idealgeotech
a division of idealcorp

Report on

Preliminary Contamination Assessment

Prepared for: SGCH

Address: 12-16 Willan Drive, Cartwright

Job No: 26661

Date: April 2017

Accredited for compliance
With ISO/IEC 17025
NATA Accreditation No. 19226

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References

EXECUTIVE SUMMARY

This executive summary presents a synopsis of the Stage 1 Preliminary Contamination Report for Lots 344, 345 & 346, 12-16 Willan Drive, Cartwright.

The object of the Stage 1 Preliminary Contamination Report was to ascertain whether the site presents a risk to human health and/or the environment arising from any past/present activities at the site or neighbouring properties. The scope of work included a documentary review of historical records, a site walkover, preliminary laboratory testing and the preparation of this report.

The only obvious potential sources of contamination arise from the following;

- Existing houses and garages that may contain asbestos or were used to store chemicals.

No history of dangerous manufacturing on site utilizing heavy chemicals was documented. No history of heavy chemicals storage was documented.

A search of the NSW EPA Contaminated Land Management record of notices yielded no previous record of contamination.

Search of Protection of the Environment Operations Public Register (POEO) revealed no licensed and delicensed premises in the vicinity (200m) of the subject site.

The results of the chemical analyses indicate that the site does not present a risk to human health or the environment in a 'resiendential with garden/accessible soil' ('A') setting and is considered suitable for the proposed development.

1.0 INTRODUCTION

Ideal Geotech have undertaken a Stage 1 Preliminary Contamination Report with limited testing and analysis as requested by Saint George Community Housing at Lot 344, 345 & 346, 12-16 Willan Drive, Cartwright. It is understood the existing residential dwellings will be demolished and a multi storey apartment complex will be constructed.

2.0 SCOPE OF WORK

The following scope of work was conducted:

- Desktop Study of the following to assist in identification of potential contamination issues:
  - Data from Environment Protection Authority
  - Data from the Protection of the Environment Operations Public Register (POEO)
  - Council records/ development and building applications
  - Council property files
  - Current and past zoning of the land
- Review of soils and geological maps
- Site walkover
- Chemical analysis of soil samples by a NATA accredited laboratory
- Preparation of a Stage 1 Preliminary Contamination Report.

3.0 SITE DESCRIPTION

The subject site is rectangular in shape and approximately 1,610m2 in area and covers 3 residential blocks, 12-16 Willan Drive, Cartwright. The site is bounded by Willan Drive to the north and neighbouring residential properties on all other sides.

The site is currently occupied by three houses and associated garages and awnings. The site is located on flat terrain and vegetation consists of grass cover and some small trees and shrubs.

4.0 SITE HISTORY

The properties of 12-16 Willan Drive are situated in a residential area as aerial photographs and titles indicate.

4.1 Geology

Reference to the Penrith 1:100,000 geological map (Geological series sheet 9030) indicates that the site is underlain by Quaternary deposits consisting of medium grained sand, silt and clay.

4.2 Aerial Photographs

Aerial Photographs from 1942, 1951, 1971 and 1986 were obtained from the NSW Department of Lands office and Google Earth used to view the site from 2004 to 2015. The aerial photographs were reviewed to assess the likely past uses of the site. The findings are summarised below and a copy of historical photographs can be found in Appendix B.

1942 –The site is situated within a paddock. Some scattered trees are present on the site.

1951 – The site and surroundaing area has been developed with residential dwellings. Industrial buildings have been built on the southern side of Hoxton Park Road.

1971 – The site has undergone very little change as visible from the previous aerial photograph in 1951 apart from the addition of some more industrial buildings on the southern side of Hoxton Park Road.

1986 – Little change present since the previous aerial photograph in 1971. Again there are some more industrial buildings on the southern side of Hoxton Park Road.

2004-2016 – The site has been unchanged since the photograph taken in 1986.

In summary, the aerial photographs reveal that the site was initially situated within a farming paddock evident from the photograph in 1942. The photographs taken in 1951 indicates the site has now been occupied by two houses. The site has remained largly unchanged from the photograph in 1951 to the date of the site inspection in 2017.

4.3 Historic Land Titles

Historic title deed searched were undertaken on the site, the results of the searches are summarised in the tables below and a copy of search results are included in Appendix A.

Table 1 – Lot 344, 345 & 346 DP227167

Date of acquisition and held term	Registed proprietor(s) & occupations where available	Reference of title at acquisition
2 February 1999	Silao Sam Atuau and Christina Tuu (Lot 344)	T 5562739
17 August 2006	Seong Myun Hong and Bok Hee Hong (Lot 345)	AC533256
30 July 2009	Reginald De Leon and Melody de Leon (Lot 346)	AE868457

4.4 Search of Contaminated Land Management Register (NSW EPA)

A search of the NSW EPA Contaminated Land Management record of notices for the Liverpool City Council area indicated that the site has had no previous contamination reported.

4.5 Search of Protection of the Environment Operations Public Register (POEO) of Licensed and Delicensed Premises

A search of the POEO public register of licensed and delicensed premises (DECC) indicated that no licensed or delicensed premises were located within the immediate surrounding area of the site (within 200m).

5.0 SITE WALKOVER AND SURROUNDING ENVIRONMENT

A site investigation was conducted on 17th February 2016. The field observations are summarised in Table 2 below.

Table 2 – Summary of Field Observations

Parameter	Observation
Visible observations on soil contamination	No visible evidence of contamination was observed. No staining of the soils or odours was documented.
Signs of plant stress	None observed.
Presence of drums or waste materials	None observed. No visible indicators of underground fuel tanks (bowsers or venting pipes).
Presence of fill	Minimal fill was observed within the site.
Quality of surface waters	No visible evidence of contamination was observed nor were any odours detected.
Flood potential	Not evident.
Relevant sensitive environments	None observed.

6.0 SUMMARY OF POTENTIAL SOURCES OF CONTAMINATION

The potential for the site to be contaminated from on-site sources and off site sources was considered by Ideal Geotech. Based on the findings of our site inspection and site history review the following actual or potential contamination sources were identified.

1. Fuel, oil, asbestos sheeting, lead based paints and pesticides may have been stored within the garages at some point.

2. The house construction may include asbestos and lead based paints.

No history of dangerous manufacturing utilizing heavy chemicals was documented.

No history of heavy chemicals storage was documented.

Properties bordering the site are residential and not considered to have posed a risk for potential contamination to the site.

7.0 SAMPLING METHODOLOGY

Limited sampling and analysis was undertaken in order to assess the nature, location and likely distribution of any contamination present at the subject site, and also any potential risk posed to human health or the environment. Test results were compared to the relevant New South Wales Environment Protection Authority (NSW EPA) criteria.

Each sample location (refer to Figure 1) was excavated utilizing hand tools to a depth of 0.2m below ground surface. The samples were collected from the hole using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring.

The samples were placed in 250g laboratory prepared glass jars which were capped using Teflon-sealed screw caps and then placed in a chilled container. The sample jars were transported to our Smithfield office and placed in a refrigerator.

The following day the samples were forwarded to SGS environmental for analysis along with a Chain of Custody which was subsequently returned to confirm the receipt of all samples.

8.0 LABORATORY CHEMICAL TESTING RESULTS

It should be appreciated that the assessment was preliminary in nature and was very limited in scope. Chemical testing was carried out on soil samples using SGS laboratory services. SGS holds accreditation with the National Association of Testing Authorities, Australia (NATA). The initial testing of the soil was undertaken as a broad scale preliminary assessment.

All testing was undertaken within the terms of their accreditation. Copies of the testing laboratory reports are shown in Appendix C. The results of laboratory testing are summarised in the following tables.

Table 3 - Heavy Metal Test Results

		Heavy Metals (mg/kg)							
Sample No.	Depth (m)	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
E1	0.2	3	0.4	11	17	66	5.9	150	<0.05
E2	0.2	10	0.5	14	21	64	5.5	120	<0.05
E3	0.2	6	<0.3	8.6	17	19	13	38	<0.05
E4	0.2	9	<0.3	10	22	40	5.2	96	<0.05
LOR		*3*	*0.3*	*0.3*	*0.5*	*1*	*0.5*	*0.5*	*0.05*
NEPM Health Investigation Level HILs (A)		**100**	**20**	**100**	**6000**	**300**	**400**	**7400**	**40**

LOR Limit of Reporting

Table 4 - Organochlorine Pesticides (OCP) & Organophosphate Pesticides (OPP) Test Results

		OCP (mg/kg)						OPP (mg/kg)		
Sample No.	Depth (m)	Aldrin+ Dieldrin	Endrin	Heptachl-or	DDD+ DDE+ DDT	DDT	Chlord-ane	Diazinon	Ethion	Chlorp-yrifos
E1	0.2	<0.3	<0.2	<0.1	<0.3	<0.1	<0.2	<0.5	<0.2	<0.2
E2	0.2	<0.3	<0.2	<0.1	<0.3	<0.1	<0.2	<0.5	<0.2	<0.2
E3	0.2	<0.3	<0.2	<0.1	<0.3	<0.1	<0.2	<0.5	<0.2	<0.2
E4	0.2	0.5	<0.2	<0.1	<0.3	<0.1	<0.2	<0.5	<0.2	<0.2
LOR		*0.3*	*0.2*	*0.1*	*0.3*	*0.1*	*0.2*	*0.5*	*0.2*	*0.2*
NEPM HILs A for low density residential areas		**6**	**10**	**6**	**240**	**NC**	**50**	**NC**	**NC**	**160**

NC No Criteria
LOR Limit of Reporting

Table 5 - Polynuclear Aromatic Hydrocarbons (PAH) and PCB Test Results

Sample No.	Depth (m)	PAH (mg/kg)			PCB
		Total	B(a)P	B(a)P TEQ (Upper)	Total
E1	0.2	<0.8	<0.1	<0.3	<1
E2	0.2	<0.8	<0.1	<0.3	<1
E3	0.2	<0.8	<0.1	<0.3	<1
E4	0.2	<0.8	<0.1	<0.3	<1
LOR		*0.8*	*0.1*	*0.3*	*1*
NEPM HILs A for low density residential areas		**300**	**NC**	**3**	**1**

NC No Criteria
LOR Limit of Reporting

Table 6 - Total Petroleum Hydrocarbon (TPH) and BTEX Test Results

Sample No.	Depth (m)	TRH (mg/kg)				BTEX (mg/kg)			
		C10-C14	C15-C28	C29-C36	Total	Benzene	Toluene	Ethyl Benzene	Total Xylenes
E1	0.2	<20	130	150	240	<0.1	<0.1	<0.1	<0.3
E2	0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
E3	0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
E4	0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
LOR		*20*	*45*	*45*	*210*	*0.1*	*0.1*	*0.1*	*0.3*
NSW EPA (DECC) Threshold Concentrations 2009 ('Guidelines for Assessing Service Station Sites')		**NC**	**NC**	**NC**	**10000**	**10**	**135**	**185**	**95**

NC No Criteria
LOR Limit of Reporting

Table 7 - Asbestos Test Results

Sample No.	Depth (m)	Asbestos Detected	Type of Asbestos
E1	0.2	No Asbestos Found	NA
E2	0.2	No Asbestos Found	NA
E3	0.2	No Asbestos Found	NA
E4	0.2	No Asbestos Found	NA

9.0 DISCUSSION OF CONTAMINATION RESULTS

9.1 Heavy Metals

The heavy metal concentrations, presented in Table 3, were less than the relecvent assessment criteria adopted, and therefore the chemical analyses indicate that areas tested are not contaminated with heavy metals.

9.2 Organochlorine Pesticides (OCP) and Organophosphorus Pesticides (OPP)

The OCP and OPP concentrations, presented in Table 4, were less than the relevant assessment criteria adopted, and therefore the chemical analyses indicate that the areas tested are not contaminated with OCP or OPP.

9.3 Polycyclic Aromatic Hydrocarbons (PAH) and Polychlorinated Biphenyl (PCB)

The PAH and PCB concentrations, presented in Table 5, were less than the relevant assessment criteria adopted, and therefore the chemical analyses indicate that the site is not contaminated with PAH or PCB.

9.4 Total Petrolium Hydrocarbons (TPH) and BTEX

The TPH and BTEX concentrations, presented in Table 6, were less than the relecvent assessment criteria adopted, and therefore the chemical analysis indicate that areas tested are not contaminated with TPH or BTEX.

9.5 Asbestos

The presence of asbestos, presented in Table 7, were found to be nill, and therefore the chemical analyses indicate that areas tested are not contaminated with asbestos.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this Contamination Report are as follows:

The only obvious potential sources of contamination arise from the following;

1. Fuel, oil, asbestos sheeting, lead based paints and pesticides may have been stored within the garages at some point.

2. The house construction may include asbestos and lead based paints.

No history of dangerous manufacturing on site utilizing heavy chemicals was documented. No history of heavy chemicals storage was documented.

A search of the NSW EPA Contaminated Land Management record of notices indicates that the site has had no previous contamination reported.

Search of Protection of the Environment Operations Public Register (POEO) revealed no licensed and delicensed premises in the vicinity (200m) of the subject site.

The results of the chemical analyses indicate that the site does not present a risk to human health or the environment in a 'resiendential with garden/accessible soil' ('A') setting and is considered suitable for the sites proposed development.

This report is a Stage 1 Preliminary Contamination Assessment with laboratory testing undertaken. Whilst the study indicated the site to be free of contamination, it is possible that contaminated soils may be present between sampling locations. Further sampling and chemical testing should be undertaken once demolition of the existing dwellings and garages has been undertaken.

For and on behalf of
Ideal Geotech

Murali Pamu
Geotechnicial Engineer

D. Dwyer
Geotechnical Engineer

REFERENCES:

Contaminated Sites – Guidelines for Assessing Service Stations. NSW Environment Protection Authority (EPA) 1994

Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites. NSW Environment Protection Authority (EPA) 2000.

Contaminated Sites – Sampling Design Guidelines. NSW Environment Protection Authority (EPA) 1995

Managing Land Contamination: Planning Guidelines SEPP55 – Remediation of Land - Department of Urban Affairs and Planning and Environment Protection Authority (DUAP and EPA) 1998.

National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council 2013.

APPENDIX A

HISTORIC LAND TITLES

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 344/227167

SEARCH DATE	TIME	EDITION NO	DATE
12/4/2017	9:55 AM	3	2/2/1999

LAND

LOT 344 IN DEPOSITED PLAN 227167
AT GREEN VALLEY
LOCAL GOVERNMENT AREA LIVERPOOL
PARISH OF ST LUKE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP227167

FIRST SCHEDULE

SILAO SAM ATUAU
CHRISTINA TUU
AS JOINT TENANTS (T 5562739)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS BY THE CROWN GRANT
2 Z558107 COVENANT
3 5562740 MORTGAGE TO WESTPAC BANKING CORPORATION

NOTATIONS

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

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 12/4/2017

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Order number: 43437787
Your Reference: willan
12/04/17 09:55

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 345/227167

SEARCH DATE	TIME	EDITION NO	DATE
12/4/2017	9:55 AM	5	17/8/2006

LAND

LOT 345 IN DEPOSITED PLAN 227167
AT GREEN VALLEY
LOCAL GOVERNMENT AREA LIVERPOOL
PARISH OF ST LUKE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP227167

FIRST SCHEDULE

SEONG MYUN HONG
BOK HEE HONG
AS JOINT TENANTS (T AC533256)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS BY THE CROWN GRANT
2 AC533257 MORTGAGE TO PERPETUAL LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

PRINTED ON 12/4/2017

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 346/227167

SEARCH DATE	TIME	EDITION NO	DATE
12/4/2017	9:55 AM	6	30/7/2009

LAND

LOT 346 IN DEPOSITED PLAN 227167
AT GREEN VALLEY
LOCAL GOVERNMENT AREA LIVERPOOL
PARISH OF ST LUKE COUNTY OF CUMBERLAND
TITLE DIAGRAM DP227167

FIRST SCHEDULE

REGINALD DE LEON
MELODY DE LEON
AS JOINT TENANTS (T AE868457)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS RESERVED BY THE CROWN GRANT
2 AE868458 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

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Contaminated land

- Management of contaminated land
- Consultants and site auditor scheme
- Underground petroleum storage systems
- Guidelines under the C. M Act
- NSW amendment
- Further guidance
- Record of notices
  - About the record
  - Search the record
  - Search tips
  - Disclaimer
- List of NSW contaminated sites notified to EPA
- Frequently asked questions
- Terms
- Other contamination issues
- Contaminated Land Management Program

Home Contaminated land Record of notices

Search results

You search for LGA: Liverpool City Council

Matched 10 notices relating to 2 sites.

Search Again | Refine Search

Suburb	Address	Site Name	Notices related to this site
CHIPPING NORTON	85-107 Alfred STREET	Former ACR	3 current and 1 former
MOORBANK	1 Faraday ROAD	ARP Australia Pty Ltd	1 current and 0 former

Page 1 of 1

12 April 2017

Environment protection licences

- Licensing under the POEO Act
- Guide to licensing
- eConnect EA
- Licence forms
- Licence fees
- Risk-based licensing
- Load-based licensing
- Pollution licensing
- POEO Public Register
  - Terms of use POEO public register
  - Search for licences, applications and notices
  - Search for penalty notices
  - Search for prosecutions and civil proceedings
  - Enforceable undertakings
  - Exemptions and approvals
  - Licensing FAQs
  - List of licences
  - Unlicensed premises still regulated by the EPA
- National Pollutant Inventory
- Compliance audit program
- Reporting and managing incidents
- Wind farm regulation
- NSW Gas Plan Regulation
- Gas industry in NSW
- Native forest logging
- Authorised officers
- Regulation of railway systems activities
- Scheduled Activities amendment, exhibition

Home > Environment protection licences > POEO Public Register > Search for licences, applications and notices

Search results

Your search for : General Search will the following criteria

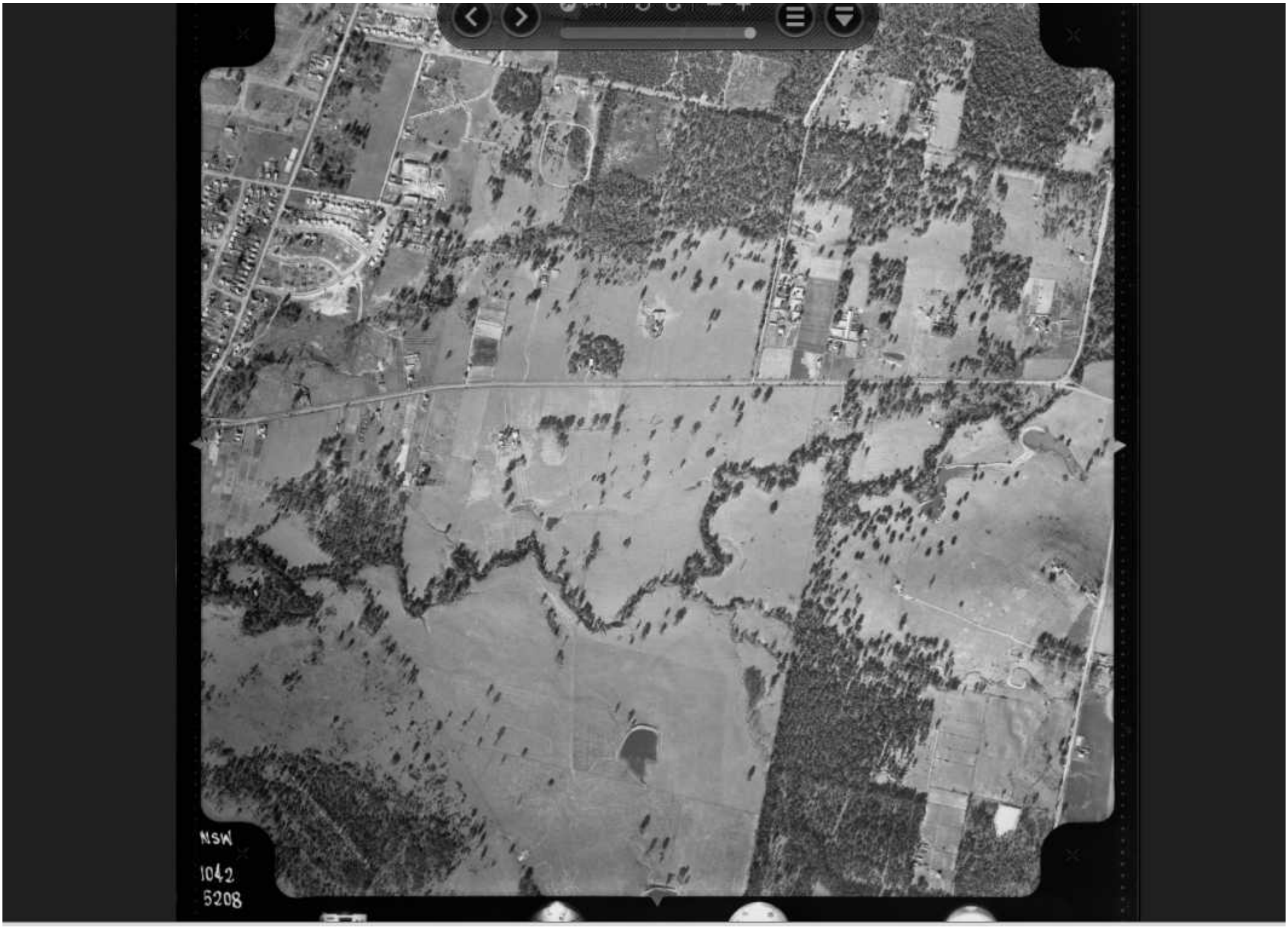
Suburb - CARTWRIGHT

returned 0 result

Search Again

APPENDIX B

AERIAL PHOTOGRAPHS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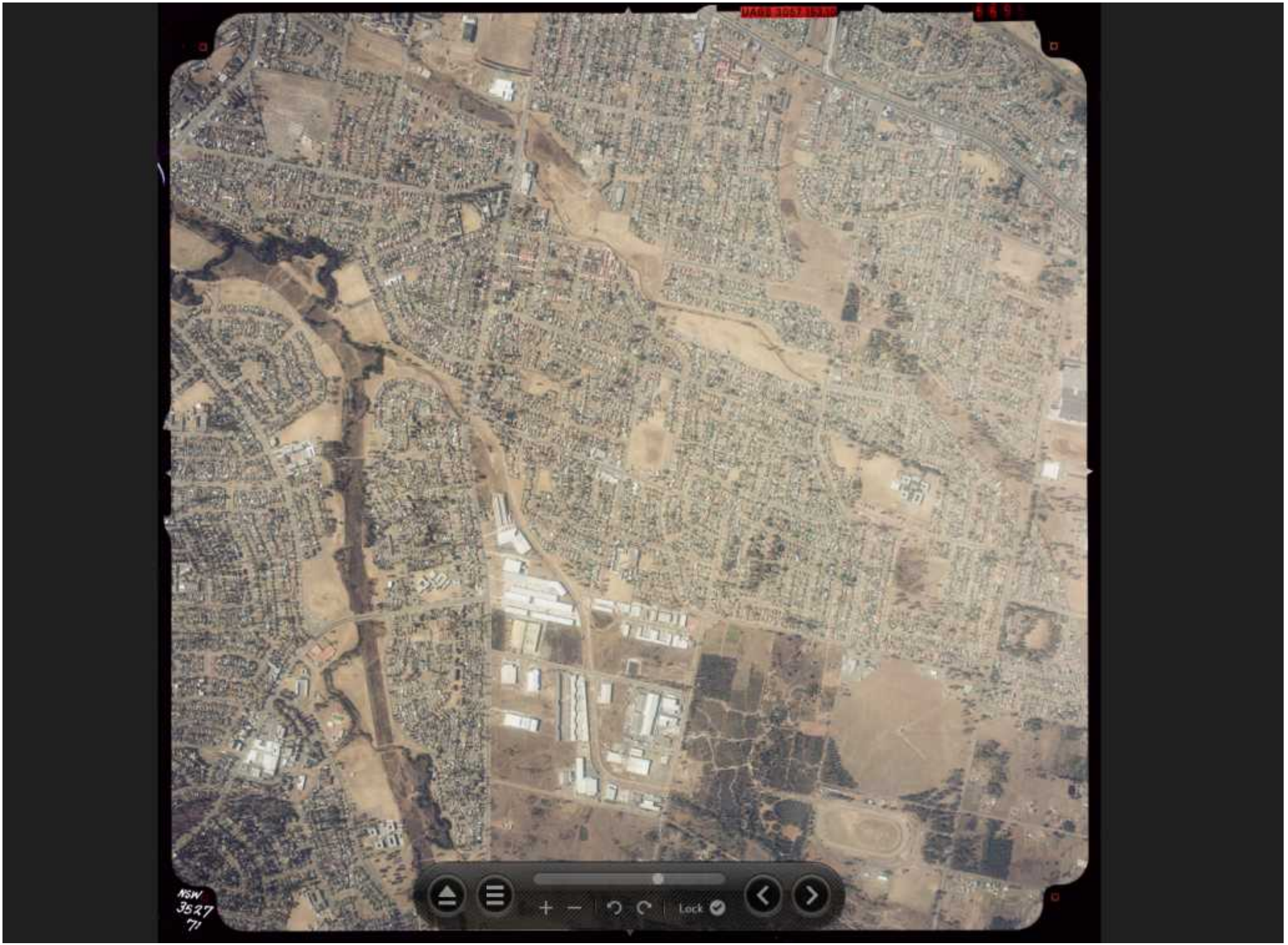
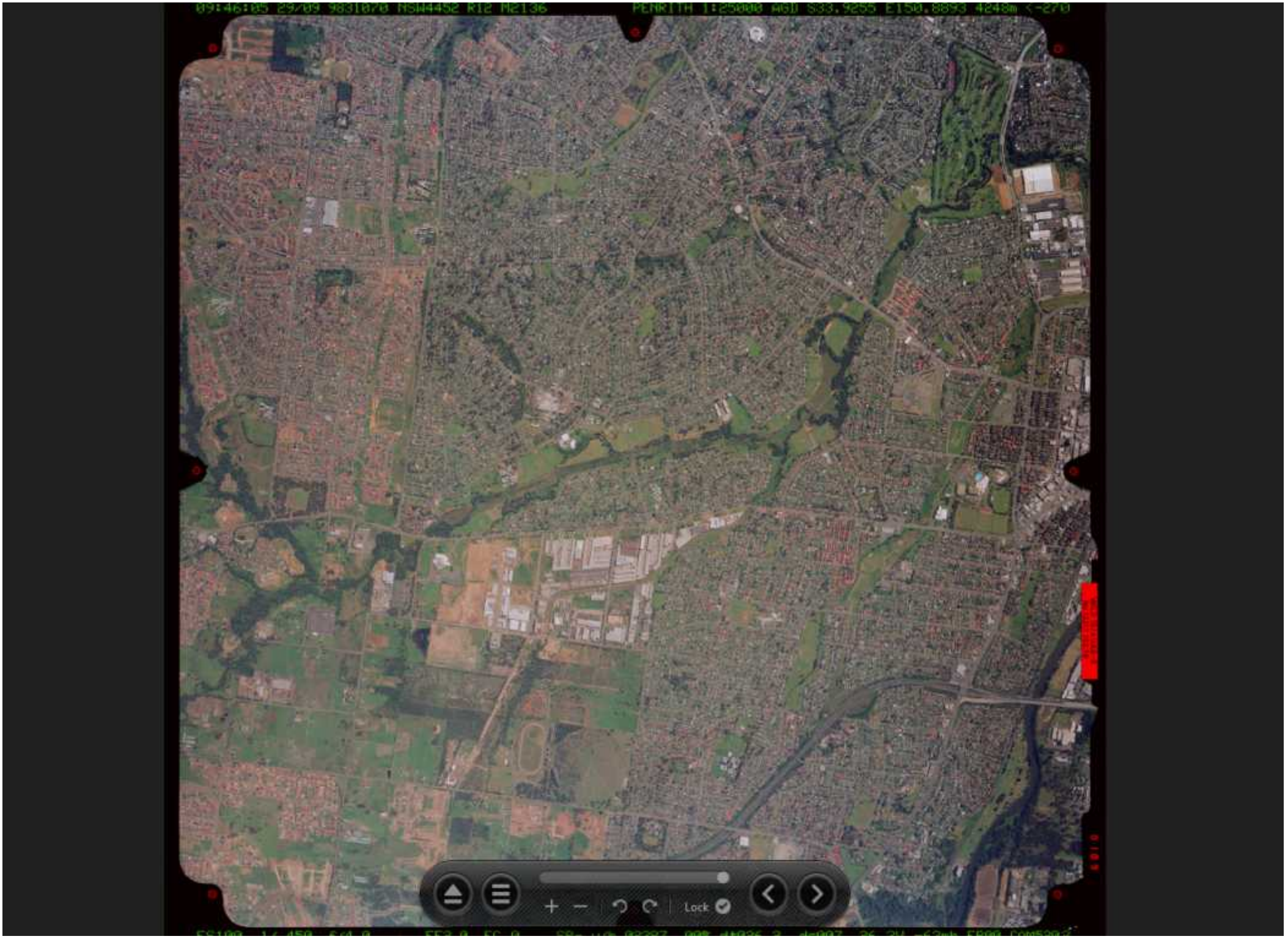
1042
5208


Lock
NSW
2200
51


NSW
3527
71
Lock


Lock

APPENDIX C

LABORATORY TEST RESULTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Dane Dwyer
Client	IDEALCORP PTY LTD
Address	PO BOX 2270 SMITHFIELD NSW 2164
Telephone	61 2 97255522
Facsimile	61 2 87866300
Email	[redacted]
Project	**26661**
Order Number	(Not specified)
Samples	4

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	[redacted]
SGS Reference	**SE163829 R0**
Date Received	4/4/2017
Date Reported	11/4/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin .

SIGNATORIES

[redacted]

Andy Sutton
Senior Organic Chemist

[redacted]

Bennet Lo
Senior Organic Chemist/Metals Chemist

[redacted]

Kamrul Ahsan
Senior Chemist

[redacted]

Ly Kim Ha
Organic Section Head

[redacted]

Yusuf Kuthpudin
Asbestos Analyst

VOC's in Soil [AN433] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
TRH C6-C9	mg/kg	20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
TRH C10-C14	mg/kg	20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	**130**	<45	<45	<45
TRH C29-C36	mg/kg	45	**150**	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	**240**	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	**290**	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	**240**	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	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)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	**0.1**
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Hexachlorobenzene (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
Lindane	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
Aldrin	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
Delta BHC	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
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
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
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	**0.4**
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	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
Endrin Aldehyde	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
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1

OP Pesticides in Soil [AN420] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2

PCBs in Soil [AN420] Tested: 5/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 10/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Arsenic, As	mg/kg	3	3	10	6	9
Cadmium, Cd	mg/kg	0.3	0.4	0.5	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	11	14	8.6	10
Copper, Cu	mg/kg	0.5	17	21	17	22
Lead, Pb	mg/kg	1	66	64	19	40
Nickel, Ni	mg/kg	0.5	5.9	5.5	13	5.2
Zinc, Zn	mg/kg	0.5	150	120	38	96

Mercury in Soil [AN312] Tested: 7/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 7/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
% Moisture	%w/w	0.5	**21**	**22**	**16**	**6.9**

Fibre Identification in soil [AN602] Tested: 10/4/2017

PARAMETER	UOM	LOR	E1 SOIL - 3/4/2017 SE163829.001	E2 SOIL - 3/4/2017 SE163829.002	E3 SOIL - 3/4/2017 SE163829.003	E4 SOIL - 3/4/2017 SE163829.004
Asbestos Detected	No unit	-	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid , mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser . Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf).
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Dane Dwyer
Client	IDEALCORP PTY LTD
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Facsimile	61 2 87866300
Email	[redacted]
Project	**26661**
Order Number	(Not specified)
Samples	4

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Facsimile	+61 2 8594 0499
Email	[redacted]
SGS Reference	**SE163829 R0**
Date Received	04 Apr 2017
Date Reported	11 Apr 2017

COMMENTS

Accredited for compliance with ISO/IEC 17025-Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

[redacted]

Andy Sutton
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Bennet Lo
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Organic Section Head

[redacted]

Yusuf Kuthpudin
Asbestos Analyst

RESULTS

Fibre Identification in soil — Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	
SE163829.001	E1	Soil	44g Sand, Soil, Rocks	03 Apr 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163829.002	E2	Soil	44g Sand, Soil, Rocks	03 Apr 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163829.003	E3	Soil	54g Sand, Soil, Rocks	03 Apr 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163829.004	E4	Soil	59g Sand, Soil, Rocks	03 Apr 2017	No Asbestos Found Organic Fibres Detected	<0.01

METHOD SUMMARY

SE163829 R0

METHOD	METHODOLOGY SUMMARY
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf).
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FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service .
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.
Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.
Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos -containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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APPENDIX D

SAMPLING LOCATIONS

Figure 1 – Sampling Location Plan

12-16 Willan Drive, Cartwright

idealgeotech
a division of idealcorp

Report on

Preliminary Contamination Assessment

Prepared for: SGCH

Address: 18-22 Willan Drive, Cartwright

Job No: 24199A

Date: October 2016

Accredited for compliance
With ISO/IEC 17025
NATA Accreditation No. 19226

16-18 Sammut Street Smithfield NSW 2164
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TABLE OF CONTENTS

Description

Executive summary

This executive summary presents a synopsis of the Preliminary Site Investigation (PSI) Assessment for 18, 20 & 22 Willan Drive, Cartwright. The site is proposed for redevelopment into a multi dwelling residential complex.

The object of the Preliminary Site Investigation was undertaken to ascertain whether the site presents a risk to human health and/or the environment arising from any past/present activities at the site or neighboring properties. Laboratory testing was undertaken to re-enforce the results of the desktop study. The scope of work included a documentary review, a site investigation, chemical analyses of eight (8) soil samples together with preparation of this report.

A PSI was requested by St George Community Housing to determine the potential for onsite contamination. This report shall provide a preliminary assessment of any site contamination and, if required, provide a basis for a more detailed investigation. At the time of the inspection (10th October 2016), each site was utilised for residential purposes.

Based on historical information reviewed, the site comprised of vacant land up until the1950s, where the site was developed for residential purposes.

The potential for the site to be contaminated from on-site sources and off site sources was considered by Ideal Geotech. Based on the findings of our site inspection and site history review, the actual or potential contamination sources were identified as low. Test results revealed levels of heavy metals are well below the adopted assessment criteria (HILs (A) and EIL), and levels of Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), organochlorin pesticides (OCP), and organophosphorus pesticide (OPP) below the 95% UCL, and therefore interpreted to be not present on site. However, asbestos was identified within soil sample E2 (2-7mm length fibre bundles found in 8x4mm cement sheet). Also, analysis of E8 confirmed that at the rear of no 18 Willan Drive there is asbestos cement sheeting stored against the back fence.

No history of dangerous manufacturing utilizing heavy chemicals or metals was documented.

No history of heavy chemicals or metals storage was documented.

The contaminants that may be present across the site were considered low in terms of significance in terms of risk to the human and environment receptors identified. However, a Detailed Site Investigation (DSI) is required to confirm the presence and extent of asbestos contamination to determine the suitability of the site for the proposed development application and address the data gaps identified.

1.0 INTRODUCTION

1.1 Overview

Ideal Geotech have undertaken a Preliminary Site Investigation, as requested by St George Community Housing at the site 18, 20 & 22 Willian Drive, Cartwright. This report has been prepared to assess the suitability of the site for subdivision work and construction based on its current condition and the findings of this investigation.

2.0 SCOPE OF WORK

The scope of works for this PSI includes:

- Review of the physical site setting and site conditions based on a site inspection, including research of the location of pits, spills, patches of discoloured vegetation, etc. (where applicable);
- Research and review of the information available, including previous environmental investigations, current and historical titles information, review of aerial photographs, EPA notices, council records, anecdotal evidence, site survey and site records on waste management practices;
- Development of a preliminary Conceptual Site Model (CSM) to demonstrate the interactions between potential sources of contamination, exposure pathways and human/ecological receptors identified;
- Collection of soil samples in accordance with a sampling plan.
- Chemical analysis by a NATA accredited laboratory.
- Assessment of the results of the chemical analysis against the appropriate guidelines, and
- Recommendations for additional investigations should any data gaps be identified or possible strategies for the management of the site, where relevant.

This report was prepared in accordance with the NSW Environment Protection Authority (EPA) "Guidelines for Consultants Reporting on Contaminated Sites" (2011).

3.0 SITE DESCRIPTION

The combined subject sites are rectangular and, legally defined as Lot 347, 348 and 349 in Deposited Plan 227167. The site is bounded by Willan Drive to the north, and residential allotments to the south, east and west. The sites measure approximately 45m along the Willan Drive border and 36m deep, encompassing a total area of approximately 1,044m^2.

At the time of the site inspection, the following observations were made:

- Asbestos cement sheeting was observed at the rear of property number 18 and may be from the shed;
- The main access to each property is off Willan Drive, on the northern boundary;

- Residential dwelling at no 22 Willan Drive is constructed primarily of Fibre Board. No 18 and 20 Willan are constructed primarily of brick;
- Vegetation on site was in good condition and well maintained;
- No surface standing water was noticed at the site; and
- There were no indicators of underground storage tanks within the site;

4.0 SITE GEOLOGY

The 1:100,000 scale Geological Series Map of the Penrith region indicates that the subject site is underlain by Quaternary deposits, generally comprises of *medium grained clay, sand and silt.*

5.0 SITE HISTORY

To ascertain the site history, a documentary review of past and present land use at the subject site and the surrounding area has been undertaken as follows:

5.1 Previous Land Use and Review of Historical Photographs

Aerial Photographs were obtained by this office from the NSW Department of Lands Office. The aerial photographs were reviewed to assess the likely past uses of the site with the findings summarised below;

1942 - The site is vacant pasture. No residential construction, commercial development or farming can be seen at the subject site.

1951 - It appears a small cottage is present on site with some minor development in the surrounding areas also observed. No significant changes to the site can be seen.

1971 - No significant changes to the site can be seen.

1982 - Significantly more development has occurred around the subject site, however, mostly residential and commercial and no obvious sources of contamination.

5.2 Search of Contaminated Land Management Register (NSW EPA)

A summary of the Cartwright area can be found. No notices have been issued to the subject site. Furthermore, the listed sites on the register are situated at such a distance (greater than 200m), that they are not believed to have provided a potential contamination risk to the subject property.

5.3 Search of Protection of the Environment Operations Public Register (POEO) of Licensed and Delicensed Premises

A search of the POEO public register of licensed and delicensed premises (DECC) indicated that that three licensed or delicensed premises were located within Cartwright, however not within the immediate surrounding area of the site (within 200m).

5.4 Work Cover NSW Records

At the time of reporting, this office had not been given authorisation to request a search of the Stored Chemical Information Database (SCID) for licenses to keep dangerous goods at the site from Work Cover NSW.

5.5 Product Spill & Loss History

No external information was provided for any product spill and loss. However, based on the site inspection, the site was free of visible signs of chemical staining.

5.6 Section 149 Certificates

At the time of reporting, this office could not access The Planning Certificate – Section 149 of the Environmental Planning & Assessment Act 1979.

6.0 SITE CONDITION AND SURROUNDING ENVIRONMENT

A site investigation was conducted on 10th October 2016. The field observations are summarized in the table below:

Table 1 – Summary of Field Observations

Parameter	Observation
Visible observations on soil contamination	No visible evidence of contamination was observed. No staining of the soils or odours was documented.
Presence of drums, fill or waste materials	None observed. No visible indicators of underground fuel tanks (bowsers or venting pipes).
Presence of fill	Fill was not observed
Flood potential	Not evident.
Relevant sensitive environments	Not evident.

7.0 AREAS OF ENVIRONMENTAL CONCERN AND CONCEPTUAL SITE MODEL

Based on the site inspection, site history, and review of available information from the desktop study, the potential Areas of Environmental Concern (AEC) and their associated Contaminants of Concern (CoCs) for the site were identified. These are summarised in table 2 below;

Table 2 – Summary of Areas of Environmental Concern

Potential AEC	Potentially contaminating activity	Potential CoCs	Potential Exposure Pathways	Risk
Entire site	Construction using asbestos cement sheeting	Asbestos	Soil (surface) and air	Low to Medium
Garden and storage sheds	Storing petrol and pesticides	Metals, Hydrocarbons, OCP/OPP, BTEX, asbestos	Soil and Groundwater	Low

8.0 SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY

Sampling and analysis was undertaken to assess the nature, location and likely distribution of any contamination present at the subject site specifically within areas identified in table 2 above, and any potential risk posed to human health or the environment. Test results were compared to the relevant New South Wales Environment Protection Authority (NSW EPA) criteria. The values obtained from chemical testing will be compared to NEPM 2013, HIL Table 1A, column A.

Eight (8) samples were sent to a NATA accredited laboratory as part of a limited sampling program. Samples were selected based on site observations (odour, staining etc), and their position within the borehole (i.e. fill or natural).

8.1 Sampling Methodology

Each sample was taken at depths of 0.1 to 0.2m depth. The sample was collected using a hand auger and stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring. The samples were placed in 250g laboratory prepared glass jars which were capped using Teflon-sealed screw caps and then placed in a chilled container. The sample jars were transported to our office and placed in a refrigerator.

The following day the samples were forwarded to SGS environmental for analysis along with a Chain of Custody which was subsequently returned to confirm the receipt of all samples.

9.0 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field sampling was undertaken by Ideal Geotech. A Geotechnical Consultant from Ideal Geotech sampled from the test locations

9.1 Decontamination Procedures

Soil samples were collected using a stainless steel trowel. The trowel was decontaminated between sampling events using the following procedure:

1) Soil was removed from the trowel by scrubbing with a brush

2) The trowel was washed with phosphate free detergent in a bucket

3) The trowel was then rinsed in distilled water in another bucket

4) Steps 2 and 3 were repeated

5) The trowel was then dried with a clean disposable towel

10.0 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

10.1 Laboratory Accreditation

SGS Australia Pty Ltd are accredited by the National Association of Testing Authorities (NATA) for the analysis carried out and are also accredited for compliance with ISO/IEC 17025.

10.2 Sample Holding Times

The holding times for samples at SGS are presented in the table below, along with the allowable holding time, detailed in Schedule B (3) of the National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013):

Table 3 – Holding Times

Laboratory	Analyte	Date Sampled	Date Received	Date of Extraction/ Analysis	Holding Time	Allowable Holding Time
SGS						
	Metals	10-10-16	12-10-16	17-10-16	7 days	6 months*
	Organochloride Pesticides (OCP)	10-10-16	12-10-16	17-10-16	7 days	14 days
	Organophosphorus Pesticides (OPP)	10-10-16	12-10-16	17-10-16	7 days	14 days
	Total Petroleum Hydrocarbons (TPH), PAH, BTEX	10-10-16	12-10-16	17-10-16	7 days	14 days

Note 1: (*) Metals excludes Mercury which has a holding time of 28 days.

10.3 Analytical Methods Used and Practical Quantitation Limits

The analytical methods and practical quantitation limits (PQL)/level of reporting (LOR) used by SGS are indicated on the test certificates located in Appendix A.

10.4 Laboratory Quality Control

SGS carry out in-house Quality Control testing. This provides the laboratory information regarding the accuracy of testing carried out. The RPD (relative percent difference) results for SGS are within the acceptance criteria adopted by the laboratory (see QC attached). The results met the criteria and are tabulated below:

Table 4 – RPDs

Laboratory	QC Type	QC Outliners Occur	QC Acceptance Criteria
ALS/SGS	Laboratory Blanks	No	Achieved
ALS/SGS	Laboratory Duplicates	No	Achieved
ALS/SGS	Matrix Spikes	No	Achieved
ALS/SGS	Surrogate Spikes	No	Achieved

11.0 QUALITY ASSESSMENET AND QUALITY CONTROL DATA EVALUATION

Quality Assessment and Quality Control have been achieved through the following procedures.

11.1 Document Completeness

- Preparation of chain of custody records
- Laboratory confirmation of receipt of intact samples and relevant chain of custody
- Laboratory provision of NATA accredited results certificates

11.2 Data Completeness

- Analysis of contaminants of concern

11.3 Data Representativeness

This is achieved by the following:

- Representative sampling of potential contaminants based on the site history and site activities
- Sufficient duplicate and split sample numbers complying with NEPM
- Adequate laboratory internal QA and QC methods complying with NEPM

11.4 Data Comparability

- Use of consistent sampling personnel and methodologies
- Use of NATA accredited laboratories
- Use of consistent test methods between selected laboratories
- Use of consistent test methods between samples

11.5 Data Precision and Accuracy

- The use of NATA accredited laboratories – a requirement of which is adequately trained and experienced staff
- The use of appropriate and validated laboratory test methods
- Acceptable laboratory performance based on results of blank, matrix spike, control, duplicate and surrogate samples

11.6 Data Evaluation

Based on the above information regarding quality assurance and quality control, it is considered that the quality objectives for field procedures and laboratory results are reliable for this assessment.

Table 5 – Data Evaluation Summary

Data Quality Objectives	Field Considerations	Laboratory Considerations	QC Acceptance Criteria
Completeness	Achieved	Achieved	Achieved
Comparability	Achieved	Achieved	Achieved
Representativeness	Achieved	Achieved	Achieved
Precision	Achieved	Achieved	Achieved
Accuracy	Achieved	Achieved	Achieved

12.0 BASIS FOR ASSESSMENT CRITERIA

The Assessment criteria used in this investigation have been obtained from the following guideline documents:

- The National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; 'standard residential with garden/accessible soil' ('A').

- Ecological Investigation Levels (EILs) for metals are applicable for assessing the risk to terrestrial ecosystems.

- The 'Guidelines for Assessing Service Stations' produced by the (NSW EPA) under the publications of the Contaminated Land Management Act provides guidance for threshold concentrations for petroleum hydrocarbons.

Table 6 – Basis of Assessment

Contaminant	Assessment Criteria (mg/kg)			Guidelines
	Health Based Investigation Level (HIL'A')	Ecological Investigation Levels (EIL's)	NSW EPA Threshold Concentrations	
Inorganics				
(Heavy Metals)				
Arsenic (total)	100	20		NEPM (2013)
Cadmium	20	3		NEPM (2013)
Chromium (vI)	100	400		NEPM (2013)
Copper	6000	100		NEPM (2013)
Lead	300	600		NEPM (2013)
Mercury	40	1		NEPM (2013)
Nickel	400	60		NEPM (2013)
Zinc	7400	200		NEPM (2013)
Organics				
TPH				
C10 to C36			1000	NSW EPA, DECC
Benzene	0.5	50		2009 & NEPM
Toulene	160	85		(2013)
Ethylbenzene	55	70		NEPM (2013)
Xylene	40	105		NEPM (2013)
Phenol	3000			NEPM (2013)
PAH	300			NEPM (2013)
OCP				NEPM (2013)
Aldrin + Dieldrin	6			NEPM (2013)
Chlordane				NEPM (2013)
Heptachlor	50			NEPM (2013)
DDD+DDE+DDT	6			
OPP	240			
Diazinon	-			See Note (a)
Ethion	-			See Note (a)
Fenitrothion	-			See Note (a)
PCB	1			
Asbestos	0.01%	--	-	NEPM (2013)
Cyanide	200			NEPM (2013)

Note (a): As yet a guideline relating to Organophosphate Pesticides (OPP) in soils has not been published. If contaminant levels had been detected a site specific threshold concentration would have been derived, however, as no contaminant levels were detected this was not required.

13.0 LABORATORY TEST RESULTS

Test results are tabulated and presented below (Tables 7, 8, 9 and 10) along with the relevant assessment criteria. Laboratory test certificates are in Appendix A.

Table 7 – Heavy Metal Test Results

			Heavy Metals (mg/kg)							
Location	Sample No.	Depth (m)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
See Plan	E1	0.1 - 0.2	4	2.1	16	61	79	0.06	14	230
See Plan	E2	0.1 - 0.2	3	<0.3	12	12	72	0.05	6.0	74
See Plan	E3	0.1 - 0.2	4	<0.3	9	30	27	<0.05	4.5	44
See Plan	E4	0.1 - 0.2	3	<0.3	10	12	27	<0.05	5.1	64
See Plan	E5	0.1 - 0.2	5	<0.3	18	15	31	<0.05	10	95
See Plan	E6	0.1 - 0.2	3	<0.3	9.0	16	42	<0.05	5.2	56
See Plan	E7	0.1 - 0.2	4	0.7	11	21	41	<0.05	8.9	100
See Plan	E8	0.1 - 0.2	6	0.3	23	14	42	<0.05	2.4	21
Practical Quantitation Limit (PQL)			3	0.3	0.3	0.5	1	0.01	0.5	0.5
Number of Samples			8	8	8	8	8	8	8	8
95% Upper Confidence Level			**5.2**	**2.2**	**19.3**	**47.6**	**66.6**	**0.066**	**13.6**	**133.6**
NEPM Health Investigation Level HILs (A)			100	20	100	1000	300	15	600	7400
NEPM Ecological Investigation Level EIL			20	3	400	100	600	1	60	200

Note (A): For statistical assessment sample concentrations less than the PQL are considered equal to the PQL.

Table 8: Organochlorine Pesticides (OCP), Organophosphate Pesticides (OPP), PCB & Cyanide Test Results

Sample ID			OCP (mg/kg)						OPP (mg/kg)		
Location	Sample No.	Depth (m)	Aldrin	Dieldrin	Heptachlor	DDD	DDE	DDT	Diazinon	Ethion	Fenitrothion
See Plan	E1	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E2	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E3	0.1-0.2	<0.1	<0.2	0.5	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E4	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E5	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E6	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E7	0.1-0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	<0.2
See Plan	E8	0.1-0.2	<0.1	<0.2	<0.1	<0.1	0.3	0.2	<0.5	<0.2	<0.2
Practical Quantitation Limit			0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.2	0.2
Number of Samples			Non Detect						Non Detect		
Mean											
Standard Deviation											

Coefficient of Variation							
95% Upper Confidence Level							
NEPM Health Based Investigation Level (2013)	10 [a]	10[a]	10	200 [b]	200[b]	200[b]	See Note (c)

Note (a): Aldrin + Dieldrin, Note (b): DDD + DDE + DDT, Note (c): General guidelines for OPP levels in soil have not been developed, if levels had been detected a Site Specific Threshold Concentration would have been derived.

Table 9: Total Petroleum Hydrocarbon (TPH) Test Results

Location	Sample No.	Depth (m)	TPH (mg/kg)				Benzene (mg/kg)	Toulene (mg/kg)	Ethlyben-zene (mg/kg)	Xylene (mg/kg)
			C10-C14	C15-C28	C29-C36	Total				
See Plan	E5	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E6	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E8	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E9	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E10	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E12	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E13	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
See Plan	E14	0.1 – 0.2	<20	<45	<45	<210	<0.1	<0.1	<0.1	<0.3
Practical Quantitation Limit (PQL)			20	45	45	210	-	-	-	-
Number of Samples			Non Detect							
Mean										
Standard Deviation										
Coefficient of Variation										
95% Upper Confidence Level										
NEPM Health Based Investigation Level (2013)							0.5	160	55	40
NSW EPA (DECC) Threshold Concentrations 2009 ('Guidelines for Assessing Service Station Sites')						1000				

Table 10: Asbestos Test Results

Sample ID/Location	Depth (m)	Asbestos Detected	Type of Asbestos
E1	0.1 – 0.2	No	NA
E2	0.1 – 0.2	Yes, 2-7mm length fibre bundles found in 8x4mm cement sheet	Amosite, Chrysolite and Crosidolite
E3	0.1 – 0.2	No	NA
E4	0.1 – 0.2	No	NA
E5	0.1 – 0.2	No	NA
E6	0.1 – 0.2	No	NA
E7	0.1 – 0.2	No	NA
E8	From stored sheeting	Yes, In cement sheet fragment.	Amosite and Chrysotile

13.1 Heavy Metals

Heavy metal concentrations for Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc are presented in Table 7. The concentrations of all metals were well below the 95% UCL (HILs A and EIL). Therefore, the heavy metal concentrations, present in the fill and natural soil layer are not considered likely to pose a risk to human health or the environment under a 'standard residential with garden/accessible soil' setting.

13.2 Organochlorine Pesticides (OCP) , Organophosphorus Pesticides (OPP), Cyanide and PCB

The OCP, OPP, Cyanide and PCB concentrations, presented in Table 8, were less than the relevant assessment criteria adopted, and therefore the chemical analyses indicate that the site is not contaminated with OCP, OPP.

13.3 Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH) and BTEX

The TPH, PAH and BTEX concentrations, presented in Table 9, were less than the relevant assessment criteria adopted, and therefore the chemical analyses indicate that the site is not contaminated with TPH, PAH or BTEX.

13.4 Asbestos Test Results

The Asbestos test results are presented in table 10. Asbestos was identified within soil sample E2 (2-7mm length fibre bundles found in 8x4mm cement sheet). Also, analysis of E8 confirmed that the sheeting observed on site is asbestos cemented sheeting.

14.0 Data Gaps

Based on the Conceptual Site Model and searches, the following data gaps were identified;

- Undertake council and work cover searches;
- Carry out additional soil sampling to further delineate asbestos contamination.
- Preparation of a HAZMAT report.

15.0 CONCLUSION AND RECOMMENDATIONS

The conclusion of this Preliminary Site Investigation is as follows:

The contaminants that may be present across the site were low significance in terms of risk to the human and environment receptors identified. However, a Detailed Site Investigation (DSI) is required to confirm the presence and extent of asbestos contamination to determine the suitability of the site for the proposed development application and address the data gaps identified.

Should you have any queries, please do not hesitate to contact the undersigned.

For and on behalf of
Ideal Geotech Pty Ltd

[redacted]

Dane Dwyer
Geotechnical Engineer

[redacted]

Murali Pamu
Geotechnical Engineer

References

Contaminated Sites – Guidelines for Assessing Service Stations. NSW Environment Protection Authority (EPA) 1994

Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites. NSW Environment Protection Authority (EPA) 2000.

Contaminated Sites – Sampling Design Guidelines. NSW Environment Protection Authority (EPA) 1995

National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council 2013.

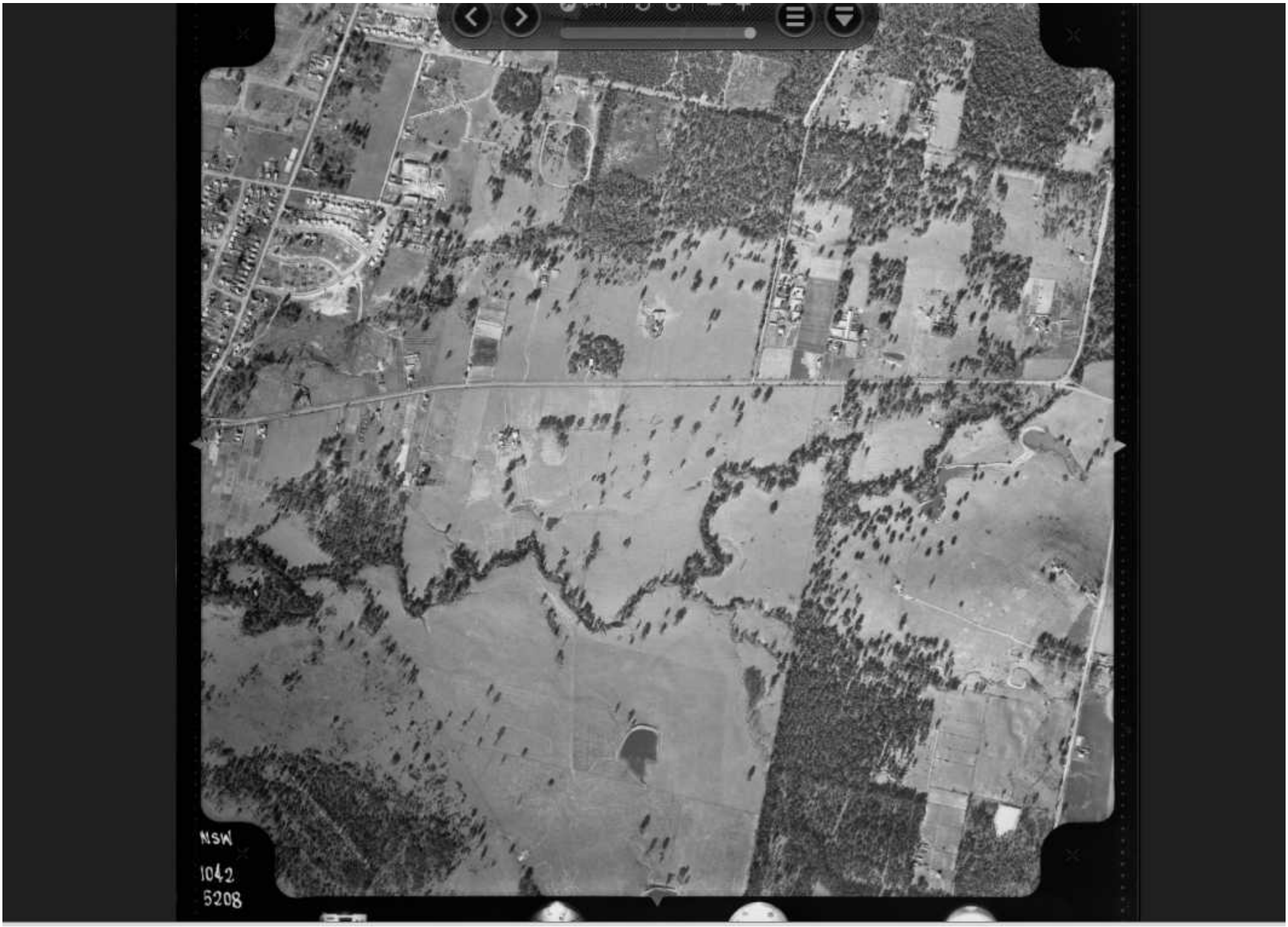
APPENDIX A

SUPPORTING DOCUMENTATION

Asb 8 sample taken from fibro sheets under this roof

Sample Locations

18-22 Willan Drive, Cartwright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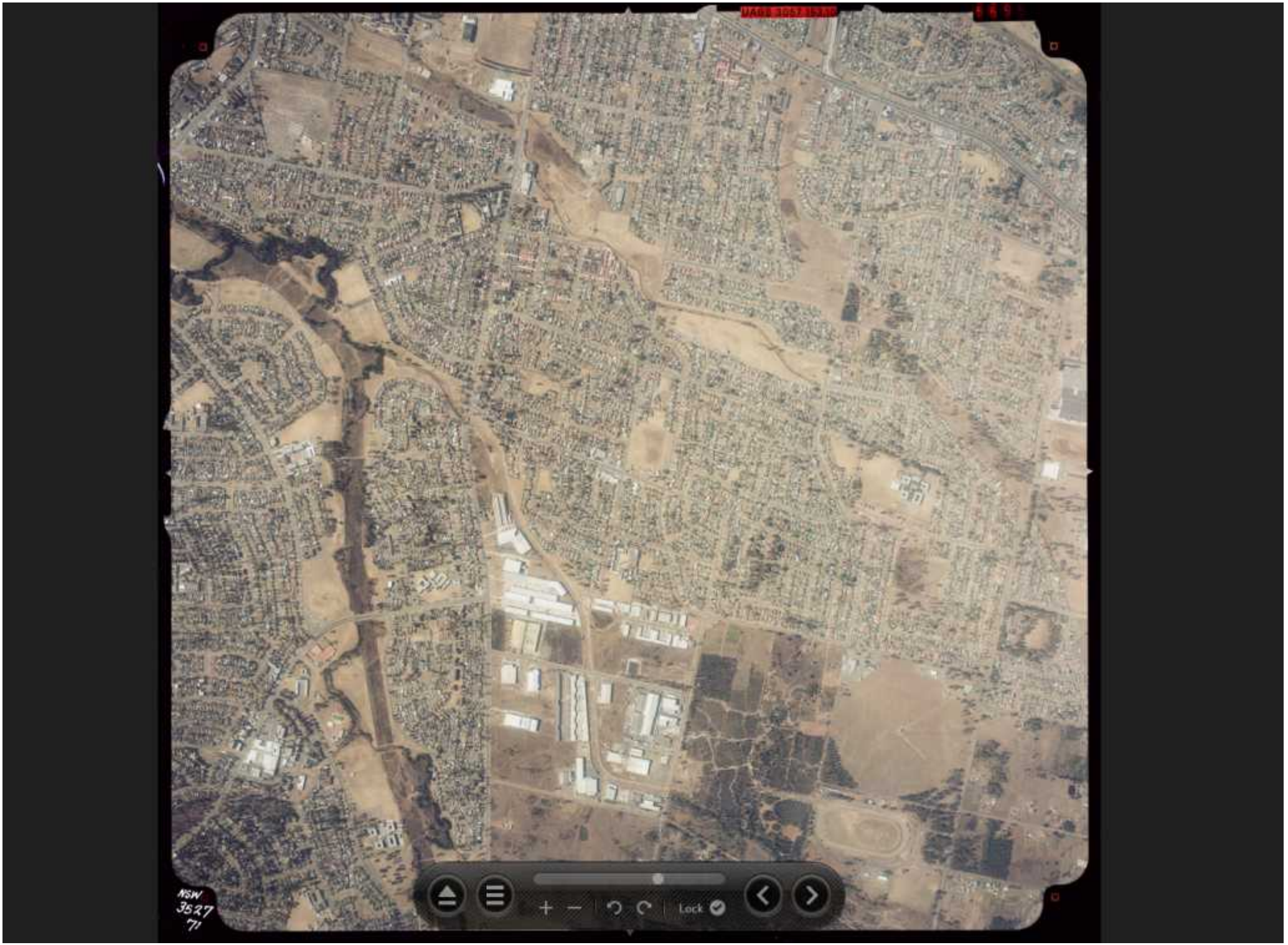
1042
5208


Lock
NSW
2200
51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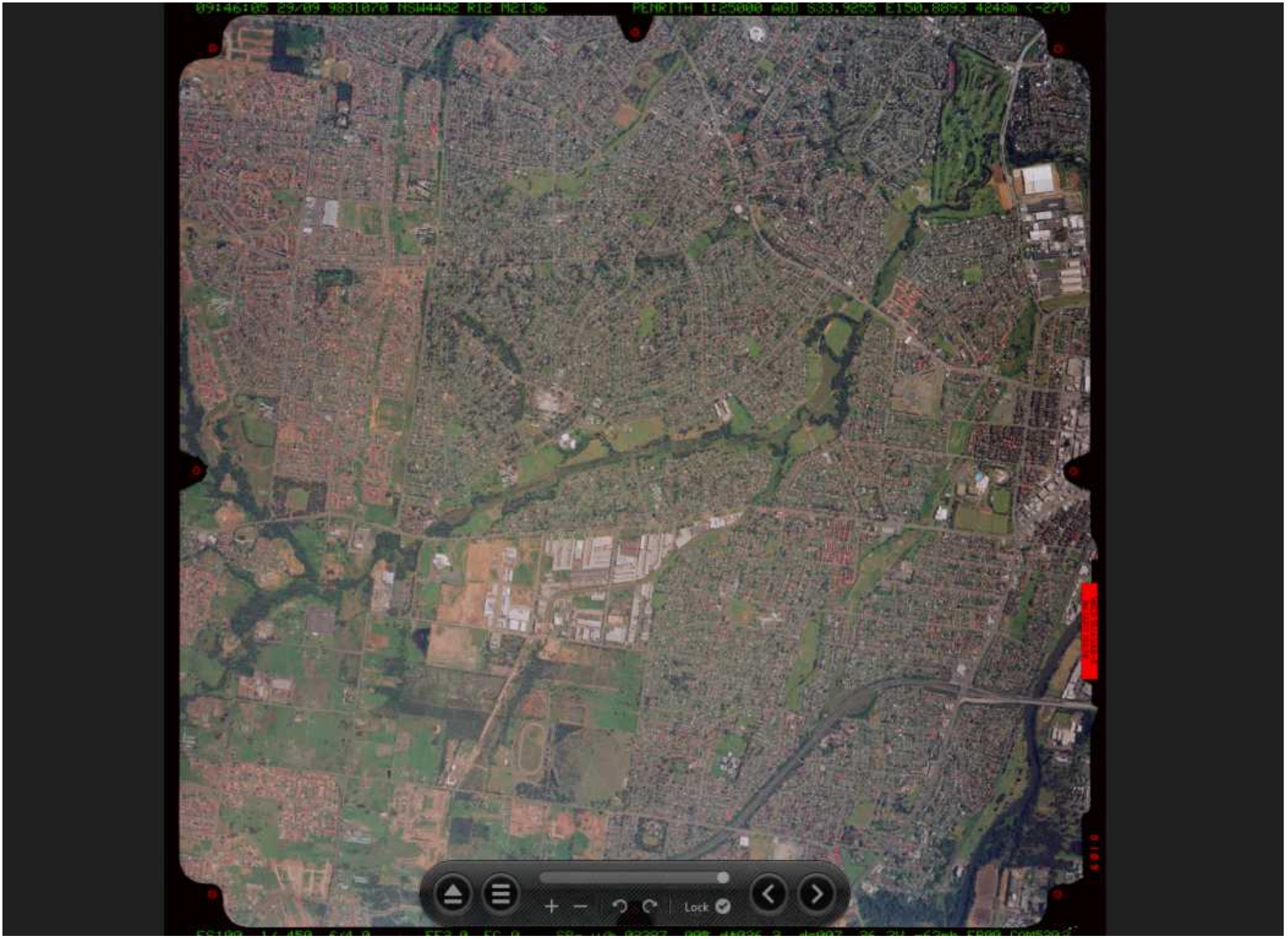
3527
71
Lock


Lock

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Dane Dwyer
Client	IDEALCORP PTY LTD
Address	PO BOX 2270 SMITHFIELD NSW 2164
Telephone	61 2 97255522
Facsimile	61 2 87866300
Email	[redacted]
Project	**24199**
Order Number	(Not specified)
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Email	[redacted]
SGS Reference	**SE157964 R0**
Date Received	11/10/2016
Date Reported	18/10/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Sample #2: 2-7mm length fibre bundles found in 8x4mm cement sheet fragment.

Asbestos analysed by Approved Identifiers Ravee Sivasubramaniam and Yusuf Kuthpudin .

SIGNATORIES

[redacted]

Bennet Lo
Senior Organic Chemist/Metals Chemist

[redacted]

Dong Liang
Metals/Inorganics Team Leader

[redacted]

Ly Kim Ha
Organic Section Head

[redacted]

Ravee Sivasubramaniam
Hygiene Team Leader

VOC's in Soil [AN433] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
TRH C6-C9	mg/kg	20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
TRH C10-C14	mg/kg	20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<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	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8

OC Pesticides in Soil [AN400/AN420] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	**0.5**	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	**0.2**	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	**0.1**	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	**0.2**	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

OC Pesticides in Soil [AN400/AN420] Tested: 13/10/2016 (continued)

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1

OP Pesticides in Soil [AN400/AN420] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2

PCBs in Soil [AN400/AN420] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 17/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Arsenic, As	mg/kg	3	4	3	4	<3	5
Cadmium, Cd	mg/kg	0.3	2.1	<0.3	<0.3	<0.3	0.3
Chromium, Cr	mg/kg	0.3	16	12	9.0	10	18
Copper, Cu	mg/kg	0.5	61	12	30	12	15
Lead, Pb	mg/kg	1	79	72	27	27	31
Nickel, Ni	mg/kg	0.5	14	6.0	4.5	5.1	10
Zinc, Zn	mg/kg	0.5	230	74	44	64	95

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Arsenic, As	mg/kg	3	3	4	6
Cadmium, Cd	mg/kg	0.3	0.3	0.7	0.3
Chromium, Cr	mg/kg	0.3	9.0	11	23
Copper, Cu	mg/kg	0.5	16	21	14
Lead, Pb	mg/kg	1	42	41	42
Nickel, Ni	mg/kg	0.5	5.2	8.9	2.4
Zinc, Zn	mg/kg	0.5	56	100	21

Mercury in Soil [AN312] Tested: 17/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Mercury	mg/kg	0.05	**0.06**	**0.05**	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 13/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
% Moisture	%w/w	0.5	15	9.7	5.2	18	12

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007	E8 SOIL - 10/10/2016 SE157964.008
% Moisture	%w/w	0.5	10	13	21

Fibre Identification in soil [AN602] Tested: 17/10/2016

PARAMETER	UOM	LOR	E1 SOIL - 10/10/2016 SE157964.001	E2 SOIL - 10/10/2016 SE157964.002	E3 SOIL - 10/10/2016 SE157964.003	E4 SOIL - 10/10/2016 SE157964.004	E5 SOIL - 10/10/2016 SE157964.005
Asbestos Detected	No unit	-	No	Yes	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	**>0.01**	<0.01	<0.01	<0.01

PARAMETER	UOM	LOR	E6 SOIL - 10/10/2016 SE157964.006	E7 SOIL - 10/10/2016 SE157964.007
Asbestos Detected	No unit	-	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01

Fibre ID in bulk materials [AN602] Tested: 18/10/2016

PARAMETER	UOM	LOR	E8 (FCP) MATERIAL - 10/10/2016 SE157964.009
Asbestos Detected	No unit	-	Yes

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid , mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser . Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN400	OC and OP Pesticides by GC-ECD: The determination of organochlorine (OC) and organophosphorus (OP) pesticides and polychlorinated biphenyls (PCBs) in soils, sludges and groundwater. (Based on USEPA methods 3510, 3550, 8140 and 8080.)
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC /MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup /fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS /ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf).
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Project	**24199**
Order Number	(Not specified)
Samples	8

LABORATORY DETAILS

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SGS Reference	**SE157964 R0**
Date Received	11 Oct 2016
Date Reported	18 Oct 2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

Sample #2: 2-7mm length fibre bundles found in 8x4mm cement sheet fragment.

Asbestos analysed by Approved Identifiers Ravee Sivasubramaniam and Yusuf Kuthpudin .

SIGNATORIES

[redacted]

Bennet Lo
Senior Organic Chemist/Metals Chemis

[redacted]

Dong Liang
Metals/Inorganics Team Leader

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Ravee Sivasubramaniam
Hygiene Team Leader

ANALYTICAL REPORT

RESULTS

Fibre Identification in soil — Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE157964.001	E1	Soil	51g Clay, Sand, Soil, Rocks	10 Oct 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE157964.002	E2	Soil	50g Clay, Sand, Rocks	10 Oct 2016	Amosite, Chrysotile & Crocidolite Asbestos Found Organic Fibres Detected	>0.01
SE157964.003	E3	Soil	64g Clay, Sand, Soil, Rocks	10 Oct 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE157964.004	E4	Soil	54g Clay, Rocks	10 Oct 2016	No Asbestos Found	<0.01
SE157964.005	E5	Soil	74g Clay, Sand, Rocks	10 Oct 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE157964.006	E6	Soil	64g Clay, Sand, Soil, Rocks	10 Oct 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE157964.007	E7	Soil	46g Clay, Sand, Soil, Rocks	10 Oct 2016	No Asbestos Found Organic Fibres Detected	<0.01

ANALYTICAL REPORT

SE157964 R0

RESULTS

Fibre ID in bulk materials — Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification
SE157964.009	E8 (FCP)	Other	110x70x4mm cement sheet fragment	10 Oct 2016	Amosite & Chrysotile Asbestos Detected

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
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AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service .
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.
Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.
Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos -containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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