block or on adjoining land v) no unreasonable risk to occupants of the block through any contamination of the block or on adjoining land vi) no unreasonable level of odour for the occupants of dwellings on the block or on adjoining land vii) no unreasonable level of light emission for the occupants of dwellings on the block or on adjoining land.

Response: Complies with Criterion C3 as :

i) The concept site plans submitted with the application demonstrate that sufficient car parking for the child care centre can be provided on-site

ii) The traffic flow generated by the child care centre is within the capacity of the surrounding road network.

iii) The concept site plans submitted with the application demonstrate that adequate waste management facilities for the child care centre can be provided on-site

iv) A child care centre is not a noise generating use and therefore not Noise Management Plan is required to accompany the DA. The site is suitable for use as a Child Care Centre on noise grounds.

v) A Contamination Report has been prepared by Douglas Partners confirming that the site is not contaminated and is suitable for use as a Child Care Centre. (Refer separate report submitted with the DA).

vi) It is not considered that the Child Care Centre will generate any odours that will have any impact on residents on the northern side of Walhallow St. It is also not considered that any odours generated from the Belconnen Bowling Club have any impact on the subject site.

vii) The child care centre would operate generally between 7.00am and 6.00pm and as such, would not generate any unreasonable light emissions to nearby residents.

4.1 Community and Recreational Facilities	
There is no applicable rule.	C4 Community facilities or recreational facilities that are authorised by a lease comply with the Community and Recreational Facilities Location Guidelines General Code.

Response: Complies with Criterion C4 – refer to separate assessment against Community and Recreational Facilities Location Guidelines General Code (Attachment D).

4.3 Secondary residence	
R6 A variation to a lease to authorise a secondary residence is approved only where the block affected by the lease is 500m or larger.	This is a mandatory requirement. There is no applicable criterion.

Response: Not Applicable – No secondary residence proposed.

Rule	Criteria
5.1 Expressing the number of dwellings	
R7 A variation to a lease that expresses the number of approved or lawfully erected dwellings is consistent with both of the following: a) all other provisions of the lease b) the Territory Plan, including all relevant codes.	This is a mandatory requirement. There is no applicable criterion.
Response: Not Applicable – No residential use proposed.	
6.1 Removing relocating or changing easements	
R8 A proposal to vary a lease to remove, relocate or change easements is consistent with both of the following: a) is supported by written endorsement from the relevant service provider b) is supported by drawings and information demonstrating that easements are not required or are provided elsewhere on the land.	This is a mandatory requirement. There is no applicable criterion.
Response: Not Applicable – Site is not affected by any easements	

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Attachment D: Community and Recreation Facilities Location Guidelines General Code

The Community and Recreation Facilities Location Guidelines General Code (CRFLGGC) outlines the criteria for the locational requirements of community and recreation land uses. The proposed Lease Variation limits any Community Use to a Child Care Centre. The following is a summary of the provisions of the CRFLGGC Code relating to Child Care Centres:

Child Care Centre

Relationship to Shops - Near retail centre (for occasional care)

Relationship to other uses (Close to) – Long day care centres on major work routes, or easy vehicle access near major work places. Only small centres in residential areas; on pedestrian path/open space system where possible

Relationship to other uses (Separated from) – Social separation from correction facilities. Buffered from sight, smell, fumes and noise of industrial uses and from roads with high traffic volumes (refer to air quality guidelines). Separated from safety hazards (e.g. water bodies; busy roads)

Co-location Opportunity - Pre-School or primary school for long day care; Recreation facility or community centre/ house for occasional care centre; neighbourhood centre; Baby health clinic; Long day care with occasional care or at major workplaces

Other Issues – Child care centres must be licensed by the Children's Youth & Family Services Bureau. Requirements include minimum standards for building size and play area. The Bureau must be consulted in the process of site selection. Play areas should have north easterly orientation. Cul-de-sac sites acceptable if there is street capacity to handle traffic generated by the centre; corner blocks acceptable if safe access to site provided.

Response:

- The site is approximately 250m from the Hawker Group Centre.
- The site is within general proximity of major work routes (Belconnen Way, William Hovell Drive).
- The site is not near any correction facilities or industrial uses. Walhallow St is not considered to have a high traffic volume (generating air quality concerns). There are no safety hazards such as water bodies) near the site.
- The site is adjacent to the Belconnen High School and various recreation facilities including district playing fields, softball centre and enclosed oval.
- Any future development for a Child Care Centre will be licenced by Children's Youth and Family Services.
- The size of the site allows a range of design opportunities where the play areas are able to achieve a north-easterly orientation.

It is considered that proposed Lease variation to include COMMUNITY USE limited to Child Care Centre in the Lease Purpose Clause for Block 3 Section 9 Hawker is consistent with the CRFLGGC.

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Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Preliminary Site Investigation

Proposed Child Care Centre
Block 9 Section 3, Hawker, ACT

Prepared for
Purdon Planning Pty Ltd

Project 88309.00
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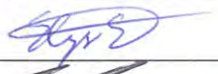
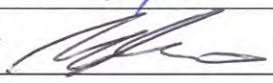
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Executive Summary

This report presents the results of a preliminary site investigation (PSI) undertaken for a proposed child care centre at Block 9 Section 3, Hawker, ACT. The investigation was commissioned in an email dated 2 May 2016 by Mr Rob Purdon of Purdon Planning Pty Ltd and was undertaken in accordance with Douglas Partners' proposal CAN160081 dated 21 April 2016. This PSI will support a Development Application for the proposed development of the site as a child care centre which will include a building, play area and car park.

The objectives of the PSI were to:

- Assess the potential for contamination at the site based on past and present site uses;
- Identify potential areas of environmental concern (PAEC);
- Determine the contaminants of concern; and
- Comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site for the proposed development of the site as a child care centre (i.e. community land use and considered equivalent to a residential land use with accessible soil).

This PSI comprised a review of historical information and a site walkover for the presence of a suite of commonly found contaminants.

The site comprises an irregular shaped area, approximately 12,698 m², occupied by a building which includes a residence and an attached area for the operation of a tennis court centre. A driveway accesses the residence part of the building from Walhallow Street. The remainder of the site is generally occupied by tennis courts. There is a central area south of the main building that is grassed with a pergola in the centre. An area of grass is also located to the north of the tennis court centre. Garden areas with mature shrubs and trees are noted around the tennis courts and building. The site slopes generally to the west from 630 m AHD to 626 m AHD.

The site is bounded by a car park and Walhallow Street to the north, a lawn bowling club to the east, and sporting fields to the south and west. The surrounding land uses are sporting fields and facilities to the west and south, and residential to the east and north.

Based on observations made during the site history review and site walkover the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with the building, tennis courts, paved areas, historical disturbed ground and historical dirt tracks. Potential contaminants associated with fill from unknown and contaminated sources are: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochloride pesticides (OCP); phenols and asbestos.
- Potential impacts from hazardous building materials associated with building on the site. Potential contaminants associated with hazardous building materials are: asbestos, Pb, PCB and synthetic mineral fibres (SMF).
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are: asbestos-containing materials (ACM).

Potential sources of contamination observed on site are shown on Drawings 1 and 2, Appendix B. However, it should be noted that other fill areas not identifiable on aerial photographs or via surface walkover, could be present.

Areas that may be impacted by potential contamination were identified on the basis of the available site information and site walkover. Based on the findings of the assessment, the potential for gross contamination to be present within the site is considered to be low.

The results of the investigation indicate that the proposed the child care centre location is generally suitable for the intended community land use (considered equivalent to a residential land use with accessible soil) subject to the following:

- An intrusive subsurface investigation to determine the extent (if any) of potential contamination at the site targeting the unknown filling.

It is considered that the parts of the site to remain as a residence and tennis centre are suitable for their current land use. However this area would need to be further investigated if the land use were to change in the future.

For any future development a construction environmental management plan (CEMP) is recommended and should include an “unexpected finds protocol” to address the potential contamination and the bonded ACM encountered and a “safe working methodology” if disturbance of the underground infrastructure is proposed

If soil is proposed to be removed from the site it must be stockpiled first and tested for the listed contaminants and subjected to a formal waste classification assessment with reference to the ACT’s *Environmental Standards: Assessment & Classification of Liquid and Non-Liquid Wastes* (Ref 5).

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Appendix A: About This Report

Appendix B: Drawing 1: Site Historical Observations
Drawing 2: Site Observations and Features

Appendix C: Site History Searches

Appendix D: Historical Aerial Photographs (Six Plates)

Appendix E: Historical Building Plans (Four Plates)

Appendix F: Site Photographs (Seven Plates)

Report on Preliminary Site Investigation
Proposed Child Care Centre
Block 9 Section 3, Hawker, ACT

1. Introduction

This report presents the results of a preliminary site investigation (PSI) undertaken for a proposed child care centre at Block 9 Section 3, Hawker, ACT. The investigation was commissioned in an email dated 2 May 2016 by Mr Rob Purdon of Purdon Planning Pty Ltd and was undertaken in accordance with Douglas Partners' proposal CAN160081 dated 21 April 2016. This PSI will support a Development Application for the proposed development of the site as a child care centre which will include a building, play area and car park. It is noted that the child care centre will be located within the easternmost portion of Block 9 however this investigation has been requested to cover the entire block.

The objectives of the PSI were to:

- Assess the potential for contamination at the site based on past and present site uses;
- Identify potential areas of environmental concern (PAEC);
- Determine the contaminants of concern; and
- Comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site for the proposed development of the site as a child care centre (i.e. community land use and considered equivalent to a residential land use with accessible soil).

This PSI comprised a review of historical information and a site walkover for the presence of a suite of commonly found contaminants.

This report must be read in conjunction with the notes *About this Report* which are included in Appendix A.

2. Scope of Work

The following scope of work was conducted for the investigation:

- A desktop study of available maps and plans;
- A review of registered groundwater bores located within a 1 km radius of the site obtained through the ACT Groundwater Abstraction Bore Register;
- Review of site history information incorporating:
    - o A review of ACT Government records through the ACT Environment's Contaminated Land Register;

- A WorkSafe ACT records search for Registered Dangerous Substances;
- A review of historical title deed information obtained through the Land Titles Office; and
- A review of selected historical aerial photography archived with the ACT Planning and Land Authority and ACTmapi.act.gov.au.

- Site walkover by an environmental engineer; and
- Preparation of this PSI report presenting the findings of the investigation, identification of potential sources of contamination, and an assessment of the need for further investigations and/or management.

3. Site Identification and Description

3.1 Site Identification

The site identification information is summarised as follows:

Table 1: Site Identification Details

Item	Details
Site Owner/ Occupiers	Pelle Projects Pty Ltd Regional Investments Pty Ltd
Site Address	19 Walhallow Street, Hawker
Current land use	Residence and Tennis Court Centre
Block and Section Number (see Drawing 1, Appendix B)	Block 9 Section 3
Territory Plan Zoning	PRZ2: Restricted Access Recreation Zone
District	Belconnen District
Approximate Site Area	12,698 m²
Proposed future land-use	Child care centre

3.2 Site Layout and Description

The general layout of the site is provided on Drawing 1, Appendix B. The site comprises an irregular shaped area occupied by a building which includes a residence and an attached area for the operation of a tennis centre. A driveway accesses the residence part of the building from Walhallow Street. The remainder of the site is generally occupied by tennis courts. There is a central area south of the main building that is grassed with a pergola in the centre. An area of grass is also located to the north of the tennis court centre. Garden areas with mature shrubs and trees are noted around the tennis courts and building. The site slopes generally to the west from 630 m AHD to 626 m AHD.

The site is bounded by a car park and Walhallow Street to the north, a lawn bowling club to the east, and sporting fields to the south and west. The surrounding land uses are sporting fields and facilities to the west and south, and residential to the east and north.

4. Proposed Development

The proposed development comprises a child care centre within the easternmost portion of the site. The centre would include a building, play area and car park. It is understood that the remainder of the site will continue as it currently exists and that the building will not be demolished. The location for the child care centre is up-gradient from the rest of the site. Drawing 2, Appendix B, shows the proposed location for the child care centre.

5. Regional Soils, Geology and Hydrogeology

5.1 Regional Soils

Reference to the 1:100 000 'Canberra Soil Landscape' Series Sheet 8727 (Ref 1) indicated that the site is mapped as being on the Williamsdale Soil Group.

The Williamsdale Soil Group is characterised by undulating rises, alluvial fans and valley flats on Silurian Volcanics of the Canberra Formation. Generally, little or no rock outcrops occur within this soil group. Soils are moderately deep, well drained podzolic soils, red and brown earths on upper rises and fan elements and moderately to very deep, poorly to imperfectly drained, solodic soils on lower rises and fan elements. This soil group is limited by its erodible and dispersible nature, its acidity, potential for seasonal water-logging and localised flooding hazard.

5.2 Regional Geology

Reference to the Canberra 1:100 000 Geological Series Sheet (Ref 2) indicated that the site is underlain by the Walker Volcanics. This unit typically comprises purple and greenish-grey dacitic ignimbrite.

5.3 Hydrogeology

The nearest surface water receptor is Lake Ginninderra approximately 2.5 km to the north east of the site. However, it is considered likely the groundwater would flow towards to the west, conforming to the topographic slope.

The 1:100,000 map Hydrogeology of the Australian Capital Territory and Environs (Ref 3) indicated that the site is underlain by geological units of late Middle Silurian aged. These typically include: andesitix, dacitic, rhyodacitic ignimbrite, minor ashstone, shale, sandstone, limestone and disseminated sulphides. The unit is typically fractured, higher yielding zones are associated with the upper and lower portions of the individual ash-flow and interbedded sediments. Groundwater quality

tends to be poor. The likely yield of the groundwater aquifer is indicated to be less than 0.5 L/s with total dissolved solids (TDS) of between 500 mg/L and 1000 mg/L.

5.4 Groundwater Bore Search

A search of the groundwater bore register was conducted through the ACT Environment Protection and Water Regulation Section of the Environment and Sustainable Development Directorate (for a copy of correspondence, refer to Appendix C). Based on the records of the Water Resources, there are no privately managed groundwater abstraction bores registered under the *Water Resource Act* 2007 within a 1 kilometre radial search area of the site.

6. Site History

The following sections describe the methodology and outcomes of the brief site history review.

6.1 Regulatory Notices Searches

A search was conducted through the ACT Directorate of Environment and Planning's Environment Protection Authority (EPA) for regulatory notices that exist for the site (letter dated 16 May 2016 refer to Appendix C).

The search indicated that, based on the records of the EPA, the site is not recorded on the contaminated sites management database or geographic information system.

The site is currently occupied by a commercial complex. Commercial complexes, prior to the introduction of natural gas to the ACT in the 1980's, utilised boiler heating or similar systems. These systems were generally fuelled by diesel or heating oil which was mainly stored in underground fuel storage tanks.

Other potentially contaminating activities may have also been undertaken at the site associated with current and past uses including the use of the site as tennis courts.

Tennis courts have in the past been associated with site contamination due to the application and storage of certain chemicals for the control of weeds and pests, and may have been subject to uncontrolled filling during the establishment of the site.

6.2 ACT WorkSafe Records Searches

A search of the ACT WorkSafe's records of the Dangerous Goods Act, 1975, database and the current Dangerous Substances Act, 2004, register (letter dated 13 May 2016, refer to Appendix C) revealed that there are no records held for Block 9 Section 3, Hawker under the current Dangerous Substances Register. It is also noted that under the Dangerous Goods ACT 1975 (1975 to April 2004), diesel tanks of 50,000 L or less were not required to be licensed with WorkCover.

6.3 Historical Title Search

A Land Titles search at the ACT Office of Regulatory Services (ORS) on 17 May 2016 indicated that Block 9 Section 3, Hawker was leased from 14 October 1977 (lease granted on 7 February 1986) on a lease terminating 13 October 2076 to tenants in common; Pelle Projects Pty Ltd and Regional Investments Pty Ltd of 3 Sargood Street O'Connor ACT 2603 in Equal Shares. A variation of lease was lodged on 29 October 1996. A transfer was lodged on 23 September 2009 and 8 October 2015. There are no records of the site held by ORS prior to this.

6.4 Historical Aerial Photography

Historical aerial photographs from six periods of photography, archived by the ACT Planning and Land Authority and ACTmapi.act.gov.au were reviewed (refer to Aerial Photograph Plates D1 to D7 in Appendix D). The photographs indicated that the site has undergone considerable changes in layout since the earliest available aerial photograph dated 1958. Aerial photographs examined were as follows:

- 3 May 1958 (Run 3, 1:10,330, B/W);
- 16 May 1968 (Run 7, 1:14,000, B/W);
- 26 April 1975 (Run 75c9, 1:2,300, Colour);
- 3 March 1983 (Run 10, 1:7,300, Colour);
- 3 May 1990 (Run 10, 1:2,225, Colour);
- 2004 (Colour).

The historical aerial photographs were examined for signs of potential areas of environmental concern such as planting patterns, previous structures which may have subsequently been removed, existing structures, stripped soil or areas of fill or disturbance or other signs of a potentially contaminating nature. The findings of the review are summarised below and have been illustrated on Drawing 1, Appendix B:

1958 Aerial Photograph (Plate D1):

- The site appeared to have been arable farmland;
- A few mature trees were noted on the site;
- A creek flowed to the west of the site in a south to north orientation;
- A road was noted to the north of the site in an east to west orientation; and
- The surrounding area appeared to be arable farmland.

1968 Aerial Photograph (Plate D2):

- The site and surrounding area generally remained the same as the *1958 Aerial Photograph*; and
- Some disturbance, the beginning of a residential development, was noted to the north east.

1975 Aerial Photograph (Plate D3):

- Part of the western portion and most of the north eastern portion of the site were disturbed likely by the general development surrounding the site;

- Dirt tracks ran along the southern, eastern and western boundaries. Two dirt tracks were noted through the centre of the site perpendicular to each other in a north to south orientation and a west to east orientation;
- Walhallow Street was constructed to the north of the site;
- Sporting fields were constructed to the south of the site and the lawn bowling club was constructed to the east; and
- The surrounding suburb of Hawker was under development or had been developed.

1983 Aerial Photograph (Plate D4):

- A building had been constructed within the north central portion of the site;
- Tennis courts were constructed within the eastern portion of the site;
- Pathways were visible from the building south and east to the tennis courts:
- The western portion of the site was grassed with dirt tracks crossing through in various directions;
- Additional sporting fields were constructed to the west of the site; and
- A car park was located to the north of the site;

1990 Aerial Photograph (Plate D5):

- Additional tennis courts had been constructed within the western portion of the site; and
- The site and surrounding area remained generally the same as the *1983 Aerial Photograph*.

2004 Aerial Photograph (Plate D6):

- The site and surrounding area remained generally the same as the *1990 Aerial Photograph*.

It is noted that data obtained from aerial photos was limited due to the relatively small scale and poor resolutions when enlarged.

6.5 Historical Building Plans

Available building plans for the site including a 'Site Plan' and 'Floor Plan' for the 'Proposed Tennis Centre' both dated December 1977, a 'Proposed Extension Plan' dated August 1981, and a 'Proposed Pergola and Tennis Courts to be Erected' dated July 2009 were obtained from the ACT Planning and Land Authority (refer to Appendix E).

The Site Plan from 1977 shows the proposed layout of the site including the tennis courts and the building which was to incorporate a residence, amenities and store room for the tennis centre, and garage. A Floor Plan also from 1977 shows the proposed layout of the building including the layout of the residence and the amenities area. A swimming pool was proposed in the Proposed Extension Plan from 1981. The site layout plan from 2009 showed proposed additional tennis courts.

There was no evidence of an aboveground or underground fuel storage tank or boiler used for heating oil in the building plans available.

6.6 Underground Services

A Dial Before you Dig (DBYD) search was conducted to access available services plans to give an indication of potential conduit lines for migration of contamination off-site. The services were noted as follows:

- Electricity:
  - enters the site at the south western corner and turns to the north within the centre of the site. Overhead electricity is noted entering the site from Walhallow Street to access the building from where underground electricity accesses various parts of the building.
- Water:
  - aligned along the eastern and part of the northern boundary.
- Sewer:
  - aligned along the southern and western boundary, and enters the site at the northern boundary from Walhallow Street.
- Communication:
  - enters the site along the northern boundary and accesses the building.

6.7 Site Interview

The tenant of the residence, Mr. Salvio, was interviewed on 26 May 2016. The tenant did not have access to the tennis centre section of the building however noted the following:

- Heating in the residence was electric;
- The tennis centre contained toilets/showers, a main room with chairs and a kitchenette that also had some storage area;
- The tennis centre was rarely used;
- The kitchenette in the tennis centre had an electric stovetop;
- There was no knowledge of there being a boiler for heating oil at the tennis centre or at the residence; and
- There was also no knowledge of any herbicides or pesticides being used on the site or currently stored on the site.

7. Site Walkover

A site walkover was undertaken on 26 May 2016. The site walkover was undertaken to check and identify (where possible) the likely presence, or otherwise, of potential sources of contamination with reference to the site history review, and to identify and comment on additional potential sources of contamination which were encountered/observed. Drawing 2 (Appendix B) and Photographs 1 to 13 (Appendix F) show the layout of the site.

The site walkover confirmed that the site is currently occupied by a building which includes a residence and an attached tennis centre. The remaining areas of the site are generally occupied by tennis courts.

The residence is in a separate area that is fenced off from the rest of the site with its own driveway entrance, walled garden and disused swimming pool. The area of the tennis centre comprises a small main room with some chairs, toilets, and a kitchenette with an area for storage. The inside was not

accessible during the site walkover, however, from the outside the interior looked disused. There did not appear to be signs of a boiler or aboveground/underground fuel storage around the tennis centre. It also appeared to be an area designed for a small scale operation. Some plastic furniture was noted just outside to the south of the building under a roof cover. Pathways lead to the tennis centre from the car park to the north of the site around a grassed area; see Photographs 1 to 3, Appendix F.

The tennis court surfaces appeared to be a combination of hardcourt and artificial grass. These appeared to be in various conditions from fairly good to poor. Those in a poor condition had cracks in the courts some with weeds growing through and were water logged. Each of the tennis court areas were fenced with paths between them to allow access. A 15 L paint container was noted near the tennis courts however this was broken and contained soil; see Photographs 4 to 9, Appendix F.

Areas of vegetation including shrubs and trees were located in between the different tennis court areas and around a tennis wall court in the southern central portion of the site. The vegetation was mostly overgrown. However the area near the building looked to be less overgrown and an area south of residence appeared to have been recently cleared. Scattered rubbish such as old wooden benches, plastic bottles and food wrappers were noted around the tennis courts. It did not appear that herbicides had been used recently at the site. Trees were also noted lining the southern boundary of the site; see Photographs 10 to 12, Appendix F.

A grassed area was located just to the south of the tennis centre part of the building. A number of concrete paths crossed through here to the tennis courts. A pergola was also noted in the centre, with other pergolas noted around the tennis courts in the western portion of the site; see Photographs 9 and 13, Appendix F.

No asbestos-containing material was noted during the site walkover. Buried services were noted within the site including electricity and stormwater.

The principal observations (see Drawing 2, Appendix B) made during the walkover which could be potential sources of contamination on the site included:

- Filling associated with the construction of the building, tennis courts and paved areas; refer to Photograph 1 to 9 and 13, Appendix F.

The site is bounded by a car park and Walhallow Street to the north, a lawn bowling club to the east, and sporting fields to the south and west. The surrounding land uses are sporting fields and facilities to the west and south, and residential to the east and north. It is considered that the potential for migration of contaminants onto the site from current adjacent land uses is low.

8. Potential for Contamination

The site history review indicated that the site was arable farmland at least from 1958. The site was disturbed between 1968 and 1975 likely from the development of the surrounding area. Between 1968 and 1975 the building was constructed along with the tennis courts within the eastern portion of the site. Between 1983 and 1995 tennis courts were constructed in the western portion of the site.

Uncontrolled filing is considered possible from the construction of the building, tennis courts and paved areas. Also due to the age of the building it is possible that hazardous materials included asbestos were used in its construction.

The search of the ACT Directorate of Environment and Planning's indicated that, based on the records of the EPA, the site not is recorded on the contaminated sites management database or geographic information system. The search did note that the site is currently occupied by a commercial complex. Commercial complexes, prior to the introduction of natural gas to the ACT in the 1980's, utilised boiler heating or similar systems.

The EPA search also noted that other potentially contaminating activities may have also been undertaken at the site associated with current and past uses including the use of the site as tennis courts. Tennis courts have in the past been associated with site contamination due to the application and storage of certain chemicals for the control of weeds and pests, and may have been subject to uncontrolled filling during the establishment of the site.

Historical building plans from ACT Planning and Land Authority showed that most of the building has been a residence since its construction with only a small section designated for the operation of the tennis centre. There was no indication of a boiler for heating oil or any fuel storage tank used for the tennis centre on the building plans.

The site walkover confirmed that the site is currently occupied by a building which includes a residence and an attached tennis centre. The remaining areas of the site are generally occupied by tennis courts. Some of the tennis courts appeared to be in disrepair and due to the overgrown vegetation generally around the site it appeared that herbicides and likely pesticides as well had not been used recently. Scattered rubbish, such as old wooden benches, plastic bottles and food wraps, were noted around the tennis courts. Buried services were also noted within the site.

A site interview indicated no knowledge of storage or use of herbicides and pesticides at the site. There was also no knowledge of a boiler for heating oil or any fuel storage.

It is considered that due to the small scale of the tennis centre operation, attached to a residence, it is very unlikely a boiler used for heating oil in commercial complexes was located at the site. It is possible that herbicides and pesticides were used on the site at some point in the past. However considering the overgrown vegetation and disrepair of many of the tennis courts, it is likely some time has lapsed since either herbicides or pesticides were used, therefore it is considered unlikely that there would be residual impacts from the past use.

Based on observations made during the site history review and site walkover the main sources of potential contamination are considered to be:

- Potential impacts from filling associated with the building, tennis courts, paved areas, historical disturbed ground and historical dirt tracks. Potential contaminants associated with fill from unknown and contaminated sources are: metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), zinc (Zn); total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene, xylene (BTEX); polycyclic aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); organochloride pesticides (OCP); phenols and asbestos.

- Potential impacts from hazardous building materials associated with building on the site. Potential contaminants associated with hazardous building materials are: asbestos, Pb, PCB and synthetic mineral fibres (SMF).
- Potential impacts from buried services on the site. Potential contaminants associated with buried services are asbestos-containing materials (ACM).

Potential sources of contamination observed on site are shown on Drawings 1 and 2, Appendix B. However, it should be noted that other fill areas not identifiable on aerial photographs or via surface walkover, could be present.

9. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding potential contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

9.1 Potential Contamination Sources

Based on Section 8 the potential contamination sources are as follows:
S1 – Filling (metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos).
S2 – Hazardous building materials and buried service infrastructure (asbestos, Pb, PCB and SMF).

9.2 Potential Receptors

9.2.1 Human Health Receptors

Potential human health receptors include the following:
R1 – Current users (resident and visitors).
R2 – Construction and maintenance workers.
R3 – Final end users (community and commercial).
R4 – Land users in adjacent areas (community and residential).

9.2.2 Environmental Receptors

Potential environmental receptors include the following:
R5 – Groundwater.
R6 – Terrestrial ecology.
R7 – Surface water.

Groundwater quality (R5) tends to be poor in the area (Section 5.3) therefore it is proposed that leachability testing will be undertaken only if a viable complete pathway between on-site soil contamination and groundwater is identified.

9.3 Potential Pathways

Potential pathways for contamination present include the following:
P1 – Ingestion and dermal contact.
P2 – Inhalation of dust and/or vapours.
P3 – Surface water run-off.
P4 – Leaching of contaminants and vertical mitigation into groundwater.
P5 – Lateral migration of groundwater providing baseflow to watercourses.
P6 – Direct contact with terrestrial ecology.

There are no likely preferential pathways for contamination as there are no sources of mobile contamination such as hydrocarbons or gas substances that would migrate offsite along this pathway.

9.4 Summary of Potential Complete Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (potential complete pathways). The possible pathways between the above sources (S1 and S2) and receptors (R1 to R7) are provided below in Table 2.

Table 2: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor	Comments
S1 – Filling: metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos.	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (resident and visitors). R2 – Construction and maintenance workers. R3 – Final end users (community and commercial).	An intrusive investigation is required to assess possible contamination including chemical testing of the soils.
	P2 – Inhalation of dust and/or vapours.	R4 – Land users in adjacent areas (community and residential).	
	P4 – Leaching of contaminants and vertical mitigation into groundwater.	R5 – Groundwater.	An intrusive investigation is required to assess groundwater if the site is found to be contaminated. See Note 1.
	P3 – Surface water run-off. P5 – Lateral migration of groundwater providing base flow to watercourses.	R7 – Surface water (on site dam).	An investigation is required to assess the impacts on surface water if the site is found to be contaminated. See Note 2
	P6 – Direct contact with terrestrial ecology.	R6 – Ecology.	An intrusive investigation is required to assess possible contamination including chemical testing of the soils.
S2 – Hazardous building materials and buried service infrastructure Asbestos, lead, PCB and SMF.	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (resident and visitors). R2 – Construction and maintenance workers. R3 – Final end users (community and commercial).	If the building is to be refurbished or demolished in the future a pre-demolition hazardous building materials survey of the building is recommended prior to the demolition of the building. For any future development a construction environmental management plan (CEMP) is recommended and should include an “unexpected finds protocol” to address potential bonded ACM encountered and a “safe working methodology” if disturbance of the underground infrastructure is proposed

1. Leachability testing is not proposed at this stage. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then leachability testing (ASLP) may be required.
2. The nearest surface water receptor is Lake Ginninderra approximately 2.5 km to the north east of the site. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater contamination via a leachable migration pathway then groundwater testing may be required.

10. Summary

Based on the results of this PSI the following are noted:

- The site history review and site walkover indicated that the site was arable farmland at least from 1958. Between 1968 and 1975 the building which contains a residence and attached tennis centre was constructed along with the tennis courts within the eastern portion of the site. Additional tennis courts were later constructed in the western portion of the site;
- Uncontrolled filling is possible from the construction of the building, tennis courts and paved areas. Also due to the age of the building it is possible that hazardous materials included asbestos were used in its construction;
- The EPA search indicated that the site is currently occupied by a commercial complex which, prior to the introduction of natural gas to the ACT in the 1980's, utilised boiler heating or similar systems. The search also noted that other potentially contaminating activities associated with tennis courts include the application and storage of certain chemicals for the control of weeds and pests, and the use of uncontrolled filling during the establishment of the site;
- Historical building plans showed that most of the building has been a residence since its construction with only a small section designated for the operation of the tennis centre. There was no indication of a boiler for heating oil or any fuel storage tank used for the tennis centre on the building plans;
- During the site walkover some of the tennis courts appeared to be in disrepair and due to the overgrown vegetation generally around the site it appeared that herbicides and likely pesticides as well had not been used recently;
- A site interview indicated no knowledge of storage or use of herbicides and pesticides at the site. There was also no knowledge of a boiler for heating oil or any fuel storage at the site;
- It is considered that due to the small scale of the tennis centre operation, attached to a residence, it is very unlikely a boiler used for heating oil in commercial complexes was located at the site;
- Buried services were noted within the site; and
- No asbestos-containing material was noted during the site walkover.

11. Conclusions and Recommendations

Areas that may be impacted by potential contamination were identified on the basis of the available site information and site walkover. Based on the findings of the assessment, the potential for gross contamination to be present within the site is considered to be low.

The results of the investigation indicate that the proposed the child care centre location is generally suitable for the intended community land use (considered equivalent to a residential land use with accessible soil) subject to the following:

- An intrusive subsurface investigation to determine the extent (if any) of potential contamination at the site targeting the unknown filling.

It is considered that the parts of the site to remain as a residence and tennis centre are suitable for their current land use. However this area would need to be further investigated if the land use were to change in the future.

For any future development a construction environmental management plan (CEMP) is recommended and should include an “unexpected finds protocol” to address the potential contamination and the bonded ACM encountered and a “safe working methodology” if disturbance of the underground infrastructure is proposed

If soil is proposed to be removed from the site it must be stockpiled first and tested for the listed contaminants and subjected to a formal waste classification assessment with reference to the ACT’s *Environmental Standards: Assessment & Classification of Liquid and Non-Liquid Wastes* (Ref 5).

Considering the age of the existing building it is considered possible that they may contain hazardous building materials (HBM) such as asbestos, lead paint or PCB in fluorescent light fittings. Therefore it is recommended that a hazardous building materials survey is undertaken prior to refurbishment or demolition, if this is to be undertaken in the future, and if HBM are identified the footprints of the buildings and surrounding areas should be validated following demolition.

12. References

1 NSW Department of Land and Water Conservation (2000): *Canberra Soil Landscape Series Sheet 8727* 1:100 000 scale map.

2 Bureau of Mineral Resources (1992): *Geology of Canberra Geological Series Sheet 8727, 1:100 000 scale map.*

3 Bureau of Mineral Resources, Geology and Geophysics (1984): *Hydrogeology of the Australian Capital Territory and Environs* 1:100,000 scale map.

4 ACT EPA. *Contaminated Sites Environment Protection Policy*, January 2009.

5 ACT’s *Environmental Standards: Assessment, Classification & Management of Liquid & Non-Liquid Wastes*, June 2000.

13. Limitations

Douglas Partners (DP) has prepared this report for Part Block 9 Section 3, Hawker, ACT in accordance with DP's proposal dated 21 April 2016, and acceptance from Purdon Planning Pty Ltd dated 2 May 2016. This report is provided for the exclusive use of Riverview Group Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

DP’s advice is based upon the conditions observed at the site surface during this investigation. The accuracy of the advice provided by DP in this report may be affected by unobserved variations in ground conditions across the site. The advice may also be limited by budget constraints imposed by others or by site accessibility.

Asbestos containing materials (ACM) have not been detected by observation on the surface of the site. The possible presence of HBM including ACM, cannot be precluded in unobserved or untested parts of the site and hence no warranty can be given that HBM is not present.

This report must be read in conjunction with all of the attached 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 stated 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.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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.

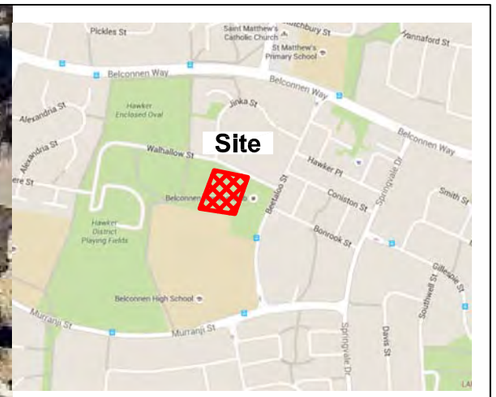
Site Inspection

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.

Appendix B

Drawing 1 – Site Historical Observations
Drawing 2 – Site Observations and Features





Locality Plan

LEGEND

- Approximate Site Boundary
- Approximate Location of Dirt Tracks noted in the 1975 Aerial Photograph
- Approximate Location of major ground disturbance noted in the 1975 Aerial Photograph
- Approximate Location of Dirt Tracks noted in the 1983 Aerial Photograph

0 10 20 30 40

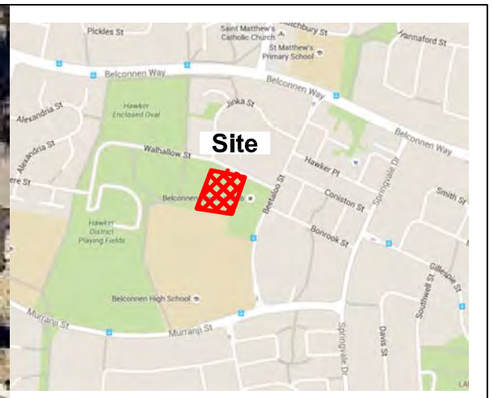
Approximate Scale (m)

NOTE: Base drawing from nearmap.com

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Purdon Planning Pty Ltd		TITLE: **Site Historical Observations**	PROJECT No: 88309.00
OFFICE: Canberra	DRAWN BY: ESS	**Preliminary Site Investigation**	DRAWING No: 1
SCALE: As shown	DATE: 12.05.2016	**Part Block 9 Section 3, Hawker, ACT**	REVISION: 0





Locality Plan

LEGEND

- Approximate Site Boundary
- Location of Residence
- Location of Tennis Centre
- Proposed Location of Child Care Centre
- Approximate Surface Water Flow Direction
- P1 Approximate Photo Location Direction

0 10 20 30 40

Approximate Scale (m)

NOTE: Base drawing from nearmap.com

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Site Features and Observations**	PROJECT No: 88309.00
	OFFICE: Canberra / DRAWN BY: ESS	**Preliminary Site Investigation**	DRAWING No: 2
	SCALE: As shown / DATE: 12.05.2016	**Part Block 9 Section 3, Hawker, ACT**	REVISION: 0

Appendix C

Site History Searches

ACT Government
Chief Minister, Treasury and Economic Development

Our ref: Reid 9 May2016
Your ref: T7WY6M

Mr Colin Reid
Email: colin.reid@douglaspartners.com.au

Dear Mr Reid

Re: Groundwater Bore Search

I refer to your application for a groundwater bore search. There are no privately managed groundwater abstraction bores registered under the *Water Resources Act 2007* within a 1km radial search area of Block 9 Section 3, Hawker.

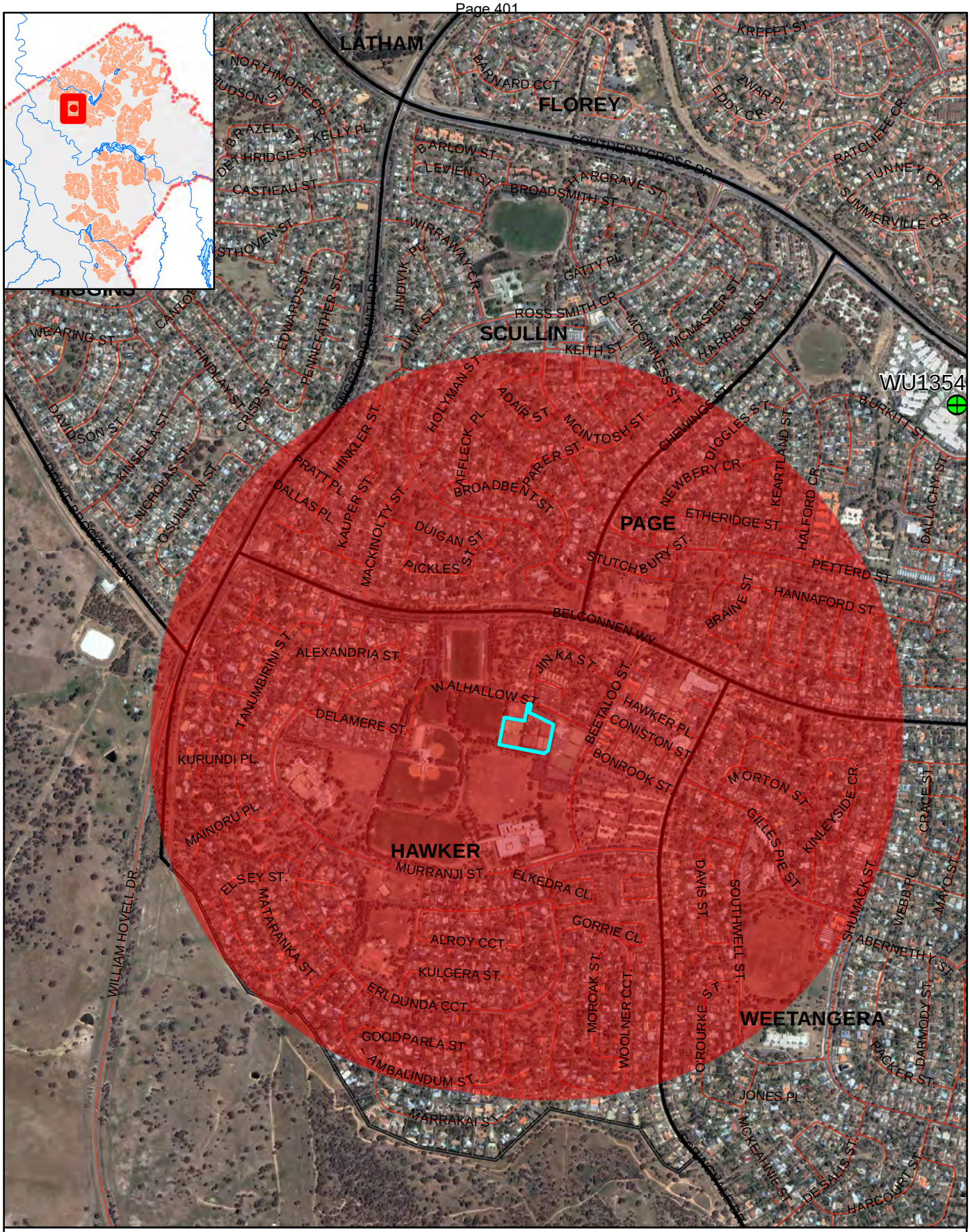
Please note that this search does not include investigation and/or monitoring bores associated with possible contaminated sites in the search area. If you require more information please contact Contaminated Sites (Environmental Standards) on 132281.

If you have any questions please contact me on (02) 6205 8310 or email richa.jain@act.gov.au.

Yours sincerely

Richa Jain
Environment Protection Officer
Environment and Dangerous Substances Licensing
Dame Pattie Menzies House, 16 Challis Street, Dickson, ACT 2602

12 May 2016



Groundwater Bore Search
1km Radius of
Block 9 Section 3 Hawker

Date: 12 May 2016
Produced by: Environment Protection Branch

Coordinate system: MGA Zone 55
Datum: GDA 1994

Contact: via Access Canberra (Ph:132281)

Disclaimer: Access Canberra does not warrant that the data is free from errors.

Legend

- Licensed Bores
- Buffer_of_B9 S3 Hawker

N

ACT Government
Chief Minister, Treasury and Economic Development

0 0.25 0.5 1
Kilometres

ACT Government
Chief Minister, Treasury and Economic Development

File Ref: New File

Mr Colin Reid
Douglas Partners Pty Ltd
PO Box 1487
Fyshwick ACT 2609

RE: CONTAMINATED LAND SEARCH

Dear Mr Reid

Thank you for your search form request of 09/05/2016 enquiring about:

Block 9 Section 3 Hawker Belconnen

Records held by the Environment Protection Authority (EPA) for the above block(s) indicate the following:

The block is not recorded on the EPA's contaminated sites management database or geographic information system.

The site is currently occupied by a commercial complex. Commercial complexes, prior to the introduction of natural gas to the ACT in the 1980's, utilised boiler heating or similar systems. These systems were generally fuelled by diesel or heating oil which was mainly stored in underground fuel storage tanks.

Other potentially contaminating activities may have also been undertaken at the site associated with current and past uses including the use of the site as tennis courts.

Tennis courts have in the past been associated with site contamination due to the application and storage of certain chemicals for the control of weeds and pests and may have been subject to uncontrolled filling during the establishment of the site.

The ANZECC 1992, Guidelines for the Assessment and Management of Contaminated Sites and the Contaminated Sites Environment Protection Policy 2009 list fuel and chemical storage as past activities associated with land contamination which may pose a risk to human health and the environment.

The EPA has not issued any environment protection orders under sections 91C (1), 91D (1) or 125 (4), requested an audit under section 76(2) or received a notification under section 76A (1) of the *Environment Protection Act 1997* (the Act) over the site and as a result the site is not recorded on the Register of contaminated sites under section 21(A) of the Act.

The information detailed above only relates to records held by the EPA and may not represent the actual condition of the site.

At present the EPA has no information on contamination of the above block(s) other than as detailed above. However, this does not absolutely rule out the possibility of contamination and should not be interpreted as a warranty that there is no contamination.

I appreciate that this does not absolutely rule out the existence of contamination of the soils. If you or your clients wish to be completely sure you, or they, should arrange to conduct independent tests.

Yours sincerely

Mark Heckenberg

Mark Heckenberg
Project Officer
Construction, Environment and Workplace Protection
Access Canberra
16/05/2016

ACT Government
Chief Minister, Treasury and Economic Development

13 May 2016

Douglas Partners Pty Ltd
PO Box 1487
FYSHWICK ACT 2609

Attention: Elyse Storr

Thank you for the application for a records search on Block 9 Section 3, Walhallow Street Hawker, ACT.

I have conducted a search of the Dangerous Substances Register and the Dangerous Goods Data Base and hold no records for Block 9 Section 3 Hawker.

(Please note: Under the *Dangerous Goods Act 1975* (1975 to April 2004), tanks of 50,000 litres which contained Diesel were not required to be licenced with WorkCover, only if the capacity was 50,001 litres).

If you have any questions in relation to this matter please do not hesitate in contacting me on 62076353 or email lisa.curran@act.gov.au.

Regards

Lisa Curran
Administration Officer
Dangerous Substances Licensing

GPO Box 158 Canberra ACT 2601 |
Phone 6207 3000 | Fax 6205 0336 |
worksafe@act.gov.au | worksafe.act.gov.au

Volume 996 **Folio** 82 **Edition** 5

AUSTRALIAN CAPITAL TERRITORY

TITLE SEARCH

Hawker Section 3 Block 9 on Deposited Plan 6696
Lease commenced on 14/10/1977, granted on 07/02/1986, term TERMINATING 13-OCT-2076
Area is 1 hectares 2690 square metres or thereabouts

Tenants in common:
Pelle Projects Pty Limited
Regional Investments Pty Limited
of 3 Sargood Street O'Connor ACT 2602
in Equal Shares

Registered Date	Dealing Number	Description
		Original title is **Volume** 996 **Folio** 82 Purpose Clause: Refer Crown Lease S.180 Land Act 1991: Compliance/Completion Cert Issued
31/10/1996	1013758	Variation of Lease (refer instrument)
21/10/2015	1996891	Mortgage to Westpac Banking Corporation
		End of interests

This data (excluding administrative interests) is certified correct by the Registrar-General at 14:31:55 on 17/05/2016
Unregistered dealings have not been formally recorded in the register.

Volume 996 **Folio** 82 **Editions** All

Title is Cancelled

AUSTRALIAN CAPITAL TERRITORY

HISTORICAL SEARCH

Hawker Section 3 Block 9 on Deposited Plan 6696
Area is 1 hectares 2690 square metres or thereabouts

Registered Date	Dealing Number	Description
		Original title is **Volume** 996 **Folio** 82
07/02/1986	525884	Mortgage to COMMONWEALTH BANK OF AUSTRALIA - lodged on 07/02/1986
08/05/1996	992959	Mortgage to COMMONWEALTH BANK OF AUSTRALIA - lodged on 01/05/1996
31/10/1996	1008895	Production - lodged on 20/09/1996
31/10/1996	1013758	Variation of Lease (refer instrument) - lodged on 29/10/1996
23/06/2009	1636004	Application to Vary Restrictions- Compliance Certificate Issued - lodged on 23/06/2009
23/06/2009	1636005	Discharge of Mortgage (M992959) - lodged on 23/06/2009
23/06/2009	1636006	Discharge of Mortgage (M525884) - lodged on 23/06/2009
28/09/2009	1649896	Transfer - lodged on 23/09/2009
28/09/2009	1649897	Mortgage to Commonwealth Bank of Australia - lodged on 23/09/2009
21/10/2015	1996889	Discharge of Mortgage (M1649897) - lodged on 08/10/2015
21/10/2015	1996890	Transfer - lodged on 08/10/2015
21/10/2015	1996891	Mortgage to Westpac Banking Corporation - lodged on 08/10/2015
		End of interests

This data (excluding administrative interests) is certified correct by the Registrar-General at 15:32:28 on 17/05/2016
Unregistered dealings have not been formally recorded in the register.

Appendix D

Historical Aerial Photographs (Six Plates)



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Aerial Photograph 1958** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra DRAWN BY: ESS		PLATE No: D1
	SCALE: NTS DATE: 12.05.2016		REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Aerial Photograph 1968** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra DRAWN BY: ESS		PLATE No: D2
	SCALE: NTS DATE: 12.05.2016		REVISION: 0



Douglas Partners Geotechnics | Environment | Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Aerial Photograph 1975** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra DRAWN BY: ESS		PLATE No: D3
	SCALE: NTS DATE: 12.05.2016		REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Aerial Photograph 1983** **Preliminary Site Investigation** **Part Block 19 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra / DRAWN BY: ESS		PLATE No: D4
	SCALE: NTS / DATE: 12.05.2016		REVISION: 0



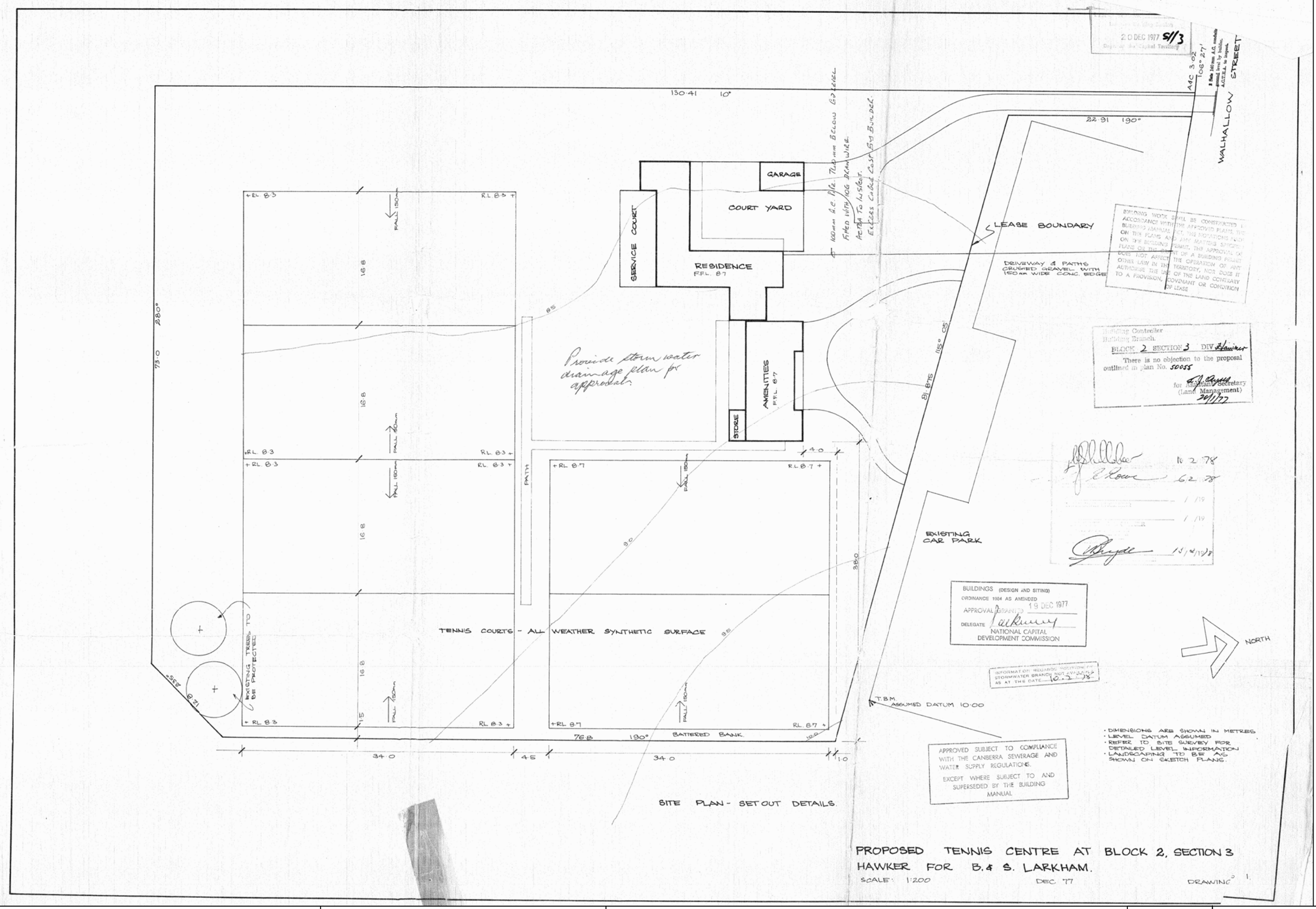
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Aerial Photograph 1990** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.01
	OFFICE: Canberra DRAWN BY: ESS		PLATE No: D5
	SCALE: NTS DATE: 12.05.2016		REVISION: 0



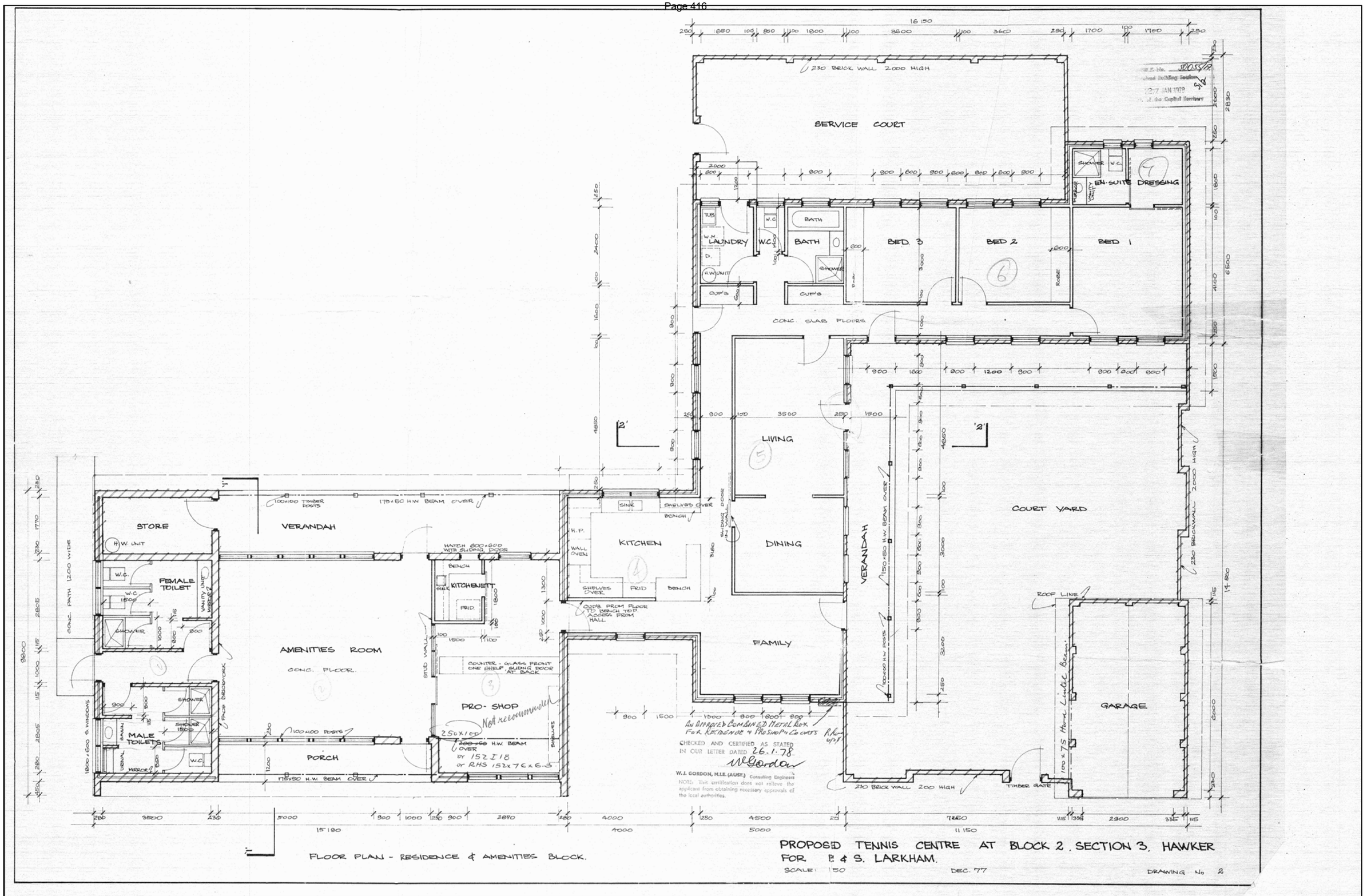
Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd		TITLE: **Aerial Photograph 2004** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.01
	OFFICE: Canberra	DRAWN BY: ESS		PLATE No: D6
	SCALE: NTS	DATE: 12.05.2016		REVISION: 0

Appendix E

Historical Building Plans (Four Plates)



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Site Plan - Proposed Tennis Centre - 1977** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra / DRAWN BY: ESS		PLATE No: E1
	SCALE: NTS / DATE: 23.05.2016		REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Floor Plan - Proposed Tennis Centre - 1977** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra / DRAWN BY: ESS		PLATE No: E2
	SCALE: NTS / DATE: 23.05.2016		REVISION: 0

Stage 1 Swimming Pool, Courtyard wall surround-ing pool, Footings to residence extension & store extension on club house

Stage 2 Completion of Residence Extension

PLAN REGISTERED No. 5055/E
Examined Plan Unit Section
29 JUL 1981

S1/2

C

100 3900 100

1900

STORE

100 STUD FRAME WITH STAINED TIMBER LINING

REMOVE WALL AND WINDOW

DINING

B/HR

R.L. 8.7

FAMILY

TAKE FOOTING DOWN TO BOTTOM OF POOL LEVEL

GATE 900

SWIMMING POOL 9000x3600

WALL 2000 HIGH FOOTING 380x250 2 LAYERS F.B.T.M.

12100 450

7000

6000 6500 250

B

D

A

1

1

115 450

2000

FOOTING 380 x 250 2 LAYERS F.B.T.M.

SECTION 1

FENCE

BUILDING WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS THE BUILDING MANUAL ACT, THE NOTATIONS MADE ON THE PLANS AND ANY MATTERS SPECIFIED ON THE BUILDING PERMIT. THE APPROVAL OF PLANS OR THE GRANT OF A BUILDING PERMIT DOES NOT AFFECT THE OPERATION OF ANY OTHER LAW IN THE TERRITORY NOR DOES IT AUTHORISE THE USE OF THE LAND CONTRARY TO A PROVISION, COVENANT OR CONDITION OF LEASE.

MODIFICATIONS IF APPLICABLE

BUILDINGS (DESIGN AND SITING) ORDINANCE 1964 AS AMENDED
APPROVAL GRANTED
27 JUL 1981
DELEGATE
NATIONAL CAPITAL DEVELOPMENT COMMISSION

PLANS APPROVED AS COMPLYING WITH THE REQUIREMENTS OF THE
Local 10 dec 1981
ENGINEER FOR WATER SUPPLY AND SEWERAGE
CHIEF ELECTRICAL ENGINEER 1/19
STRUCTURAL ENGINEER 1/19

Calculations is sufficient
30 NOV 1981

APPROVED FOR CONSTRUCTION BY THE HOLDER OF A "B" CLASS LICENCE.
TYPE OF CONSTRUCTION REQUIRED.
CLASS OF OCCUPANCY.
27 AUG 1981
DEPUTY BUILDING CONTROLLER UNDER BUILDING ORDINANCE 1972

DEPARTMENT OF THE CAPITAL TERRITORY
LANDS DIVISION
APPROVAL GRANTED pursuant to clause 4(g) of the Crown Lease for the proposal outlined in Plan No. 5055/E

DELEGATE OF THE MINISTER
7.8.81

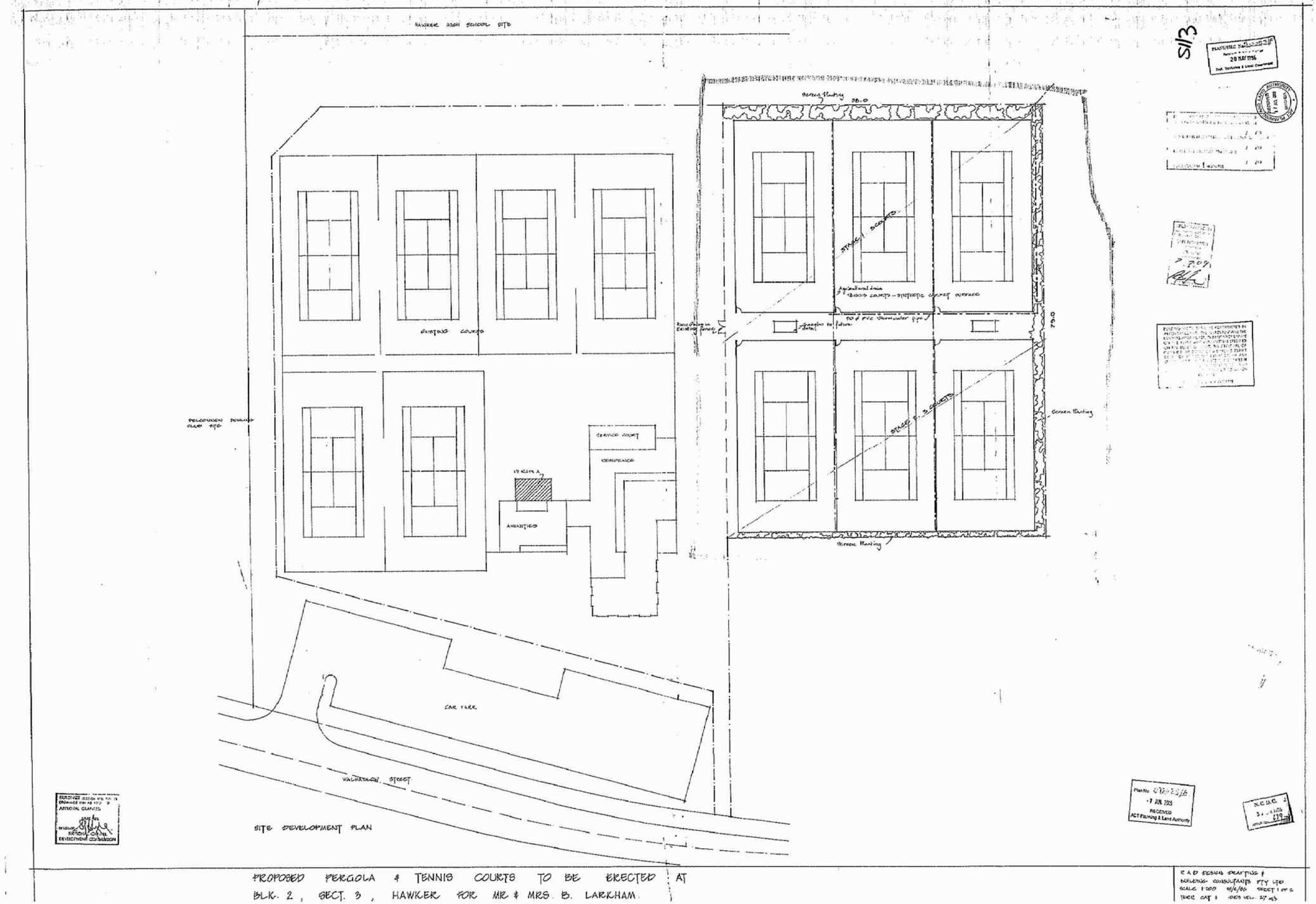
PROPOSED EXTENSION AT BLOCK 2 SECTION 3 HAWKER FOR B & S LARKHAM

3/4

SCALE 1:100 1:500

THIS SET CONTAINS 4 SHEETS NUMBERED 1/4 TO 4/4 INCLUSIVE AND SHOULD REMAIN INTACT.

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Proposed Extension - 1981** **Preliminary Site Investigation** **Part Block 9 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra DRAWN BY: ESS		PLATE No: E3
	SCALE: NTS DATE: 23.05.2016		REVISION: 0



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Purdon Planning Pty Ltd	TITLE: **Proposed Pergola and Tennis Court to be Erected - 2009** **Preliminary Site Investigation** **Part Block 19 Section 3, Hawker, ACT**	PROJECT No: 88309.00
	OFFICE: Canberra / DRAWN BY: ESS		PLATE No: E4
	SCALE: NTS / DATE: 23.05.2016		REVISION: 0

Appendix F

Site Photographs (Seven Plates)



Photo 1: Residence from the northern side



Photo 2: Tennis centre from the northern side

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**		PROJECT:	88309
	Preliminary Site Investigation		Plate	1
	Block 9 Section 3, Hawker, ACT		REV:	A
	Client	Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 3: Tennis centre from the southern side



Photo 4: Tennis courts at north east of the site

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	88309
	Preliminary Site Investigation	Plate	2
	Block 9 Section 3, Hawker, ACT	REV:	A
	Client: Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 5: Tennis courts at the south east of the site



Photo 6: Tennis courts at the central southern portion of the site

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs**	PROJECT:	88309
	Preliminary Site Investigation	Plate	3
	Block 9 Section 3, Hawker, ACT	REV:	A
	Client: Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 7: Tennis courts at the north west of the site



Photo 8: Tennis courts at the south west of the site

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs**	PROJECT:	88309
	Preliminary Site Investigation	Plate	4
	Block 9 Section 3, Hawker, ACT	REV:	A
	Client: Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 9: Pathway near tennis courts and pergolas in the western portion



Photo 10: Vegetation between tennis courts

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs**	PROJECT:	88309
	Preliminary Site Investigation	Plate	5
	Block 9 Section 3, Hawker, ACT	REV:	A
	Client: Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 11: Tennis wall court with overgrown vegetation



Photo 12: Cleared area south of residence

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs**	PROJECT:	88309
	Preliminary Site Investigation	Plate	6
	Block 9 Section 3, Hawker, ACT	REV:	A
	Client: Purdon Planning Pty Ltd	DATE:	27-May-16



Photo 13: Grassed area south of tennis centre

21 September, 2016

The Assessing Officer
ACT Planning & Land Authority
Dame Pattie Menzies Building
Dickson ACT

Dear Karen

Re: DA201629661 Block 3 Section 9 Hawker

I refer to your request for further information dated 25 August, 2016.

Please find an amended Site Plan showing how the proposed childcare facility can be accessed via the existing private lease, without vehicle access through the adjacent public car park.

We trust this addresses the immediate concerns of TC&CS and demonstrates that a viable development can be achieved on the site, subject to design and siting approval.

We also note that there were 2 public submissions lodged in relation to the development from the Belconnen Bowling Club and an adjacent absentee property owner.

In relation to concerns by the Belconnen Bowling Club, we confirm that the lease variation perse is not a building approval, but are confident that a single storey childcare centre, if built on the subject site, will not overshadow adjacent bowling greens. Partial development of the site for a childcare facility will add activity and passive surveillance to the local area without impact on bowling club activities.

With regard to the Coghlan objection, we contend that the proposed lease variation will not of itself negate the opportunity for continued use of the site as a sporting facility, and that any decision to invest in a childcare facility is seen as a business investment decision that will take into account market forces of supply and demand.

On this basis, we do not consider the objection from Coghlan or the Club, to warrant refusal of the lease variation.

Yours sincerely



Rob Purdon

Director

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Braddon ACT 2612
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www.purdon.com.au