



ENVIRONMENTAL - REMEDIATION - GEOTECHNICAL ENGINEERING - WORK HEALTH & SAFETY - LABORATORIES - DRILLING

DETAILED SITE INVESTIGATION

**1-7 Ramsay Road and
Part of 5 & 7 Harrabrook Road,
Five Dock NSW**

Prepared for
Croftstar Pty Ltd

19th August 2021

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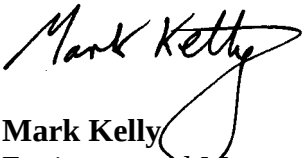
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ABBREVIATIONS

ADWG	Australian Drinking Water Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground Storage Tank
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethyl benzene and Xylene
COC	Contaminants of Concern
DLWC	Department of Land & Water Conservation
DNR	Department of Natural Resources
DQOs	Data Quality Objectives
POEO	Protection of the Environment Operations
DSI	Detailed Site Investigation
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
HIL	Health-Based Soil Investigation Level
LGA	Local Government Area
NEHF	National Environmental Health Forum
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
OCF	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photo Ionisation Detector
PQL	Practical Quantitation Limit
PSH	Phase Separated Hydrocarbon
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance / Quality Control
RAC	Remediation Acceptance Criteria
RAP	Site Remediation Plan
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SCID	Stored Chemical Information Database
SEPP	State Environment Planning Policy
SMP	Site Management Plan
SVC	Site Validation Criteria
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VHC	Volatile Halogenated Compounds

EXECUTIVE SUMMARY

Aargus Pty Ltd ('Aargus') was appointed by Croftstar Pty Ltd (the 'client') to undertake a Detailed Site Investigation ('DSI') within the property located at 1-7 Ramsay Road and Part of 5 & 7 Harrabrook Road, Five Dock NSW (the 'site'). It is understood that the site is proposed for the demolition of existing buildings and redevelopment into a mixed commercial-residential building with basement car parking and deep soil landscaping areas.

At the time of the inspection (4th August 2021), the site was used for a current retail shop, a former commercial property and backyards of two residential purposes.

The land title information provided suggested that 1-5 Ramsay Road was initially owned by private individuals through to 1957 when the property was purchased by The Commissioner for Motor Transport / Property NSW until 2017. 7 Ramsay Road was initially owned by private individuals through to 1966 when the property was owned by a number of companies until 1980, when private individuals owned the property. 5 & 7 Harrabrook Avenue have been owned by private individuals through to 2020.

The aerials photography review indicated that 1-5 Ramsay Road was vacant land until the mid 1960s when commercial development commenced comprising of a number of buildings and sealed surfaces for parking with some additions until 1982, thereafter the site remained unchanged. 7 Ramsay Road has always been occupied by a commercial building in the eastern portion. 5 & 7 Harrabrook Avenue have always been a backyard of the residential property. The general land use of the immediate site vicinity seems to have been consistently residential and commercial to the north, a road then commercial/vacant land/residential to the east, residential to the west, and a road then a creek.

There were no records for the site on the NSW EPA database. The client indicated that 1-5 Ramsay Road was formerly used as an office by Service NSW (formerly the RTA, RMS, DMR etc), with the workshop used to undertake safety checks on vehicles requiring registration etc.

The findings of the assessment indicated the following areas of environmental concern: in relation to imported fill of unknown origin, pesticide use, previous site uses, leaks of motor vehicles, metal degradation, and potential presence of hazardous materials in current or past building structures, which may pose risks to human and environmental receptors.

The soil assessment revealed the following:

- Heavy metals concentrations were below the HIL 'B' and/or the site derived EILs with the exception of:
 - A lead concentration in sample BH1 (0-0.1m) which exceeded the HIL 'B' and the site derived EIL.
 - A zinc concentration in samples BH1 (0-0.1m) and BH2 (0-0.1m) which exceeded the site derived EIL.
- TRH and BTEXN concentrations were below the HSL 'A&B', ESLs and/or Management Limits, with the exception of:
 - A TRH F3 concentration in sample BH1 (0-0.1m) which exceeded the ESL.
 - A benzo(a)pyrene concentration in sample BH1 (0-0.1m) which exceeded the ESL.
- PAH, OC & PCB concentrations were below the HIL 'B', EILs and/or ESLs with the exception of:
 - A benzo(a)pyrene as TEQ concentration in samples BH1 (0-0.1m), BH7 (0.3-0.4m) and BH7 (1-1.1m) which exceeded the HIL 'B'.
 - A benzo(a)pyrene concentration in sample BH1 (0-0.1m) which exceeded the ESL.
- Asbestos was not detected in any of the samples analysed.

Based on the CSM, the following data gaps were identified with respect to the pollution linkages identified:

- The lateral and/or vertical extent at boreholes BH1, BH2 & BH7.
- Additional soil samples beneath the existing site features and in the areas previously inaccessible.
- A search of Council and SafeWork NSW records and a review of the 10.7 Planning Certificates.

Based on the results of this investigation it is considered that the risks to human health and the environment associated with soil contamination at the site are low within the context of the proposed use of the site for a mixed commercial-residential building with basement car parking and deep soil landscaping areas development. The site is therefore considered to be rendered suitable for the proposed use, subject to the following:

- An appropriate remedial / management strategy is developed, culminating in preparation of a Remedial Action Plan (RAP) in accordance with EPA guidelines, in regards to the removal of the three hotspots BH1, BH2 & BH7, as well addressing the aforementioned data gaps.
- Any soils requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).

1 INTRODUCTION

1.1 Background

Aargus Pty Ltd ('Aargus') was appointed by Croftstar Pty Ltd (the 'client') to undertake a Detailed Site Investigation ('DSI') within the property located at 1-7 Ramsay Road and Part of 5 & 7 Harrabrook Road, Five Dock NSW (the 'site'). The location of the property is presented in Figure 1 of Appendix A.

It is understood that the site is proposed for the demolition of existing buildings and redevelopment into a mixed commercial-residential building with basement car parking and deep soil landscaping areas. The proposed development plans can be found in Appendix B.

A site investigation was requested by The City of Canada Bay Council to determine the potential for onsite contamination as part of the Development Application (DA).

1.2 Objective

The primary objectives of this DSI are as follows:

- Identify potential areas where contamination may have occurred from current and historical activities;
- Identify potential contaminants associated with potentially contaminating activities;
- Assess the potential for soils to have been impacted by current and historical activities; and
- Assess the suitability of the site for redevelopment into a mixed commercial-residential building with basement car parking and deep soil landscaping areas based on its current condition and the findings of this investigation.

1.3 Scope of Works

The scope of works for this DSI includes:

- Review of the physical site setting and site conditions based on a site inspection, including research of the location of sewers, drains, holding tanks and pits, spills, patches of discoloured vegetation, etc. (where applicable);
- Research and review of the information available, including current and historical titles information, review of aerial photographs, groundwater bore searches, EPA notices, 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;
- A targeted soil boring/sampling investigative study – formulating and conducting a sampling plan and borehole investigation;
- Laboratory analysis and results from sample analysis – findings and comparison to regulatory guidelines;
- Field and laboratory Quality Assurance/Quality Control (QA/QC); 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 with reference to the NSW Environment Protection Authority (EPA) "*Guidelines for Consultants Reporting on Contaminated Sites*" (2020).

2 SITE IDENTIFICATION AND DESCRIPTION

2.1 Site Identification

Site identification information and land use is summarised in the table below.

Table 1: Site Identification

Lot and DP Number (Address)	Lots A, B & D in DP415618 and Lot 5 in DP310522 (1-5 Ramsay Road, Five Dock) Lot 1 in DP241337 (7 Ramsay Road, Five Dock) Part Lot 2 in DP310522 (5 Harrabrook Road, Five Dock) Part Lot 1 in DP310522 (7 Harrabrook Road, Five Dock)
Coordinates (NE corner) *	Latitude: -33.872587, Longitude: 151.132388
Approx. Site Area	2,578m ²
Local Government Area	City of Canada Bay
Parish	Concord
County	Cumberland
Current Land Zoning**	B1 – Neighbourhood Centre R2 – Low Density Residential
Proposed Land Use	Mixed Retail and Medium Density Residential
Current Site Owner	Croftstar Pty Ltd
Site End Users	Residents (adults & children), visitors, workers

Notes: * refer to <http://maps.six.nsw.gov.au/>

** refer to <https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address>

The site boundary and Lot and DP numbers are presented in Figure 2 of Appendix A.

2.2 Site Inspection

A site visit was carried out on Wednesday 4th August 2021 by an Aargus field scientist to inspect the site for any potential sources of contamination and document any observations made regarding the current site conditions. At the time of the site inspection, the following observations were made:

- The site was irregular in shape and used for retail, commercial and residential purposes.
- 1-5 Ramsay Road
 - Two-storey brick building with a metal roof formerly in the central southern portion with a single-storey brick building extended to the east.
 - A metal shipping container was located in the south eastern corner.
 - A metal awning in the central northern portion.
 - A brick building with a metal roof in the north western corner used a workshop, with car hoists and oil collection drums. The concrete sealed surfaces were in a good condition, with no staining observed.
 - The remainder of the site was a concrete and/or bitumen car park area.
 - The south eastern portion was occupied by a garden bed / landscaping area.
- 7 Ramsay Road
 - Two-storey brick building with metal roof used for retail / residential purposes occupied the eastern portion.
 - A single-storey brick building with metal roof occupied the central portion.
 - The western portion was open.
- Part 5 Harrabrook Avenue
 - Rear backyard that is grass and tree covered.
- Part 7 Harrabrook Avenue
 - Rear backyard that is grass and tree covered.
 - A wooden garage with a tile roof and concrete floor.
 - A metal shed.

The site features are presented in Figure 3 of Appendix A. Site photographs are included in Appendix C.

2.3 Topography and Surface Water Drainage

The following observations were made during the site inspection carried out on Wednesday 4th August 2021:

- The site topography is generally flat, with a slight slope to the south west.
- Ramsay Road on the eastern perimeter slopes from the north to the south, whilst Henley Marine Drive on the southern perimeter slopes from the east to the west.
- Stormwater runoff from the site is expected to flow in a south-westerly direction towards Henley marine Drive.

2.4 Surrounding Land Uses

The surrounding land uses identified are described in the table below:

Table 2: Surrounding Land Uses

Orientation	Description
North	Retail and Residential
East	Ramsay Road then a mechanics and vacant land
South	Henley Marine Drive then Iron Cove Creek
West	Low density residential

3 SITE HISTORY

3.1 Land Titles

A review of historical documents held at the NSW Department of Lands offices was undertaken to identify the current and previous land owners, and potential land uses. The results of the title search are summarised in the following table.

Table 3: Land Title Information

Year	Lots A, B & D in DP415618 and Lot 5 in DP310522 (1-5 Ramsay Road, Five Dock NSW)
2017-Current	Croftstar Pty Ltd
2001-2017	Property NSW
1957-2001	The Commissioner for Motor Transport
	Prior Title: Vol 7983 Fol 232
	Prior Title: Vol 7377 Fol 20
	Prior Title: Vol 6555 Fol 13
1952-1957	David Bernard Whitehouse
	Prior Title: Vol 6105 Fol 31
1950-1952	Robert James Carson

Year	Lot 1 In DP241337 (7 Ramsay Road, Five Dock NSW)
2020-Current	Croftstar Pty Ltd
2016-2020	Frank Carigliano & Fernanda Carigliano
1998-2016	John D O'leary
1980-1998	Raymond Hughes & Vicki Maxine Hughes
1978-1980	Vyner Service Pty Ltd
1972-1978	The Royce Group Of Driving School Pty Ltd
1966-1972	Remo Investments Pty Ltd & Rombar Investments Pty Ltd
	Prior Title: Vol 11849 Fol 245
	Prior Title: Vol 10520 Fol 176
	Prior Title: Vol 6622 Fol 111
1952-1966	Joseph Pittorino
1945-1952	Mary Elsie Gearin
	Prior Title: Vol 4406 Fol 187
1937-1945	Alma Fifield & Cecil Harry Roberge
1930-1937	Annie Roberge

Year	Lot 1 In DP573543 (7 Harrabrook Avenue, Five Dock NSW)
2019-Current	Croftstar Pty Ltd
2006-2019	Leonard Paul Russell & Ronald Andrew Russell
1984-2006	Constance Joyce Russell
	Prior Title: Vol 3660 Fol 133
1970-1984	George Edward Russell & Constance Joyce Russell
1960-1970	Edith Hannah Russell
1924-1960	George Edward Russell & Edith Hannah Russell
1924-1924	Henry Lorenz Dorn

Year	Lot 2 In DP573543 (5 Harrabrook Avenue, Five Dock NSW)
2020-Current	Croftstar Pty Ltd
2015-2020	Duncan John Rennie & Kate Gemma Quinlan
2008-2015	Antonino Lombardo
2007-2008	Martin James Jessop & Wendy Jane Michelle Evans
2002-2007	Jack Epsimos & Katerina Epsimos
1993-2002	Bret John Maloney & Susan Anne Maloney
1988-1993	Brian Graham & Adrienne Kay Cobby
1988-1988	Annie Doull Treagle & Margaret Austin Soulsby
	Prior Title: Vol 15392 Fol 8
	Prior Title: Vol 3739 Fol 80
1925-1988	Verlie Urlene Bartlett

In summary, the land title information provided suggested the following:

- 1-5 Ramsay Road was initially owned by private individuals through to 1957 when the property was purchased by The Commissioner for Motor Transport / Property NSW until 2017, when the current site owner purchased the property.
- 7 Ramsay Road was initially owned by private individuals through to 1966 when the property was owned by a number of companies until 1980, when private individuals owned the property. The current site owner purchased the property in 2020.
- 5 Harrabrook Avenue has been owned by private individuals through to 2020, when the current site owner purchased the property.
- 7 Harrabrook Avenue has been owned by private individuals through to 2019, when the current site owner purchased the property.

A copy of the land titles information obtained by Aargus can be found in Appendix D.

3.2 Aerial Photographs

Selected aerial photographs obtained from the NSW Department of Lands were reviewed to describe the site features and surrounding areas at various timelines. A summary of the review is presented in the table below.

Table 4: Summary of Historical Aerial Photos

Year	Site	Surrounding areas
1943	1-5 Ramsay Road was vacant land. 7 Ramsay Road occupied by a building on the eastern portion and vacant land on the western portion. Part 5 Harrabrook Avenue was vacant. Part 7 Harrabrook Avenue was occupied by two sheds in the southern portion and vacant land in the central portion.	N: Residential and commercial S: Vacant land then a creek E: Road then commercial, vacant and residential W: Residential
1955	The site layout appeared to be similar to that observed in the 1943 photo.	No apparent changes were observed from the previous photo.
1965	The site layout appeared to be similar to that observed in the 1955 photo, with the exception of two buildings and a sealed surface in the eastern half of 1-5 Ramsay Road, and a new shed on the southern portion of Part 7 Harrabrook Avenue.	No apparent changes were observed from the previous photo, with the exception of: S: A Road has been constructed.
1970	The site layout appeared to be similar to that observed in the 1965 photo, with the exception of a new building in the north western portion of 1-5 Ramsay Road and the area also being sealed.	No apparent changes were observed from the previous photo.
1975	The site layout appeared to be similar to that observed in the 1970 photo, with the exception of a new building in the central southern portion of 1-5 Ramsay Road.	No apparent changes were observed from the previous photo.
1982	The site layout appeared to be similar to that observed in the 1975 photo, with the exception of a new metal awning in the central portion of 1-5 Ramsay Road.	No apparent changes were observed from the previous photo.

Year	Site	Surrounding areas
1991	The site layout appeared to be similar to that observed in the 1982 photo.	No apparent changes were observed from the previous photo.
1998	The site layout appeared to be similar to that observed in the 1991 photo.	No apparent changes were observed from the previous photo.
2005	The site layout appeared to be similar to that observed in the 1998 photo.	No apparent changes were observed from the previous photo.
2021	The site layout appeared to be similar to that observed in the 2005 photo.	No apparent changes were observed from the previous photo.

In summary, land use of the site appeared to have been:

- 1-5 Ramsay Road – vacant land until the mid 1960s when commercial development commenced comprising of a number of buildings and sealed surfaces for parking with some additions until 1982, thereafter the site remained unchanged.
- 7 Ramsay Road has always been occupied by a commercial building in the eastern portion.
- 5 Harrabrook Avenue has always been a vacant backyard of the residential property.
- 7 Harrabrook Avenue has always been a backyard of the residential property, with the southern portion occupied by sheds.

The general land use of the immediate site vicinity seems to have been consistently residential and commercial to the north, a road then commercial/vacant land/residential to the east, residential to the west, and a road then a creek.

Copies of current and historical aerial photographs are presented in Appendix E.

3.3 EPA Records

3.3.1 CLM Act 1997

The NSW EPA publishes records of contaminated sites under Section 58 of the Contaminated Land Management (CLM) Act 1997. The notices relate to investigation and/or remediation of site contamination considered to pose a significant risk of harm under the definition in the CLM Act. However, it should be noted that the EPA record of Notices for Contaminated Land does not provide a record of all contaminated land in NSW.

A search of the EPA database revealed that the subject site is not listed. However, two other properties were listed within the suburb of Five Dock, situated approximately between 300m and 900m to the north-north west from the site and were not considered to pose an adverse impact on the site.

Copies of the EPA records are included in Appendix F.

3.4 SafeWork NSW Records

A search of the Stored Chemical Information Database (SCID) for licences to keep dangerous goods at the site was requested from the SafeWork NSW. The search will be provided as an addendum to this report once received from SafeWork NSW.

3.5 Planning 10.7 Certificates

The Planning 10.7 Certificates – Section 149 (2) of the Environmental Planning & Assessment Act 1979 for the site were not available at the time of reporting.

3.6 Council Search Records

A search of the City of Canada Bay Council database will be updated once the information has been received from the Council.

3.7 Anedotal Information

The client provided the following information:

- 1-5 Ramsay Road – was formerly used as an office by Service NSW (formerlay the RTA, RMS, DMR etc), with the workshop used to undertake safety checks on vehicles requiring registration etc.
- 7 Ramsay Road has been used for retail (various shops) purposes.
- 5 Harrabrook Avenue has always been a vacant backyard of the residential property.
- 7 Harrabrook Avenue has always been a backyard of the residential property, with the sheds used for poultry storage.

3.8 Industrial Processes and Products Manufactured

A review of the industrial processes and/or products manufactured at the site was conducted, with no such activities known to have taken place within the site.

3.9 Former Chemical Storage and Transfer Areas

A review of the former chemical storage and transfer areas and/or products manufactured at the site was conducted, with no such activities known to have taken place within the site.

3.10 Product Spill & Loss History

It was indicated by the client, that to their knowledge no serious land or water contamination had occurred.

The majority of the commercial portion of the site is currently either occupied by a building and/ or sealed surfaces. At the time of the inspections, the sealed surfaces of the concrete slab were in generally good condition with only minor cracks observed. In addition, there were no visible signs of oil and/or chemical staining, indicating that any surface spills (if they did occur at all) were cleaned up immediately and did not appear to penetrate the existing slab.

3.11 Discharges to Land, Water and Air

No discharge to the land, water and air were observed.

3.12 Complaint History

No complaints for the site were noted.

3.13 Historical Use of Adjacent Land

It was indicated by the client that to their knowledge, the adjacent lands to the site have been used primarily for residential, retail and/or commercial uses.

3.14 Discussion and Summary of Site History

Based on available information, the site historical usage is summarised as follows:

- The land title information provided suggested the following:
 - 1-5 Ramsay Road was initially owned by private individuals through to 1957 when the property was purchased by The Commissioner for Motor Transport / Property NSW until 2017, when the current site owner purchased the property.
 - 7 Ramsay Road was initially owned by private individuals through to 1966 when the property was owned by a number of companies until 1980, when private individuals owned the property. The current site owner purchased the property in 2020.
 - 5 Harrabrook Avenue has been owned by private individuals through to 2020, when the current site owner purchased the property.
 - 7 Harrabrook Avenue has been owned by private individuals through to 2019, when the current site owner purchased the property.
- The aerials photography review indicated:
 - 1-5 Ramsay Road – vacant land until the mid 1960s when commercial development commenced comprising of a number of buildings and sealed

surfaces for parking with some additions until 1982, thereafter the site remained unchanged.

- o 7 Ramsay Road has always been occupied by a commercial building in the eastern portion.
- o 5 Harrabrook Avenue has always been a vacant backyard of the residential property.
- o 7 Harrabrook Avenue has always been a backyard of the residential property, with the southern portion occupied by sheds.
- The general land use of the immediate site vicinity seems to have been consistently residential and commercial to the north, a road then commercial/vacant land/residential to the east, residential to the west, and a road then a creek.
- There were no records for the site on the NSW EPA database.
- The client provided the following information:
 - o 1-5 Ramsay Road – was formerly used as an office by Service NSW (formerly the RTA, RMS, DMR etc), with the workshop used to undertake safety checks on vehicles requiring registration etc.
 - o 7 Ramsay Road has been used for retail (various shops) purposes.
 - o 5 Harrabrook Avenue has always been a vacant backyard of the residential property.
 - o 7 Harrabrook Avenue has always been a backyard of the residential property, with the sheds used for poultry storage.

4 ENVIRONMENTAL SETTING

4.1 Sensitive Environmental Receptors

The nearest down-gradient watercourse is a Iron Cove Creek located approximately 20m to the south which discharges into Iron Cove / Parramatta River approximately 850m to the east.

4.2 Geology

The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, 1983), published by the Department of Mineral Resources indicates the residual soils within the site to be underlain by either:

- Hawkesbury Sandstone comprising medium to coarse grained quartz sandstone, very minor shale and laminite lenses; and/or
- Quaternary Age soils consisting of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places with common shell layers.

4.3 Acid Sulfate Soils

To determine whether there is a potential for acid sulphate soils to be present at the site, reference was made to the NSW Department of Land & Water Conservation (DLWC) *Acid Sulphate Soil Risk Maps* (Edition Two, December 1997, Scale 1:250,000), specifically Map No. 93 – “Prospect / Parramatta River”. A review of the map indicated that there is no known occurrence of acid sulphate soil materials at the site.

The NSW ePlanning Spatial Viewer website indicated that the site was in a Class 5 area (<https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address>).

4.4 Hydrogeology

Based on available information, our desktop study indicates that the inferred groundwater flow direction would be towards the south east, as shown in Figure 6 in Appendix A.

A search of the Department of Natural Resources (DNR) borehole database information revealed four (4) groundwater bores within a 500m radius of the site. A summary of the relevant information provided by the registered groundwater bore record search is provided in the following table:

Table 5: Summary of Registered Groundwater Bore Records

GW Bore ID	Intended Purpose	Depth (m bgl)	Standing Water Level (m bgl)	Water Bearing Zones	Salinity (µS/cm)
GW110180	Monitoring	34.00	-	-	-
GW110181	Monitoring	3.10	-	-	-
GW112144	Monitoring	57.10	-	-	-
GW112145	Monitoring	29.75	-	-	-

The registered groundwater bores within a 500m radius of the site and used for monitoring purposes and were unlikely to be used for human consumption since the site is not located within the SEPP boundary for the Sydney Drinking Water Catchment.

A copy of the groundwater bore search records can be found in Appendix G.

4.5 Summary of Local Meteorology

The monthly rainfall of the local area can be represented by the data collected by Bureau of Meteorology (BOM) from the rainfall gauge located in Concord Golf Club, which is located approximately 3.5km north west of the site. Records indicate that the mean annual rainfall for since 1930 is 1127.9mm.

Reference can be made to Appendix H – Local Meteorology.

5 REAS OF POTENTIAL ENVIRONMENTAL CONCERN

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

Table 6: Summary of Potential Areas and Contaminants of Concern

Potential AEC	Potentially contaminating activity	Potential CoCs	Likelihood of Site Impact	Justification
Entire site	Importation of fill material from unknown origin	Metals, TPH, BTEX, PAH, OCP, PCB, Asbestos	Low	Based on the site observations and site topography, the presence of imported fill material is likely to be minimal.
	Potential for pesticides to have been sprayed or injected on or underneath concrete slabs	OCP	Low	The site is not known for having been used for agricultural purposes from the 1950s when OCPs were first introduced into Australia. If use of OCPs has occurred, the impact is likely to have been localised and limited to the near surface layer.
Metal Features	Degradation of the metal	Heavy metals	Low	If this occurred, it would be restricted to the near surface soils.
Previous Site activities	Leaks from vehicles, storage of oil	Metals, TPH, BTEX, PAH	Low	Sealed surfaces were noted on site. The majority of the sealed surfaces appeared to be in good condition.
Car parking	Leaks from vehicles	Metals, TPH, BTEX, PAH	Low	Sealed surfaces were noted on site. The majority of the sealed surfaces appeared to be in good condition.
Building Structures	Potential Asbestos/Fibro Features	Asbestos	Low	If present, these will be removed by licensed contractors.

6 DATA QUALITY OBJECTIVES

6.1 Step 1 – State the Problem

6.1.1 Problem Statement

The site is proposed to be developed into a mixed commercial-residential building with basement car parking and deep soil landscaping areas. As part of the DA application, it is a Council requirement that a site investigation report be prepared by a consultant to assess whether the site is suitable for the proposed development.

However, the desktop study identified some areas of potential environmental concern, in relation to imported fill of unknown origin, pesticide use, previous site uses, leaks of motor vehicles, metal degradation, and potential presence of hazardous materials in current or past building structures, which may pose risks to human and environmental receptors.

6.1.2 Objectives

The objectives of the DSI are:

- To assess the potential for the soils to have been impacted by current and historically contaminating activities.
- To assess the suitability of the site for redevelopment into a mixed commercial-residential building with basement car parking and deep soil landscaping areas as part of Council's requirements for the DA.

6.1.3 Project Team

The nominated core project team and their responsibilities are listed in the table below.

Table 7: Project Team and Responsibilities

Project Team Member	Responsibilities
Mark Kelly – Principal Environmental Consultant	Technical Review
Nick Kariotoglou – Principal Environmental Scientist	Project Director and Field Representative
Saad Bin Suleman – Environmental Engineer	Field Representative and Report Author

6.1.4 Preliminary Conceptual Site Model

The preliminary CSM, based on the PSI, is summarised in the table below.

Table 8: Conceptual Site Model

Potential Sources	Potential Receptor	Potential Exposure Pathways	Complete Linkages	Risk	Justification
Fill materials	Site users or the general public	Dermal contact, inhalation or ingestion of exposed impacted soils	Limited (Current)	Low	The majority of the site is sealed by either building structures or hard-standing surfaces. Any contamination on site will be remediated.
Former site activities			No (Future)	Negligible	If present, contaminated soils are likely to be remediated and removed for off-site disposal.
Pesticide use					
Leaks from vehicles	The aquatic ecosystems at the nearby Iron Cove Creek	Migration of impacted groundwater and surface water run-off	Yes (Current)	Low	No obvious sources of contamination were observed on site that could migrate off site with surface water run-off.
Metal degradation			No (Future)	Negligible	Any sources of contamination will be removed.
	Underlying Aquifer	Leaching and migration of contaminants through groundwater infiltration	Limited (Current)	Low	Due to concrete flooring leachability of metals and other inorganics vertical migration of contaminants is likely to be limited.

Potential Sources	Potential Receptor	Potential Exposure Pathways	Complete Linkages	Risk	Justification
			No (Future)	Negligible	If present, contaminated soils are likely to be remediated.
Asbestos in current/former buildings	Site user or visitors	Inhalation of airborne fibres	Limited (Current)	Low	If present, they are likely to be in a bonded form.
			No (Future)	Negligible	If present, contaminated soils are likely to be remediated.

6.2 Step 2 - Identify the Decisions of the Study

The decisions required to address the contamination problem are as follows:

- Is soil contamination present within the areas of potential environmental concern identified?
- Is soil contamination likely to present an unacceptable risk of harm to humans or the environments?
- Is the site currently suitable for the proposed land use being residential with minimal access to soil?
- Is there a potential for onsite/offsite migration issues?
- If not, does the site require further investigation and/or remediation works?

6.3 Step 3 - Identify Information Inputs

The following information is required for input into the decisions identified in Step 2:

- Identification of potential areas and contaminants of concern as detailed in Section 5 of this report;
- Selection of soil assessment criteria from appropriate guidelines as detailed in Section 8 of this report;
- Collection of soil samples from site;
- Headspace analysis for screening of VOCs present within soils using a PID; and
- Comparison and interpretation of results against the adopted soil assessment criteria.

6.4 Step 4 – Define the Study Boundaries

The spatial and temporal aspects of the investigation area that the data must represent to support the decisions identified in Step 2 are as follows:

- The lateral extent of the study boundary is defined by the site boundaries as shown in the Site Location Plans (refer to Figure 1).
- The vertical extent of the study boundary is defined by the depth of the natural soils in borehole BH3 located at approximately 1.5 metres below the ground surface.

6.5 Step 5 – Develop the Analytical Approach

The acceptable limits for laboratory QA/QC parameters are shown in the table below and are based upon the laboratory reported acceptable limits and those stated within the NEPM 2013 Guidelines.

Table 9: Acceptable Limits for QC Samples

Type of QC Sample	Control Limit
FIELD	
Rinsate Blanks	Analytes <LOR
Intra-Laboratory Duplicates	RPD's <50%
Inter-Laboratory Duplicates	RPD's <50%
Trip Blanks	Volatiles <LOR
Trip Spike Recovery	>70%
LABORATORY	
Method Blanks	< Laboratory LOR
Matrix Spike	Recovery targets: - Metals: 70% to 130% - Organics: 60% to 140%
Laboratory Duplicate	RPD's <30%
Laboratory Control Samples	Recovery targets: 60% to 140%
Surrogate Spike	Recovery targets: 60% to 140%

The following conditions should be adopted:

- If the control limits are exceeded, then an assessment of the significance of the results should be carried out;
- If the results of the DQI assessment indicate that the data set is reliable, then the data set will be deemed to be acceptable for the purposes of the investigation; and
- If the measured concentrations of soil and groundwater samples analysed meet their respective validation criteria, then no additional assessment is required.

6.6 Step 6 - Specify Limits on Decision Errors

There are two types of decision errors:

- **Sampling errors**, which occur when the samples collected are not representative of the conditions within the investigation area; and
- **Measurement errors**, which occur during sample collection, handling, preparation, analysis and data reduction.

These errors may lead to following (null hypothesis):

- Deciding that the site is not suitable for the proposed development when it actually is (Type I error);
- Deciding that the site is suitable for the proposed development when it is actually not (Type II error);
- Deciding that the risks to human health from soil vapour concentrations are high and require further management or remediation, when the risks are actually low (Type I error); and
- Deciding that the risks to human health from soil vapour concentrations are low and requires no further management, when the risks are actually high (Type II error).

A 5% significance level has been selected for Type I errors on the basis that 95% of the data set will satisfy the DQIs. Therefore, the acceptable limit of the decision errors is based on a 5% probability of the hypothesis being incorrect.

An assessment will be made as to the likelihood of a decision error being made based on:

- The acceptable limits for inter/intra laboratory duplicate sample comparisons as specified in Step 5 of the DQOs; and
- The acceptable limits for laboratory QA/QC parameters are based upon the laboratory reported acceptable limits and those stated within the NEPM Guidelines.

If the concentration of a particular contaminant of concern exceeds its assessment criteria, then a further assessment is required to address the significance of the result. Statistical analysis based on 95% UCL may be used to assess the significance of the data provided the following conditions are met:

- the arithmetic mean of the data set must be less than its respective threshold level; that is, it is acceptable for individual results to exceed its respective threshold level, but the cumulative mean of the data set of soil sample results must not exceed the threshold level;
- the standard deviation of the data set is less than 50% of the relevant threshold level; and
- no individual sample result should be greater than 250% of the relevant threshold level.

Ecological data is not included in this assessment process as ecological results cannot be statistically interpreted.

6.7 Step 7 - Optimise the Design for Obtaining Data

The optimum design for obtaining data in order to achieve the Data Quality Objectives is as follows:

- Only NATA-accredited environmental testing laboratories will be commissioned to analyse soil samples and will implement a quality control plan conforming to the NEPM (Assessment of Site Contamination) Measure Schedule B(3) Guidelines for Analysis of Potentially Contaminated Soils;
- An assessment of the Data Quality Indicators to determine if the field procedures and laboratory analytical results are reliable;
- The investigation will be carried out by an experienced and qualified Environmental Scientist, who is trained in sampling at contaminated sites in accordance with Aargus protocols based on best practice industry standards;
- Collection of QA/QC samples at frequencies prescribed in the NEPM Guidelines; and
- In accordance with the NSW EPA “Sampling Design Guidelines” (September 1995) a minimum of nine (9) sampling points for a site area of 2,578m² will be adopted to provide general site coverage.

7 DATA QUALITY INDICATORS

7.1 General

The five Data Quality Indicators (DQIs) comprising completeness; comparability; representativeness; precision and accuracy provide an assessment of the reliability of field procedures and laboratory analytical results in accordance with the NEPM 2013 Schedule B2 Guidelines on Site Characterisation, Appendix C – Assessment of data quality. These are addressed in the following sub-sections.

7.2 Completeness

Data Completeness is a measure of the amount of useable data (expressed as %) from a data collection activity. The completeness is equal to the percentage of valid quality assurance and quality control results.

The assessment should address the following:

Table 10: Data Completeness

Field	Laboratory
• All critical locations are sampled; • All samples collected from critical grids and depths; • Consistency in the use of standard operating procedures, equipment, sampler; • Completion and correctness of field documentation.	• All critical samples and analytes are analysed in accordance with the DQOs; • Appropriateness of laboratory methods and PQLs.

The minimum target frequency for each type of QA/QC sample should be carried out in accordance with the following table:

Table 11: QA/QC Requirements

Field QA/QC Sample	Frequency (Soil)
Intra-Laboratory Duplicate	1 in 20 samples
Inter-Laboratory Duplicate	1 in 20 samples
Field Blanks	1 per day (rinsate)
Trip Blank	1 per sample batch
Trip Spike	1 per sample batch

Where any of the above objectives are not achieved for particular samples, steps will be taken to rectify the non-conformance, if possible. Alternatively, data qualifiers detailing the nature of the quality problem will be documented in the report and attached to relevant data in the result summary tables.

The target for overall completeness for each data set is a minimum of 95%. A data completeness of less than 95% may be accepted where it can be justified that the non-conformance does not have a significant effect on the outcome of the results.

7.3 Comparability

Data Comparability is the confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event.

The qualitative assessment should address the following:

Table 12: Data Comparability

Field	Laboratory
- Consistency in the use of standard operating procedures, equipment, sampler - Consistency in the method of sample collection for each media - Quantification of influence by climatic conditions	- Consistency of analytical methods and limits of reporting (LOR) for each analyte - Whether laboratory limits of reporting are set at < 20% of the adopted site criteria value for each analyte - Consistent use of one primary and one secondary laboratory

7.4 Representativeness

Data Representativeness is the confidence (expressed qualitatively) that data are representative of each media present on the site.

The qualitative assessment should address the following:

Table 13: Data Representativeness

Field	Laboratory
- Samples are collected in accordance with the DQOs - Receipt of samples within holding times - Receipt of intact samples - Receipt of adequately preserved samples	All samples are extracted and analysed within their respective holding times

7.5 Precision

Data Precision is a quantitative measure of the variability (or reproducibility) of data.

Intra-laboratory or Inter-laboratory Duplicate Samples (B) results are compared with Primary Sample (A) results using Relative Percentage Differences (RPDs) according to the following formula:

$$\%RPD = \left| \frac{A - B}{A + B} \right| \times 200$$

Duplicate sampling rates for this assessment (**for each separate sample batch**) are to be tested for all the same analytes as the primary sample:

Table 14: Data Precision

Type of QC Sample	Control Limit
Field Intra-Laboratory Duplicate (Blind)	RPD < +/- 50%
Field Inter-Laboratory Duplicate (Split)	RPD < +/- 50%

Where the laboratory has reported results for a particular analyte below the limit of reporting for either the primary sample or a duplicate sample, the RPD is reported as 'Not Calculable' or NC. A discussion should be made as to which sample should be adopted and compared against the relevant assessment criteria. However, no discussion is required where both the primary sample and the duplicate sample for a particular analyte are below the limit of reporting.

7.6 Accuracy

Data Accuracy is a quantitative measure of the closeness of reported data to the true value. Laboratory measured recovery of analytes in lab control samples with known concentrations. Laboratory QA/QC testing is to include:

Table 15: Data Accuracy

Laboratory QA/QC Sample	Frequency
Method Blank	1 per 20 samples
Matrix Spike	1 per 20 samples
Laboratory Duplicate	Laboratory defined
Laboratory Control	Laboratory defined
Surrogate Spike	All organic samples

8 SITE INVESTIGATION AND SCREENING LEVELS

8.1 General

The selection of appropriate human health and ecological site assessment criteria were based on the “National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)”, NEPC (2013). Full details of the site investigation and screening levels for each potential contaminant of concern in soils identified in Section 5 are presented in Appendix I.

8.2 Soils Investigation and Screening Levels

8.2.1 Health Investigation Levels (HILs)

The NEPM presents Tier 1 Health Investigation Levels (HILs) for a broad range of chemicals such as metals, inorganics, PAHs, phenols, pesticides and other organics. The HILs are applicable to generic land uses such as residential, commercial/industrial or public open space and all soil types, generally within the first 3 metres of soil below ground level. The HILs have been applied to assess human health risks via all relevant pathways of exposure.

Based on the proposed development, soil investigation results within the site will be assessed against the **HIL ‘B’** – *Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.*

8.2.2 Health Screening Levels (HSLs)

The NEPM presents Tier 1 Health Screening Levels (HSLs) for the following petroleum compounds and fractions:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Naphthalene; and
- TPH C6-C10 and TPH >C10-C16 fractions

The HSLs are applicable to generic land uses such as residential, commercial/industrial or recreational/public open space and different soil types between the ground surface and soils >4 metres below ground level. The HILs have been applied to assess human health risks via the inhalation and direct contact pathways of exposure.

8.2.3 Ecological Investigation Levels (EILs)

The NEPM presents Ecological Investigation Levels (Interim EILs) for As, Cu, CrIII, Ni, Pb, Zn, DDT and naphthalene.

The EILs are applicable to generic land uses such as areas of ecological significance, urban residential areas and public open space, and commercial/industrial land uses. The EILs have been applied to assess risks to terrestrial ecosystems, generally, within the top 2 metres of soil at the final surface/ground level.

Site specific EILs for Copper, Zinc, Nickel and Chromium III can be derived by adding the Ambient Background Concentration (ABC) to the Added Contaminant Limits (ACL), as per the following formula $EIL = ABC + ACL$.

The ABC of a contaminant is the soil concentration in a specified locality that is the sum of the naturally occurring background level and the contaminant levels that have been introduced from diffuse or non-point sources by generating anthropogenic activity not attributed to industrial, commercial, or agricultural activities.

The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required. ACLs are based on the soil characteristics of pH, CEC and clay content. Different soils types / profiles will have different contaminant EILs rather than a single generic EIL for each contaminant. ACLs apply chromium III (CrIII), copper (Cu), nickel (Ni) and zinc (Zn) for site-specific EIL determination.

The soil properties to be measured for site-specific derivation of ACLs for CrIII, Cu, Ni and Zn are summarised below:

- pH - Cu
- CEC - Cu, Ni, Zn
- % clay - CrIII

Note – the lowest concentration of copper that is derived from the pH or the CEC calculation is to be used for the ACL.

Insufficient data was available to derive ACLs for As, Pb, DDT and naphthalene. As a result, the derived EILs are generic to all soils and are presented as total soil contaminant concentrations in Tables 1(B)4 and 1(B)5.

8.2.4 Ecological Screening Levels (ESLs)

Table 1B (6) of the NEPM presents Ecological Screening Levels (ESLs) for TPH C6-C40 fractions, BTEX and benzo(a)pyrene.

The ESLs are applicable to generic land uses such as areas of ecological significance, urban residential areas and public open space, and commercial/industrial land uses. The ESLs have been applied to assess risks to terrestrial ecosystems, generally, within the top 2 metres of coarse or fine soil at the final surface/ground level.

8.2.5 Petroleum Hydrocarbon Management Limits

Table 1B (7) of the NEPM presents petroleum hydrocarbon management limits for application to TPH fractions C₆-C₁₀, >C₁₀-C₁₆, >C₁₆-C₃₄ and >C₃₄-C₄₀. The management limits are applicable for coarse or fine soils in residential, parkland, public open space or commercial/industrial land uses following consideration of relevant ESLs and HSLs.

8.2.6 Asbestos

Health screening for asbestos in soil, which are based on scenario-specific likely exposure levels, are adopted from the WA DoH guidelines and are referred in Table 7 in Schedule B1.

Table 16 Health screening levels for asbestos contamination in soil

Form of asbestos	Health Screening Level (w/w)			
	Residential A ¹	Residential B ²	Recreational C ³	Commercial/Industrial D ⁴
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF ⁵ (friable asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

1. Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.
2. Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
4. Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.
5. The screening level of 0.001% w/w asbestos in soil for FA and AF (i.e. non-bonded/friable asbestos) only applies where the FA and AF are able to be quantified by gravimetric procedures (refer Section 4.10). This screening level is not applicable to free fibres.

8.3 Export of Waste

To assess the waste classification of materials to be disposed of off-site, the NSW EPA refers to the NSW EPA (2014) "*Waste Classification Guidelines, Part 1: Classifying Waste*".

9 SOIL INVESTIGATION

9.1 General Methodology

The soil investigation was carried out on Wednesday 4th August 2021 and was designed to meet the Data Quality Objectives. The fieldwork procedures adopted were carried out in general accordance with the Aargus fieldwork protocols, which are based on industry standard practice as prescribed in the NEPM.

Prior to the commencement of the intrusive investigation, a Dial-Before-You-Dig (DBYD) search was carried out and a professional services locator was engaged to clear the proposed sampling locations for underground services.

Upon clearance of the proposed sampling locations, concrete surfaces at each borehole location (where present) were cored by using a 200mm diameter diatube.

The boreholes were backfilled with clean spoil or clean sand/gravel.

A description of sub-surface conditions observed during drilling are presented in borehole logs included in Appendix J.

9.2 Sampling Design Rationale

Seven boreholes (BH1 to BH9) were drilled by adopting a near systematic and targeted grid sampling pattern across the site to provide general site coverage with consideration given to accessibility, site features and the proposed development zones.

It is considered that the number of sampling points adopted meets the minimum requirements of the NSW EPA “Sampling Design Guidelines” (1995) for a site area of 2,578m² and to detect a hotspot diameter of 21.5. The borehole locations are shown in Figure 4 of Appendix A.

9.3 Sampling Density and Sampling Depth

Boreholes were advanced through fill material and terminated at least 0.5m into natural soils to allow for the collection of at least one soil sample from fill material and one from natural soils.

9.4 Sampling Methodology

Soil sampling was carried out in general accordance with Aargus Fieldwork Protocols. In summary:

- Soil samples were collected using a split tube sampler/push tube from each soil type or change in lithology and approximately every 1 metre depth where no change in material was apparent.
- Samples were transferred into clean laboratory supplied containers using a hand trowel.
- In general, each soil sample was divided into two sub-samples. One of the sub-samples was placed into a laboratory-supplied container and a second sub-sample was placed in a separate zip-lock bag for field headspace screening using a PID.

Sampling of asbestos was undertaken as follows:

- o One wetted 500ml sample from each sampling location was submitted for laboratory analysis for AF.

9.5 Field Tests

A calibrated Photo-ionisation Detector (PID) meter was used to obtain the following field measurements:

- Background concentrations of ionisable volatile organic compounds (VOCs) in the ambient air taken approximately 5 to 10 metres upwind of the general work area; and
- Headspace analysis of bagged soil samples collected to detect the presence of ionisable VOCs.

The PID readings were observed before and after each measurement of a sample to ensure that the PID was operating correctly. The procedures followed in performing field headspace on soil samples can be found in the Aargus Field Protocols.

Readings of PID maximums, fluctuations and general comments of observation were recorded in Aargus field record forms included in Appendix K. The PID calibration certificate can be found in Appendix K.

9.6 Soil Laboratory Analysis

Soil samples were submitted to their respective laboratories as specified in Section 10.2. The schedules of analysis for each sampling batch are presented in Appendix N.

10 QUALITY ASSURANCE / QUALITY CONTROL

10.1 Field QA/QC

10.1.1 General

The frequency required for each field quality assurance / quality control (QA/QC) sample is presented in the table below.

Table 17: QA/QC Sampling Frequency

	Intra-Lab Duplicates	Inter-Lab Duplicates	Rinsates	Trip Blanks	Trip Spikes
Sampling Frequency	1 in 20 primary samples	1 in 20 primary samples	1 / Day	1 / Day	1 / Day

10.1.2 Field Duplicates

Duplicates of primary samples were collected to enable the assessment of variability in analyte concentrations between samples collected from the same sampling point. The table below list the duplicate soil samples collected with their corresponding primary samples.

Table 18: Soil Field Duplicate Samples

Primary Sample ID	Sample Depth (m bgl)	Blind Duplicate ID	Split Duplicate ID	Date Sampled
BH3	0.3 – 0.4	D1	SS1	04.08.2021

10.1.3 Rinsates

Rinsate samples recovered for each day in which sampling took place to identify possible cross contamination between the sampling locations are listed in the table below.

Table 19: Rinsate Samples

Sample ID	Equipment Type	Sample Media	Date Collected
R1	Hand Auger / Trowel	Soil	04.08.2021

10.1.4 Trip Blanks / Spikes

Trip spike and trip blank samples were collected to assess the effect of sample handling on volatile concentrations in the samples collected and are listed in the table below.

Table 20: Trip Blank/Trip Spikes

Sample ID	QC Sample Type	Media	Date Collected
TB1	Trip Blank	Soil	04.08.2021
TS1	Trip Spike	Soil	04.08.2021

10.1.5 Sample Handling, Storage and Transport

The following sampling handling, storage and transport procedures were adopted to ensure sample integrity:

- Samples were collected in laboratory supplied containers. A list of sample preservation methods and the types of sample containers used are attached in Appendix L.
- Soil sample containers were placed immediately into a chilled cooler box and dispatched to their respective analytical laboratories on the same day. If this was not possible, samples were temporarily held overnight in the Aargus office refrigerator at a temperature of no greater than 4 °C and dispatched the following day.
- A Chain of Custody form (COC) was completed for all samples collected and included with the samples for transport to their respective laboratories for chemical analysis. Copies of COCs are included in Appendix M.
- All glass bottles were individually bubble wrapped for protection and insulated containers/coolers were used for sample shipment.
- Disposable nitrile gloves were used for OH&S purposes and were changed between every sample location.

10.1.6 Decontamination Procedures

The decontamination of non-dedicated sampling equipment was achieved by washing with phosphate-free detergent and tap water, followed by a final rinse with distilled water. Decontamination was conducted after the collection of samples at each sample location. A clean pair of disposable gloves was used when handling each sample.

The drilling augers were decontaminated between sampling locations by physically removing soil material between boreholes, washing the augers with Decon 90 and rinsing them with water.

10.1.7 Calibration of Equipment

The 10.6eV lamp of the PID was calibrated with isobutylene gas at 100ppm prior to commencement of fieldwork and prior to commencement of each day's fieldwork. The battery in the PID unit was recharged after every day's use in the field.

Copies of calibration records for each relevant item of equipment used can be found in Appendix K.

10.2 Laboratory QA/QC

10.2.1 Laboratories Used

The following NATA-accredited laboratories were commissioned to carry out laboratory analysis of soil samples collected:

- Primary Laboratory – Eurofins MGT (Sydney)
- Secondary Laboratory – ALS Environmental
- ASET Environmental - conducted asbestos analysis on selected primary soil samples

These laboratories also operate Quality Systems that are designed to comply with ISO/IEC 17025. All primary samples, blind duplicates, rinsate samples, trip blank/spikes were dispatched to the primary laboratory. All split samples were dispatched to the secondary laboratory. Laboratory Certificates of Analysis are included in Appendix M.

10.2.2 Holding Times

The holding times for chemicals analysed are presented in Appendix L and were based on USEPA methods, Standard Methods for the Examination of Water and Wastewater (APHA).

10.2.3 Test Methods and Practical Quantitation Limits

The test methods adopted by the laboratories are listed in Appendix L and Practical Quantitation Limits (PQLs) adopted are specified within the Laboratory Certificates of Analysis included in Appendix M.

The methods used by the laboratories generally comply with those listed in the NEPM such as Standards Australia and International standards (US EPA SW-846, APHA 2005, ASTM 2008). Alternate methods may be used by the laboratories however the alternative method must be at least rigorous and reliable as the reference method, and either that:

- it has been validated against an appropriate certified reference material (CRM) on the range of soil types and concentrations most likely to be analysed. This requires adequate recovery of analytes using CRMs during method validation, as well as regular participation in national proficiency trials by bodies such as the National Measurement Institute (NMI) or Proficiency Testing Australia (PTA) or other accredited provider; and / or
- it has been verified against quantitative data generated by a laboratory that is accredited for the reference method to ISO 17025 by NATA or one of its mutual recognition agreement partners.

The laboratory should document the method performance verification and make the data available for independent audit.

10.3 QA/QC Data Evaluation

The Data Quality Indicators (DQIs) for both fieldwork and laboratory procedures were assessed with reference to Appendix V of the NEPM and Guidelines for the NSW Site Auditor Scheme (3rd ed.), 2017. In summary, the findings of the QA/QC evaluation indicated the following:

- Data Completeness – The data set is considered to be adequately complete.
- Data Comparability – The data set is considered to be adequately comparable.
- Data Representativeness – The data set is considered to be adequately representative.
- Data Precision – The data set is considered to be adequately precise.
- Data Accuracy – The data set is considered to be adequately accurate.

The sampling methods (including sample preservation, transport and decontamination procedures) and laboratory methods followed during this investigation works were consistent with Aargus protocols and were found to meet the DQOs for this project.

It is therefore considered that the data is sufficiently reliable and that the results can be used for the purpose of this project.

11 FIELD OBSERVATIONS

11.1 Geology

Based on surface and sub-surface conditions observed during the intrusive investigation, the surface and sub-surface profile across the site is summarised in the table below.

Table 21: Summary of Geological Observations

Geological Unit	Lithological Description	Depth Ranges: Top to Base (m bgl)
NA	Concrete / Bitumen / Pavers / Pavement	
Topsoil	Clayey Sand, fine grained, dark brown with rootlets	0.0m to 0.4m
Fill	Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels	0.0m to 1.4m
Natural Soils	Clayey SAND, fine to medium grained, pale brown, dark brown	0.2m to 1.5m

The following additional observations were made:

- No hydrocarbon staining was observed within any of the borehole locations.
- No hydrocarbon odours were encountered within any of the borehole locations, with exception of the fill profile at borehole BH7.
- No fibre-containing fragments were observed in any of the borehole samples.

We recommend that this section be read in conjunction with Figure 4 (Sample Location Plan) in Appendix A, the Daily Work Sheets in Appendix K and the borehole logs in Appendix J.

11.2 Field Headspace Results

Ionisable VOC detections in PID readings taken from soil samples subjected to field headspace analysis were all less than 1ppm. The PID field record forms can be found in Appendix K.

12 LABORATORY RESULTS

12.1 General

A comparison of soil laboratory results against their respective assessment criteria (as specified in Section 8) are presented in the summary tables in Appendix N. Certificates of laboratory analysis are attached in Appendix M. A discussion of the results is presented in the following sub-sections.

12.2 Soil Results

12.2.1 Heavy Metals

12.2.1.1 Health Investigation Levels (HILs)

As indicated in Table A1, the concentrations of the discrete heavy metals were below the Health Investigation Level (HIL) for a residential unit development, that being the HIL 'B', with the exception of:

- A lead concentration of 1,500mg/kg in sample BH1 (0-0.1m) which exceeded the HIL 'B' of 1,200mg/kg.

12.2.1.2 Ecological Investigation Levels (EILs)

As indicated in Table A1, the arsenic concentrations were below the Ecological Investigation Level (EIL) for urban residential and public open space.

The EILs for Copper, Zinc and Nickel were derived by adding the Ambient Background Concentration (ABC) to the Added Contaminant Limits (ACL), as per the following formula
 $EIL = ABC + ACL$.

The ABC for the site has been determined by recovering a sample from an appropriate reference point, that being borehole BH2 (0.3-0.4m), a sample of uncontaminated NATURAL strata from within the site.

The ABC concentrations are summarised in Table A3.

The results of pH, CEC and %clay for the natural soil samples are summarised in Table A2. Based on the results in Table A2, the site ACLs for Cu, Ni and Zn have been derived and are provided in Table A3.

The calculated EIL for Cu, Pb, Ni and Zn, after appropriate rounding, have been summarised in Table A3.

Therefore, as shown in Table A4, the Cu, Pb, Ni and Zn concentrations from locations BH1, BH2 & BH5 were below the site derived EILs, with exception of:

- A lead concentration of 1,500mg/kg in sample BH1 (0-0.1m) which exceeded the site derived EIL of 1,200mg/kg.
- A zinc concentration of 780mg/kg in sample BH1 (0-0.1m) which exceeded the site derived EIL of 720mg/kg.
- A zinc concentration of 780mg/kg in sample BH2 (0-0.1m) which exceeded the site derived EIL of 720mg/kg.

12.2.2 TRH, BTEX, NAPHTHALENE &/OR BENZO(a)PYRENE

12.2.2.1 Health Screening Levels (HSLs)

As indicated in Table B1, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), benzene, toluene, ethyl benzene, xylenes and naphthalene concentrations were below the HSL 'A' & HSL 'B' for a sand soil profile with a source depth of "0m to <1m" and "1m to <2m".

12.2.2.2 Ecological Screening Levels (ESLs)

As indicated in Table B2, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), F3 (C₁₆-C₃₄), F4 (C₃₄-C₄₀), benzene, toluene, ethyl benzene, xylenes and benzo(a)pyrene concentrations were below the ESL for a coarse grained soil texture in an “urban residential and public open space” environment, with the exception of:

- A TRH F3 concentration of 480mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 300mg/kg.
- A benzo(a)pyrene concentration of 5.9mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 0.7mg/kg.

12.2.2.3 Management Limits

As indicated in Table B3, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), F3 (C₁₆-C₃₄) and F4 (C₃₄-C₄₀) concentrations were below the Management Limits for a coarse grained soil texture in an “residential parkland and public open space” environment.

12.2.3 PAH, OCP & PCB

12.2.3.1 Health Investigation Levels (HILs)

As indicated in Table C, the concentrations of the benzo(a)pyrene (as TEQ), Total PAH, OCP & PCB were below the Health Investigation Level (HIL) for a residential unit development, that being the HIL ‘B’, with the exception of:

- A benzo(a)pyrene as TEQ concentration of 8.8mg/kg in sample BH1 (0-0.1m) which exceeded the HIL ‘B’ of 4.0mg/kg.
- A benzo(a)pyrene as TEQ concentration of 4.3mg/kg in sample BH7 (0.3-0.4m) which exceeded the HIL ‘B’ of 4.0mg/kg.
- A benzo(a)pyrene as TEQ concentration of 14mg/kg in sample BH7 (1-1.1m) which exceeded the HIL ‘B’ of 4.0mg/kg.

12.2.3.2 Ecological Investigation Levels (EILs)

As indicated in Table C, the concentrations of naphthalene and DDT/DDE/DDD were below the Ecological Investigation Level (EIL) for urban residential and public open space.

12.2.3.3 Ecological Screening Levels (ESLs)

As indicated in Table C, the benzo(a)pyrene concentrations were below the ESL for a coarse grained soil texture in an “urban residential and public open space” environment, with the exception of:

- A benzo(a)pyrene concentration of 5.9mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 0.7mg/kg.

12.2.4 Asbestos

As indicated in Table D, no asbestos was detected in any of the samples analysed.

13 DISCUSSION OF RESULTS

The soil assessment revealed the following:

- Heavy metals concentrations were below the HIL 'B' and/or the site derived EILs with the exception of:
 - A lead concentration of 1,500mg/kg in sample BH1 (0-0.1m) which exceeded the HIL 'B' of 1,200mg/kg and the site derived EIL of 1,200mg/kg.
 - A zinc concentration of 780mg/kg in sample BH1 (0-0.1m) which exceeded the site derived EIL of 720mg/kg.
 - A zinc concentration of 780mg/kg in sample BH2 (0-0.1m) which exceeded the site derived EIL of 720mg/kg.
- TRH and BTEXN concentrations were below the HSL 'A&B', ESLs and/or Management Limits, with the exception of:
 - A TRH F3 concentration of 480mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 300mg/kg.
 - A benzo(a)pyrene concentration of 5.9mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 0.7mg/kg.
- PAH, OC & PCB concentrations were below the HIL 'B', EILs and/or ESLs with the exception of:
 - A benzo(a)pyrene as TEQ concentration of 8.8mg/kg in sample BH1 (0-0.1m) which exceeded the HIL 'B' of 4.0mg/kg.
 - A benzo(a)pyrene as TEQ concentration of 4.3mg/kg in sample BH7 (0.3-0.4m) which exceeded the HIL 'B' of 4.0mg/kg.
 - A benzo(a)pyrene as TEQ concentration of 14mg/kg in sample BH7 (1-1.1m) which exceeded the HIL 'B' of 4.0mg/kg.
 - A benzo(a)pyrene concentration of 5.9mg/kg in sample BH1 (0-0.1m) which exceeded the ESL of 0.7mg/kg.
- Asbestos was not detected in any of the samples analysed.

Reference should be made to Figure 7 in Appendix A for a copy of the hotspot location plan.

14 CONCEPTUAL SITE MODEL

14.1 Conceptual Site Model

The refined Conceptual Site Model (CSM) presented in the table below provides a representation of the potential risks associated with the linkages between the following elements:

- Potential contamination sources and their associated contaminants of concern identified in Section 5. Only potential areas of concern with a significance rating of low to high were included;
- Potential human receptors that may be impacted by site contamination are current and future end-users, construction workers and the general public within the immediate vicinity;
- Potential environmental receptors identified in Section 4;
- Potential exposure pathways; and
- Whether each source-pathway-receptor pollution linkage are complete, limited or not present, based on current and future site conditions.

Table 22: Conceptual Site Model

Potential Sources	Potential Receptor	Potential Exposure Pathways	Complete Linkages	Risk	Justification
Lead, Zinc, TRH F3, BaP & BaP as TEQ in BH1	Site users or the general public	Dermal contact, inhalation or ingestion of exposed impacted soils	Limited (Current)	Low	Direct contact with impacted soils is limited to the grassed areas at BH1 and BH2, the remainder of the site is sealed.
Zinc in BH2			No (Future)	Negligible	If present, contaminated soils are likely to be remediated and removed with the remaining soils from the basement excavation level for off-site disposal.
BaP as TEQ in BH7					
Asbestos in buildings	Site user or visitors	Inhalation of airborne fibres	Limited (Current)	Low	If present, asbestos material is likely to be limited to the building fabric and would be in bonded form.
			No (Future)	Negligible	A hazardous materials survey is likely to be required prior to the demolition of the existing buildings for the proposed development and licensed contractors would have to remove any asbestos likely to be present.

14.2 Data Gaps

Based on the CSM, the following data gaps were identified with respect to the pollution linkages identified:

- The lateral and/or vertical extent at boreholes BH1, BH2 & BH7.
- Additional soil samples beneath the existing site features and in the areas previously inaccessible.
- A search of Council and SafeWork NSW records and a review of the 10.7 Planning Certificates.

15 CONCLUSION AND RECOMMENDATIONS

The findings of the assessment indicated the following areas of environmental concern: in relation to imported fill of unknown origin, pesticide use, previous site uses, leaks of motor vehicles, metal degradation, and potential presence of hazardous materials in current or past building structures, which may pose risks to human and environmental receptors.

The soil assessment revealed the following:

- Heavy metals concentrations were below the HIL 'B' and/or the site derived EILs with the exception of:
 - A lead concentration in sample BH1 (0-0.1m) which exceeded the HIL 'B' and the site derived EIL.
 - A zinc concentration in samples BH1 (0-0.1m) and BH2 (0-0.1m) which exceeded the site derived EIL.
- TRH and BTEXN concentrations were below the HSL 'A&B', ESLs and/or Management Limits, with the exception of:
 - A TRH F3 concentration in sample BH1 (0-0.1m) which exceeded the ESL.
 - A benzo(a)pyrene concentration in sample BH1 (0-0.1m) which exceeded the ESL.
- PAH, OC & PCB concentrations were below the HIL 'B', EILs and/or ESLs with the exception of:
 - A benzo(a)pyrene as TEQ concentration in samples BH1 (0-0.1m), BH7 (0.3-0.4m) and BH7 (1-1.1m) which exceeded the HIL 'B'.
 - A benzo(a)pyrene concentration in sample BH1 (0-0.1m) which exceeded the ESL.
- Asbestos was not detected in any of the samples analysed.

Based on the CSM, the following data gaps were identified with respect to the pollution linkages identified:

- The lateral and/or vertical extent at boreholes BH1, BH2 & BH7.

- Additional soil samples beneath the existing site features and in the areas previously inaccessible.
- A search of Council and SafeWork NSW records and a review of the 10.7 Planning Certificates.

Based on the results of this investigation it is considered that the risks to human health and the environment associated with soil contamination at the site are low within the context of the proposed use of the site for a mixed commercial-residential building with basement car parking and deep soil landscaping areas development. The site is therefore considered to be rendered suitable for the proposed use, subject to the following:

- An appropriate remedial / management strategy is developed, culminating in preparation of a Remedial Action Plan (RAP) in accordance with EPA guidelines, in regards to the removal of the three hotspots BH1, BH2 & BH7, as well addressing the aforementioned data gaps.
- Any soils requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).

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

For and on behalf of

Aargus Pty Ltd

Written by:



Saad Bin Suleman

Environmental Engineer

Reviewed By:



Mark Kelly

Principal Environmental Consultant

LIMITATIONS

The Aargus assessment is based on the result of limited site investigations and sample testing. Neither Aargus, nor any other reputable consultant, can provide unqualified warranties nor does Aargus assume any liability for site conditions not observed or accessible during the time of the investigations.

Despite all reasonable care and diligence, the materials encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. There is always some disparity in subsurface conditions across a site that cannot be fully defined by investigation. Hence it is unlikely that measurements and values obtained from sampling and testing during environmental works carried out at a site will characterise the extremes of conditions that exist within the site. In addition, site characteristics may change at any time in response to variations in natural conditions, chemical reactions, truck movement or contractor movement of soils and other events, e.g. groundwater movement and or spillages of contaminating substances. These changes may occur subsequent to Aargus investigations and assessment.

This report and associated documentation and the information herein have been prepared solely for the use of the client at the time of writing the report and is valid (for the purposes of management or transport of material) for a period of one month only from the date of issue. Any other reliance assumed by third parties on this report shall be at such parties' own risk. Any ensuing liability resulting from use of the report by third parties cannot be transferred to Aargus.

Whilst this report provides a review of site conditions encountered at sampling locations within the investigation, it should be noted that if materials are proposed to be moved from site - Part 5.6, Section 143 of the Protection of the Environment Operations (POEO) Act 1997 states that it is an offence for waste to be transported to a place that cannot lawfully be used as a facility to accept that waste. It is the duty of the owner and transporter of the waste to ensure that all material removed from a site must be accompanied by an appropriate waste classification report and materials are disposed of appropriately. An environmental or validation report does not constitute a waste classification report and results are treated

differently. Aargus accepts no liability for the unlawful disposal of waste materials from any site. Aargus does not accept any responsibility for the material tracking, loading, management, transport or disposal of waste from the site. If material is to be removed from a site, before disposal of any material to a licensed landfill is undertaken, the site owner must ensure an appropriate waste classification exists for all materials on the site planning to be removed, the waste producer will need to obtain prior consent from the licensed landfill/recycler. The receiving site should check to ensure that the material received matches the description provided in the report.

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

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

REFERENCES

This report was prepared with reference to the following guiding documents:

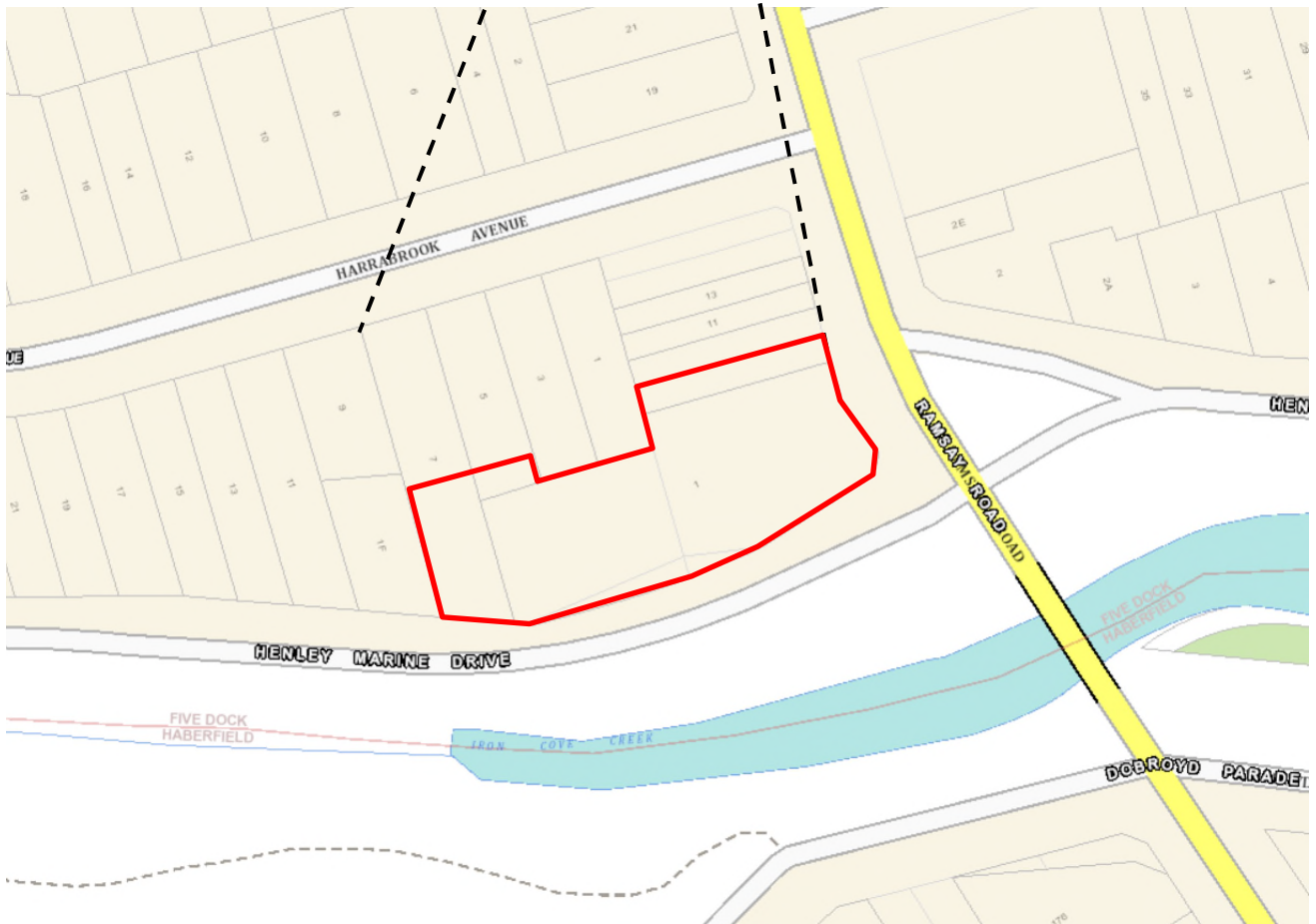
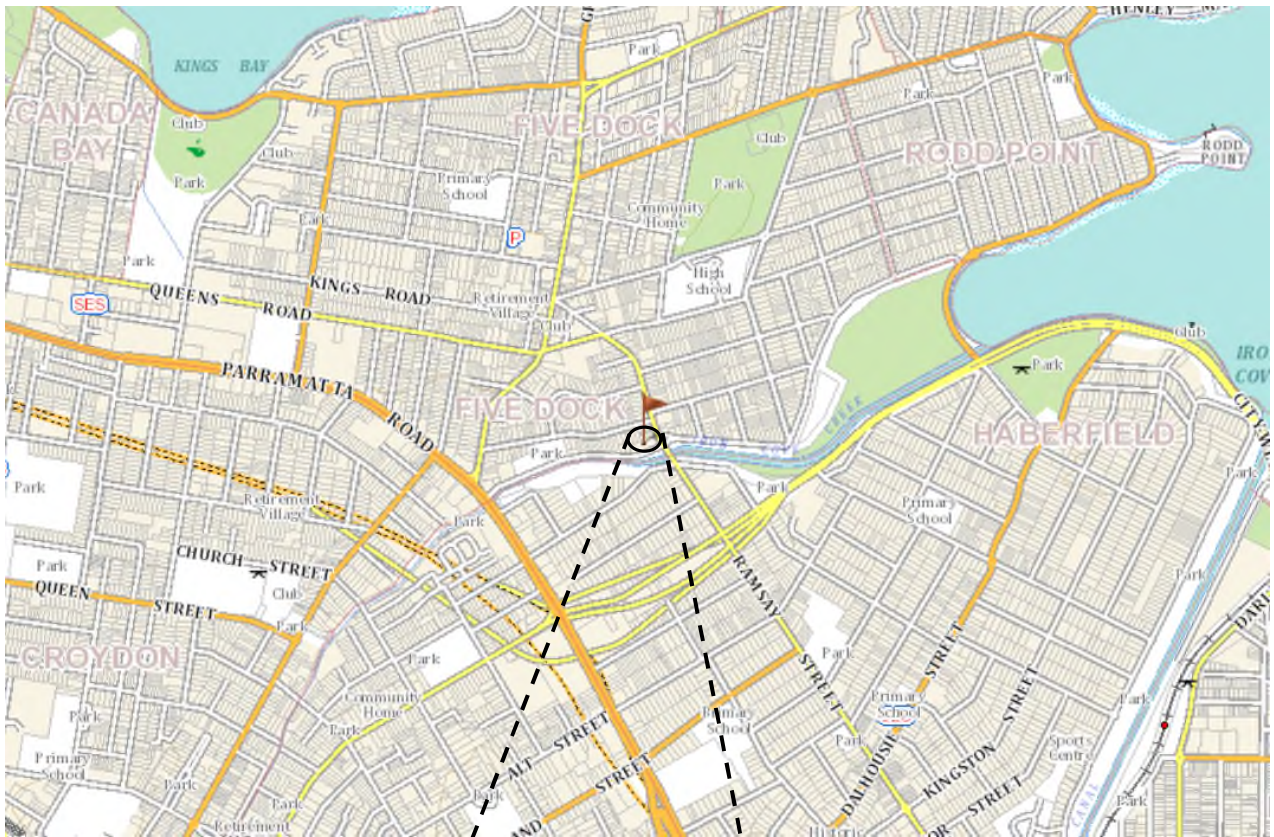
- Department of Urban Affairs and Planning – EPA (1998) “Managing Land Contamination – Planning Guidelines – SEPP 55 – Remediation of Land”.
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).
- NSW DEC “Guidelines for the NSW Site Auditor Scheme” (2017, 3rd edition). NSW Environment Protection Authority, Sydney.
- NSW EPA (2014) – “Waste Classification Guidelines, Part 1: Classifying Waste”.
- NSW EPA “Guidelines for Consultants Reporting on Contaminated Sites” (2020). NSW Environment Protection Authority, Sydney.
- NSW EPA “Sampling Design Guidelines” (1995). NSW Environment Protection Authority, Sydney.

APPENDIX A

SITE PLANS



SITE LOCALITY MAP



PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	1	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	18.08.2021
Approved by	MK	Date	18.08.2021

SITE PLAN – LOT & DEPOSITED PLAN



PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	2	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	18.08.2021
Approved by	MK	Date	18.08.2021

SITE FEATURES



SITE FEATURES - LEGEND

1. Two-storey brick building with metal roof
2. Brick building with metal roof
3. Metal Container
4. Asphaltic/concrete car park
5. Metal Awning
6. Brick building with tile roof
7. Brick workshop with metal shed (motor mechanic)
8. Grass and tree covered area
9. Wooden Shed with tile roof

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	3	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	18.08.2021
Approved by	MK	Date	18.08.2021

BOREHOLE LOCATIONS ON AERIAL VIEW



LEGEND



Borehole location

PROJECT DETAILS

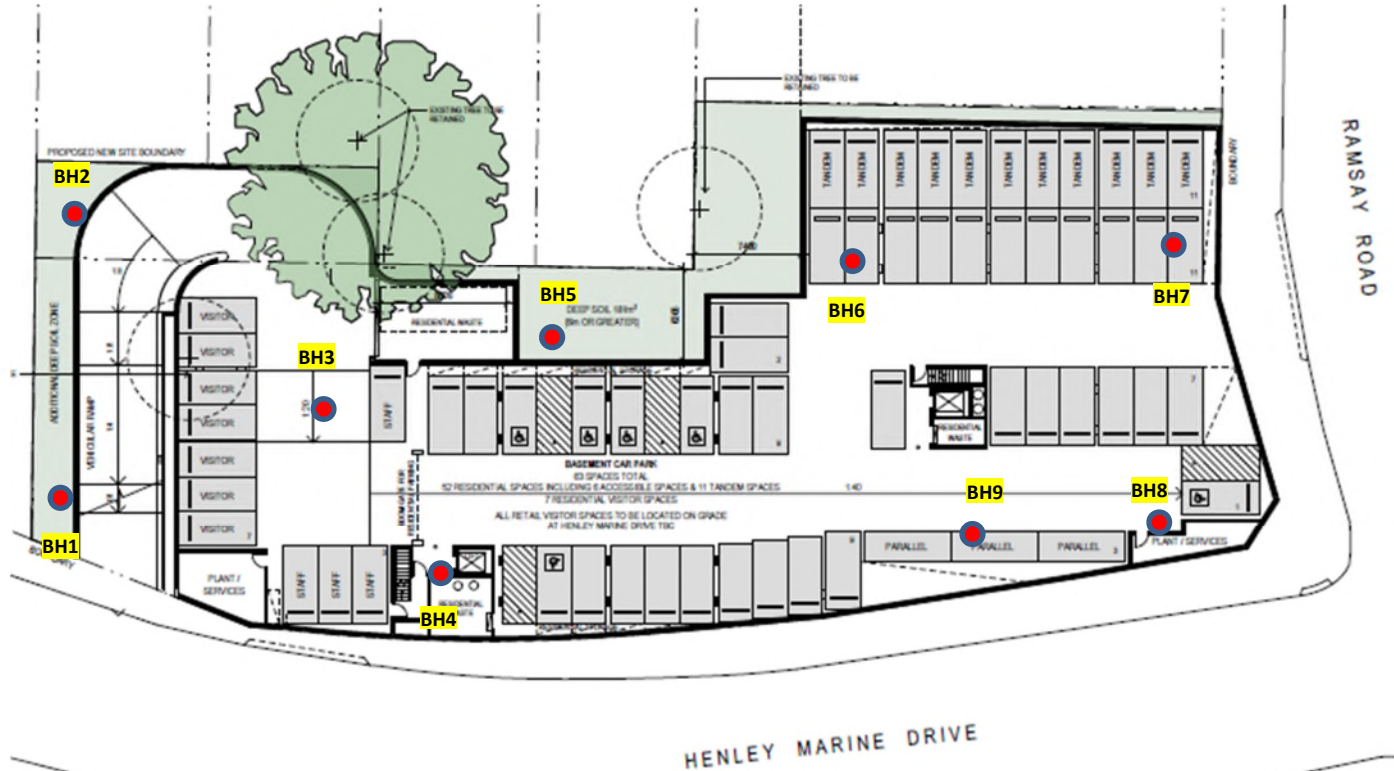
Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	4	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	04.08.2021
Approved by	MK	Date	18.08.2021

BOREHOLE LOCATIONS ON PROPOSED LAYOUT



LEGEND



Borehole location

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	5	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	04.08.2021
Approved by	MK	Date	18.08.2021

INFERRED GROUNDWATER FLOW DIRECTION

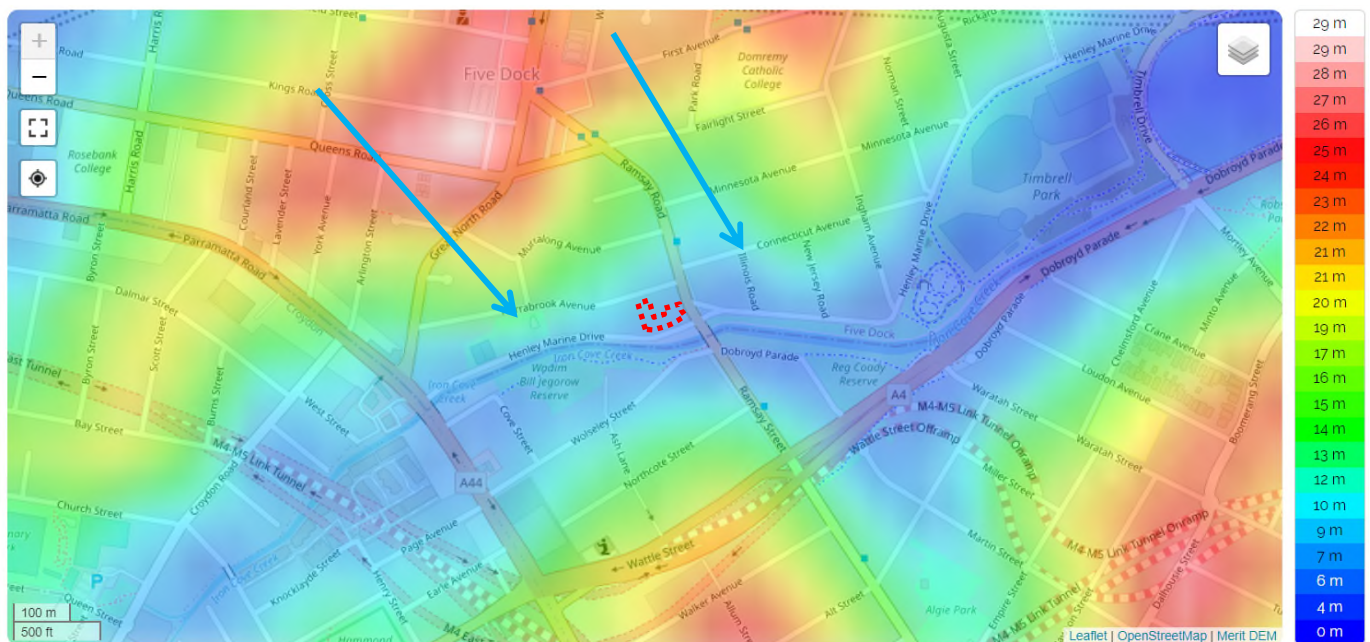
Contour Map Creator

0.314

improvement ideas

7 ramsay road five dock

search



Sydney, New South Wales, Australia (-33.85482 151.21645)

SITE FEATURES - LEGEND

→ Inferred Groundwater Flow Direction

Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	6	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	18.08.2021
Approved by	MK	Date	18.08.2021

HOTSPOT LOCATIONS



LEGEND



Borehole location



Hotspot

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part of 5 & 7 Harrabrook Avenue, Five Dock NSW



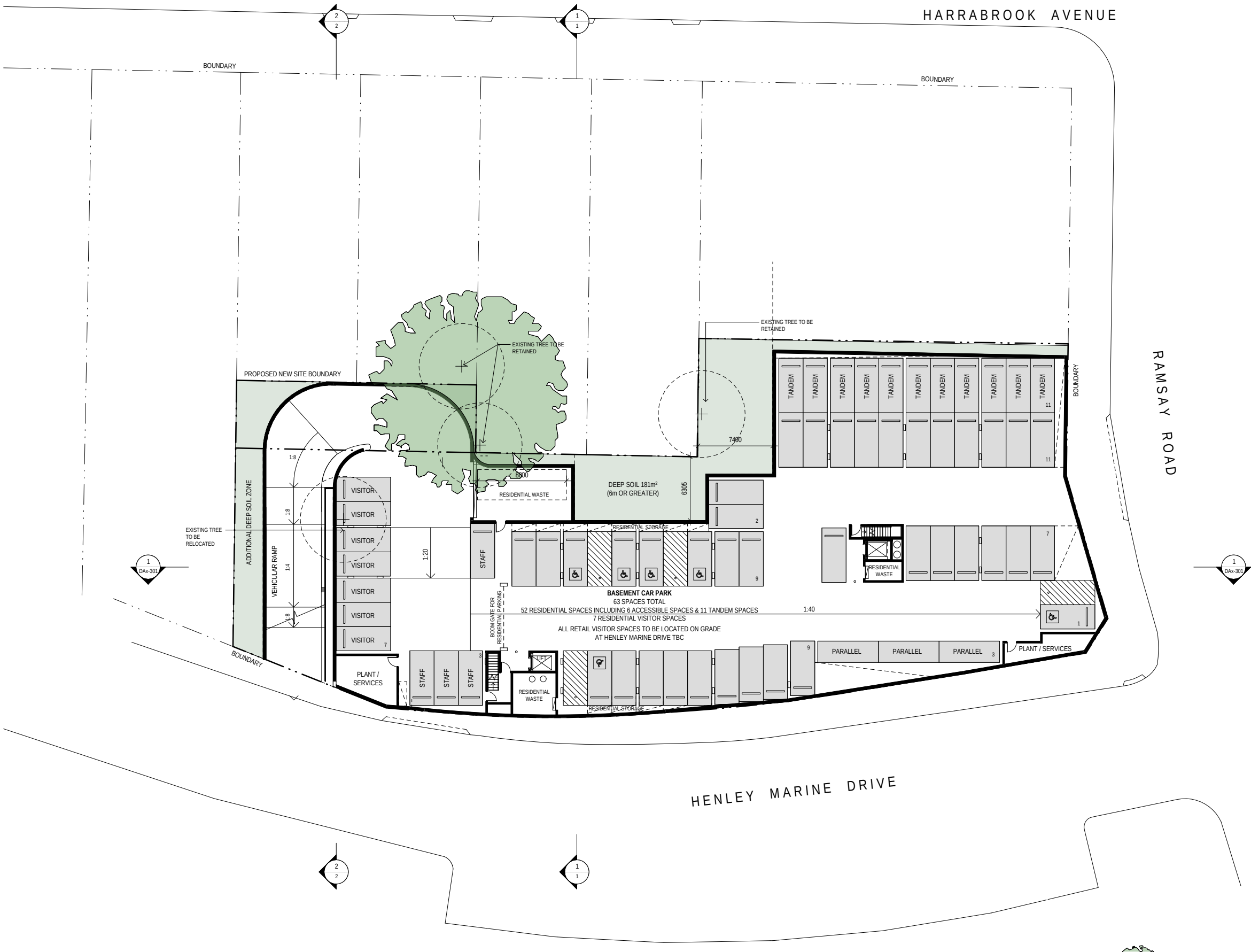
DRAWING DETAILS

Figure No.	7	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	04.08.2021
Approved by	MK	Date	18.08.2021

APPENDIX B

PROPOSED DEVELOPMENT PLANS





1 **BASEMENT**
1:200 @ A1

STATUS

PRELIMINARY

Do not scale drawings. Verify all dimensions on site.
This drawing is NOT SUITABLE for construction.

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P9	05.07.21	DRAFT AMENDED PP SET
P8	29.10.20	INDICATIVE TECHNICAL DRAWING SET
P7	26.08.20	PRELIMINARY ISSUE
P6	20.08.20	PRELIMINARY ISSUE
P5	05.08.20	PRELIMINARY ISSUE
P4	27.04.20	PRELIMINARY ISSUE
P3	14.02.20	PRELIMINARY ISSUE
P2	10.10.19	PRELIMINARY ISSUE
P1	01.10.19	PRELIMINARY ISSUE

ISS	DATE	PURPOSE OF ISSUE

NOTES



PROJECT
**RAMSAY RD PLANNING
PROPOSAL**
1 RAMSAY RD & 1-7 HARRABROOK AVE
FIVE DOCK

CLIENT
PARISI

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NOMINATED ARCHITECT
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DRAWING NO. **DA-099** ISSUE **P9**

DRAWN BY CHECKED BY SCALE **1:200@A1**

DRAWING TITLE
FLOOR PLAN BASEMENT LEVEL

JOB NO.
PAR-1903

DATE
05.07.21





1 **GROUND FLOOR GRAPHIC**
1:200 @ A1

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STATUS

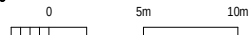
PRELIMINARY

Do not scale drawings. Verify all dimensions on site. This drawing is NOT SUITABLE for construction.

ISS	DATE	PURPOSE OF ISSUE
P9	05.07.21	DRAFT AMENDED PP SET
P8	29.10.20	INDICATIVE TECHNICAL DRAWING SET
P7	26.08.20	PRELIMINARY ISSUE
P6	20.08.20	PRELIMINARY ISSUE
P5	05.08.20	PRELIMINARY ISSUE
P4	22.07.20	PRELIMINARY ISSUE
P3	21.07.20	PRELIMINARY ISSUE
P2	15.06.20	PRELIMINARY ISSUE
P1	27.04.20	PRELIMINARY ISSUE

NOTES

1:400 @ A3
1:200 @ A1



PROJECT
**RAMSAY RD PLANNING
PROPOSAL**
1 RAMSAY RD @ 1-7 HARRABROOK AVE
FIVE DOCK

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NOMINATED ARCHITECT
Vince Squillace Reg No. 6468 (NSW),
17219 (VIC), 3677 (QLD)

DRAWING NO. **DA-100** ISSUE **P9**

DRAWN BY CHECKED BY SCALE **1:200@ A1**

DRAWING TITLE
FLOOR PLAN GROUND LEVEL

JOB NO.
PAR-1903

DATE
05.07.21





1 **LEVEL 1 - GRAPHIC**
1:200 @ A1

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STATUS

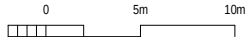
PRELIMINARY

Do not scale drawings. Verify all dimensions on site.
This drawing is NOT SUITABLE for construction.

ISS	DATE	PURPOSE OF ISSUE
P9	05.07.21	DRAFT AMENDED PP SET
P8	29.10.20	INDICATIVE TECHNICAL DRAWING SET
P7	26.08.20	PRELIMINARY ISSUE
P6	20.08.20	PRELIMINARY ISSUE
P5	05.08.20	PRELIMINARY ISSUE
P4	22.07.20	PRELIMINARY ISSUE
P3	16.07.20	PRELIMINARY ISSUE
P2	15.06.20	PRELIMINARY ISSUE
P1	27.04.20	PRELIMINARY ISSUE

NOTES

1:400 @ A3
1:200 @ A1



PROJECT
**RAMSAY RD PLANNING
PROPOSAL**
1 RAMSAY RD @ 1-7 HARRABROOK AVE
FIVE DOCK

CLIENT
PARISI

squillace

ARCHITECTS
INTERIOR DESIGNERS
www.squillace.com.au

SYDNEY
1/80 Albion Street, Surry Hills NSW 2010
Ph: +61 2 8354 1300 | Fax: +61 2 8354 1311
ABN: 24 132 554 753

MELBOURNE
Level 2, 333 Flinders Lane, Melbourne VIC 3000
Ph: +61 3 9629 4888 | Fax: +61 3 9649 7444
ABN: 34 137 620 538

NOMINATED ARCHITECT
Vince Squillace Reg No. 6468 (NSW),
17219 (VIC), 3677 (QLD)

DRAWING NO.
DA-101

DRAWN BY

CHECKED BY

DRAWING TITLE
FLOOR PLAN LEVEL 1

ISSUE
P9

SCALE
**1:200@
A1**

JOB NO.
PAR-1903

DATE
05.07.21





1 **LEVEL 2 - GRAPHIC**
1: 200 @ A1

STATUS
PRELIMINARY

Do not scale drawings. Verify all dimensions on site.
This drawing is NOT SUITABLE for construction.

ISS	DATE	PURPOSE OF ISSUE
P8	05.07.21	DRAFT AMENDED PP SET
P7	29.10.20	INDICATIVE TECHNICAL DRAWING SET
P6	26.08.20	PRELIMINARY ISSUE
P5	20.08.20	PRELIMINARY ISSUE
P4	05.08.20	PRELIMINARY ISSUE
P3	22.07.20	PRELIMINARY ISSUE
P2	16.07.20	PRELIMINARY ISSUE
P1	27.04.20	PRELIMINARY ISSUE

NOTES
1:400 @ A3
1:200 @ A1

0 5m 10m

PROJECT
**RAMSAY RD PLANNING
PROPOSAL**
1 RAMSAY RD @ 1-7 HARRABROOK AVE
FIVE DOCK

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Ph: +61 3 9629 4888 | Fax: +61 3 9649 7444
ABN: 34 137 620 538

NOMINATED ARCHITECT
Vince Squillace Reg No. 6468 (NSW),
17219 (VIC), 3677 (QLD)

DRAWING NO.
DA-102

DRAWN BY
CHECKED BY
DRAWING TITLE
FLOOR PLAN LEVEL 2

ISSUE
P8

SCALE
**1: 200@
A1**

JOB NO.
PAR-1903

DATE
05.07.21





1 **LEVEL 3 - GRAPHIC**
1 : 200 @ A1

STATUS
PRELIMINARY

Do not scale drawings. Verify all dimensions on site.
This drawing is NOT SUITABLE for construction.

P10	05.07.21	DRAFT AMENDED PP SET
P9	29.10.20	INDICATIVE TECHNICAL DRAWING SET
P8	26.08.20	PRELIMINARY ISSUE
P7	20.08.20	PRELIMINARY ISSUE
P6	10.08.20	PRELIMINARY ISSUE
P5	05.08.20	PRELIMINARY ISSUE
P4	22.07.20	PRELIMINARY ISSUE
P3	21.07.20	PRELIMINARY ISSUE
P2	15.06.20	PRELIMINARY ISSUE
P1	27.04.20	PRELIMINARY ISSUE

ISS	DATE	PURPOSE OF ISSUE

NOTES
1:400 @ A3
1:200 @ A1

0 5m 10m

PROJECT
RAMSAY RD PLANNING PROPOSAL
1 RAMSAY RD @ 1-7 HARRABROOK AVE
FIVE DOCK

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Ph: +61 3 9629 4888 | Fax: +61 3 9649 7444
ABN: 34 137 620 538

NOMINATED ARCHITECT
Vince Squillace Reg No. 6468 (NSW),
17219 (VIC), 3677 (QLD)

DRAWING NO. **DA-103** ISSUE **P10** JOB NO. **PAR-1903**

DRAWN BY CHECKED BY SCALE **1 : 200@ A1** DATE **05.07.21**

DRAWING TITLE
FLOOR PLAN LEVEL 3





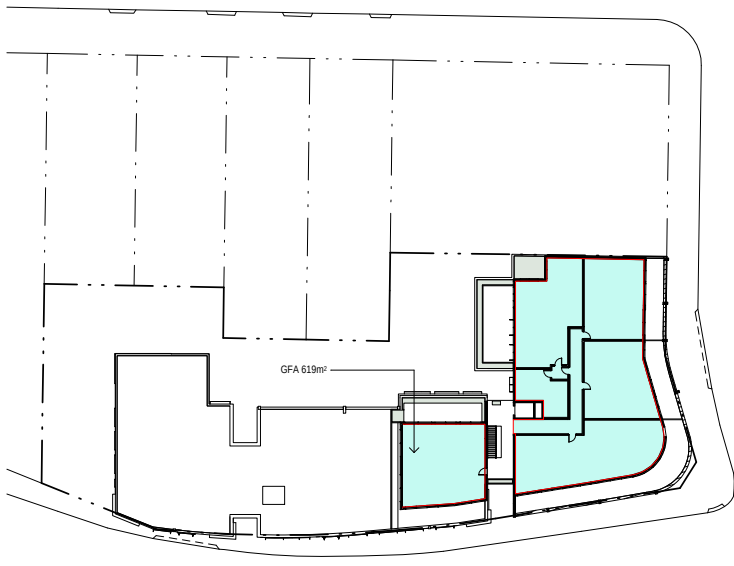
1 **GFA PLAN - GROUND FLOOR**
1 : 500 @ A1



2 **GFA PLAN - LEVEL 1**
1 : 500 @ A1



3 **GFA PLAN - LEVEL 2**
1 : 500 @ A1



4 **GFA PLAN - LEVEL 3**
1 : 500 @ A1

GFA	
GROUND FLOOR	1253 m²
LEVEL 1	1300 m²
LEVEL 2	1281 m²
LEVEL 3	619 m²
TOTAL	4453 m²

FSR = GFA : SITE AREA
SITE AREA = 2578 m²
PROPOSED GFA = 4453 m²
PROPOSED FSR = 1.73 : 1

APPENDIX C

SITE PHOTOGRAPHS



SITE PHOTOGRAPHS

Client:	Croftstar Pty Ltd
Project:	DSI
Site Location:	1-7 Ramsay Road & Part 5 & 7 Harrabrook Avenue, Five Dock NSW
Job No.:	ES8303
Photos Taken On:	04.08.2021
Photos Taken By:	SBS



Photograph N° 1



View of: Southern side of the site from Henley Marine Drive.

Photograph N° 2



View of: East side of the site showing the entrance to vehicle parking lot site.

Photograph N° 3



View of: metal container in the eastern portion of the site.

Photograph N° 4



View of: Vehicle parking lot in the eastern portion of the site.

Photograph N° 5



View of: Western portion of the site occupied by wooden shed with tiled roof.

Photograph N° 6



View of: Vehicle parking lot and metal container in the eastern portion of the site.

Photograph N° 7



View of: Western portion of the site occupied by metal shed, tree and grass.

Photograph N° 8



View of: East side of the site occupied by a brick building with metal roof and vehicle parking.

Photograph N° 9



View of: Inside of the two-storey brick building with metal roof in southern portion of the site

Photograph N° 10



View of: Southern portion of the site occupied by two-storey brick building with metal roof.

Photograph N° 11



View of: central west portion of the site occupied by a brick building with metal roof utilized as auto repair workshop.

Photograph N° 12



View of: Southern portion of the site occupied by a two-storey brick building with metal roof extending to a single-storey brick building with metal roof.

APPENDIX D

LAND TITLE INFORMATION



CLIENT: CROFTSTAR PTY LTD

Year	(1-5 Ramsay Road, Five Dock NSW)
2017-Current	Croftstar Pty Ltd
2001-2017	Property NSW
1957-2001	The Commissioner for Motor Transport
	Prior Title: Vol 7983 Fol 232
	Prior Title: Vol 7377 Fol 20
	Prior Title: Vol 6555 Fol 13
1952-1957	David Bernard Whitehouse
	Prior Title: Vol 6105 Fol 31
1950-1952	Robert James Carson
Year	Lot 1 In DP241337 (7 Ramsay Road, Five Dock NSW)
2020-Current	Croftstar Pty Ltd
2016-2020	Frank Carigliano & Fernanda Carigliano
1998-2016	John D O'leary
1980-1998	Raymond Hughes & Vicki Maxine Hughes
1978-1980	Vyner Service Pty Ltd
1972-1978	The Royce Group Of Driving School Pty Ltd
1966-1972	Remo Investments Pty Ltd & Rombar Investments Pty Ltd
	Prior Title: Vol 11849 Fol 245
	Prior Title: Vol 10520 Fol 176
	Prior Title: Vol 6622 Fol 111
1952-1966	Joseph Pittorino
1945-1952	Mary Elsie Gearin
	Prior Title: Vol 4406 Fol 187
1937-1945	Alma Fifield & Cecil Harry Roberge
1930-1937	Annie Roberge

Year	Lot 1 In DP573543 (7 Harrabrook Avenue, Five Dock NSW)
2019-Current	Croftstar Pty Ltd
2006-2019	Leonard Paul Russell & Ronald Andrew Russell
1984-2006	Constance Joyce Russell
	Prior Title: Vol 3660 Fol 133
1970-1984	George Edward Russell & Constance Joyce Russell
1960-1970	Edith Hannah Russell
1924-1960	George Edward Russell & Edith Hannah Russell
1924-1924	Henry Lorenz Dorn

Year	Lot 2 In DP573543 (5 Harrabrook Avenue, Five Dock NSW)
2020-Current	Croftstar Pty Ltd
2015-2020	Duncan John Rennie & Kate Gemma Quinlan
2008-2015	Antonino Lombardo
2007-2008	Martin James Jessop & Wendy Jane Michelle Evans
2002-2007	Jack Epsimos & Katerina Epsimos
1993-2002	Bret John Maloney & Susan Anne Maloney
1988-1993	Brian Graham & Adrienne Kay Cobby

1988-1988	Annie Doull Treagle & Margaret Austin Soulsby
	Prior Title: Vol 15392 Fol 8
	Prior Title: Vol 3739 Fol 80
1925-1988	Verlie Urlene Bartlett

Title Search

17/08/2021 01:40 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: A/415618

SEARCH DATE	TIME	EDITION NO	DATE
17/8/2021	1:40 PM	3	26/4/2021

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY COMMONWEALTH BANK OF AUSTRALIA.

LAND

LOT A IN DEPOSITED PLAN 415618
AT FIVE DOCK
LOCAL GOVERNMENT AREA CANADA BAY
PARISH OF CONCORD COUNTY OF CUMBERLAND
TITLE DIAGRAM DP415618

FIRST SCHEDULE

CROFTSTAR PTY LTD (T AM990842)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
- 3 AQ991774 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

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Title Search

17/08/2021 01:44 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: AUTO CONSOL 7983-232

SEARCH DATE	TIME	EDITION NO	DATE
17/8/2021	1:44 PM	4	26/4/2021

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY COMMONWEALTH BANK OF AUSTRALIA.

LAND

LAND DESCRIBED IN SCHEDULE OF PARCELS

AT FIVE DOCK

LOCAL GOVERNMENT AREA CANADA BAY

PARISH OF CONCORD COUNTY OF CUMBERLAND

TITLE DIAGRAM DP415618

FIRST SCHEDULE

CROFTSTAR PTY LTD (T AM990842)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S) AS REGARDS LOT D
- 2 LAND EXCLUDES MINERALS (S.141 PUBLIC WORKS ACT, 1912) AS REGARDS LOT B
- 3 AQ991774 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

SCHEDULE OF PARCELS

LOT B IN DP415618

LOT D IN DP415618.

*** END OF SEARCH ***



DI-ES8303

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Historical Search

17/08/2021 01:48 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 1:48PM

FOLIO: D/415618

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

Prior Title(s): VOL 7983 FOL 232

Recorded	Number	Type of Instrument	C.T. Issue
31/8/1989		TITLE AUTOMATION PROJECT	LOT RECORDED
		FOLIO NOT CREATED	
3/8/1992		CONVERTED TO	CONSOL CREATED
		AUTO CONSOL 7983-232	CT NOT ISSUED
27/3/2001	7408114	DEPARTMENTAL DEALING	

*** END OF SEARCH ***



DI-ES8303

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Historical Search

17/08/2021 01:42 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 1:42PM

FOLIO: A/415618

First Title(s): OLD SYSTEM

Prior Title(s): SER 3 PG 196

Recorded	Number	Type of Instrument	C.T. Issue
22/5/2017	CA176228	CONVERSION ACTION	FOLIO CREATED
		CT NOT ISSUED	
24/5/2017	AM420004	DEPARTMENTAL DEALING	
24/5/2017	AM339044	RESUMPTION APPLICATION	EDITION 1
20/12/2017	AM990842	TRANSFER	
20/12/2017	AM990843	MORTGAGE	EDITION 2
		CORD ISSUED	
26/4/2021	AQ991770	DISCHARGE OF MORTGAGE	
26/4/2021	AQ991774	MORTGAGE	EDITION 3
		CORD ISSUED	

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

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**LAND
REGISTRY
SERVICES**

Direct Info
Quick and easy online

17/08/2021 01:43 PM

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Form: 01T
Release: 6.2
Licence: 01-05-025
Licensee: LEAP Legal Software Pty Limited
Firm name: Cordato Partners Lawyers

TRANSFER

New South Wales
Real Property Act 1900



AM990842U

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY

Revenue NSW use only

Office of State Revenue
(NSW)

Client No: 95757970

4260

Duty: \$10 Tars No: 9245254-001

Asst details:

(A) TORRENS TITLE

5/310522, A/415618 & ~~2883-232~~ Auto-conv

7983-232

(B) LODGED BY

Document
Collection
Box

Name, Address or DX, Telephone, and Customer Account Number if any

535G LLPN:123854C

SAT GLOBAL

DX 885
SYDNEY
9210 0700

CODES

T
TW

Reference: 68393279 CROFTSTAR

(C) TRANSFEROR

Government Property NSW ABN 91 840 597 406

(D) CONSIDERATION

The transferor acknowledges receipt of the consideration of \$10,500,000.00 and as regards the abovementioned land transfers to the transferee an estate in fee simple.

(E) ESTATE

(F) SHARE

TRANSFERRED

Whole

(G)

Encumbrances (if applicable):

(H) TRANSFEE

Croftstar Pty Ltd ABN 62 919 046 203 ACN 060918863

(I)

TENANCY:

(J) Certified correct for the purposes of the Real Property Act 1900 and executed on behalf of the company named below by the authorised person(s) whose signature(s) appear(s) below pursuant to the authority specified.

Company: Government Property NSW ABN 91 840 597 406

Authority: section 127 of the Corporations Act 2001

Signature of authorised person:

Name of authorised person:

Office held: Director

Signature of authorised person:

Name of authorised person:

Office held: Director

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

Signature:

Signatory's name: Anthony James Cordato

Signatory's capacity: Solicitor for the Transferee

(K) The transferee's solicitor certifies that the eNOS data relevant to this dealing has been submitted and stored under

eNOS ID No. 1440064

Full name: Anthony James Cordato

Signature:

STATUTORY DECLARATION SIGHTED

authorised to send 2/15/12
I, Nores Cofa Dreda

Annexure 'A' to transfer

Transferor: Property NSW ABN 91 840 597 406

Transferee: Croftstar Pty Limited ABN 62 919 046 203

Folio Identifier: 5/310522, A/415618, and ^{AC}7983-232

Certified correct for the purposes of the
Real Property Act 1900

Signed by DENNIS SZABO as delegate on
behalf of Property NSW ABN 91 840 597 406
but not so as to incur any personal liability
in the presence of:

P88712

Signature of witness

[Signature]

Signature of authorised delegate

JIAJIA CHEN

Name of witness (please print)

Dennis Szabo

Name of authorised delegate (please print)

Executive Director
Commercial Transaction, PNSW

Level 5 46 Blyth St.

Sydney NSW 2000

Address of witness

Title of delegate

I Xloren Croft Dennis authorised to execute 15/12

FILM WITH

Statutory Declaration
OATHS ACT 1900, NSW, EIGHTH SCHEDULE

AM990842

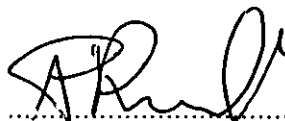
I, Alexandra O'Rorke, of Level 3 4-6 Bligh Street Sydney NSW, do solemnly and sincerely declare that

1. Lot 5 DP 310522, Lot A DP 415618 and Lot B DP 415618 is currently recorded in the name of "Government Property NSW", a statutory entity.
2. On 25 October 2016 "Government Property NSW" changed its name to "Property NSW" when clause 11.1 of Schedule 1 of Statute Law (Miscellaneous Provisions) Act (No. 2) 2016 was assented to.
3. The correct registered proprietor is "Property NSW".

.....

and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1900*.

Declared at: Sydney on 29 November 2017



.....

in the presence of an authorised witness, who states:

I, Maria Reid a, Legal Practitioner

certify the following matters concerning the making of this statutory declaration by the person who made it:

1. *I saw the face of the person, and
2. *I have confirmed the person's identity using an identification document and the document I relied on was NSW Drivers Licence No. 2243 2019



.....

29 November 2017



17/08/2021 01:50 PM

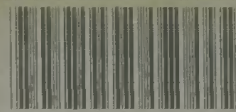
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167 Primary Appn. Nos. 8910, 35069 and 41124
Reference to Last Title
Vol. 7377 Fol. 20 (as to part)
Charting Maps: Drummoyne Sheet 1
Deposited Plan No. 10692

New South Wales.



[CER]



07983232

REGISTER BOOK.
VOL. 7983 Fol. 232

MH Issued on Primary Application No. 41124
(part) and request for consolidation.

THIS TITLE IS THE REGISTER
DO NOT DELIVER OR DESTROY
RETURN TO LAND INFORMATION
SERVICES SECT., GROUND FLOOR, L.T.D.

CANCELLED ☒
ON ISSUE OF NEW FOLIO Auto Consol 7983-232

THE COMMISSIONER FOR MOTOR TRANSPORT, is now the proprietor of an Estate in Fee Simple, subject nevertheless as regards Lot D hereinafter described, to the reservations and conditions if any contained in the Grant hereinafter referred to and also subject as regards the whole of the land hereinafter described to such encumbrances, liens and interests as are notified hereon in That piece of land at Fivedock in the Municipality of Drummoyne, Parish of Concord and County of Cumberland, shown in the plan hereon and therein edged red being Lots B and D in plan lodged with Dedication No. H532050 and being part of Portion 256 granted to John Harris on 1st January 1806 and part of land for which no Crown Grant has issued.
EXCEPTING THEREOUT the minerals specified in Section 141 of the Public Works Act 1912 in and under Lot B above described.

In witness whereof I have hereunto signed my name and affixed my Seal, this

Sixth

day of

September

, 1960.

Signed in the presence of

Wollmer

THE LAND WITHIN
DESCRIBED IS NOW
LOTS B & D IN DP 415618.

J. Watson
Registrar-General.



P.A. 41124.

COMPUTER FOLIO
DEALINGS TO BE REGISTERED.

NO FURTHER





17/08/2021 06:59 PM

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202 Primary Appn. Nos. 8910 and 35069

Reference to Last Titles

Vol. 6555 Fol.s. 13 and 14

Charting Map Drummoyne Sheet 1 (as to part)

New South Wales.

[CERTIFICATE OF TITLE.]



CANCELLED R

REGISTER BOOK.

VOL. 7377 FOL. 20

Issued on Transfer No. G729396

76559 257 K 2006-2 A. H. Pettifer, Government Printer

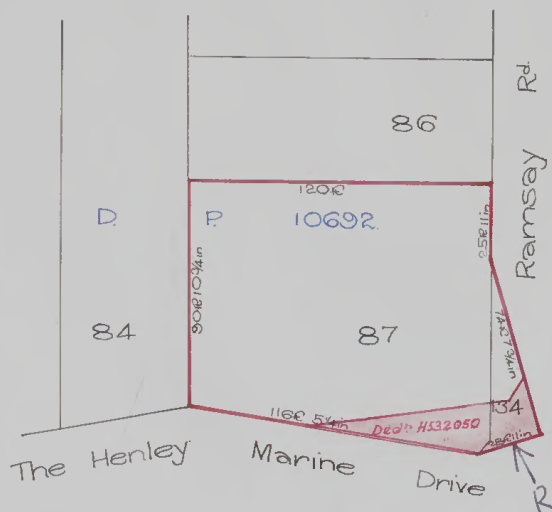
THE COMMISSIONER FOR MOTOR TRANSPORT is now the proprietor of an Estate in Fee Simple,
subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances,
liens, and interests as are notified hereon, in That piece of land at Five Dock
in the Municipality of Drummoyne Parish of Concord, and County of Cumberland
shown in the plan hereon and therein edged red being Lot 87 in Deposited Plan No. 10692 and part of Lot 134 of the Five Dock
Estate and being also part of Portion 256 granted to John Harris on 1st January 1806.

In witness whereof I have hereunto signed my name and affixed my Seal, this Fifteenth day of October, 1957

Signed in the presence of

G. W. Moss

J. Wells
Registrar-General.



As to the whole (excluding land coloured pink)
this Deed is cancelled and new Certificate of Title issued
Vol 7983 Fol. 232
Vide R. 4/1124
J. Watson
Registrar General.



G729396

Area: — Ind. 7 per
Scale: — 60 feet to one inch

Area
(lost)
Area (part)
H132050
DEDICATION. The land shown by pink
color on the plan hereon has been dedicated as a Highway.
J. Watson
REGISTRAR GENERAL.

The land designated (R) is coloured Redpink.

H132050
Lot 87 (pink)
Reserve
with P. 4/1124

Area
(lost)
Area (part)
H132050

Ded. H132050
for 4/1124

pink
4/1124

Reserve
with P. 4/1124



17/08/2021 09:19 PM

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202.

Appn. Nos. 8910 and 35069
Reference to Last Certificates
Vol. 6105 Fols. 31 to 34 inclusive

New South Wales.

[CERTIFICATE OF TITLE.]



TENANCY IN COMMON

REGISTER BOOK.

Vol. 6555, Fol. 13

CANCELLED ☒

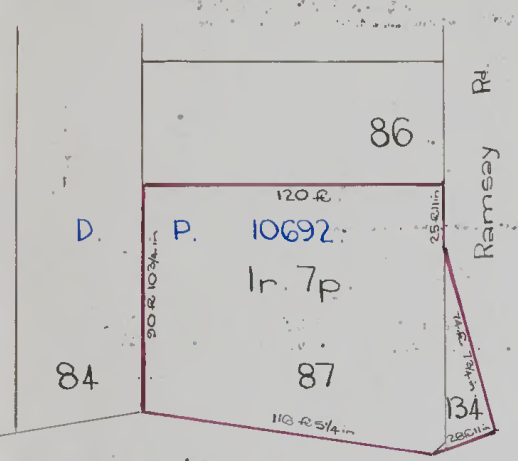
DAVID BERNARD WHITEHOUSE, of Haberfield, Taxi Proprietor, Transferee under Instrument of Transfer No. F700272 is now the proprietor of an Estate in Fee Simple, in an undivided one half share, subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances, liens, and interests as are notified hereon, in That piece of land situated at Five Dock in the Municipality of Drummoyne Parish of Concord, and County of Cumberland containing One rood seven perches or thereabouts as shown in the plan hereon and therein edged red being Lot 87 in Deposited Plan No. 10692 and part of Lot 134 of the Five Dock Estate and being also part of 1500 acres (Portion 256 of Parish) originally granted to John Harris by Crown Grant dated the 1st day of January 1806.

In witness whereof I have hereunto signed my name and affixed my Seal, this Second day of September, 1952

Signed in the presence of *G. M. Kern*

J. H. Pells

Registrar-General.



The Henley Marine Drive.

F700272⁽ⁿ⁾

B.B. KTB

Scale: 60 Feet to one inch.

NOTIFICATION REFERRED TO

No. *6729396* TRANSFER dated *14th May* 1952.
to *The Commissioner of Motor Transport of New South Wales*
of the land within described.
Entered *11th June* 1952.
As to land in this transfer this deed is canceled and new certificate issued *J. H. Pells*
Vol. *6555* Fol. *13*
REGISTRAR GENERAL







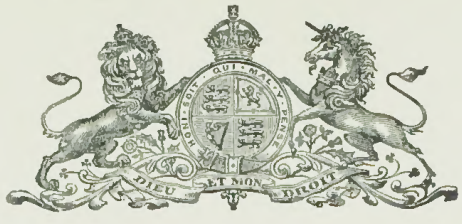
17/08/2021 09:24 PM

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201

Appn. No.s. 8910 and 35069
Reference to Last Certificate
Vol. 5397 Fol. 39

New South Wales



[CERTIFICATE OF TITLE.]

TENANCY IN COMMON.

REGISTER BOOK.
6105 **31**
Vol. Fol.

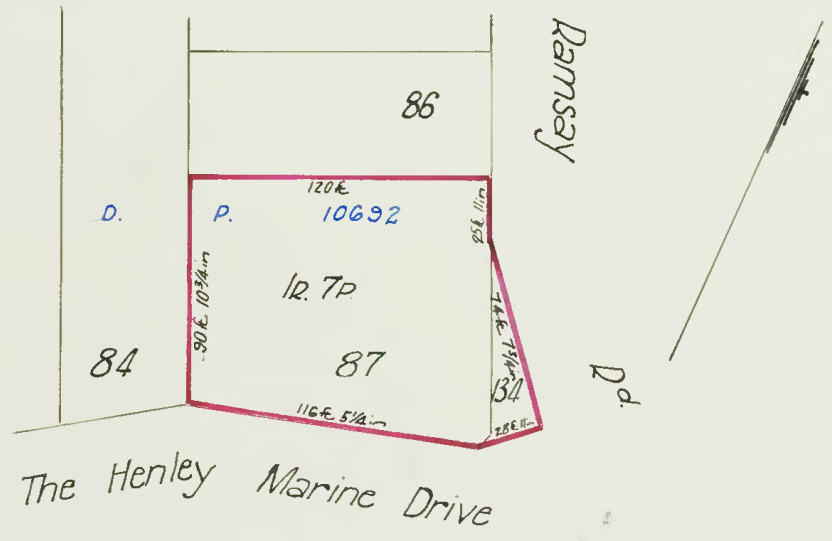
CANCELLED ☒ W

ROBERT JAMES CARSON, of Haberfield, Butcher, Transferee under Instrument of Transfer No. F109203 is now the proprietor of an Estate in Fee Simple in an undivided one fourth share subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances, liens, and interests as are notified hereon, in That piece of land situated at Five Dock in the Municipality of Drummoyne Parish of Concord, and County of Cumberland containing One rood seven perches or thereabouts as shown in the plan hereon and therein edged red being Lot 87 in Deposited Plan No. 10692 and part of Lot 134 Five Dock Estate and being also part of 1500 acres (Portion 256 of Parish) originally granted to John Harris by Crown Grant dated the 1st day of January 1806.

In witness whereof I have hereunto signed my name and affixed my Seal, this Third day of March, 1950.

Signed in the presence of *J. M. Kern*

J. Wells
Registrar-General.



F109203

Scale: 60 feet to one inch.

NOTIFICATION REFERRED TO

No. F700272 TRANSFER dated 4th July 1952 from the said Robert James Carson and also Ronald Booth, wife, Thomas Alfred Booth and Charles Duncan Keith to Lionel Ernest James of Haberfield, Balmain and David Bernard Whitehouse of Haberfield their Proprietors of the land within described Produced 21st July 1952 and entered 21st July 1952 at 5.00 p.m. 1 o'clock in the afternoon.

As to land in this transfer this certificate is void and new certificate issued Vol. 6555 Fol. 13-14

J. Wells
REGISTRAR GENERAL







Title Search

17/08/2021 07:04 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/310522

SEARCH DATE	TIME	EDITION NO	DATE
17/8/2021	7:05 PM	3	26/4/2021

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY COMMONWEALTH BANK OF AUSTRALIA.

LAND

LOT 1 IN DEPOSITED PLAN 310522

AT FIVE DOCK

LOCAL GOVERNMENT AREA CANADA BAY

PARISH OF CONCORD COUNTY OF CUMBERLAND

TITLE DIAGRAM DP310522

FIRST SCHEDULE

CROFTSTAR PTY LIMITED (T AP508570)

SECOND SCHEDULE (3 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 B141333 COVENANT AFFECTING LOTS 82 & 84 IN DP10692
- 3 AQ991777 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

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Historical Search

17/08/2021 07:06 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 7:06PM

FOLIO: 1/310522

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

Prior Title(s): VOL 3660 FOL 133

Recorded	Number	Type of Instrument	C.T. Issue
16/2/1989		TITLE AUTOMATION PROJECT	LOT RECORDED
		FOLIO NOT CREATED	
19/7/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED
		CT NOT ISSUED	
27/3/2001	7408114	DEPARTMENTAL DEALING	
13/9/2006	AC592313	TRANSMISSION APPLICATION	EDITION 1
12/2/2019	AP56043	CAVEAT	
5/9/2019	AP508569	WITHDRAWAL OF CAVEAT	
5/9/2019	AP508570	TRANSFER	
5/9/2019	AP508571	MORTGAGE	EDITION 2
		CORD ISSUED	
26/4/2021	AQ991767	DISCHARGE OF MORTGAGE	
26/4/2021	AQ991777	MORTGAGE	EDITION 3
		CORD ISSUED	

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

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17/08/2021 07:17 PM

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System Document Identification

Land Registry Document Identification

Form Number:01T-e
Template Number:T_nsw16
ELN Document ID:545352134
ELN NOS ID: 545352136

TRANSFER

New South Wales
Real Property Act 1900

AP841293

Stamp Duty: 9620742-001

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

LODGED BY:

Responsible Subscriber: WESTPAC BANKING CORPORATION ABN 33007457141
Address: 25 Pierson ST
Lockleys 5032
Telephone:
PEXA Subscriber Number: 621
Customer Account Number: 500003E
Document Collection Box: 271Q
Client Reference: 190078 Croftsta

LAND TITLE REFERENCE

2/310522

TRANSFEROR

DUNCAN JOHN RENNIE
KATE GEMMA QUINLAN

TRANSFeree

CROFTSTAR PTY LIMITED ACN 060918863
Registered company
Tenancy: Sole Proprietor

CONSIDERATION

The transferor acknowledges receipt of the consideration of \$2,425,000.00

ESTATE TRANSFERRED

FEE SIMPLE

The Transferor transfers to the Transferee the Estate specified in this Instrument and acknowledges receipt of any Consideration shown.

SIGNING FOR TRANSFEROR

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferor.

Party Represented by Subscriber:

DUNCAN JOHN RENNIE
KATE GEMMA QUINLAN

Signed By: Frank John Boitano
PEXA Signer Number:36657

Signer Capacity:Practitioner Certifier
Digital Signing Certificate Number:17967

Signed for
Subscriber: BARWICK BOITANO LAWYERS PTY LTD ABN 52119997983
BARWICK BOITANO LAWYERS

Subscriber Capacity:Representative Subscriber

PEXA Subscriber Number:15299

Customer Account Number:501761

Date: 20/01/2020

SIGNING FOR TRANSFeree

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferee.

Party Represented by Subscriber:

CROFTSTAR PTY LIMITED

Signed By:Patricia Sone

Signer Capacity:Practitioner Certifier

PEXA Signer Number:58915

Digital Signing Certificate Number:32810

**Signed for
Subscriber:**

ANTHONY JAMES CORDATO ABN 53101044954

CORDATO PARTNERS

Subscriber Capacity:Representative Subscriber

PEXA Subscriber Number:23835

Customer Account Number:503191

Date: 20/01/2020



17/08/2021 07:19 PM

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AK42377L

Form: 01T
Licence: 01-05-025
Licensee: LEAP Legal Software Pty Limited
Firm name: Barwick Boitano Lawyers

TRANSFER

New South Wales
Real Property Act 1900

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY

Office of State Revenue use only

Office of State Revenue
NSW Treasury
Client No: 112185194 3126
Duty: \$10 Trans No: 8398142-00
Asst details: 18(2)

(A) TORRENS TITLE

2/310522

(B) LODGED BY

Document Collection Box	Name, Address or DX, Telephone, and Customer Account Number if any LLPN: 126083N CREDIT UNION AUSTRALIA C/- SAI GLOBAL Property DX 885 SYDNEY 02 9210 0700 Reference: 5170706 RENNIE	CODES T TW

(C) TRANSFEROR

Antonino LOMBARDO

(D) CONSIDERATION

The transferor acknowledges receipt of the consideration of \$1,450,000.00 and as regards

(E) ESTATE

the abovementioned land transfers to the transferee an estate in fee simple.

(F) SHARE

TRANSFERRED

(G) Encumbrances (if applicable):

(H) TRANSFEE

Duncan John RENNIE and Kate Gemma QUINLAN

(I) TENANCY: Tenants in common in equal shares

DATE

(J) I certify that I am an eligible witness and that the transferor signed this dealing in my presence.
[See note* below]

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of witness:

George

Name of witness:

Address of witness:

George White
Peter White
Bay Street
Double Bay NSW

Signature of transferor:

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

Signature:

Signatory's name: Frank John Boitano

Signatory's capacity: Solicitor for the Transferee

(K) The transferee's solicitor certifies that the eNOS data relevant to this dealing has been submitted and stored under

eNOS ID No. 942979

Full name: Frank Boitano

Signature:



17/08/2021 07:22 PM

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Form: 01T
Release: 3.4
www.lands.nsw.gov.au

TRANSFER

New South Wales
Real Property Act 1900



AE324744P

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar-General to collect and maintain information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY

Office of State Revenue use only

Office of State Revenue	
NSW Treasury	
Client No: 1411509	1404
Duty: 2	Trans No: 201530
Asst details:	

(A) FOLIO OF THE REGISTER

2/310522

(B) LODGED BY

Document Collection Box	Name, Address or DX, Telephone, and LLPN if any LLPN: ANZ BANK 49R 126043B C/- ESPREC DX 885 SYDNEY 02 9210 0953	CODES T TW (Sheriff)
Reference: <u>ANZ - LOMBARDO</u>		

(C) TRANSFEROR

Martin James JESSOP and Wendy Jane Michelle EVANS

(D) **CONSIDERATION** The transferor acknowledges receipt of the consideration of \$ 957,000.00 and as regards

(E) **ESTATE** the above folio of the Register transfers to the transferee an estate in fee simple

(F) SHARE TRANSFERRED

(G) Encumbrances (if applicable):

(H) TRANSFEREE

Antonino LOMBARDO

(I) TENANCY:

DATE

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

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of witness:

Desmond Errrol SLOMAN

Signature of transferor:

Wendy Jessop

Name of witness:

DESMOND ERROL SLOMAN

Address of witness:

231 DARLING ST. BALMAIN
NSW

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

Signature:

George Peter Ducret White

Signatory's name:

Signatory's capacity:

transferee's solicitor

GEORGE PETER DURETT WHITE



17/08/2021 07:24 PM

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Form: 01T
Release: 3.3
www.lands.nsw.gov.au

①

TRANSFER

New South Wales
Real Property Act 1900



AD590365J

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the use of this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

STAMP DUTY

Office of State Revenue use only

Office of State Revenue	
NSW Treasury	
Client No: 95084398	1881
Duty: \$2.00	Trans Max: 4659052
Acct details: _____	

(A) FOLIO OF THE REGISTER

2/310522

(B) LODGED BY

Document
Collection
Box
25G

Name, Address or DX. Telephone or LLPN if
25 PIERSON ST LOCKLEYS SA 5032

TEL: 132558
LLPN: 123002H

CODES

T
TW
(Sheriff)

(C) TRANSFEROR

Jack EPSIMOS and Katerina EPSIMOS

(D) CONSIDERATION The transferor acknowledges receipt of the consideration of \$ 795,000.00 and as regards

(E) ESTATE the above folio of the Register transfers to the transferee an estate in fee simple

(F) SHARE TRANSFERRED

(G) Encumbrances (if applicable): _____

(H) TRANSFEREE

Martin James JESSOP and Wendy Jane Michelle EVANS

(I) TENANCY: Joint Tenants

DATE _____

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

Certified correct for the purposes of the Real Property Act 1900 by the transferor.

Signature of witness:

Gaudie

Name of witness:

Joanne Gaudie

Address of witness:

2-8 Bridge St
Thurshville

Signature of transferor:

J Gaudie
Katerina Epimos

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

Signature:

Desmond Errol SLOMAN

Signatory's name:

Desmond Errol SLOMAN

Signatory's capacity:

transferees' solicitor



17/08/2021 07:26 PM

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Form: 01T
Release: 2.1
www.lpi.nsw.gov.au

TRANSFER

New South Wales
Real Property Act 1900



8556980F

PRIVACY NOTE: this information is legally required and will become part of the public record

STAMP DUTY

Office of State Revenue use only

17-04-2002

0000951834-001

SECTION 18(2)

DUTY

\$ *****2.00

(A) TORRENS TITLE

FOLIO IDENTIFIER 2/310522

First Title Secure

PO Box 01115

(B) LODGED BY

Delivery
Box

270S

Name, Address or DX and Telephone

QVB Post Shop

NSW 1230

Ph: 8267 8130

CODES

T

TW

(Sheriff)

Reference: 13296 EPSIMOS/KAT

(C) TRANSFEROR

Brett John MALONEY and Susan Anne MALONEY

(D) CONSIDERATION The transferor acknowledges receipt of the consideration of \$ 582,500.00 ✓ and as regards

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

(F) SHARE
TRANSFERRED

(G) Encumbrances (if applicable):

(H) TRANSFEREE

Jack EPSIMOS & Katerina EPSIMOS ✓

JOINT TENANTS

(I) TENANCY:

(J) DATE DO NOT DATE

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

Certified correct for the purposes of the Real
Property Act 1900 by the transferor.

X Signature of witness:

Pamela G. Woods

Name of witness:

Pam Woods

Address of witness:

27 Bourke St
Tamworth

Signature of transferor:

X Brett Maloney

X Smaloney

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

Signature:

Signatory's name:

TONY KASSAPAKIS

Signatory's capacity:

transferee's solicitor



17/08/2021 07:28 PM

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RP13



TRANSFER

Real Property Act, 1900



753042 E

Office of

B

#2-

191093 9304 04 001575736/03

\$2.00

(A) **LAND TRANSFERRED**

Show no more than 20 References to Title.
If appropriate, specify the share transferred.

FOLIO IDENTIFIER 2/310522

(B) **LODGED BY**

L.T.O. Box

40L

Name, Address or DX and Telephone

STATE BANK OF NEW SOUTH WALES LIMITED
DX 1334 SYDNEY 266-3333

REFERENCE (max. 15 characters):

MAHONEY

BRIAN GRAHAM and ADRIENNE KAY COBBY

(C) **TRANSFEROR**

\$280,000.00

(D) acknowledges receipt of the consideration of

and as regards the land specified above transfers to the transferee an estate in fee simple

(E) subject to the following **ENCUMBRANCES**

1.

2.

3.

(F) **TRANSFEEE**

T

BRETT JOHN MALONEY and SUSAN ANNE MALONEY of 1/6 Prince Street,
Randwick

as joint tenants/tenants in common

(H) We certify this dealing correct for the purposes of the Real Property Act, 1900.

DATE OF EXECUTION

Signed in my presence by the transferor who is personally known to me.

David Te...

Signature of Witness

DAVID TROEDEN

Name of Witness (BLOCK LETTERS),

Shirley, Bolner

Address of Witness

Brian Graham
Signature of Transferor

Signed in my presence by the transferee who is personally known to me.

Signature of Witness

Name of Witness (BLOCK LETTERS)

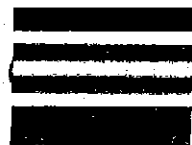
Address of Witness

C J Nichols, Solicitor for Transferee



17/08/2021 07:30 PM

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CERTIFICATE OF TITLE



15392008

NEW SOUTH WALES

PROPERTY ACT, 1900

First Title Old System

Prior Title Vol. 3739 Fols. 80 and 81

Vol. 15392 Fol. 8

EDITION
ISSUED 17 10 1985



I certify that the person named in the First Schedule is the registered proprietor of an estate in fee simple (or such other estate or interest as is set out below) in the land described subject to the recordings appearing in the Second Schedule and to the provisions of the Real Property Act, 1900.

[Signature]

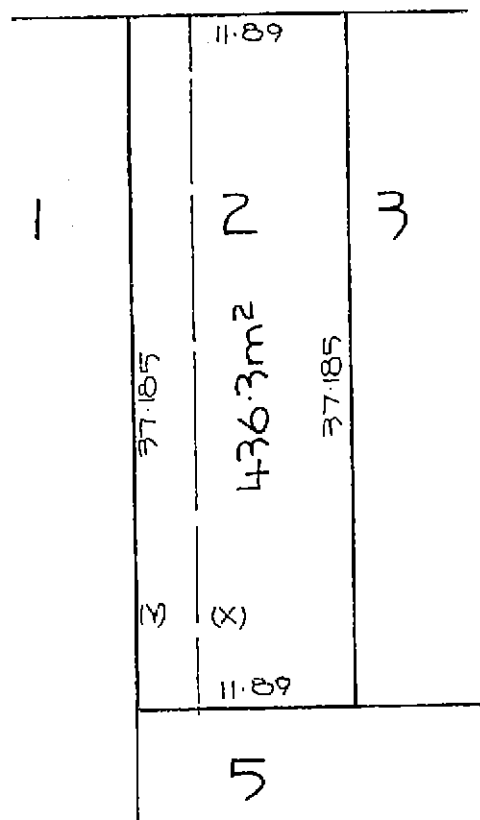
Registrar General.



PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

HARRABROOK AVE



CANCELLED

SEE AUTO FOLIO

(X) COVENANT - B 107935
(Y) COVENANT - B 141333

LAND REFERRED TO

Lot 2 in DP310522 at Five Dock in the Municipality of Drummoyne Parish of Concord County of Cumberland.

FIRST SCHEDULE

VERLIE ~~ORLINE~~ BARTLETT.

V861006

SECOND SCHEDULE

1. Reservations and conditions in the Crown Grant.
CY 2. B107935 Covenant affecting the part of the land within described shown so burdened in the plan hereon.
CY 3. B141333 Covenant affecting the part of the land within described shown so burdened in the plan hereon.

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

X2752117A
X431244T
SM/K

NOTATIONS AND UNREGISTERED DEALINGS

X431245 Mortgage to Commonwealth Savings Bank of Australia Registered 21-3-1988



PARTICULARS
SECOND SCHEDULE (continued)
Registrar General CANCELLATION

CANCELLED
SEE AUTO FOLIO

~~Amie Douli Treadle and Margaret Austin Southby as joint tenants by Transmission X275211 - Registered 18.11.1988~~
~~Brian Graham and Adrienne Kay Cobby as joint tenants by Transfer X431244 Registered 21-3-1988~~



FIRST SCHEDULE (continued)
REGISTERED PROPRIETOR
Registrar General



17/08/2021 08:44 PM

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No. of Deposited Plan 10692

Appn. No.8910

Reference to last Certificate

Vol.3660 Fol.134

New South Wales.



51131

[CERTIFICATE OF TITLE.]

TENANCY IN COMMON.

REGISTER BOOK.

VOL. 3739 FOL. 80

CANCELLED W

VERLIE URLENE BARTLETT of Ashfield, Spinster, Transferee under Instrument of Transfer from Henry Lorenz Dorn No.B 221850 is now the proprietor of an Estate in Fee Simple, in an undivided moiety or half share, subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances, liens, and interests, as are notified hereon, in that piece of land situated in the Municipality of Drummoyne Parish of Concord, and County of Cumberland containing Seventeen and one quarter perches, or thereabouts, as shown in the Plan hereon and therein edged red, being lot 2 as shown in plan annexed to Instrument of Transfer No. B 141333 and being part of 1500 acres (Portion 256 of Parish) delineated in the Public Map of the said Parish in the Department of Lands originally granted to John Harris by Crown Grant dated the first day of January One thousand eight hundred and six.

In witness whereof I have hereunto signed my name and affixed my Seal, this

fifteenth day of June, 1925

Signed in the presence of

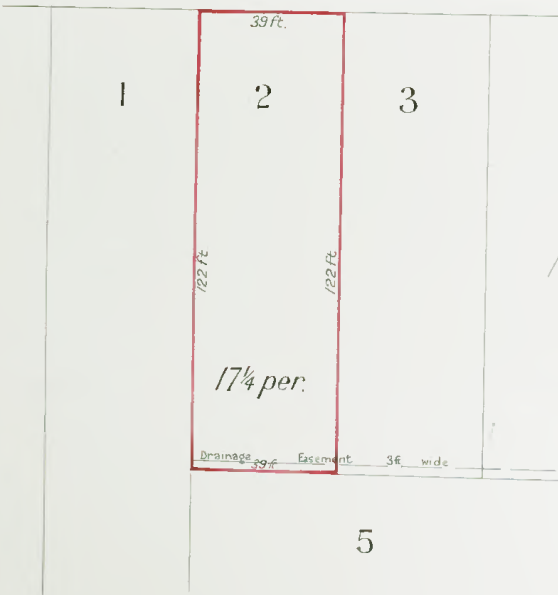
H. Murray

J. H. Williams

Registrar General.

Harrabrook

A^{re}



Scale 40 ft. to one inch

NOTIFICATION REFERRED TO.

Instrument of Transfer No.B 107935 comprising lot 83 Deposited Plan No.10692 and Instrument of Transfer No.B 141333 comprising lots 82 and 84 Deposited Plan No.10692 contain covenants and declarations in the following words:-
"And the transferee covenants with the transferrer that he will not erect any building on the land hereby transferred other than private residences and that all such main buildings shall be of stone brick concrete or similar materials And it is hereby declared that the land to which the benefit of this covenant is intended to be appurtenant is the whole of the land in Deposited Plan 10692 and that the land which is subject to the burden of such covenant is the land hereby transferred and that the person or persons by whom or with whose consent this covenant may be modified or released is the said transferrer."

J. H. Williams

Registrar General.

No. B 221851 MORTGAGE dated 27 May 1925 from the said Verlie Urlene Bartlett and also Rita Madys Bartlett to Helena Bettmar wife of John Ferdinand Albert Bettmar of Riverock Hairdresser
Produced and entered 16 June 1925 at 10 o'clock in the fore noon.
J. H. Williams
REGISTRAR GENERAL.

No. C 106522 DISCHARGE of within mortgage No.B 221851 dated January 1932
Produced 4th February 1932 and entered 4th February 1932 at 3.15 p.m. 3 o'clock in the after noon.
W. D. Dwyer
REGISTRAR GENERAL.

As to whole this Deed is cancelled and New Certificate of Title issued. Vol. 15392 Fol. 8 dated 17-10-1925. Vide 12361006

18610067A (cancel)



Title Search

17/08/2021 07:09 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 2/310522

SEARCH DATE	TIME	EDITION NO	DATE
17/8/2021	7:09 PM	9	26/4/2021

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY COMMONWEALTH BANK OF AUSTRALIA.

LAND

LOT 2 IN DEPOSITED PLAN 310522

AT FIVE DOCK

LOCAL GOVERNMENT AREA CANADA BAY

PARISH OF CONCORD COUNTY OF CUMBERLAND

TITLE DIAGRAM DP310522

FIRST SCHEDULE

CROFTSTAR PTY LIMITED (T AP841293)

SECOND SCHEDULE (4 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 B107935 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.
- 3 B141333 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.
- 4 AQ991779 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

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Historical Search

17/08/2021 07:10 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 7:10PM

FOLIO: 2/310522

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

Prior Title(s): VOL 15392 FOL 8

Recorded	Number	Type of Instrument	C.T. Issue
-----	-----	-----	-----
21/8/1988		TITLE AUTOMATION PROJECT	LOT RECORDED
		FOLIO NOT CREATED	
29/9/1989		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED
		CT NOT ISSUED	
28/10/1993	I753041	DISCHARGE OF MORTGAGE	
28/10/1993	I753042	TRANSFER	
28/10/1993	I753043	MORTGAGE	EDITION 1
30/1/1998	3761151	DISCHARGE OF MORTGAGE	
30/1/1998	3761152	MORTGAGE	EDITION 2
27/3/2001	7408114	DEPARTMENTAL DEALING	
2/5/2002	8556979	DISCHARGE OF MORTGAGE	
2/5/2002	8556980	TRANSFER	
2/5/2002	8556981	MORTGAGE	EDITION 3
26/11/2007	AD590364	DISCHARGE OF MORTGAGE	
26/11/2007	AD590365	TRANSFER	
26/11/2007	AD590366	MORTGAGE	EDITION 4
13/11/2008	AE324743	DISCHARGE OF MORTGAGE	
13/11/2008	AE324744	TRANSFER	
13/11/2008	AE324745	MORTGAGE	EDITION 5
5/12/2015	AK42376	DISCHARGE OF MORTGAGE	
5/12/2015	AK42377	TRANSFER	
5/12/2015	AK42378	MORTGAGE	EDITION 6
15/9/2018	AN713179	DEPARTMENTAL DEALING	EDITION 7



CORD ISSUED

23/4/2019 AP203309 CAVEAT

20/1/2020 AP841291 WITHDRAWAL OF CAVEAT

20/1/2020 AP841292 DISCHARGE OF MORTGAGE

20/1/2020 AP841293 TRANSFER

20/1/2020 AP841294 MORTGAGE EDITION 8

END OF PAGE 1 - CONTINUED OVER

DI-ES8303

PRINTED ON 17/8/2021

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 7:10PM

FOLIO: 2/310522

PAGE 2

Recorded Number Type of Instrument C.T. Issue

CORD ISSUED

26/4/2021 AQ991766 DISCHARGE OF MORTGAGE

26/4/2021 AQ991779 MORTGAGE EDITION 9

CORD ISSUED

*** END OF SEARCH ***



DI-ES8303

PRINTED ON 17/8/2021

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17/08/2021 07:11 PM

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System Document Identification

Form Number:01T-e
Template Number:T_nsw16
ELN Document ID:9555113
ELN NOS ID:9555115

TRANSFER

New South Wales
Real Property Act 1900

Land Registry Document Identification

AP508570

Stamp Duty: 9533833-001

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

LODGED BY:

Responsible Subscriber: WESTPAC BANKING CORPORATION ABN 33007457141

Address: Sarah Jewell- Private and Conf
25 Pierson ST
Lockleys 5032

Telephone:

PEXA Subscriber Number: 621

Customer Account Number: 500003E

Document Collection Box: 271Q

Client Reference: 180345

LAND TITLE REFERENCE

1/310522

TRANSFEROR

LEONARD PAUL RUSSELL

RONALD ANDREW RUSSELL

TRANSFeree

CROFTSTAR PTY LIMITED ACN 060918863
Registered company

Tenancy: Sole Proprietor

CONSIDERATION

The transferor acknowledges receipt of the consideration of \$2,750,000.00

ESTATE TRANSFERRED

FEE SIMPLE

The Transferor transfers to the Transferee the Estate specified in this Instrument and acknowledges receipt of any Consideration shown.

SIGNING FOR TRANSFEROR

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferor.

Party Represented by Subscriber:

LEONARD PAUL RUSSELL

RONALD ANDREW RUSSELL

Signed By: Michael Anthony Giugni

PEXA Signer Number:44512

Signer Capacity:Practitioner Certifier

Digital Signing Certificate Number:21001

**Signed for
Subscriber:**

AUSTIN GIUGNI MARTIN PTY LTD ABN 67169096557

AUSTIN GIUGNI MARTIN PTY LTD

Subscriber Capacity:Representative Subscriber

PEXA Subscriber Number:18688

Customer Account Number:502000

Date: 03/09/2019

SIGNING FOR TRANSFEREE

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferee.

Party Represented by Subscriber:

CROFTSTAR PTY LIMITED

Signed By:Patricia Sone

Signer Capacity:Practitioner Certifier

PEXA Signer Number:58915

Digital Signing Certificate Number:32810

**Signed for
Subscriber:**

ANTHONY JAMES CORDATO ABN 53101044954

CORDATO PARTNERS

Subscriber Capacity:Representative Subscriber

PEXA Subscriber Number:23835

Customer Account Number:503191

Date: 03/09/2019



17/08/2021 07:13 PM

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Form: 03TA
Release: 1.1
www.lpi.nsw.gov.au

TRANSMISSION APPLICATION



AC592313T

New South Wales
Section 93 Real Property Act 1900

PRIVACY NOTE: this information is legally required and will become part of the public record

STAMP DUTY

Office of State Revenue use only

(A) **LAND**

Torrens Title
FOLIO IDENTIFIER: 1/310522

(B) **REGISTERED
DEALING**

Number _____ Torrens Title _____

(C) **LODGED BY**

Delivery Box 545D	Name, Address or DX and Telephone LLPN: 123397E JOHN McLAREN & CO. Reference: <u>LOVE · RUSSELL</u>	CODE TA

(D) **DECEASED
REGISTERED
PROPRIETOR**

CONSTANCE JOYCE RUSSELL

(E) **APPLICANT**

LEONARD PAUL RUSSELL & RONALD ANDREW RUSSELL

(F) The applicant, being entitled as executors of the estate of the deceased registered proprietor (who died on 15 Jul 2006) pursuant to probate No. 114345/06 granted on 01 Sep 2006 to Leonard Paul Russell & Ronald Andrew Russell (a certified copy of which is lodged herewith) applies to be registered as proprietor of the estate or interest of the deceased registered proprietor in the abovementioned land

DATE 8 September 2006

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

Certified correct for the purposes of the Real Property Act 1900 by the Applicant.

Signature of witness:

Name of witness: Geoffrey Allars
Address of witness: 8/207 Great North Road
FIVE DOCK NSW 2046

Signature of Applicant:

(H) **CONSENT OF EXECUTOR, ADMINISTRATOR OR TRUSTEE**

I, _____ of the deceased registered proprietor, hereby consent to this application.

Signature of witness:

Name of witness: _____

Address of witness: _____

Signature of _____

All handwriting must be in block capitals.

Office use only—

Evidence sighted/sighted and returned:

CPH/c
CT Co-own 2006
J



17/08/2021 07:15 PM

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Deposited Plan No.10692

Appn. No. B910

Reference to last Certificate

Vol. 1932 Fol. 8

New South Wales



42443 7.24

[CERTIFICATE OF TITLE.]

CANCELLED



ON ISSUE OF NEW FOLIO 1/310522

REGISTER BOOK,

Vol. 3660 Fol. 133

5
jay

HENRY LORENZ DORN of Five Dock, Builder, Transferee under Instrument of Transfer from William Richard Croker No.B 141333 is now the proprietor of an Estate in Fee Simple, subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances, liens, and interests, as are notified hereon, in that piece of land situated at Five Dock in the Municipality of Drummoyne Parish of Concord, and County of Cumberland containing Twenty seven and three quarters perches, or thereabouts, as shown in the Plan hereon and therein edged red, being lot 1 as shown in plan annexed to the said Instrument of Transfer No.B 141333 and being part of 1500 acres (Portion 256 of Parish) delineated in the Public Map of the said Parish in the Department of Lands originally granted to John Harris by Crown Grant dated the first day of January One thousand eight hundred and six.

In witness whereof I have hereunto signed my name and affixed my Seal, this

Signed in the presence of

day of

November, 1924

[Signature]

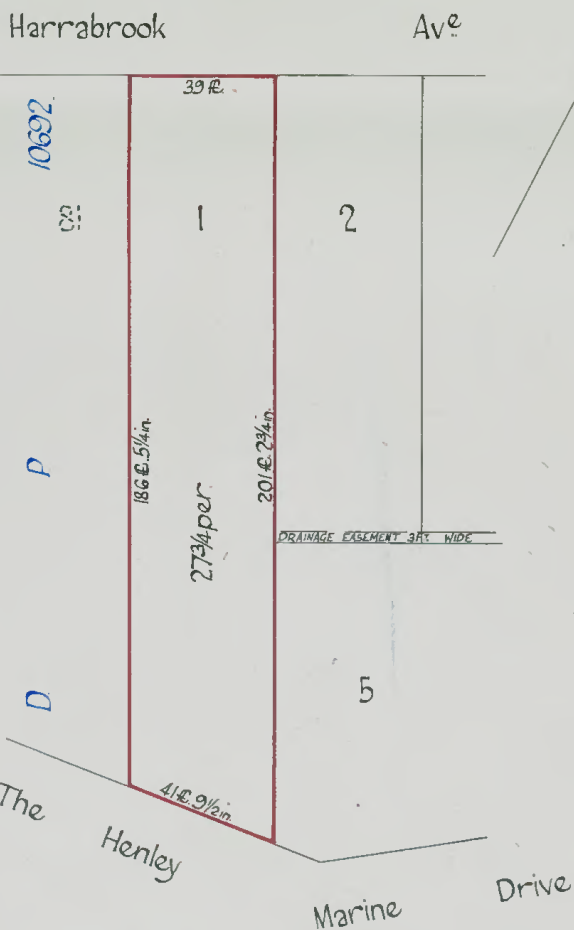
Registrar General.



"whom or with whose consent this covenant may be released or modified is the said transferror."

[Signature]

Registrar General.



NOTIFICATION REFERRED TO.

The above mentioned Instrument of Transfer No.B 141333 comprising lots 82 and 84 Deposited Plan 10692 contains a covenant and declaration in the following words:- "And the transferee covenants with the transferror that he will not erect any building on the land hereby transferred other than private residences and that all such main buildings shall be of stone brick concrete or similar materials and it is hereby declared that the land to which the benefit of this covenant is intended to be appurtenant is the whole of the land in Deposited Plan 10692 and that the land which is the subject of the burden of such covenant is the land hereby transferred and that the person or persons by

No. B 158106 TRANSFER dated 2nd December 1924 from the said Henry Lorenz Dorn to George Edward Russell of Waverley Police Constable and Edith Hannah Russell his wife as joint tenants. Produced and entered 5th December 1924 at 2 mts pt 3 o'clock in the afternoon.

[Signature]
REGISTRAR GENERAL



Edith Hannah Russell

the surviving joint-tenant, is now registered sole proprietor of the land within described. See Notice of Death (Section 101) No. H 600893 Entered 5th October 1960

[Signature]
REGISTRAR GENERAL

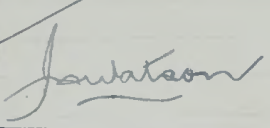


George Edward Russell of Five Dock, died 12th November 1970. His wife as joint tenant are now the registered proprietors of the land within described. See TRANSFER No. 1153711 dated 6th July 1970

Entered 12th November 1970

[Signature]
REGISTRAR GENERAL



George Edward Russell of late and Constance Joyce Russell, the surviving joint tenants ~~is~~ are now registered sole proprietor of the land within described.
See Notice of Death (Section 101) No. 316 485
Entered 4 July 1973

REGISTRAR GENERAL

REGISTERED PROPRIETOR Constance Joyce Russell
by Notice of Death T99566 Registered
29-2-1984

REGISTRAR GENERAL

COMPUTER FOLIO NO FURTHER
DEALINGS TO BE REGISTERED.

T99566 N/D R

Title Search

17/08/2021 06:58 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/241337

SEARCH DATE	TIME	EDITION NO	DATE
17/8/2021	6:59 PM	12	26/4/2021

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY COMMONWEALTH BANK OF AUSTRALIA.

LAND

LOT 1 IN DEPOSITED PLAN 241337

AT FIVE DOCK

LOCAL GOVERNMENT AREA CANADA BAY

PARISH OF CONCORD COUNTY OF CUMBERLAND

TITLE DIAGRAM DP241337

FIRST SCHEDULE

CROFTSTAR PTY. LIMITED (T AQ287866)

SECOND SCHEDULE (6 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 B177938 COVENANT
- 3 M435323 RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE
DESCRIBED SHOWN SO BURDENED IN DP241337
- 4 DP241337 CROSS EASEMENTS CREATED PURSUANT TO SECTION 181B
CONVEYANCING ACT, 1919 AFFECTING THE PARTY WALLS SHOWN
ON THE BOUNDARY BETWEEN LOTS 1 & 2 IN DP241337 SEE
M612900
- 5 AP943864 LEASE TO FRANK CARIGLIANO OF THE REAR OFFICE GARAGE
AND CARPORT AREA, 7 RAMSAY STREET, FIVE DOCK. EXPIRES:
31/12/2022.
- 6 AQ991773 MORTGAGE TO COMMONWEALTH BANK OF AUSTRALIA

NOTATIONS

UNREGISTERED DEALINGS: NIL



*** END OF SEARCH ***

DI-ES8303

PRINTED ON 17/8/2021

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

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Historical Search

17/08/2021 06:59 PM

Client Reference: DI-ES8303

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE

17/8/2021 7:00PM

FOLIO: 1/241337

First Title(s): OLD SYSTEM

Prior Title(s): VOL 11849 FOL 245

Recorded	Number	Type of Instrument	C.T. Issue
-----	-----	-----	-----
5/6/1987		TITLE AUTOMATION PROJECT	LOT RECORDED
		FOLIO NOT CREATED	
15/7/1987	W717964	DISCHARGE OF MORTGAGE	FOLIO CREATED
		EDITION 1	
23/7/1987	W717965	MORTGAGE	
23/7/1987	W717966	MORTGAGE	EDITION 2
20/6/1990	Z67424	LEASE	EDITION 3
5/2/1998	3777112	DISCHARGE OF MORTGAGE	
5/2/1998	3777113	TRANSFER	
5/2/1998	3777116	MORTGAGE	EDITION 4
12/2/2001	7404946	VARIATION OF MORTGAGE	EDITION 5
27/3/2001	7408114	DEPARTMENTAL DEALING	
16/7/2002	8775818	DISCHARGE OF MORTGAGE	EDITION 6
15/12/2011	AG689791	LEASE	EDITION 7
2/3/2016	AK259123	TRANSFER	EDITION 8
25/5/2017	AM117579	LEASE	EDITION 9
6/3/2020	AP943864	LEASE	EDITION 10
31/7/2020	AQ287866	TRANSFER	
31/7/2020	AQ287867	MORTGAGE	EDITION 11
		CORD ISSUED	



26/4/2021 AQ991769 DISCHARGE OF MORTGAGE
26/4/2021 AQ991773 MORTGAGE EDITION 12
CORD ISSUED

*** END OF SEARCH ***

DI-ES8303

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System Document Identification

Land Registry Document Identification

Form Number:01T-e
Template Number:t_nsw18
ELN Document ID:550584654
ELN NOS ID: 550584656

TRANSFER

New South Wales
Real Property Act 1900

AQ287866

Stamp Duty: 9828312-001

PRIVACY NOTE: Section 31B of the Real Property Act 1900 (RP Act) authorises the Registrar General to collect the information required by this form for the establishment and maintenance of the Real Property Act Register. Section 96B RP Act requires that the Register is made available to any person for search upon payment of a fee, if any.

LODGED BY:

Responsible Subscriber: WESTPAC BANKING CORPORATION ABN 33007457141
Address: 25 Pierson ST
Lockleys 5032
Telephone:
ELNO Subscriber Number: 621
Customer Account Number: 500072
Document Collection Box: 271Q
Client Reference: 222020 Croftsta

LAND TITLE REFERENCE

1/241337

TRANSFEROR

FRANK CARIGLIANO
FERNANDA CARIGLIANO

TRANSFeree

CROFTSTAR PTY. LIMITED ACN 060918863
Registered company
Tenancy: Sole Proprietor

CONSIDERATION

The transferor acknowledges receipt of the consideration of \$1,883,000.00

ESTATE TRANSFERRED

FEE SIMPLE

The Transferor transfers to the Transferee the Estate specified in this Instrument and acknowledges receipt of any Consideration shown.

SIGNING FOR TRANSFEROR

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferor.

Party Represented by Subscriber:

FRANK CARIGLIANO
FERNANDA CARIGLIANO

Signed By: Dante Aspite
ELNO Signer Number: 59392

Signer Capacity:Practitioner Certifier
Digital Signing Certificate Number:

Signed for
Subscriber: DANTE ASPITE ABN 61445235823
ANDERSON LAWYERS

Subscriber Capacity:Representative Subscriber

ELNO Subscriber Number: 23890

Customer Account Number:503224

Date: 31/07/2020

SIGNING FOR TRANSFEREE

I certify that:

1. The Certifier has taken reasonable steps to ensure that this Registry Instrument or Document is correct and compliant with relevant legislation and any Prescribed Requirement.
2. The Certifier has retained the evidence supporting this Registry Instrument or Document.
3. The Certifier holds a properly completed Client Authorisation for the Conveyancing Transaction including this Registry Instrument or Document.
4. The Certifier has taken reasonable steps to verify the identity of the transferee.

Party Represented by Subscriber:

CROFTSTAR PTY. LIMITED

Signed By:Patricia Sone

Signer Capacity:Practitioner Certifier

ELNO Signer Number: 58915

Digital Signing Certificate Number:

**Signed for
Subscriber:**

ANTHONY JAMES CORDATO ABN 53101044954

CORDATO PARTNERS

Subscriber Capacity:Representative Subscriber

ELNO Subscriber Number: 23835

Customer Account Number:503191

Date: 31/07/2020



**LAND
REGISTRY
SERVICES**

Direct Info
Quick and easy online

17/08/2021 07:05 PM

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Form: 01T
Licence: 01-05-025
Licensee: LEAP Legal Software Pty Limited
Firm name: John Orford & Associates

TRANSFER

New South Wales
Real Property Act 1900



AK259123K

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

STAMP DUTY

Office of State Revenue use only

Office of State Revenue	
NSW Treasury	
Client No: 5699914	3434
Duty: \$10.00	Trans No: 8572079-001
Asst details: _____	
2/3/16	

(A) TORRENS TITLE

1/241337

(B) LODGED BY

Document Collection Box	Name, Address or DX, Telephone, and Customer Account Number if any	CODES
460 M	John Orford & Assoc. Ltd 165 Forest Rd HORSTVILLE 2220	T TW
Reference: 123325 G		



John D O'Leary Electrical Service Pty Limited ACN 001 370 127

John D O'Leary

(D) CONSIDERATION

The transferor acknowledges receipt of the consideration of \$985,000.00 and as regards

(E) ESTATE

the abovementioned land transfers to the transferee an estate in fee simple.

(F) SHARE TRANSFERRED

(G) Encumbrances (if applicable):

(H) TRANSFEE

Frank CARIGLIANO and Fernanda CARIGLIANO

(I) TENANCY: JOINT TENANTS

DATE

(J) Certified correct for the purposes of the Real Property Act 1900 and executed on behalf of the corporation named below by the authorised person(s) whose signature(s) appear(s) below pursuant to the authority specified.

Corporation: John D O'Leary Electrical Service Pty Limited ACN 001 370 127
Authority: section 127 of the Corporations Act 2001

Signature of authorised person:

B. O'Leary

Name of authorised person: Beverly O'Leary

Office held: Director

Signature of authorised person:

John O'Leary

Name of authorised person:

Office held: Director/Secretary

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

Signature:

John Orford

Signatory's name: John Laurence Orford

Signatory's capacity: Solicitor for the Transferee

(K) The transferee certifies that the eNOS data relevant to this dealing has been submitted and stored under

eNOS ID No. _____ Full name: _____ Signature: _____



17/08/2021 07:07 PM

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Form: 97-01T
Licence: MID/0734/97

TRANSFER

3777113 X

New South Wales
Real Property Act 1900



Office of State Revenue use only
00*2\$ 2072018702/03 90 7070 9307 04 2072018702/03

N.S.W. STAMP DUTY

(A) **LAND TRANSFERRED**

If appropriate, specify the share or part transferred.

FOLIO IDENTIFIER 1/241337

(B) **LODGED BY**

LTO Box

Name, Address or DX and Telephone

LEGALITIES PTY. LIMITED
DX 725 SYDNEY
PH: 221 8885

605m

Reference (15 character max): Slade. PJS

(C) **TRANSFEROR**

RAYMOND HUGHES and VICKI MAXINE HUGHES

(D) acknowledges receipt of the consideration of \$215000.00 and as regards the land specified above transfers to the transferee an estate in fee simple.

(E) Encumbrances (if applicable): 1. 2. 3.

(F) **TRANSFEE**

T
TS
(s713 LGA)
TW
(Sheriff)

JOHN D O'LEARY ELECTRICAL SERVICE PTY LTD
(ACN 001 370 127)

(G)

(H) We certify this dealing correct for the purposes of the Real Property Act 1900. DATE 2.2.98

Signed in my presence by the Transferor who is personally known to me.

J. Tate
Signature of Witness

Name of Witness (BLOCK LETTERS)
Jan. Tate
Address of Witness

6/127 Princes Highway
Sylvania 2224

R Hughes
V Hughes
Signature of Transferor

M J Witts
Signature of M J WITTS
Solicitor for the Transferee
27/1/98



17/08/2021 07:09 PM

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CERTIFICATE OF TITLE
PROPERTY ACT, 1900



11849-245

NEW SOUTH WALES

Appln.No.8910

Prior Title Vol.10520 Fol.176

Vol. **11849** Fol. **245**

Edition issued 31-5-1972.

CANCELLED ☒



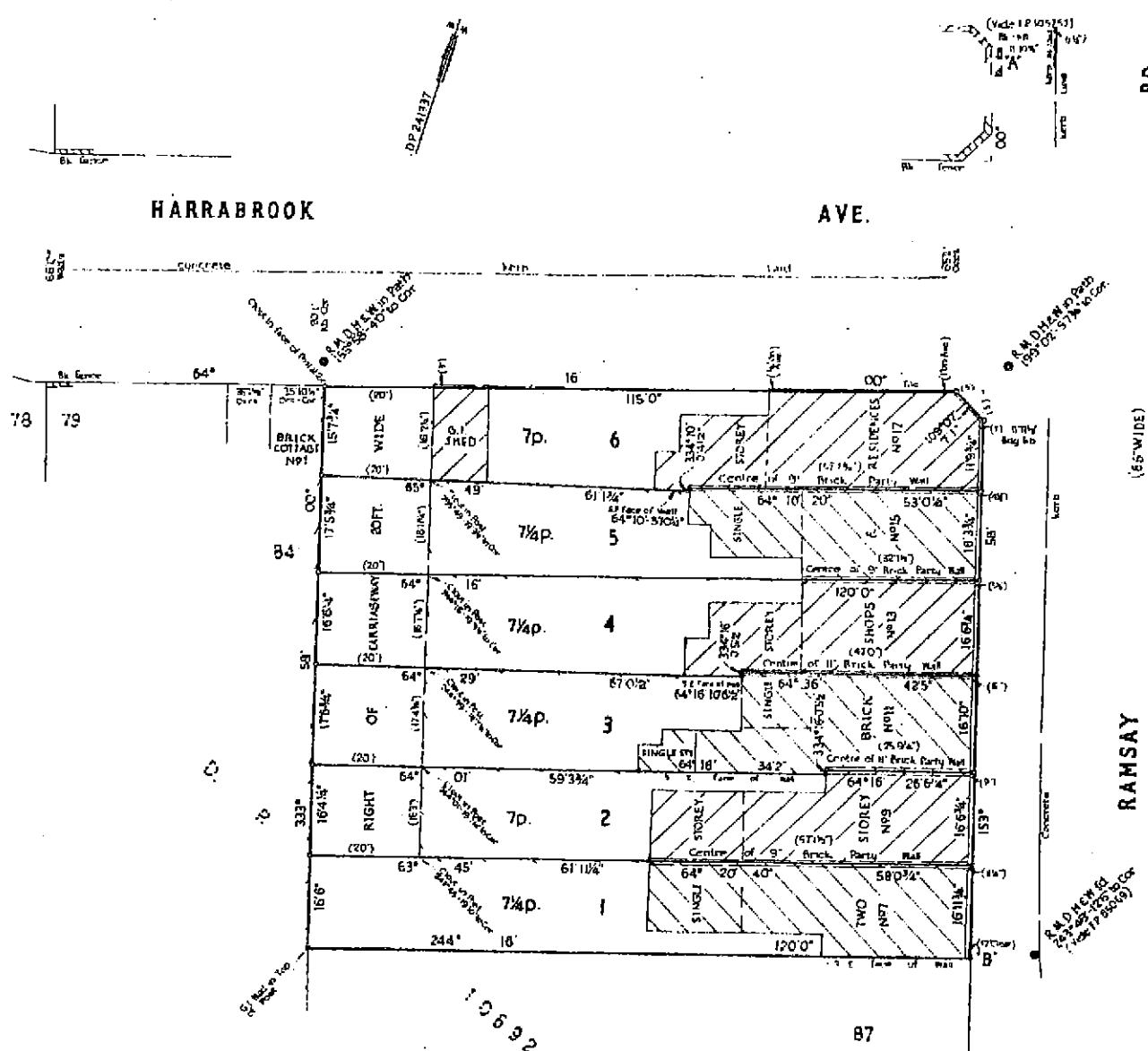
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Jawatson

Registrar General.



PLAN SHOWING LOCATION OF LAND



ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 1 in Deposited Plan 241337 at Five Dock in the Municipality of Drummoyne Parish of Concord and County of Cumberland being part of Portion 256 granted to John Harris on 1-1-1806.

FIRST SCHEDULE

~~REMO INVESTMENTS PTY LIMITED and ROEMAR INVESTMENTS PTY LIMITED as Tenants in common in equal shares.~~

SECOND SCHEDULE

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Covenant created by Transfer No.B177938.
3. Right of Carriageway appurtenant to the land above described created by the registration of Deposited Plan 241337. See M435323.
4. ~~Cross Easement (Section 181B Conveyancing Act, 1919) created by Transfer No.M612900 affecting the party wall shown on the common boundary of Lots 1 and 2 in the plan hereon.~~

Jawatson
Registrar General

1962M7500

Reg. Gen.
29-8-1972

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

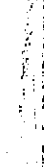
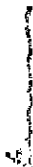
WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

11849 245

(Page 1) Vol.

FIRST SCHEDULE (continued)

FIRST SCHEDULE (continued)					
REGISTERED PROPRIETOR	INSTRUMENT			ENTERED	Signature of Registrar General
	NATURE	NUMBER	DATE		
The Royce Group of Driving Schools Pty. Limited.	Transfer	M612900	4-2-1972	27-6-1972	
Vyner Services Pty. Limited	Transfer	Q821484		11-9-1978	
Raymond Hughes of Sans Souci, Company Director and Vicki Maxine Hughes his wife as joint tenants	Transfer	S216007		18-12-1980	
FOLIO CANCELLED - NEW FOLIO IS 1/241337					

SECOND SCHEDULE (continued)

INSTRUMENT		PARTICULARS		ENTERED	Signature of Registrar General	CANCELLATION	
NATURE	NUMBER	DATE				Discharged	
* Mortgage	M612901	4-2-1972	to Violet May Rogers of Watsons Bay, Widow, ~~to Finance Corporation of Australia Limited.~~	27-6-1972		Discharged	Q821482
* Mortgage	M622445	4-2-1972	to Finance Corporation of Australia Limited.	27-6-1972		Discharged	Q821483
* Transfer	M612900	4-2-1972	Cross Easements (Section 181B Conveyancing Act, 1919) created by Transfer No.M612900 affecting the party wall shown on the common boundary of Lots 1 and 2 in the plan attached. DP 241337	27-6-1972			
Mortgage	M612901		affected by 27-6-1972 Transmission of Mortgage to Mortgagees as new Real Estate Company Downsett of Kallara and Palmer Phillips of Chateauwood both named as owner in the shares then set out.				
Mortgage	Q821485		to Hilario De Asensio Pena of Ashfield, Bricklayer	18-7-1978		Cancelled	Q821482
Mortgage	R926680		Maria Providencia Pena his wife.	11-9-1978		Discharged	R926679
Mortgage	S216008		to Australia and New Zealand Banking Group Limited	23-7-1980		Discharged	S216006
T347879			to Australia and New Zealand Banking Group Limited of ground-floor shop premises, known as 7 Ramsay Road, Five Dock, excluding upstairs residence and back yard, together with Option of Renewal, Expires 15-6-1985.	18-12-1980		Discharged	W 717964
T347879		Registered 6-1-1983					
T347879		Lease. Lessee: Fay Margaret Nichols	Registered by Transfer #469482. Registered 16-5-1983.			Lapsed	W 717964

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



**LAND
REGISTRY
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17/08/2021 08:14 PM

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10520176

NEW SOUTH WALES

CERTIFICATE OF TITLE
PROPERTY ACT, 1900, as amended.

Appln. No. 8910

Prior Title Vol. 6622 Fol. 111

Vol. 10520 Fol. 176A

Edition issued 30-3-1967

AS K565055



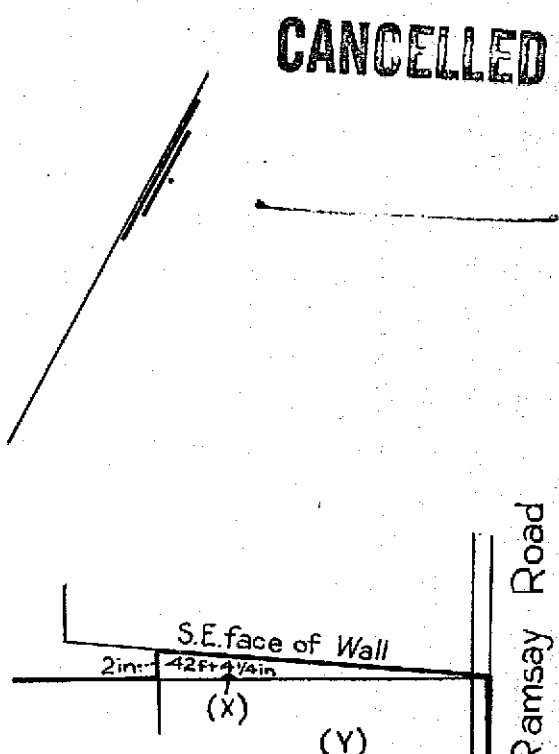
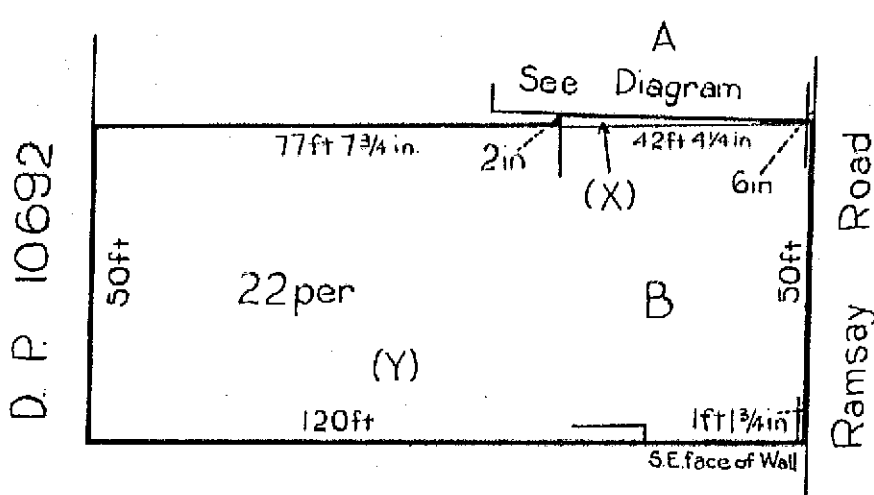
I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness *S. Vandine*

J. Watson
Registrar General.



PLAN SHOWING LOCATION OF LAND



- DIAGRAM -

K565055 Scale: 30 feet to one inch

Not to scale

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in an undivided one half share in Lot B in plan lodged with Order No. B969102 (Filed as F.P.105752) in the Municipality of Drummoyne Parish of Concord and County of Cumberland being part of Portion 256 granted to John Harris on 1-1-1806.

FIRST SCHEDULE (continued overleaf)

REMO INVESTMENTS PTY. LIMITED.

SECOND SCHEDULE (continued overleaf)

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Covenants created by Transfers Nos. A741950 and B177938 affecting the pieces of land designated (X) and (Y) respectively in the plan hereon.
3. Mortgage No. H30845 to The Commercial Banking Company of Sydney Limited. Entered 2-9-1958. Discharged K946457

J. Watson
Registrar General

WARNING THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR		INSTRUMENT		ENTERED	Signature of Registrar-General
NATURE	NUMBER	DATE			
This deed is cancelled as to <u>the whole</u>					
New Certificates of Title have issued on <u>31-5-1972</u>					
for lots in <u>Deposited Plan No. 241337</u> as follows:-					
Lots <u>1 to 6</u> Vol. <u>11849</u> Fol. <u>245</u> respectively.					
<u>850</u>					
					
<u>J. J. J. J.</u> REGISTRAR GENERAL					

SECOND SCHEDULE (continued)

INSTRUMENT		PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION
NATURE	NUMBER				
<u>Lease</u>	<u>M45919</u>	<u>13.11.1970</u>	<u>10-2-1971</u>	<u>J. J. J. J.</u>	<u>M654793</u>
	<u>M435323</u>	<u>Interests created pursuant to Section 88B Conveyancing Act, 1919,</u> <u>by the registration of Deposited Plan 241337</u>	<u>17.9.1971</u>	<u>J. J. J. J.</u>	

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

194 6957
93, 6 11 11
D 224/337
M 12-5-77
Should be in
110520 575 AS
M 513253 to
M 12 2000
M 11 05 20 133
M 12 05 10 76
Lot 2 of 201333
Page 2 of 2
with right of
carriage in
M 654793 E J. J. J. J.
M 654793
D 224/337

CANCELLED

CERTIFICATE OF TITLE
REAL PROPERTY ACT, 1900, as amended.

TORRENS TITLE
Register Book

NEW SOUTH WALES

Appln. No. 8910

Prior Title Vol. 6622 Fol. 111

Vol. 10520 Fol. 176 B

Edition issued 30-3-1967

K565055



AS

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

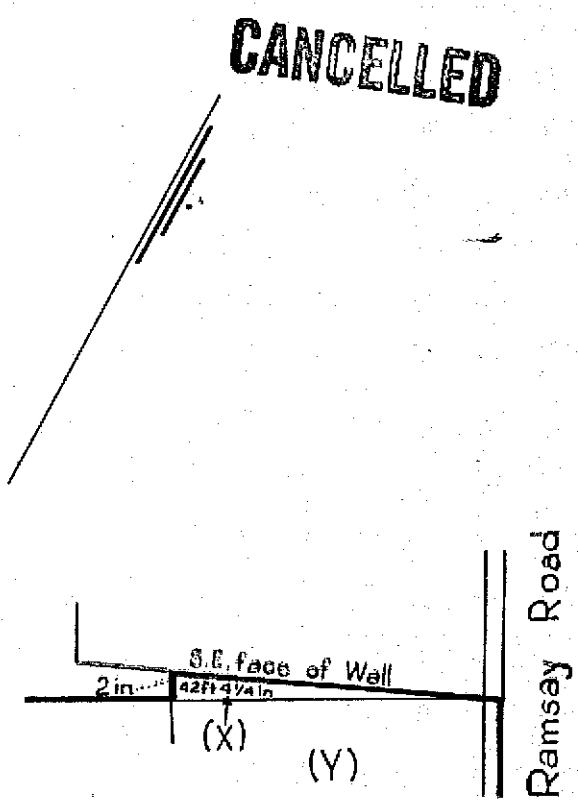
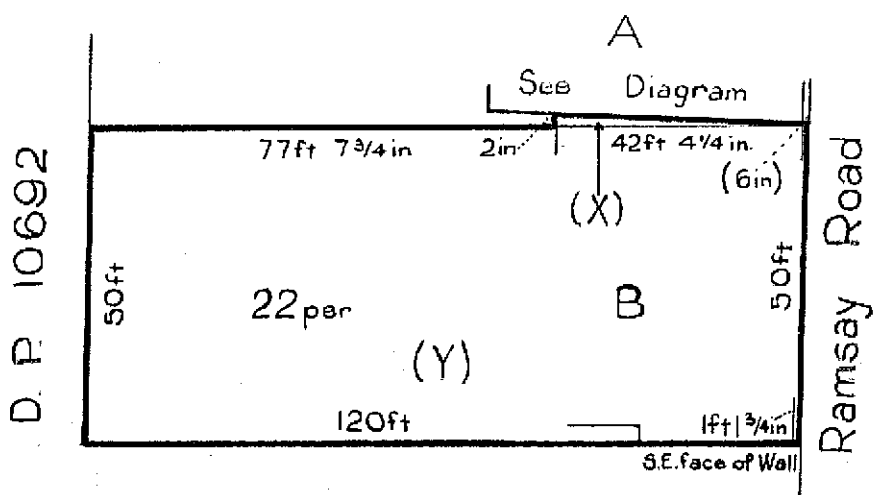
Witness

S. Vandine

Jawatson
Registrar General.



PLAN SHOWING LOCATION OF LAND



CANCELLED

K565055
OK

Scale: 30 feet to one inch

Not to Scale

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in an undivided one half share in Lot B in plan lodged with Order No.B969102 (Filed as F.P.105752) in the Municipality of Drummoyne Parish of Concord and County of Cumberland being part of Portion 256 granted to John Harris on 1-1-1806.

FIRST SCHEDULE (continued overleaf)

ROBMAR INVESTMENTS PTY. LIMITED.

SECOND SCHEDULE (continued overleaf)

1. Reservations and conditions, if any, contained in the Crown Grant above referred to.
2. Covenants created by Transfers Nos.A741950 and B177938 affecting the pieces of land designated (X) and (Y) respectively in the plan hereon.
3. Mortgage No.H30845 to The Commercial Banking Company of Sydney Limited. Entered 2-9-1958.

Discharged
K946957

Jawatson
Registrar General

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE



17/08/2021 08:46 PM

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MORTGAGE No. F 777736 has been discharged.
 Sec. G 401727 Entered 10 November 1955
J. H. Wells
 REGISTRAR GENERAL.

No. H30845 MORTGAGE dated 23rd July 1958
from the said Joseph Pittorino and Nancy
Pittorino to The Commercial
Banking Company of Sydney
Limited

Entered 2nd September 1958

J. Watson
REGISTRAR GENERAL



*Reino Investments Pty. Limited and Robert
Investments Pty. Limited are*

now the registered proprietors of land within described.

As tenants in common in Equal Shares

See TRANSFER No. K565055 dated 8th December 1966

Entered 14th February 1967

As to land in this transfer *J. Watson*
this *deed* is cancelled

and new Certificate issued

Vol 10520 Fols 175 A, B.



CT 17/67
K565055



17/08/2021 08:58 PM

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Appn. No. 5910
Reference to last Certificates
Vol. 3240 Fol. 81
3698 18
No of deposited plan 10692

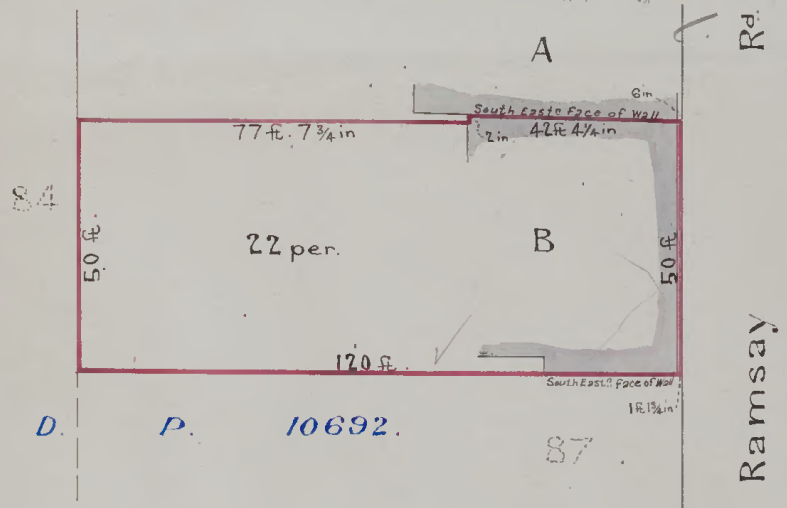


[CERTIFICATE OF TITLE.]
Order No B969102
REGISTER BOOK.
VOL. 4406 Fol. 187

CANCELLED

Annie Roberge of Five Dock married Woman by virtue of Certificates of Titles Volume 3240 Folio 81 and Volume 3698 Folio 18 now surrendered is now the proprietor of an estate in fee simple
subject nevertheless to the reservations and conditions, if any, contained in the Grant hereinafter referred to, and also subject to such encumbrances, liens, and interests as are notified hereon, in that piece of land situated at Five Dock
in the Municipality of Drummoyne Parish of Concord, and County of Cumberland containing Twenty two perches
as shown in the Plan hereon and therein edged red, being Lot B in plan annexed to Order No B969102 and being part of 1500 acres (Portion 256 of Parish) delineated in the public maps of the said Parish in the Department of Lands originally granted to John Harris by Crown Grant dated the 1st day of January 1806

In witness whereof I have hereunto signed my name and affixed my Seal, this twenty third day of May 1930.
Signed in the presence of W. J. McNeill
W. S. Hayton
Registrar General.



whose consent this covenant may be released varied or modified is the said William Richard Brooker his heirs executors administrators or assigns
Instrument of Transfer No 177938 comprising the residue of the land above described contains a covenant and declaration in the following words:-
And the transferee covenants with the said William Richard Brooker his executors administrators and assigns that all main buildings to be erected upon the said land shall be of stone brick concrete or similar material
And it is hereby declared that the land to which the benefit of this covenant is intended to be appurtenant is the whole of the land in deposited plan No 10692 and that the land which is subject to the burden of such covenant is the land hereby transferred and that the person or persons by whom or with whose consent this covenant may be modified or released is or are the said transferee William Richard Brooker his executors administrators and assigns

Notification referred to
Instrument of Transfer No A 741980 comprising inter alia part of the land above described contains a covenant and declaration in the following words:-
And the said Christian Samuel Withellau hereby covenants with the said William Richard Brooker his executors administrators and assigns that no the said Christian Samuel Withellau his executors administrators and assigns will not erect any main building on the land hereby transferred unless such main building is of stone or brick or concrete or similar material And it is hereby declared that the land to which the benefit of this covenant is intended to be appurtenant is the whole of the land in deposited plan No 10692 and the land which is subject to the burden of such covenant is the land hereby transferred and that the person or persons by whom or with

No B969100 Deeds dated the 29th day of June 1929 from Annie Roberge to Peter Walter Deig of Lane Cove (Queens)

of shops and premises erected on part of the land above described
Produced the 22nd day of November 1929 and entered the
9th day of May 1930 at 4 o'clock in the afternoon

W. H. Hayton
Registrar General



No. B 969103 MORTGAGE dated 15th November 1929
from the said Annie Roberge to Permanent Trustee Company
New South Wales Limited of the land within described
together with or easement over part of the land comprised in
Certificate of Title Vol 4406 Fol 1861

Produced 22nd November 1929 and entered 30th May 1930
at 2 o'clock in the afternoon

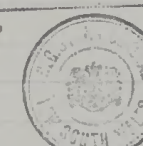
W. H. Hayton
Registrar General



No. B 969104 MORTGAGE dated 15th November 1929
from the said Annie Roberge to Edward Charles
Moore of Kensington Estate Manager

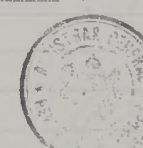
Produced and entered 11th June 1930
at 10 o'clock in the forenoon

W. H. Hayton
Registrar General



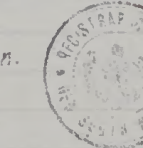
No. C 586971 APPLICATION BY TRANSMISSION
from the said Annie Roberge to Edward Charles
Moore of Kensington Estate Manager the registered
Proprietor of the Land within described in pursuance of the above
Application Produced 15th October 1937 and
entered 28th October 1937
at 12 o'clock in the afternoon

W. H. Hayton
Registrar General



No. C 586972 CAVEAT dated 15th October 1937
by the Registrar General.
Produced 15th October 1937
entered 28th October 1937
at 12 o'clock in the afternoon

W. H. Hayton
Registrar General



The within mentioned LEASE No. 796900
has expired by effluxion of time.
Dated 28th October 1937 Vide C 586973

W. H. Hayton
Registrar General



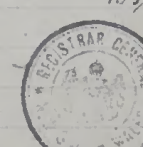
No. C 586975 DISCHARGE of within mortgage
B 969103 dated 14th October 1937
Produced 15th October 1937 entered 28th October 1937
at 12 o'clock in the afternoon

W. H. Hayton
Registrar General



No. C 586976 DISCHARGE of within mortgage
B 969104 dated 11th October 1937
Produced 15th October 1937 entered 28th October 1937
at 12 o'clock in the afternoon

W. H. Hayton
Registrar General



No. C 586977 MORTGAGE dated 14th October 1937
from the said Annie Roberge and Cecil Harry Roberge
to Edward Charles Moore of Kensington Estate Manager

Produced 15th October 1937 and entered 28th October 1937
at 12 o'clock in the afternoon

W. H. Hayton
Registrar General



No. C 586978 MORTGAGE dated 14th October 1937
from the said Annie Roberge and Cecil Harry Roberge
to Edward Charles Moore of Kensington Estate Manager

Produced 21st October 1937 and entered 10th November 1937
at 4 o'clock in the afternoon

W. H. Hayton
Registrar General



No. C 951741 DISCHARGE of within mortgage
No. C 586978 dated 13th September 1940
Produced and entered 15th October 1940
at 2 o'clock in the afternoon

W. H. Hayton
Registrar General



The within Caveat No. C 586972 is hereby withdrawn
Dated 28th September 1945

J. H. Wells
Registrar General



No. D 413556 TRANSFER dated 13th September 1945
from the said Annie Roberge and Cecil Harry Roberge
to Michael James of meat Manufacturer

Produced 18th September 1945 and entered 18th September 1945
at 12 o'clock in the afternoon

J. H. Wells
Registrar General



No. F 540150 DISCHARGE of within mortgage
No. C 586977 dated 4th November 1951
Produced and entered 14th November 1951
at 12 o'clock in the afternoon

J. H. Wells
Registrar General



No. F 635090 APPLICATION BY TRANSMISSION
from the said Mary Gene Geerin of Edgecliff Widow

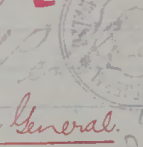
Produced 18th March 1952 and entered 7th April 1952
at 12 o'clock in the afternoon

J. H. Wells
Registrar General



No. F 774908 Caveat dated 2nd December 1952
Produced and entered 9th December 1952 at
11 o'clock in the afternoon

J. H. Wells
Registrar General



This Deed is Cancelled and Certificate of Title Issued
Vol. 6682 Fol. 111
OF 188504 REGISTRAR GENERAL

No. F 782429 WITHDRAWN
The within Caveat No. F 782429 is hereby withdrawn
Produced 22nd October 1952 and entered 22nd October 1952
at 3 o'clock in the afternoon

No. F 774908 Caveat dated 2nd December 1952
Produced and entered 9th December 1952 at
11 o'clock in the afternoon

No. F 774908 Caveat dated 2nd December 1952
Produced and entered 9th December 1952 at
11 o'clock in the afternoon

No. F 783504 Caveat dated 2nd December 1952
Produced and entered 9th December 1952 at
11 o'clock in the afternoon

APPENDIX E

CURRENT AND HISTORICAL AERIAL PHOTOGRAPHS



HISTORICAL AERIAL PHOTOGRAPHS - 1943



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	1	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1955



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	2	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1965



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	3	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1970



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	4	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1975



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	5	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1982



LEGEND

 Site Boundary

PROJECT DETAILS

Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS

Figure No.	6	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1991



LEGEND

 Site Boundary

PROJECT DETAILS	
Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS			
Figure No.	7	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 1998



LEGEND

 Site Boundary

PROJECT DETAILS	
Project Title	Detailed Site Investigation
Project No.	ES8303
Client	Croftstar Pty Ltd
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW



DRAWING DETAILS			
Figure No.	8	Rev No.	0
Scale	As above	Size	A4
Drawn by	SBS	Date	17.08.2021
Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 2005



LEGEND

 Site Boundary

PROJECT DETAILS			DRAWING DETAILS			
Project Title	Detailed Site Investigation		Figure No.	9	Rev No.	0
Project No.	ES8303		Scale	As above	Size	A4
Client	Croftstar Pty Ltd		Drawn by	SBS	Date	17.08.2021
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW		Approved by	MK	Date	17.08.2021

HISTORICAL AERIAL PHOTOGRAPHS - 2021



LEGEND

 Site Boundary

PROJECT DETAILS			DRAWING DETAILS			
Project Title	Detailed Site Investigation		Figure No.	10	Rev No.	0
Project No.	ES8303		Scale	As above	Size	A4
Client	Croftstar Pty Ltd		Drawn by	SBS	Date	17.08.2021
Site Address	1-7 Ramsay Road and Part 5 & 7 Harrabrook Avenue, Five Dock NSW		Approved by	MK	Date	17.08.2021

APPENDIX F

NSW EPA RECORDS



Background

A strategy to systematically prioritise, assess and respond to notifications under Section 60 of the *Contaminated Land Management Act 1997* (CLM Act) has been developed by the EPA. This strategy acknowledges the EPA's obligations to make information available to the public under *Government Information (Public Access) Act 2009*.

When a site is notified to the EPA, it may be accompanied by detailed site reports where the owner has been proactive in addressing the contamination and its source. However, often there is minimal information on the nature or extent of the contamination.

After receiving a report, the first step is to confirm that the report does not relate to a pollution incident. The Protection of the Environment Operations Act 1997 (POEO Act) deals with pollution incidents, waste stockpiling or dumping. The EPA also has an incident management process to manage significant incidents (<https://www.epa.nsw.gov.au/reporting-and-incidents/incident-management>).

In many cases, the information indicates the contamination is securely immobilised within the site, such as under a building or carpark, and is not currently causing any significant risks for the community or environment. Such sites may still need to be cleaned up, but this can be done in conjunction with any subsequent building or redevelopment of the land. These sites do not require intervention under the CLM Act, and are dealt with through the planning and development consent process. In these cases, the EPA informs the local council or other planning authority, so that the information can be recorded and considered at the appropriate time (<https://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/role-of-planning-authorities>).

Where indications are that the contamination could cause actual harm to the environment or an unacceptable offsite impact (i.e. the land is 'significantly contaminated'), the EPA would apply the regulatory provisions of the CLM Act to have the responsible polluter and/or landowner investigate and remediate the site. If the reported contamination could present an immediate or long-term threat to human health NSW Health will be consulted. SafeWork NSW and Water NSW can also be consulted if there appear to be occupational health and safety risks or an impact on groundwater quality.

As such, the sites notified to the EPA and presented in the list of contaminated sites notified to the EPA are at various stages of the assessment and remediation process. Understanding the nature of the underlying contamination, its implications and implementing a remediation program where required, can take a considerable period of time. The list provides an indication, in relation to each nominated site, as to the management status of that particular site. Further detailed information may be available from the EPA or the person who notified the site.

The following questions and answers may assist those interested in this issue.

Frequently asked questions

Why does my land appear on the list of notified sites?

Your land may appear on the list because:

- the site owner and/or the polluter has notified the EPA under section 60 of the CLM Act
- the EPA has been notified via other means and is satisfied that the site is or was contaminated.

If a site is on the list, it does not necessarily mean the contamination is significant enough to regulate under the CLM Act.

Does the list contain all contaminated sites in NSW?

No. The list only contains contaminated sites that EPA is aware of. If a site is not on the list, it does not necessarily mean the site is not contaminated.

The EPA relies on responsible parties and the public to notify contaminated sites.

How are notified contaminated sites managed by the EPA?

There are different ways the EPA can manage notified contaminated sites. Options include:

- regulation under the CLM Act, POEO Act, or both
- notifying the relevant planning authority for management under the planning and development process
- managing the site under the Protection of the Environment Operation (Underground Petroleum Storage Systems) Regulation 2014.

There are specific cases where contamination is managed under a tailored program operated by another agency (for example, the Resources & Geoscience's Legacy Mines Program).

What should I do if I am a potential buyer of a site that appears on the list?

You should seek advice from the seller to understand the contamination issue. You may need to seek independent contamination or legal advice.

The information provided in the list is indicative only and a starting point for your own assessment. Land contamination from past site uses is common, mainly in urban environments. If the site is properly remediated or managed, it may not affect the intended future use of the site.

Who can I contact if I need more information about a site?

You can contact the Environment Line at any time by calling 131 555 or by emailing info@environment.nsw.gov.au.

List of NSW Contaminated Sites Notified to the EPA

Disclaimer

The EPA has taken all reasonable care to ensure that the information in the list of contaminated sites notified to the EPA (the list) is complete and correct. The EPA does not, however, warrant or represent that the list is free from errors or omissions or that it is exhaustive.

The EPA may, without notice, change any or all of the information in the list at any time.

You should obtain independent advice before you make any decision based on the information in the list.

The list is made available on the understanding that the EPA, its servants and agents, to the extent permitted by law, accept no responsibility for any damage, cost, loss or expense incurred by you as a result of:

1. any information in the list; or
2. any error, omission or misrepresentation in the list; or
3. any malfunction or failure to function of the list;
4. without limiting (2) or (3) above, any delay, failure or error in recording, displaying or updating information.

Site Status	Explanation
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or <i>Protection of the Environment Operations Act 1997</i> .
Under Preliminary Investigation Order	The EPA has issued a Preliminary Investigation Order under s10 of the <i>Contaminated Land Management Act 1997</i> , to obtain additional information needed to complete the assessment.
Regulation under CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the <i>Contaminated Land Management Act 1997</i> is not required.

Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the <i>Contaminated Land Management Act 1997</i> . A regulatory approach is being finalised.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record.
Contamination currently regulated under POEO Act	Contamination is currently regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA as the appropriate regulatory authority reasonably suspects that a pollution incident is occurring/ has occurred and that it requires regulation under the POEO Act. The EPA may use environment protection notices, such as clean up notices, to require clean up action to be taken. Such regulatory notices are available on the POEO public register.
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the <i>Contaminated Land Management Act 1997</i> (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the <i>Protection of the Environment Operations Act 1997</i> (POEO Act).

Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record.

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
FAIRFIELD	Endeavour Energy Fairfield Zone Substation	22 Hedges STREET	Other Industry	Regulation under CLM Act not required	-33.86133019	150.9555899
FAIRFIELD EAST	Speedway-Branded Service Station Fairfield	251 The Horsley DRIVE	Service Station	Regulation under CLM Act not required	-33.8711661	150.9630077
FAIRFIELD HEIGHTS	7-Eleven Fairfield Heights	234 Hamilton (Cnr The Boulevard) ROAD	Service Station	Regulation under CLM Act not required	-33.87208474	150.9373134
FAIRY MEADOW	Woolworths Petrol Service Station	47 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.39399705	150.8925369
FAIRY MEADOW	Caltex Fuel Depot and adjoining land	46 Montague STREET	Service Station	Contamination formerly regulated under the CLM Act	-34.40050499	150.8953125
FAIRY MEADOW	Deynal (Seeman)	51-59 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.39437085	150.8924666
FARLEY	Farley Wastewater Treatment Works	Owlpen LANE	Other Industry	Regulation under CLM Act not required	-32.74431314	151.5194217
FASSIFERN	Newstan Colliery	Fassifern ROAD	Other Industry	Regulation under CLM Act not required	-32.97942521	151.5660046
FASSIFERN	Former Arsenic Smelter	Fassifern ROAD	Other Industry	Regulation under CLM Act not required	-32.99649819	151.5618283
FEDERAL	Federal General Store	3-6 Federal DRIVE	Service Station	Contamination formerly regulated under the CLM Act	-28.65190728	153.4552976
FENNELL BAY	Fennell Bay Public School	2 Bay ROAD	Unclassified	Under assessment	-32.991544	151.601637
FERN BAY	Former service station	37 Fullerton (1006 Nelson Bay Road) STREET	Service Station	Regulation under CLM Act not required	-32.87245004	151.7939904
FIVE DOCK	7-Eleven Five Dock Service Station	231-235 Great North ROAD	Service Station	Regulation under CLM Act not required	-33.86488376	151.130002
FIVE DOCK	Caltex Five Dock Service Station	47 Ramsay Road, corner Fairlight STREET	Service Station	Regulation under CLM Act not required	-33.87002804	151.1301835
FORBES	BP (Former Mobil) Depot Forbes	3-15 Union STREET	Other Petroleum	Regulation under CLM Act not required	-33.37751977	148.0101422
FORBES	Former Gasworks	24-26 Union STREET	Gasworks	Contamination currently regulated under CLM Act	-33.37752036	148.0090064

Contaminated Land Notices

Search results

Your search for: Suburb: FIVE DOCK

[Search Again](#)

[Refine Search](#)

did not find any records in our database.

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the [planning process](#).

More information about particular sites may be available from:

- The [POEO public register](#)
- The appropriate planning authority: for example, on a planning certificate issued by the local council under [section 149 of the Environmental Planning and Assessment Act](#).

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... [more search tips](#)

List of Notified Sites

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
FAIRFIELD	Endeavour Energy Fairfield Zone Substation	22 Hedges STREET	Other Industry	Regulation under CLM Act not required	-33.86133019	150.9555899
FAIRFIELD EAST	Speedway-Branded Service Station Fairfield	251 The Horsley DRIVE	Service Station	Regulation under CLM Act not required	-33.8711661	150.9630077
FAIRFIELD HEIGHTS	7-Eleven Fairfield Heights	234 Hamilton (Cnr The Boulevard) ROAD	Service Station	Regulation under CLM Act not required	-33.87208474	150.9373134
FAIRY MEADOW	Woolworths Petrol Service Station	47 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.39399705	150.8925369
FAIRY MEADOW	Caltex Fuel Depot and adjoining land	46 Montague STREET	Service Station	Contamination formerly regulated under the CLM Act	-34.40050499	150.8953125
FAIRY MEADOW	Deynal (Seeman)	51-59 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.39437085	150.8924666
FARLEY	Farley Wastewater Treatment Works	Owlpen LANE	Other Industry	Regulation under CLM Act not required	-32.74431314	151.5194217
FASSIFERN	Newstan Colliery	Fassifern ROAD	Other Industry	Regulation under CLM Act not required	-32.97942521	151.5660046
FASSIFERN	Former Arsenic Smelter	Fassifern ROAD	Other Industry	Regulation under CLM Act not required	-32.99649819	151.5618283
FEDERAL	Federal General Store	3-6 Federal DRIVE	Service Station	Contamination formerly regulated under the CLM Act	-28.65190728	153.4552976
FENNELL BAY	Fennell Bay Public School	2 Bay ROAD	Unclassified	Under assessment	-32.991544	151.601637
FENNELL BAY	Former service station	37 Fullerton (1006 Nelson Bay Road) STREET	Service Station	Regulation under CLM Act not required	-33.83246004	151.3030004
FIVE DOCK	7-Eleven Five Dock Service Station	231-235 Great North ROAD	Service Station	Regulation under CLM Act not required	-33.86488376	151.130002
FIVE DOCK	Caltex Five Dock Service Station	47 Ramsay Road, corner Fairlight STREET	Service Station	Regulation under CLM Act not required	-33.87002804	151.1301835
FORBES	BP (Former Mobil) Depot Forbes	3-15 Union STREET	Other Petroleum	Regulation under CLM Act not required	-33.37751977	148.0101422
FORBES	Former Gasworks	24-26 Union STREET	Gasworks	Contamination currently regulated under CLM Act	-33.37752036	148.0090064

POEO Licenses and Notices Search

Search results

Your search for: **General Search** with the following criteria

Suburb - five dock

returned 2 results

[Export to excel](#)

1 of 1 Pages

[Search Again](#)

Number	Name	Location	Type	Status	Issued date
303	VISY PACKAGING PTY. LTD.	53-75 QUEENS ROAD, FIVE DOCK, NSW 2046	POEO licence	Surrendered	17 Jan 2000
1032772	VISY PACKAGING PTY. LTD.	53-75 QUEENS ROAD, FIVE DOCK, NSW 2046	s.80 Surrender of a Licence	Issued	27 Nov 2003

18 August 2021

Summary Licence No: 303

[View this licence](#) (PDF document 295 kb)

Licence holder: VISY PACKAGING PTY. LTD.

Premises: 53-75 QUEENS ROAD, FIVE DOCK, NSW, 2046

LGA: CANADA BAY **Catchment:** Sydney Coast & Georges River

Administrative fee: \$760.00

Licence status: Surrendered

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

Licence review: Complete date 01 Jul 2002

Due date 01 Jul 2005

Pollution incident management

plan: No

Applications

Number	Application type	Current status	Date received
140208	s.55 Licence Transfer	Approved	01 Mar 2001
1032772	s.80 Surrender of a Licence	Issued	30 Sep 2003

Notices

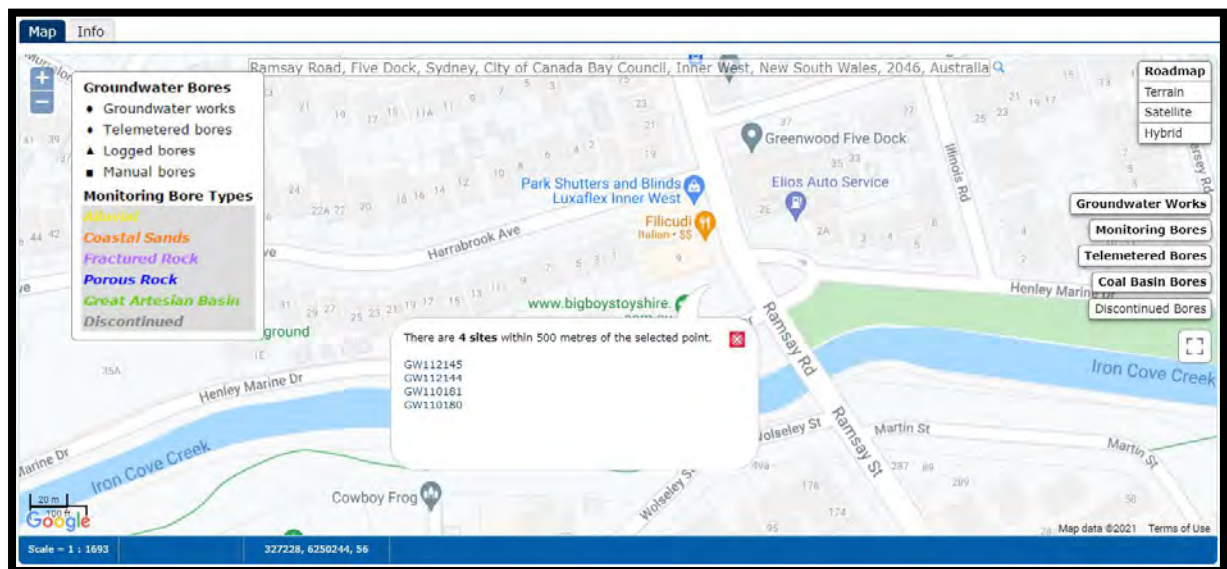
Number	Issue date	Notice type
1032772	27 Nov 2003	s.80 Surrender of a Licence

APPENDIX G

GROUNDWATER BORE SEARCH



Groundwater Boreholes Search



WaterNSW

Work Summary

GW110180

Licence:	Licence Status:
Authorised Purpose(s): Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status:	
Construct.Method: Auger	
Owner Type: Other Govt	
Commenced Date:	Final Depth: 34.00 m
Completion Date: 07/12/2004	Drilled Depth: 34.00 m
Contractor Name: Terratest Pty Ltd	
Driller: Trevor Higgs	
Assistant Driller:	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:			
County		Parish	Cadastre
Form A: CUMBERLAND	CONCORD	//99999	
Licensed:			
Region: 10 - Sydney South Coast		CMA Map:	
River Basin: - Unknown	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6250334.000	Latitude: 33°52'23.8"S	
Elevation Source: Unknown	Easting: 327751.000	Longitude: 151°08'15.6"E	
GS Map: -	MGA Zone: 56	Coordinate Source: Unknown	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	3.10	150			Auger
1		Hole	Hole	3.10	34.00	96			Auger

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.70	1.70	FILL	Fill	
1.70	2.40	0.70	SANDY CLAY	Sandy Clay	
2.40	3.10	0.70	SANDSTONE	Sandstone	
3.10	20.30	17.20	SANDSTONE	Sandstone	
20.30	20.50	0.20	SHALE	Shale	
20.50	34.00	13.50	SANDSTONE	Sandstone	

***** End of GW110180 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW110181

Licence:	Licence Status:
Authorised Purpose(s):	
Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status:	
Construct.Method: Auger	
Owner Type: Other Govt	
Commenced Date:	Final Depth: 3.10 m
Completion Date: 07/12/2004	Drilled Depth: 3.10 m
Contractor Name: Terratest Pty Ltd	
Driller: Trevor Higgs	
Assistant Driller:	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:				
Form A: CUMBERLAND		County	Parish	Cadastre
Licensed:		CONCORD		//99999
Region: 10 - Sydney South Coast		CMA Map:		
River Basin: - Unknown		Grid Zone:		
Area/District:		Scale:		
Elevation: 0.00 m (A.H.D.)		Northing: 6250332.000		Latitude: 33°52'23.9"S
Elevation Source: Unknown		Easting: 327750.000		Longitude: 151°08'15.6"E
GS Map: -		MGA Zone: 56		Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	3.10	150			Auger

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.70	1.70	FILL	Fill	
1.70	2.40	0.70	SANDY CLAY	Sandy Clay	
2.40	3.10	0.70	SANSSTONE	Sand	

***** End of GW110181 *****

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112144

Licence:	Licence Status:
	Authorised Purpose(s): Intended Purpose(s): MONITORING BORE
Work Type: Bore	
Work Status: Equipped	
Construct.Method:	
Owner Type: Other Govt	
Commenced Date:	Final Depth: 57.10 m
Completion Date: 20/11/2002	Drilled Depth: 57.10 m
Contractor Name: (None)	
Driller: Unkown Unknown	
Assistant Driller:	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:			
	County Form A: CUMBERLAND Licensed:	Parish CONCORD	Cadastre 2//590209
Region: 10 - Sydney South Coast	CMA Map:		
River Basin: - Unknown	Grid Zone:		Scale:
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6250218.000		Latitude: 33°52'27.0"S
Elevation Source: Unknown	Easting: 326839.000		Longitude: 151°07'40.0"E
GS Map: -	MGA Zone: 56		Coordinate Source: Unknown

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work name, status, drill method & drilled depth.

*** End of GW112144 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112145

Licence:	Licence Status:
	Authorised Purpose(s): Intended Purpose(s): MONITORING BORE
Work Type: Bore	
Work Status: Equipped	
Construct.Method:	
Owner Type: Private	
Commenced Date:	Final Depth: 29.75 m
Completion Date: 12/12/2002	Drilled Depth: 29.75 m
Contractor Name: (None)	
Driller: Unkown Unknown	
Assistant Driller:	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:			
	County Form A: CUMBERLAND Licensed:	Parish CONCORD	Cadastre 7010 93651
Region: 10 - Sydney South Coast	CMA Map:		
River Basin: - Unknown	Grid Zone:		Scale:
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6250359.000		Latitude: 33°52'23.0"S
Elevation Source: Unknown	Easting: 327695.000		Longitude: 151°08'13.4"E
GS Map: -	MGA Zone: 56		Coordinate Source: Unknown

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work name, status, drill method & drilled depth.

*** End of GW112145 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

APPENDIX H

LOCAL METEOROLOGY



Monthly Rainfall (millimetres)

CONCORD GOLF CLUB

Station Number: 066013 · State: NSW · Opened: 1930 · Status: Open · Latitude: 33.85°S · Longitude: 151.10°E · Elevation: 15 m

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1930	49.8	19.3	97.0	79.8	77.7	190.8	58.4	16.5	0.0	47.5	10.7	147.6	795.1
1931	31.5	35.1	134.9	303.3	131.1	27.7	384.3	7.4	150.4	9.4	114.8	101.9	1431.8
1932	0.0	99.6	98.8	67.1	48.3	25.9	70.9	72.1	186.4	39.1	139.2	137.2	984.6
1933	170.4	5.1	83.6	224.0	164.1	37.8	37.8	116.1	85.6	96.3	101.1	87.1	1209.0
1934	78.7	240.0	56.4	154.7	205.5	106.4	254.0	125.5	310.4	48.5	113.3	72.4	1765.8
1935	92.5	142.5	72.9	69.1	55.6	48.3	50.0	2.0	53.1	130.0	51.1	181.1	948.2
1936	129.8	145.3	224.5	75.9	88.6	83.6	17.8	46.0	15.0	23.1	11.9	102.4	963.9
1937	100.3	42.4	255.5	104.9	26.4	423.7	34.5	144.3	10.4	90.4	143.8	59.7	1436.3
1938	199.9	178.3	50.3	54.9	105.2	11.4	95.8	254.0	31.2	131.1	48.5	4.3	1164.9
1939	107.2	4.1	260.5	111.7	79.0	13.2	20.5	70.6	49.4	95.0	53.6	13.4	878.2
1940	21.0	16.3	16.5	169.2	67.1	30.5	91.9	24.6	112.8	50.8	45.2	261.1	907.0
1941	138.5	51.7	27.2	79.1	36.1	46.6	52.3	71.1	70.4	69.0	23.7	33.0	698.7
1942	9.7	32.5	546.1	17.0	40.9	114.6	43.1	18.6	27.5	277.5	169.3	129.8	1426.6
1943	74.2	15.2	26.6	59.4	626.0	23.5	7.6	211.9	178.8	31.5	191.8	70.4	1516.9
1944	54.5	78.5	29.9	71.7	79.9	68.0	149.2	127.6	49.8	18.5	14.5	17.0	759.1
1945	99.9	59.2	32.7	245.0	167.5	302.7	91.9	43.9	2.5	45.3	84.3	66.7	1241.6
1946	13.7	74.8	139.5	418.3	80.5	170.8	0.8	0.0	23.5	60.9	64.3	23.8	1070.9
1947	29.8	218.1	57.0	184.2	87.9	52.2	11.9	23.1	16.2	44.2	146.9	203.5	1075.0
1948	262.1	72.1	130.7	23.6	183.7	172.1	14.0	24.5	68.7	15.5	21.9	94.2	1083.1
1949	376.8	162.8	103.1	38.7	92.4	498.5	67.2	129.0	227.1	38.9	128.8	49.0	1912.3
1950	184.4	208.3	173.9	159.3	201.0	855.6	362.2	73.7	114.9	136.1	139.1	28.2	2636.7
1951	389.5	62.3	137.9	8.7	117.5	382.3	22.9	135.9	107.7	36.3	6.1	17.2	1424.3
1952	61.0	47.8	134.6	365.0	49.0	246.7	289.6	366.0	16.5	124.2	79.8	40.5	1820.7
1953	69.1	187.6	129.6	18.7	489.3	3.8	38.1	43.0	34.0	66.0	40.0	3.6	1122.8
1954	130.2	370.3	25.4	16.5	40.8	13.2	99.7	52.4	74.5	223.7	141.6	106.0	1294.3
1955	188.3	433.9	264.5	75.9	299.6	56.0	10.4	8.2	34.4	64.0	324.8	165.9	1925.9
1956	201.8	656.9	413.5	36.6	122.3	112.6	42.2	68.2	19.0	59.7	4.1	26.3	1763.2
1957	51.3	95.3	54.3	13.5	1.8	14.0	93.6	107.7	2.8	5.1	15.5	37.7	492.6
1958	106.1	232.8	329.1	35.1	8.0	159.1	22.9	64.0	30.1	43.7	11.7	83.9	1126.5
1959	104.8	156.3	103.2	34.3	24.9	85.1	106.5	33.4	49.8	228.2	98.9	31.8	1057.2
1960	44.7	91.1	52.5	19.9	110.3	58.5	104.7	40.5	41.2	200.4	54.9	173.5	992.2
1961	60.5	59.8	44.8	77.7	18.4	42.6	29.0	160.4	30.8	48.1	392.7	88.4	1053.2
1962	132.2	151.8	43.8	48.3	227.4	3.8	59.8	91.1	72.7	19.3	7.9	135.0	993.1
1963	102.1	63.8	307.9	209.5	157.4	179.3	38.6	188.3	31.1	44.8	37.5	277.9	1638.2
1964	12.8	27.0	209.2	140.3	26.8	335.0	8.9	26.2	13.9	80.1	69.4	38.9	988.5
1965	29.3	12.6	11.4	62.6	24.3	163.3	136.6	13.7	64.3	169.3	13.3	31.2	731.9
1966	16.4	100.1	116.0	133.6	42.6	113.8	9.2	55.3	50.6	46.6	110.5	93.0	887.7
1967	144.3	153.3	99.0	39.4	26.1	201.7	14.5	197.5	56.9	70.5	76.3	20.4	1099.9
1968	133.1	13.3	123.9	11.0	91.6	7.1	35.3	22.6	13.5	2.1	16.7	85.8	556.0
1969	33.1	216.2	79.4	188.2	33.0	110.1	25.6	130.4	60.0	61.1	255.0	39.8	1231.9
1970	102.9	42.7	74.8	39.1	12.8	21.1	0.0	28.8	205.5	18.1	152.8	288.4	987.0
1971	104.5	142.8	65.4	68.0	53.2	35.5	16.8	64.3	65.8	1.1	63.5	154.9	835.8
1972	302.8	95.8	214.3	79.1	59.7	68.6	2.4	27.6	14.2	290.4	120.8	26.1	1301.8
1973	113.7	302.1	22.9	100.5	25.7	58.9	103.7	59.8	38.6	162.4	120.8	31.3	1140.4
1974	138.3	93.4	274.8	128.6	180.3	172.7	5.8	91.4	32.2	67.2	56.2	16.0	1256.9
1975	29.0	142.6	245.0	72.8	8.8	241.8	135.8	21.5	31.8	93.3	23.0	17.2	1062.6
1976	231.2	214.0	304.7	28.8	35.6	123.2	155.5	7.4	59.0	194.6	101.4	17.4	1472.8
1977	87.0	159.6	169.0	16.0	120.2	97.6	4.2	17.2	44.4	7.5	19.3	35.5	777.5

Quality control: 12.3 Done & acceptable, 12.3 Not completed or unknown

Monthly Rainfall (millimetres)

CONCORD GOLF CLUB

Station Number: 066013 · State: NSW · Opened: 1930 · Status: Open · Latitude: 33.85°S · Longitude: 151.10°E · Elevation: 15 m

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1978	237.0	23.5	328.6	101.6	109.5	327.4	6.7	20.0	82.4	82.7	96.5	66.4	1482.3
1979	84.0	29.4	91.2	17.2	78.9	145.8	16.6	5.0	20.9	30.1	51.0	1.8	571.9
1980	165.2	78.6	55.6	5.9	128.8	52.6	34.2	8.2	2.7	32.9	45.7	41.1	651.5
1981	61.8	188.3	55.6	118.4	92.6	31.6	33.8	8.3	7.3	150.3	125.0	77.8	950.8
1982	55.9	18.5	177.6	7.2	4.6	66.5	51.2	6.3	159.8	43.0	11.0	10.4	612.0
1983	31.3	35.9	238.3	96.4	139.2	74.3	39.8	37.9	42.5	121.2	33.9	87.2	977.9
1984	178.1	80.8	196.1	100.5	97.5	73.7	119.4	12.4	44.6	50.7	252.5	62.7	1269.0
1985	7.3	68.5	58.8	209.0	116.9	101.7	49.9	18.6	44.8	144.6	65.6	64.5	950.2
1986	175.8	64.1	8.7	68.8	18.2	14.7	21.9	415.6	28.4	56.3	139.3	24.9	1036.7
1987	73.9	19.7	166.1	37.4	48.3	63.7	99.0	234.8	10.0	209.7	181.4	57.1	1201.1
1988	218.6	174.8	81.8	536.9	176.3	56.8	184.2	44.7	101.0	1.2	167.2	162.3	1905.8
1989	81.2	78.8	119.0	313.1	117.1	204.7	16.7	71.0	0.4	10.2	35.4	147.0	1194.6
1990	78.1	691.4	170.1	315.8	107.0	23.0	52.6	187.9	112.0	47.0	49.2	20.4	1854.5
1991	73.4	74.2	26.4	21.6	51.6	310.4	65.3	5.8	19.0	9.0	31.6	171.0	859.3
1992	67.2	313.4	38.0	36.0	45.6	84.9	7.5	20.4	12.4	80.0	137.2	137.3	979.9
1993	76.0	74.3	95.0	31.0	17.2	39.4	79.7	38.3	83.1	37.7	78.9	35.3	685.9
1994	8.6	65.7	149.4	128.2	29.5	59.8	11.6	6.2	8.6	22.6	43.8	52.2	586.2
1995	87.0	27.8	194.8	26.0	173.7	68.4	1.6	0.0	210.7	38.9	154.3	96.2	1079.4
1996	181.5	40.1	42.6	33.4	143.5	70.4	61.7	145.4	82.9	29.2	62.9	50.6	944.2
1997	191.8	127.8	31.8	3.2	81.2	62.8	90.4	9.0	93.8	51.4	28.6	28.4	800.2
1998	99.8	34.8	19.8	240.6	243.4	83.0	72.7	352.0	27.6	49.2	47.8	31.6	1302.3
1999	192.4	202.6	41.4	193.6	36.6	47.0	168.2	72.4	47.2	158.4		97.0	
2000	27.2	7.4	248.2	48.0	31.8	31.4	23.0	20.0	31.4	62.8	149.2	37.4	717.8
2001	170.2		104.0	69.6	223.0	10.6		49.4	16.0	33.0	76.4	43.4	
2002			70.6	31.0	73.0	19.2	10.6	8.2		28.6	29.0	84.6	
2003	10.4	92.0	101.6	233.6	340.6	68.8	44.4	31.2	8.6	68.4	84.0	73.4	1157.0
2004	63.0	103.8	89.8	69.0	9.2	5.4	32.2	70.0		248.0	67.8	62.6	
2005	83.0	109.4		22.6	35.0	85.0	60.6	3.0	52.6	43.0	143.2	28.8	
2006	98.6	80.0	41.6	3.8	14.2	138.6	101.8	75.8	193.6	6.6		65.6	
2007	77.6	127.2		133.8	13.4	436.2	39.6	129.8		45.4	157.8	143.8	
2008	59.8	231.8	56.6	153.8	12.6	95.6	68.6	36.0	96.4	50.8	67.0	70.4	999.4
2009	11.4	135.2	70.6		113.8	68.4	53.4	5.2		124.0	8.4	57.4	
2010	25.6	227.6	59.0	27.2	119.6	104.4	69.6	24.2	53.4	102.0	132.2		
2011	35.8	13.8	168.2	168.0	115.6	94.6	204.0	39.8	80.4	36.2	159.6	113.4	1229.4
2012	129.4	137.4	231.6	189.0	18.8	220.6	32.4	12.6	24.4	28.8	40.2	40.2	1105.4
2013	127.8	147.2	90.6	136.4	56.8	259.0	34.4	11.8	34.8	16.0	162.8	30.2	1107.8
2014	18.0	65.4	111.2	40.2	7.8	33.0		227.8	43.4	98.0	28.2	200.8	
2015	160.0	97.0	49.8	450.2	111.6		43.4	55.2	44.8	48.4	101.2	76.0	
2016	294.8		83.8	40.2	13.8	339.6	97.6	148.4	68.4	16.8	23.8	60.8	
2017	34.0	157.4	339.0	56.8	15.2	164.4	0.8	21.6	0.0	55.8	49.2	55.2	949.4
2018	25.8	143.8	82.0	20.2	13.4	109.0	4.0	7.6	40.2	218.6	131.8	112.8	909.2
2019	59.6	88.2	169.8	20.4	10.2	133.6	40.4	54.2	134.0	34.6	29.6	3.2	777.8
2020	47.4	469.2	133.4	42.8	86.0	55.2	142.8	63.2	34.4	96.2	44.2	96.2	1311.0
2021	61.0	87.2	392.0	24.2	87.4	51.2	24.6						

Quality control: 12.3 Done & acceptable, 12.3 Not completed or unknown

Monthly Rainfall (millimetres)

CONCORD GOLF CLUB

Station Number: 066013 · State: NSW · Opened: 1930 · Status: Open · Latitude: 33.85°S · Longitude: 151.10°E · Elevation: 15 m

Statistics for this station calculated over all years of data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	103.2	126.5	130.5	103.3	93.8	120.9	66.0	71.9	60.7	75.2	87.2	77.2	1127.9
Lowest	0.0	4.1	8.7	3.2	1.8	3.8	0.0	0.0	0.0	1.1	4.1	1.8	492.6
5th percentile	10.9	13.5	24.0	9.9	9.0	11.0	3.1	5.1	2.7	7.1	10.8	11.8	609.4
10th percentile	18.0	19.1	29.6	17.0	13.4	14.7	7.4	7.4	9.4	15.5	14.3	17.2	714.0
Median	83.0	92.0	98.9	69.0	78.3	73.7	42.7	43.0	44.4	50.7	67.0	62.7	1070.9
90th percentile	199.9	232.0	265.5	233.6	183.4	302.7	143.4	187.9	140.6	169.3	160.2	162.7	1663.2
95th percentile	249.6	347.5	328.9	314.5	234.6	361.0	195.1	231.3	191.4	221.1	187.6	191.9	1859.6
Highest	389.5	691.4	546.1	536.9	626.0	855.6	384.3	415.6	310.4	290.4	392.7	288.4	2636.7

Statistics calculated over the period 1961-1990

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	107.4	118.1	138.5	112.4	79.3	107.1	50.3	75.8	51.4	78.5	96.4	74.0	1089.1
Lowest	7.3	12.6	8.7	5.9	4.6	3.8	0.0	5.0	0.4	1.1	7.9	1.8	556.0
5th Percentile	14.4	15.6	16.6	8.9	10.6	10.5	3.2	6.8	4.8	1.6	12.0	12.9	589.9
10th percentile	27.7	19.6	41.7	15.5	17.7	20.5	5.6	8.1	9.7	7.0	16.4	17.1	647.5
Median	94.6	79.8	117.5	78.4	69.3	74.0	34.0	33.3	43.5	53.5	67.5	49.1	1044.9
90th percentile	219.9	214.2	277.8	219.9	159.3	208.4	135.9	189.2	102.1	171.8	188.5	155.6	1497.9
95th percentile	234.4	263.4	306.5	314.6	178.5	288.9	147.0	218.0	138.3	202.9	253.9	225.9	1757.2
Highest	302.8	691.4	328.6	536.9	227.4	335.0	184.2	415.6	205.5	290.4	392.7	288.4	1905.8

1) Calculation of statistics

Summary statistics, other than the Highest and Lowest values, are only calculated if there are at least 20 years of data available.

2) Gaps and missing data

Gaps may be caused by a damaged instrument, a temporary change to the site operation, or due to the absence or illness of an observer.

3) Further information

<http://www.bom.gov.au/climate/cdo/about/about-rain-data.shtml>.

APPENDIX I

REGULATORY CRITERIA



Site Criteria Based on:

NEPM 2013 - Schedule B1

Guideline on Investigation Level
For Soil and Groundwater

Table 1A(1) Health investigation levels for soil contaminants

Chemical	Health-based investigation levels (mg/kg)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial/ industrial ¹ D
Metals and Inorganics				
Arsenic ²	100	500	300	3 000
Beryllium	60	90	90	500
Boron	4500	40 000	20 000	300 000
Cadmium	20	150	90	900
Chromium (VI)	100	500	300	3600
Cobalt	100	600	300	4000
Copper	6000	30 000	17 000	240 000
Lead ³	300	1200	600	1 500
Manganese	3800	14 000	19 000	60 000
Mercury (inorganic) ⁵	40	120	80	730
Methyl mercury ⁴	10	30	13	180
Nickel	400	1200	1200	6 000
Selenium	200	1400	700	10 000
Zinc	7400	60 000	30 000	400 000
Cyanide (free)	250	300	240	1 500
Polycyclic Aromatic Hydrocarbons (PAHs)				
Carcinogenic PAHs (as BaP TEQ) ⁶	3	4	3	40
Total PAHs ⁷	300	400	300	4000
Phenols				
Phenol	3000	45 000	40 000	240 000
Pentachlorophenol	100	130	120	660
Cresols	400	4 700	4 000	25 000
Organochlorine Pesticides				
DDT+DDE+DDD	240	600	400	3600
Aldrin and dieldrin	6	10	10	45
Chlordane	50	90	70	530
Endosulfan	270	400	340	2000
Endrin	10	20	20	100
Heptachlor	6	10	10	50
HCB	10	15	10	80
Methoxychlor	300	500	400	2500
Mirex	10	20	20	100
Toxaphene	20	30	30	160
Herbicides				
2,4,5-T	600	900	800	5000
2,4-D	900	1600	1300	9000

Chemical	Health-based investigation levels (mg/kg)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial/ industrial ¹ D
MCPA	600	900	800	5000
MCPB	600	900	800	5000
Mecoprop	600	900	800	5000
Picloram	4500	6600	5700	35000
Other Pesticides				
Atrazine	320	470	400	2500
Chlorpyrifos	160	340	250	2000
Bifenthrin	600	840	730	4500
Other Organics				
PCBs ⁸	1	1	1	7
PBDE Flame Retardants (Br1–Br9)	1	2	2	10

Notes:

- (1) Generic land uses are described in detail in Schedule B7 Section 3

HIL A – Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

HIL B – Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.

HIL D – Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

- (2) Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).
- (3) Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
- (4) Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis should be considered.
- (5) Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,
- (6) Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01

Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

Where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk.

- (7) Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.
- (8) PCBs: HIL relates to non-dioxin-like PCBs only. Where a PCB source is known, or suspected, to be present at a site, a site-specific assessment of exposure to all PCBs (including dioxin-like PCBs) should be undertaken.

Table 1A(2) Interim soil vapour health investigation levels for volatile organic chlorinated compounds

Chemical	Interim soil vapour HIL (mg/m ³)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial / Industrial ¹ D
TCE	0.02	0.02	0.4	0.08
1,1,1-TCA	60	60	1200	230
PCE	2	2	40	8
cis-1,2-dichloroethene	0.08	0.08	2	0.3
Vinyl chloride	0.03	0.03	0.5	0.1

Notes:

1. Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7, though secondary school buildings should be assessed using residential 'A/B' for vapour intrusion purposes.
2. Interim HILs for VOCCs are conservative soil vapour concentrations that can be adopted for the purpose of screening sites where further investigation is required on a site-specific basis. They are based on the potential for vapour intrusion using an indoor air-to-soil vapour attenuation factor of 0.1 and an outdoor air-to-soil vapour attenuation factor of 0.05.
3. Application of the interim HILs is based on a measurement of shallow (to 1 m depth) soil vapour (or deeper where the values are to be applied to a future building with a basement) or sub-slab soil vapour.
4. The applicability of the interim HILs needs to be further considered when used for other building types such as homes with a crawl-space and no slab, which may require site-specific assessment.
5. Use of the interim HILs requires comparison with data that has been collected using appropriate methods and meets appropriate data quality requirements.
6. Oral and dermal exposure should be considered on a site-specific basis where direct contact exposure is likely to occur.

Table 1A(3) Soil HSLs for vapour intrusion (mg/kg)

Table 11(5) Soil HSLs for Vapor Intrusion (mg/kg)														
	HSL A & HSL B Low - high density residential				HSL C recreational / open space				HSL D Commercial / Industrial				Soil saturation concentrati on (C _{sat})	
CHEMICAL	0 m to <1 m	1 m to <2 m	2 m to <4m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+		
SAND														
Toluene	160	220	310	540	NL	NL	NL	NL	NL	NL	NL	NL	560	
Ethylbenzene	55	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	64	
Xylenes	40	60	95	170	NL	NL	NL	NL	230	NL	NL	NL	300	
Naphthalene	3	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	9	
Benzene	0.5	0.5	0.5	0.5	NL	NL	NL	NL	3	3	3	3	360	
F1 ⁽⁹⁾	45	70	110	200	NL	NL	NL	NL	260	370	630	NL	950	
F2 ⁽¹⁰⁾	110	240	440	NL	NL	NL	NL	NL	NL	NL	NL	NL	560	
SILT														
Toluene	390	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	640	
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	69	

	HSL A & HSL B Low – high density residential				HSL C recreational / open space				HSL D Commercial / Industrial				
Xylenes	95	210	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330
Naphthalene	4	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.6	0.7	1	2	NL	NL	NL	NL	4	4	6	10	440
F1⁽⁹⁾	40	65	100	190	NL	NL	NL	NL	250	360	590	NL	910
F2⁽¹⁰⁾	230	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	570
CLAY													
Toluene	480	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	630
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	68
Xylenes	110	310	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330
Naphthalene	5	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.7	1	2	3	NL	NL	NL	NL	4	6	9	20	430
F1⁽⁹⁾	50	90	150	290	NL	NL	NL	NL	310	480	NL	NL	850
F2⁽¹⁰⁾	280	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	560

Notes:

- (1) Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used,
- (2) The key limitations of the HSLs should be referred to prior to application and are presented in Friebel and Nadebaum (2011b and 2011d).
- (3) Detailed assumptions in the derivation of the HSLs and information on how to apply the HSLs are presented in Friebel and Nadebaum (2011a and 2011b).

- (4) Soil HSLs for vapour inhalation incorporate an adjustment factor of 10 applied to the vapour phase partitioning to reflect the differences observed between theoretical estimates of soil vapour partitioning and field measurements. Refer Friebel & Nadebaum (2011a) for further information.
- (5) The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
- (6) The HSLs for TPH C₆-C₁₀ in sandy soil are based on a finite source that depletes in less than seven years, and therefore consideration has been given to use of sub-chronic toxicity values. The >C₈-C₁₀ aliphatic toxicity has been adjusted to represent sub-chronic exposure, resulting in higher HSLs than if based on chronic toxicity. For further information refer to Section 8.2 and Appendix J in Friebel and Nadebaum (2011a).
- (7) The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.
- (8) For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
- (9) To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
- (10) To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.



Table 1A(4) Groundwater HSLs for vapour intrusion (mg/L)

	HSL A & HSL B Low - high density residential			HSL C recreational / open space			HSL D Commercial / industrial			
CHEMICAL	2 m to <4 m	4 m to <8 m	8 m+	2 m to <4 m	4 m to <8 m	8 m+	2 m to <4 m	4 m to <8 m	8 m+	Solubility limit
SAND										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	0.8	0.8	0.9	NL	NL	NL	5	5	5	59
F1 ⁽⁷⁾	1	1	1	NL	NL	NL	6	6	7	9.0
F2 ⁽⁸⁾	1	1	1	NL	NL	NL	NL	NL	NL	3.0
SILT										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17

	HSL A & HSL B Low - high density residential			HSL C recreational / open space			HSL D Commercial / industrial			
Benzene	4	5	5	NL	NL	NL	30	30	30	59
F1⁽⁷⁾	6	6	6	NL	NL	NL	NL	NL	NL	9.0
F2⁽⁸⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0
CLAY										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	5	5	5	NL	NL	NL	30	30	35	59
F1⁽⁷⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	9.0
F2⁽⁸⁾	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0

Notes:

- (1) Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used,
- (2) The key limitations of the HSLs are presented in Friebel and Nadebaum (2011d) and should be referred to prior to application.
- (3) Detailed assumptions in the derivation of the HSLs and information on the application of the HSLs are presented in Friebel and Nadebaum (2011a and 2011b).
- (4) The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
- (5) The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly, the maximum length of the shorter side of the concrete slab

and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.

- (6) For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
- (7) To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
- (8) To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

Table 1A(5) Soil vapour HSLs for vapour intrusion (mg/m³)

CHEMICAL	HSL A & HSL B Low - high density residential					HSL C recreational / open space					HSL D Commercial / Industrial				
	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m to <8 m	8 m+
SAND															
Toluene	1300	3800	7300	15 000	29 000	NL	NL	NL	NL	NL	4800	16 000	39 000	84 000	NL
Ethylbenzene	330	1100	2200	4300	8700	NL	NL	NL	NL	NL	1300	4600	11 000	25 000	53 000
Xylenes	220	750	1500	3000	6100	NL	NL	NL	NL	NL	840	3,200	8000	18 000	37 000
Naphthalene	0.8	3	6	10	25	410	NL	NL	NL	NL	3	15	35	75	150
Benzene	1	3	6	10	20	360	2400	4700	9500	19 000	4	10	30	65	130
F1 ⁽⁸⁾	180	640	1,300	2600	5300	86 000	NL	NL	NL	NL	680	2800	7000	15 000	32 000
F2 ⁽⁹⁾	130	560	1200	2400	4800	NL	NL	NL	NL	NL	500	2400	NL	NL	NL
SILT															
Toluene	1400	14 000	32 000	69 000	140 000	NL	NL	NL	NL	NL	5700	63 000	NL	NL	NL
Ethylbenzene	380	4200	9700	21 000	43 000	NL	NL	NL	NL	NL	1500	19 000	54 000	NL	NL
Xylenes	260	2900	6800	15 000	30 000	NL	NL	NL	NL	NL	1000	13 000	38 000	NL	NL
Naphthalene	0.9	10	25	60	120	NL	NL	NL	NL	NL	4	50	150	350	750
Benzene	1	10	25	55	110	1800	12 000	24 000	48 000	97 000	4	50	140	320	670

	HSL A & HSL B Low – high density residential					HSL C recreational / open space					HSL D Commercial / Industrial				
F1⁽⁸⁾	210	2600	6000	13 000	26 000	NL	NL	NL	NL	NL	850	11 000	33 000	77 000	160 000
F2⁽⁹⁾	160	2300	5400	NL	NL	NL	NL	NL	NL	NL	670	NL	NL	NL	NL
CLAY															
Toluene	1600	23 000	53 000	110 000	NL	NL	NL	NL	NL	NL	6500	100 000	NL	NL	NL
Ethylbenzene	420	6800	16 000	35 000	NL	NL	NL	NL	NL	NL	1800	31 000	NL	NL	NL
Xylenes	280	4800	11 000	24 000	50 000	NL	NL	NL	NL	NL	1200	21 000	NL	NL	NL
Naphthalene	1	20	45	95	200	NL	NL	NL	NL	NL	4	85	240	560	1200
Benzene	1	15	40	90	180	3000	20 000	40 000	81 000	160 000	5	80	230	530	1100
F1⁽⁸⁾	230	4200	9900	21 000	44 000	NL	NL	NL	NL	NL	1000	19 000	55 000	130 000	270 000
F2⁽⁹⁾	180	3,800	NL	NL	NL	NL	NL	NL	NL	NL	800	NL	NL	NL	NL

1. Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used,
2. The key limitations of the HSLs should be referred to prior to application and are presented in Friebe and Nadebaum (2011b and 2011d).
3. Detailed assumptions in the derivation of the HSLs and information on how to apply the HSLs are presented in Friebe and Nadebaum (2011a and 2011b).
4. The maximum possible soil vapour concentrations have been calculated based on vapour pressures of the pure chemicals. Where soil vapour HSLs exceed these values a soil-specific source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
5. Soil vapour HSLs should be compared with measurements taken as laterally close as possible to the soil or groundwater sources of vapour (i.e. within or above vapour sources). Consideration is required of where the sample is taken, the current condition of the site and the likely future condition of the site. Shallow gas measurements in open space (less than 1 m below ground surface) may be subject to influences of weather conditions and moisture.
6. The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly, the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.

7. For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
8. To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
9. To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

Table 1B(1) Soil-specific added contaminant limits for aged zinc in soil

Zn added contaminant limits (ACL, mg added contaminant/kg)						
Areas of ecological significance						
pH^a	CEC^b (cmol_e/kg)					
	5	10	20	30	40	60
4.0	15	20	20	20	20	20
4.5	20	25	25	25	25	25
5.0	30	40	40	40	40	40
5.5	40	60	60	60	60	60
6.0	50	90	90	90	90	90
6.5	50	90	130	130	130	130
7.0	50	90	150	190	190	190
7.5	50	90	150	210	260	280
Urban residential/public open space¹						
pH^a	CEC^b (cmol_e/kg)					
	5	10	20	30	40	60
4.0	70	85	85	85	85	85
4.5	100	120	120	120	120	120
5.0	130	180	180	180	180	180
5.5	180	270	270	270	270	270
6.0	230	400	400	400	400	400
6.5	230	400	590	590	590	590
7.0	230	400	700	880	880	880
7.5	230	400	700	960	1200	1300
Commercial/industrial						
pH^a	CEC^b (cmol_e/kg)					
	5	10	20	30	40	60
4.0	110	130	130	130	130	130
4.5	150	190	190	190	190	190
5.0	210	290	290	290	290	290
5.5	280	420	420	420	420	420
6.0	360	620	620	620	620	620
6.5	360	620	920	920	920	920
7.0	360	620	1100	1400	1400	1400
7.5	360	620	1100	1500	1900	2000

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
 2. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
 3. The EIL is calculated from summing the ACL and the ABC.
- a = pH measured using the CaCl₂ method (Rayment & Higginson 1992).
b = CEC measured using the silver thiourea method (Chabra et al. 1972).

Table 1B(2) Soil-specific added contaminant limits for aged copper in soils

Cu added contaminant limits (ACL, mg added contaminant/kg)					
Areas of ecological significance					
<i>CEC (cmol/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
30	65	70	70	75	80
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
20	45	65	90	190	270
Urban residential/public open space¹					
<i>CEC (cmol/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
95	190	210	220	220	230
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
60	130	190	280	560	800
Commercial/industrial					
<i>CEC (cmol/kg)^a based</i>					
<i>5</i>	<i>10</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>60</i>
140	280	300	320	330	340
<i>pH^b based</i>					
<i>4.5</i>	<i>5.5</i>	<i>6</i>	<i>6.5</i>	<i>7.5</i>	<i>8.0</i>
85	190	280	400	830	1200

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
 2. The lower of the CEC or the pH-based ACLs for the land use and soil conditions is the ACL to be used.
 3. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
 4. The EIL is calculated from summing the ACL and the ABC.
- a = CEC measured using the silver thiourea method (Chabra et al. 1972).
- b = pH measured using the CaCl₂ method (Rayment & Higginson 1992).

Table 1B(3) Soil-specific added contaminant limits for aged chromium III and nickel in soil

CHEMICAL	Clay content (% clay)	Added contaminant limits (mg added contaminant/kg) for various land uses		
		Areas of ecological significance	Urban residential and public open space	Commercial and industrial
Chromium III	1	60	190	310
	2.5	80	250	420
	5	100	320	530
	≥10	130	400	660
Nickel	CEC ^a (cmol _c /kg)	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
	5	5	30	55
	10	30	170	290
	20	45	270	460
	30	60	350	600
	40	70	420	730
	60	95	560	960

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3. The EIL is calculated from summing the ACL and the ABC.

a = CEC measured using the silver thiourea method (Chabra et al. 1972).

Table 1B(4) Generic added contaminant limits for lead in soils irrespective of their physicochemical properties

	Pb added contaminant limit (ACL, mg added contaminant/kg) for various land uses		
CHEMICAL	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
Lead	470	1100	1800

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. Aged values are applicable to lead contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3. The EIL is calculated from summing the ACL and the ABC.

Table 1B(5) Generic EILs for aged As, fresh DDT and fresh naphthalene in soils irrespective of their physicochemical properties

CHEMICAL	Ecological Investigation Levels (mg total contaminant/kg)		
	Areas of ecological significance	Urban residential and public open space ¹	Commercial and industrial
Arsenic ²	40	100	160
DDT ³	3	180	640
Naphthalene ³	10	170	370

Notes:

1. Urban residential/public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
2. Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3. Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
4. Insufficient data was available to calculate ACLs for As, DDT and naphthalene. The EIL should be taken directly from Table 1B(5).

Table 1B(6) ESLs for TPH fractions F1 – F4, BTEX and benzo(a)pyrene in soil

CHEMICAL	Soil texture	ESLs (mg/kg dry soil)		
		Areas of ecological significance	Urban residential and public open space	Commercial and industrial
F1 C ₆ -C ₁₀	<i>Coarse/ Fine</i>	125*	180*	215*
F2 >C ₁₀ -C ₁₆		25*	120*	170*
F3 >C ₁₆ -C ₃₄	<i>Coarse</i>	-	300	1700
	<i>Fine</i>	-	1300	2500
F4 >C ₃₄ -C ₄₀	<i>Coarse</i>	-	2800	3300
	<i>Fine</i>	-	5600	6600
Benzene	<i>Coarse</i>	8	50	75
	<i>Fine</i>	8	65	95
Toluene	<i>Coarse</i>	10	85	135
	<i>Fine</i>	65	105	135
Ethylbenzene	<i>Coarse</i>	1.5	70	165
	<i>Fine</i>	40	125	185
Xylenes	<i>Coarse</i>	10	105	180
	<i>Fine</i>	1.6	45	95
Benzo(a)pyrene	<i>Coarse</i>	0.7	0.7	1.4
	<i>Fine</i>	0.7	0.7	1.4

Notes:

- (1) ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.
- (2) ‘-’ indicates that insufficient data was available to derive a value.
- (3) To obtain F1, subtract the sum of BTEX concentrations from C₆-C₁₀ fraction.

Table 1 B(7) Management Limits for TPH fractions F1–F4 in soil

TPH fraction	Soil texture	Management Limits ¹ (mg/kg dry soil)	
		Residential, parkland and public open space	Commercial and industrial
F1² C ₆ –C ₁₀	<i>Coarse</i>	700	700
	<i>Fine</i>	800	800
F2² >C ₁₀ –C ₁₆	<i>Coarse</i>	1000	1000
	<i>Fine</i>	1000	1000
F3 >C ₁₆ –C ₃₄	<i>Coarse</i>	2500	3500
	<i>Fine</i>	3500	5000
F4 >C ₃₄ –C ₄₀	<i>Coarse</i>	10 000	10 000
	<i>Fine</i>	10 000	10 000

¹ Management limits are applied after consideration of relevant ESLs and HSLs

² Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

Table 4

SOIL HEALTH SCREENING LEVELS FOR DIRECT CONTACT (mg/kg)^(a,b)

Chemical	HSL-A Residential (Low Density)	HSL-B Residential (High Density)	HSL-C Recreational Open Space	HSL-D Commercial / Industrial
Toluene	14,000	21,000	18,000	99,000
Ethylbenzene	4,500	5,900	5,300	27,000
Xylenes	12,000	17,000	15,000	81,000
Naphthalene	1,400	2,200	1,900	11,000
Benzene	100	140	120	430
C6-C10	4,400	5,600	5,100	26,000
>C10-C16	3,300	4,200	3,800	20,000
>C16-C34	4,500	5,800	5,300	27,000
>C34-C40	6,300	8,100	7,400	38,000

Note:

- (a) Derived assumptions used in the derivation of the HSLs and information on how to apply the HSLs are presented in:
- Frebel E & Nadebaum P 2011. Health screening levels for petroleum hydrocarbons in soil and groundwater Part 1: Technical development document, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia
 - Frebel E & Nadebaum P 2011. Health screening levels for petroleum hydrocarbons in soil and groundwater Part 2: Application document, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia
- (b) The key limitations in the development of the HSLs should be referred to prior to application. These are presented in the text of the summary document and the HSL application checklist in Appendix A of the Application Document (Frebel & Nadebaum 2011 – Part 2)

Table 7: Health screening levels for asbestos contamination in soil

Form of Asbestos	Health Screening Level (w/w)			
	Residential A ¹	Residential B ²	Recreational C ³	Commercial/ Industrial D ⁴
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA & AF (friable asbestos & fines)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

Notes:

1. Residential A with garden/accessible soil also includes children's day care centres, preschools and primary schools.
2. Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. Residential C includes public open space such as parks, playgrounds, playing fields (e.g. Ovals), secondary schools and unpaved footpaths.
4. Commercial/Industrial D includes premises such as shops, offices, factories and industrial sites.

Table 1C Groundwater Investigation Levels (GILs)

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Metals and Metalloids			
Aluminium, Al pH>6.5	55	-	-
Antimony	-	-	0.003
Arsenic	24 as As(III) 13 as As(V)	-	0.01
Barium	-	-	2
Beryllium	-	-	0.06
Boron	370 ^C	-	4
Cadmium H	0.2	0.7 ^D	0.002
Chromium, Cr (III) H	-	27	-
Chromium, Cr (VI)	1 ^C	4.4	0.05
Cobalt	-	1	-
Copper H	1.4	1.3	2
Iron, (Total)	-	-	-
Lead H	3.4	4.4	0.01
Manganese	1900 ^C	-	0.5
Mercury (Total)	0.06 ^D	0.1 ^D	0.001
Molybdenum	-	-	0.05
Nickel H	11	7	0.02
Selenium (Total)	5 ^D	-	0.01
Silver	0.05	1.4	0.1
Tributyl tin (as Sn)	-	0.006 ^C	-
Tributyl tin oxide	-	-	0.001
Uranium	-	-	0.017
Vanadium	-	100	-
Zinc H	8 ^C	15 ^C	-
Non-metallic Inorganics			
Ammonia ^E (as NH ₃ -N at pH 8)	900 ^C	910	-
Bromate	-	-	0.02
Chloride	-	-	-
Cyanide (as un-ionised Cn)	7	4	0.08
Fluoride	-	-	1.5

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Hydrogen sulphide (un-ionised H ₂ S measured as S)	1	-	-
Iodide	-	-	0.5
Nitrate (as NO ₃)	refer to guideline	refer to guideline	50
Nitrite (as NO ₂)	refer to guideline	refer to guideline	3
Nitrogen	refer to guideline	refer to guideline	-
Phosphorus	refer to guideline	refer to guideline	-
Sulphate (as SO ₄)	-	-	500
Organic alcohols/other organics			
Ethanol	1400	-	-
Ethylenediamine tetra-acetic acid (EDTA)	-	-	0.25
Formaldehyde	-	-	0.5
Nitrilotriacetic acid	-	-	0.2
Anilines			
Aniline	8	-	-
2,4-Dichloroaniline	7	-	-
3,4-Dichloroaniline	3	150	-
Chlorinated Alkanes			
Dichloromethane	-	-	0.004
Trihalomethanes (total)	-	-	0.25
Tetrachloromethane (carbon tetrachloride)	-	-	0.003
1,2-Dichloroethane	-	-	0.003
1,1,2-Trichloroethane	6500	1900	-
Hexachloroethane	290 ^D	-	-
Chlorinated Alkenes			
Chloroethene (vinyl chloride)	-	-	0.0003
1,1-Dichloroethene	-	-	0.03
1,2-Dichloroethene	-	-	0.06
Tetrachloroethene (PCE) (Perchloroethene)	-	-	0.05

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Chlorinated Benzenes			
Chlorobenzene	-	-	0.3
1,2- Dichlorobenzene	160	-	1.5
1,3- Dichlorobenzene	260	-	-
1,4- Dichlorobenzene	60	-	0.04
1,2,3- Trichlorobenzene	3 ^D	-	for individual or total trichlorobenzenes
1,2,4- Trichlorobenzene	85 ^D	20 ^D	
1,3,5-Trichlorobenzene	-	-	
Polychlorinated Biphenyls (PCBs)			
Aroclor 1242	0.3 ^D	-	-
Aroclor 1254	0.01 ^D	-	-
Other Chlorinated Compounds			
Epichlorohydrin	-	-	0.1
Hexachlorobutadiene	-	-	0.0007
Monochloramine	-	-	3
Monocyclic Aromatic Hydrocarbons			
Benzene	950	500 ^C	0.001
Toluene	-	-	0.8
Ethylbenzene	-	-	0.3
Xylenes	350 (as o-xylene) 200 (as p-xylene)	-	0.6
Styrene (Vinyl benzene)	-	-	0.03
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	16	50 ^C	-
Benzo[a]pyrene	-	-	0.00001
Phenols			
Phenol	320	400	-
2-Chlorophenol	340 ^C	-	0.3
4-Chlorophenol	220	-	-
2,4-Dichlorophenol	120	-	0.2
2,4,6-Trichlorophenol	3 ^D	-	0.02
2,3,4,6-Tetrachlorophenol	10 ^D	-	-
Pentachlorophenol	3.6 ^D	11 ^D	0.01

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
2,4-Dinitrophenol	45	-	-
Phthalates			
Dimethylphthalate	3700	-	-
Diethylphthalate	1000	-	-
Dibutylphthalate	10 ^D	-	-
Di(2-ethylhexyl) phthalate	-	-	0.01
Pesticides			
Acephate	-	-	0.008
Aldicarb	-	-	0.004
Aldrin plus Dieldrin	-	-	0.0003
Ametryn	-	-	0.07
Amitraz	-	-	0.009
Amitrole	-	-	0.0009
Asulam	-	-	0.07
Atrazine	13	-	0.02
Azinphos-methyl	-	-	0.03
Benomyl	-	-	0.09
Bentazone	-	-	0.4
Bioresmethrin	-	-	0.1
Bromacil	-	-	0.4
Bromoxynil	-	-	0.01
Captan	-	-	0.4
Carbaryl	-	-	0.03
Carbendazim (Thiophanate-methyl)	-	-	0.09
Carbofuran	0.06	-	0.01
Carboxin	-	-	0.3
Carfentrazone-ethyl	-	-	0.1
Chlorantraniliprole	-	-	6
Chlordane	0.03 ^D	-	0.002
Chlorfenvinphos	-	-	0.002
Chlorothalonil	-	-	0.05
Chlorpyrifos	0.01 ^D	0.009 ^D	0.01
Chlorsulfuron	-	-	0.2
Clopyralid	-	-	2

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Cyfluthrin, Beta-cyfluthrin	-	-	0.05
Cypermethrin isomers	-	-	0.2
Cyprodinil	-	-	0.09
1,3-Dichloropropene	-	-	0.1
2,2-DPA	-	-	0.5
2,4-D [2,4-dichlorophenoxy acetic acid]	280	-	0.03
DDT	0.006 ^D	-	0.009
Deltramethrin	-	-	0.04
Diazinon	0.01	-	0.004
Dicamba	-	-	0.1
Dichloroprop	-	-	0.1
Dichlorvos	-	-	0.005
Dicofol	-	-	0.004
Diclofop-methyl	-	-	0.005
Dieldrin plus Aldrin	-	-	0.0003
Diflubenzuron	-	-	0.07
Dimethoate	0.15	-	0.007
Diquat	1.4	-	0.007
Disulfoton	-	-	0.004
Diuron	-	-	0.02
Endosulfan	0.03 ^D	0.005 ^D	0.02
Endothal	-	-	0.1
Endrin	0.01 ^D	0.004 ^D	-
EPTC	-	-	0.3
Esfenvalerate	-	-	0.03
Ethion	-	-	0.004
Ethoprophos	-	-	0.001
Etridiazole	-	-	0.1
Fenamiphos	-	-	0.0005
Fenarimol	-	-	0.04
Fenitrothion	0.2	-	0.007
Fenthion	-	-	0.007
Fenvalerate	-	-	0.06
Fipronil	-	-	0.0007

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Flamprop-methyl	-	-	0.004
Fluometuron	-	-	0.07
Fluproponate	-	-	0.009
Glyphosate	370	-	1
Haloxypop	-	-	0.001
Heptachlor	0.01 ^D	-	-
Heptachlor epoxide	-	-	0.0003
Hexazinone	-	-	0.4
Imazapyr	-	-	9
Iprodione	-	-	0.1
Lindane (γ-HCH)	0.2	-	0.01
Malathion	0.05	-	0.07
Mancozeb (as ETU, ethylene thiourea)	-	-	0.009
MCPA	-	-	0.04
Metaldehyde	-	-	0.02
Metham (as methylisothiocyanate, MITC)	-	-	0.001
Methidathion	-	-	0.006
Methiocarb	-	-	0.007
Methomyl	3.5	-	0.02
Methyl bromide	-	-	0.001
Metiram (as ETU, ethylene thiourea)	-	-	0.009
Metolachlor/s–Metolachlor	-	-	0.30
Metribuzin	-	-	0.07
Metsulfuron-methyl	-	-	0.04
Mevinphos	-	-	0.006
Molinate	3.4	-	0.004
Napropamide	-	-	0.4
Nicarbazin	-	-	1
Norflurazon	-	-	0.05
Omethoate	-	-	0.001
Oryzalin	-	-	0.4
Oxamyl	-	-	0.007

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Paraquat	-	-	0.02
Parathion	0.004 ^C	-	0.02
Parathion methyl	-	-	0.0007
Pebulate	-	-	0.03
Pendimethalin	-	-	0.4
Pentachlorophenol	-	-	0.01
Permethrin	-	-	0.2
Picloram	-	-	0.30
Piperonyl butoxide	-	-	0.6
Pirimicarb	-	-	0.007
Pirimiphos methyl	-	-	0.09
Polihexanide	-	-	0.7
Profenofos	-	-	0.0003
Propachlor	-	-	0.07
Propanil	-	-	0.7
Propargite	-	-	0.007
Proparzone	-	-	0.05
Propiconazole	-	-	0.1
Propyzamide	-	-	0.07
Pyrasulfatole	-	-	0.04
Pyrazophos	-	-	0.02
Pyroxsulam	-	-	4
Quintozone	-	-	0.03
Simazine	3.2	-	0.02
Spirotetramat	-	-	0.2
Sulprofos	-	-	0.01
2,4,5-T	36	-	0.1
Tebuthiuron	2.2	-	-
Temephos	-	0.05 ^D	0.4
Terbacil	-	-	0.2
Terbufos	-	-	0.0009
Terbuthylazine	-	-	0.01
Terbutryn	-	-	0.4
Thiobencarb	2.8	-	0.04
Thiometon	-	-	0.004

Substance	Groundwater Investigation Levels		
	Fresh Waters ^A	Marine Waters ^A	Drinking Water ^B
	(µg/L)	(µg/L)	(mg/L)
Thiram	0.01	-	0.007
Toltrazuril	-	-	0.004
Toxafene	0.1 ^D	-	-
Triadimefon	-	-	0.09
Trichlorfon	-	-	0.007
Triclopyr	-	-	0.02
Trifluralin	2.6 ^D	-	0.09
Vernolate	-	-	0.04
Surfactants			
Linear alkylbenzene sulfonates (LAS)	280	-	-
Alcohol ethoxylated sulfate (AES)	650	-	-
Alcohol ethoxylated surfactants (AE)	140	-	-

- A Investigation levels apply to typical slightly-moderately disturbed systems. See ANZECC & ARMCANZ (2000) for guidance on applying these levels to different ecosystem conditions.
- B Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2011).
- C Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance.
- D Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZECC & ARMCANZ (2000) for further guidance.
- E For changes in GIL with pH refer to ANZECC & ARMCANZ (2000) for further guidance.
- H Values have been calculated using a hardness of 30 mg/L CaCO₃ refer to ANZECC & ARMCANZ (2000) for further guidance on recalculating for site-specific hardness.

US EPA

Regional Screening Levels (RSLs) -
Generic Tables (June 2017)

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #29); H = HEAST; F = See FAQ; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)																																				
Toxicity and Chemical-specific Information													Contaminant										Screening Levels										Protection of Ground Water SSLs			
SFO (mg/kg-day)	K _e y	IUR (ug/m ³ -y)	K _e y	RfD _o (mg/kg-day)	K _e y	RfC _o (mg/m ³)	K _e y	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)									
2.2E-06	I			1.2E-03	O						0.1		Acetophate	30560-19-1	7.6E+01	n	9.8E+02	n					2.4E+01	n		5.3E-03	n									
				9.0E-03	I	V	1		1.1E+05	Acetaldehyde	75-07-0	1.1E+01	c**	4.9E+01	c**	1.3E+00	c**	5.6E+00	c**	2.4E+00	c**		5.2E-04	c**												
				2.0E-02	I		1			Acetochlor	34256-82-1	1.3E+03	n	1.6E+04	n					3.5E+02	n		2.8E-01	n												
				3.1E+01	A	V	1		1.1E+05	Acetone	67-64-1	6.1E+04	n	6.7E+05	nms	3.2E+04	n	1.4E+05	n	1.4E+04	n		2.9E+00	n												
				2.0E-03	X		1		0.1	Acetone Cyanohydrin	75-86-5	2.8E+06	nm	1.2E+07	nm	2.1E+00	n	8.8E+00	n																	
3.8E+00	C	1.3E-03	C	6.0E-02	I	V	1				2.5E+03	Acetonitrile	75-05-8	8.1E+02	n	3.4E+03	n			6.3E+01	n	2.6E+02	n	1.3E+02	n	2.6E-02	n									
				1.0E-01	I		1			Acetophenone	98-86-2	7.8E+03	ns	1.2E+05	nms					1.9E+03	n		5.8E-01	n												
				5.0E-04	I	2.0E-05	I	V	1		0.1	2.3E+04	Acetylaminofluorene, 2-Acrolein	53-96-3	1.4E-01	c	6.0E-01	c	2.2E-03	c	9.4E-03	c	1.6E-02	c	7.2E-05	c										
																										8.4E-06	n									
5.0E-01	I	1.0E-04	I	2.0E-03	I	6.0E-03	I	V	M	1	0.1		Acrylamide	79-06-1	2.4E-01	c	4.6E+00	c	1.0E-02	c	1.2E-01	c	5.0E-02	c		1.1E-05	c									
				5.0E-01	I	1.0E-03	I	V	1		1.1E+05	Acrylic Acid	79-10-7	9.9E+01	n	4.2E+02	n	1.0E+00	n	4.4E+00	n	2.1E+00	n		4.2E-04	n										
				4.0E-02	A	2.0E-03	I	V	1		1.1E+04	Acrylonitrile	107-13-1	2.5E-01	c*	1.1E+00	c*	4.1E-02	c*	1.8E-01	c*	5.2E-02	c*		1.1E-05	c*										
5.6E-02	C			1.0E-02	I						0.1		Adiponitrile	111-69-3	8.5E+06	nm	3.6E+07	nm	6.3E+00	n	2.6E+01	n		1.1E+00	c	2.0E+00	8.7E-04	c	1.6E-03							
				1.0E-03	I					0.1	15972-60-8	Alachlor	9.7E+00	c*	4.1E+01	c					2.0E+01	n	3.0E+00	4.9E-03	n	7.5E-04										
										0.1	116-06-3	Aldicarb	6.3E+01	n	8.2E+02	n																				
										0.1	1646-88-4	Aldicarb Sulfone	6.3E+01	n	8.2E+02	n					2.0E+01	n	2.0E+00	4.4E-03	n	4.4E-04										
										0.1	1646-87-3	Aldicarb sulfoxide	6.3E+01	n	8.2E+02	n					2.0E+01	n	2.0E+00	4.4E-03	n	4.4E-04										
1.7E+01	I	4.9E-03	I	3.0E-05	I			V			1		Aldrin	309-00-2	3.9E-02	c*	1.8E-01	c	5.7E-04	c	2.5E-03	c	9.2E-04	c		1.5E-04	c									
				5.0E-03	I	1.0E-04	X	V	1		1.1E+05	Allyl Alcohol	107-18-6	3.5E+00	n	1.5E+01	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		4.2E-05	n										
						1.0E-03	I	V	1		1.4E+03	Allyl Chloride	107-05-1	7.2E-01	c**	3.2E+00	c**	4.7E-01	c**	2.0E+00	c**	7.3E-01	c**		2.3E-04	c**										
				1.0E+00	P	5.0E-03	P		1			Aluminum	7429-90-5	7.7E+04	n	1.1E+06	nm	5.2E+00	n	2.2E+01	n	2.0E+04	n		3.0E+04	n										
2.1E+01	C	6.0E-03	C	4.0E-04	I						1		Aluminum Phosphide	20859-73-8	3.1E+01	n	4.7E+02	n					8.0E+00	n												
				9.0E-03	I					0.1	834-12-8	Ametryn	5.7E+02	n	7.4E+03	n					1.5E+02	n		1.6E-01	n											
									0.1	92-67-1	Aminobiphenyl, 4-	2.6E-02	c	1.1E-01	c	4.7E-04	c	2.0E-03	c	3.0E-03	c		1.5E-05	c												
				8.0E-02	P					0.1	591-27-5	Aminophenol, m-	5.1E+03	n	6.6E+04	n					1.6E+03	n		6.1E-01	n											
				4.0E-03	X					0.1	95-55-6	Aminophenol, o-	2.5E+02	n	3.3E+03	n					7.9E+01	n		3.0E-02	n											
2.0E-02	P			2.5E-02	P						0.1		Aminophenol, p-	123-30-8	1.3E+03	n	1.6E+04	n					4.0E+02	n		1.5E-01	n									
				2.5E-03	I					1	0.1	Amitraz	33089-61-1	1.6E+02	n	2.1E+03	n					8.2E+00	n		4.2E+00	n										
						5.0E-01	I	V	1			Ammonia	7664-41-7	1.6E+02	n	2.1E+03	n	5.2E+02	n	2.2E+03	n															
				2.0E-01	I					1		Ammonium Sulfamate	7773-06-0	1.6E+04	n	2.3E+05	nm					4.0E+03	n													
5.7E-03	I	1.6E-06	C	7.0E-03	P	3.0E-03	X	V	1		1.4E+04	Amyl Alcohol, tert-	75-85-4	8.2E+01	n	3.4E+02	n	3.1E+00	n	1.3E+01	n	6.3E+00	n		1.3E-03	n										
				2.0E-03	X				1	0.1	62-53-3	Aniline	9.5E+01	c**	4.0E+02	c*	1.0E+00	n	4.4E+00	n	1.3E+01	c*		4.6E-03	c*											
											84-65-1	Anthrquinone, 9,10	1.4E+01	c**	5.7E+01	c*					1.4E+00	c*		1.4E-02	c*											
				4.0E-04	I				0.15	7440-36-0	Antimony (metallic)	3.1E+01	n	4.7E+02	n					7.8E+00	n	6.0E+00	3.5E-01	n	2.7E-01											
				5.0E-04	H				0.15	1314-60-9	Antimony Pentoxide	3.9E+01	n	5.8E+02	n					9.7E+00	n															
1.5E+00	I	4.3E-03	I	2.0E-04	I				0.15			Antimony Trioxide	1332-81-6	3.1E+01	n	4.7E+02	n					7.8E+00	n													
				3.0E-04	I	1.5E-05	C		1	0.03	1309-64-4	Arsenic, Inorganic	2.8E+05	nm	1.2E+06	nm	2.1E-01	n	8.8E-01	n																
				3.5E-06	C	5.0E-05	I		1		7440-38-2	Arsine	6.8E-01	c**	3.0E+00	c**	6.5E-04	c*	5.2E-02	c	5.2E-02	c	1.0E+01	1.5E-03	c	2.9E-01										
											7784-42-1	Arsine	2.7E-01	n	4.1E+00	n	5.2E-02	n	2.2E-01	n	7.0E-02	n														
2.3E-01	C	2.5E-04	C	3.6E-02	O					0.1		Asulam	3337-71-1	2.3E+03	n	3.0E+04	n					7.2E+02	n		1.8E-01	n										
				3.5E-02	I					0.1	1912-24-9	Atrazine	2.4E+00	c	1.0E+01	c					3.0E-01	c	3.0E+00	6.1E-04	c	1.9E-03										
									0.1	492-80-8	Auramine	6.2E-01	c	2.6E+00	c	1.1E-02	c	4.9E-02	c	6.7E-02	c															
				4.0E-04	I					0.1	65195-55-3	Avermectin B1	2.5E+01	n	3.3E+02	n					8.0E+00	n		1.4E+01	n											
				3.0E-03	A	1.0E-02	A	V	1	0.1	86-50-0	Azinphos-methyl	1.9E+02	n	2.5E+03	n	1.0E+01	n	4.4E+01	n	5.6E+01	n		1.7E-02	n											
1.1E-01	I	3.1E-05	I									Azobenzene	103-33-3	5.6E+00	c	2.6E+01	c	9.1E-02	c	4.0E-01	c	1.2E-01	c		9.3E-04	c										
				1.0E+00	P	7.0E-06	P		1	0.1	123-77-3	Azodicarbonamide	8.6E+03	n	4.0E+04	n	7.3E-03	n	3.1E-02	n	2.0E+04	n		6.8E+00	n											
				2.0E-01	I	5.0E-04	H		0.07	7440-39-3	Barium	1.5E+04	n	2.2E+05	nm	5.2E-01	n	2.2E+00	n	3.8E+03	n	2.0E+03	1.6E+02	n	8.2E+01											
				2.0E-02	C	2.0E-04	C	M	0.025	10294-40-3	Barium Chromate	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c															
																									</											

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #29); H = HEAST; F = See FAQ; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice); c = cancer; n = noncancer; * = where n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)																															
Toxicity and Chemical-specific Information												Contaminant										Screening Levels							Protection of Ground Water SSLs		
SFO (mg/kg-day)	K _e (y)	IUR (ug/m ³ -y)	K _e (y)	RfD _e (mg/kg-day)	K _e (y)	RfC _e (mg/m ³)	K _e (y)	o	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)			
6.2E-02	I	3.7E-05	C	2.0E-02	I	4.0E-02	X	V	1			4.0E+03	Bromochloromethane	74-97-5	1.5E+02	n	6.3E+02	n	4.2E+01	n	1.8E+02	n	8.3E+01	n			2.1E-02	n			
												9.3E+02	Bromodichloromethane	75-27-4	2.9E-01	c	1.3E+00	c	7.6E-02	c	3.3E-01	c	1.3E-01	c	8.0E+01(F)	3.6E-05	c	2.2E-02			
7.9E-03	I	1.1E-06	I	2.0E-02	I	9.2E+02						7.5E-25	Bromoform	75-25-2	1.9E+01	c*	8.6E+01	c	2.6E+00	c	1.1E+01	c	3.3E+00	c	8.7E-04	c	2.1E-02				
				1.4E-03	I	5.0E-03	I	V	1			3.6E+03	Bromomethane	74-83-9	6.8E+00	n	3.0E+01	n	5.2E+00	n	2.2E+01	n	7.5E+00	n		1.9E-03	n				
				5.0E-03	H			V	1			2104-96-3	Bromophos		3.9E+02	n	5.8E+03	n					3.5E+01	n		1.5E-01	n				
1.0E-01	O			1.5E-02	O					1	0.1		Bromoxynil	1689-84-5	5.3E+00	c	2.2E+01	c					6.1E-01	c		5.2E-04	c				
				1.5E-02	O			V	1				Bromoxynil Octanoate	1689-99-2	1.2E+03	n	1.8E+04	n					1.0E+02	n		9.0E-01	n				
3.4E+00	C	3.0E-05	I		2.0E-03	I	V	1				6.7E+02	Butadiene, 1,3-	106-99-0	5.8E-02	c*	2.6E-01	c*	9.4E-02	c*	4.1E-01	c*	1.8E-02	c		9.9E-06	c				
				3.0E-02	O					1	0.1		Butanoic acid, 4-(2,4-dichlorophenoxy)-	94-82-6	1.9E+03	n	2.5E+04	n					4.5E+02	n		4.2E-01	n				
				1.0E-01	I			V	1			7.6E+03	Butanol, N-	71-36-3	7.8E+03	ns	1.2E+05	nms					2.0E+03	n		4.1E-01	n				
				2.0E+00	P	3.0E+01	P	V	1			2.1E+04	Butyl alcohol, sec-	78-92-2	1.3E+05	nms	1.5E+06	nms	3.1E+04	n	1.3E+05	n	2.4E+04	n		5.0E+00	n				
2.0E-04	C	5.7E-08	C	5.0E-02	I			V	1			0.1	Butylate	2008-41-5	3.9E+03	n	5.8E+04	n					4.6E+02	n		4.5E-01	n				
3.6E-03	P			3.0E-01	P					1	0.1		Butylated hydroxyanisole	25013-16-5	2.7E+03	c	1.1E+04	c	4.9E+01	c	2.2E+02	c	1.5E+02	c		2.9E-01	c				
													Butylated hydroxytoluene	128-37-0	1.5E+02	c	6.4E+02	c					3.4E+00	c		1.0E-01	c				
				5.0E-02	P			V	1			1.1E+02	Butylbenzene, n-	104-51-8	3.9E+03	ns	5.8E+04	ns					1.0E+03	n		3.2E+00	n				
				1.0E-01	X			V	1			1.5E+02	Butylbenzene, sec-	135-98-8	7.8E+03	ns	1.2E+05	nms					2.0E+03	n		5.9E+00	n				
				1.0E-01	X			V	1			1.8E+02	Butylbenzene, tert-	98-06-6	7.8E+03	ns	1.2E+05	nms					6.9E+02	n		1.6E+00	n				
				2.0E-02	A					1	0.1		Cacodylic Acid	75-60-5	1.3E+03	n	1.6E+04	n					4.0E+02	n		1.1E-01	n				
1.8E-03	I			1.0E-03	I	1.0E-05	A			0.025	0.001		Cadmium (Diet)	7440-43-9	7.1E+01	n	9.8E+02	n							5.0E+00	6.9E-01	n	3.8E-01			
1.8E-03	I			5.0E-04	I	1.0E-05	A			0.05	0.001		Cadmium (Water)	7440-43-9					1.6E-03	c**	6.8E-03	c**	9.2E+00	n							
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C	M	0.025				Calcium Chromate	13765-19-0	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c							
				5.0E-01	I	2.2E-03	C			1	0.1		Caprolactam	105-60-2	3.1E+04	n	4.0E+05	nm	2.3E+00	n	9.6E+00	n	9.9E+03	n		2.5E+00	n				
1.5E-01	C	4.3E-05	C	2.0E-03	I					1	0.1		Captafol	2425-06-1	3.0E+00	c*	1.5E+01	c	6.5E-02	c	2.9E-01	c	4.0E-01	c*		7.1E-04	c*				
2.3E-03	C	6.6E-07	C	1.3E-01	I					1	0.1		Captan	133-06-2	2.4E+02	c*	1.0E+03	c	4.3E+00	c	1.9E+01	c	3.1E+01	c*		2.2E-02	c*				
				1.0E-01	I					1	0.1		Carbaryl	63-25-2	6.3E+03	n	8.2E+04	n					1.8E+03	n		1.7E+00	n				
				5.0E-03	I					1	0.1		Carbofuran	1563-66-2	3.2E+02	n	4.1E+03	n					9.4E+01	n	4.0E+01	3.7E-02	n	1.6E-02			
				1.0E-01	I	7.0E-01	I	V	1			7.4E+02	Carbon Disulfide	75-15-0	7.7E+02	ns	3.5E+03	ns	7.3E+02	n	3.1E+03	n	8.1E+02	n		2.4E-01	n				
7.0E-02	I	6.0E-06	I	4.0E-03	I	1.0E-01	I	V	1			4.6E+02	Carbon Tetrachloride	56-23-5	6.5E-01	c	2.9E+00	c	4.7E-01	c	2.0E+00	c	4.6E-01	c	5.0E+00	1.8E-04	c	1.9E-03			
						1.0E-01	P	V	1			5.9E+03	Carbonyl Sulfide	463-58-1	6.7E+01	n	2.8E+02	n	1.0E+02	n	4.4E+02	n	2.1E+02	n		5.1E-01	n				
				1.0E-02	I					1	0.1		Carbosulfan	55285-14-8	6.3E+02	n	8.2E+03	n					5.1E+01	n		1.2E+00	n				
				1.0E-01	I					1	0.1		Carbovin	5234-68-4	6.3E+03	n	8.2E+04	n					1.9E+03	n		1.0E+00	n				
						9.0E-04	I			1			Ceric oxide	1306-38-3	1.3E+06	nm	5.4E+06	nm	9.4E-01	n	3.9E+00	n									
				1.0E-01	I			V	1				Chloral Hydrate	302-17-0	7.8E+03	n	1.2E+05	nm					2.0E+03	n		4.0E-01	n				
4.0E-01	H			1.5E-02	I					1	0.1		Chloranben	133-90-4	9.5E+02	n	1.2E+04	n					2.9E+02	n		7.0E-02	n				
										1	0.1		Chloranil	118-75-2	1.3E+00	c	5.7E+00	c					1.8E-01	c		1.5E-04	c				
3.5E-01	I	1.0E-04	I	5.0E-04	I	7.0E-04	I	V	1	0.04			Chlordane	12789-03-6	1.7E+00	c*	7.7E+00	c*	2.8E-02	c*	1.2E-01	c*	2.0E-02	c*	2.0E+00	2.7E-03	c*	2.7E-01			
1.0E+01	I	4.6E-03	C	3.0E-04	I					1	0.1		Chlordecone (Kepone)	143-50-0	5.4E-02	c	2.3E-01	c	6.1E-04	c	2.7E-03	c	3.5E-03	c		1.2E-04	c				
				7.0E-04	A					1	0.1		Chlorfenvinphos	470-90-6	4.4E-01	n	5.7E+02	n					1.1E+01	n		3.1E-02	n				
				9.0E-02	O					1	0.1		Chlorinuron, Ethyl-	90982-32-4	5.7E+03	n	7.4E+04	n					1.8E+03	n		6.0E-01	n				
				1.0E-01	I	1.5E-04	A	V	1			2.8E+03	Chlorine	7782-50-5	1.8E-01	n	7.8E-01	n	1.5E-01	n	6.4E-01	n	3.0E-01	n		1.4E-04	n				
				3.0E-02	I	2.0E-04	I	V	1				Chlorine Dioxide	10049-04-4	2.3E+03	n	3.4E+04	n	2.1E-01	n	8.8E-01	n	4.2E-01	n							
				3.0E-02	I					1			Chlorite (Sodium Salt)	7758-19-2	2.3E+03	n	3.5E+04	n					6.0E+02	n	1.0E+03	n					
						5.0E+01	I	V	1			1.2E+03	Chloro-1,1-difluoroethane, 1-	75-68-3	5.4E+04	ns	2.3E+05	nms	5.2E+04	n	2.2E+05	n	1.0E+05	n		5.2E+01	n				
				3.0E-04	I	2.0E-02	H	2.0E-02	I	V	1	7.9E+02	Chloro-1,3-butadiene, 2	126-99-8	1.0E-02	c	4.4E-02	c	9.4E-03	c	4.1E-02	c	1.9E-02	c		9.8E-06	c				
4.6E-01	H									1	0.1		Chloro-2-methylaniline HCl, 4-	3165-93-3	1.2E+00	c	5.0E+00	c					1.7E-01	c		1.5E-04	c				
1.0E-01	P	7.7E-05	C	3.0E-03	X					1	0.1		Chloro-2-methylaniline, 4-	95-69-2	5.4E+00	c*	2.3E+01	c	3.6E-02	c	1.6E-01	c	7.0E-01	c*		4.0E-04	c*				
2.7E-01	X																														

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs			
SFO (mg/kg-day) ¹	K _e y	IUR (ug/m ³) ¹	K _e y	RfD ₀ (mg/kg-day)	K _e y	RfC ₁ (mg/m ³)	K _e y	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
5.0E-01	C	8.4E-02	S	3.0E-03	I	1.0E-04	I	M	0.025			Chromium(VI)	18540-29-9	3.0E-01	c	6.3E+00	c	1.2E-05	c	1.5E-04	c	3.5E-02	c		6.7E-04	c			
				1.3E-02	I				0.013			Chromium, Total	7440-47-3											1.0E+02	1.4E+01	n	1.8E+05		
		9.0E-03	P	3.0E-04	P	6.0E-06	P		1	0.1		Clofentazine	74115-24-5	8.2E+02	n	1.1E+04	n					2.3E+02	n		1.4E+01	n			
												Cobalt	7440-48-4	2.3E+01	n	3.5E+02	n	3.1E-04	c*	1.4E-03	c*	6.0E+00	n		2.7E-01	n			
		6.2E-04	I					V	M	1		Coke Oven Emissions	8007-45-2					1.6E-03	c	2.0E-02	c			1.3E+03	2.8E+01	n	4.6E+01		
				4.0E-02	H							Copper	7440-50-8	3.1E+03	n	4.7E+04	n					8.0E+02	n						
				5.0E-02	I	6.0E-01	C		1	0.1		Cresol, m-	108-39-4	3.2E+03	n	4.1E+04	n	6.3E+02	n	2.6E+03	n	9.3E+02	n		7.4E-01	n			
				5.0E-02	I	6.0E-01	C		1	0.1		Cresol, o-	95-48-7	3.2E+03	n	4.1E+04	n	6.3E+02	n	2.6E+03	n	9.3E+02	n		7.5E-01	n			
				1.0E-01	A	6.0E-01	C		1	0.1		Cresol, p-	106-44-5	6.3E+03	n	8.2E+04	n	6.3E+02	n	2.6E+03	n	1.9E+03	n		1.5E+00	n			
				1.0E-01	A				1	0.1		Cresol, p-chloro-m-	59-50-7	6.3E+03	n	8.2E+04	n					1.4E+03	n		1.7E+00	n			
		1.9E+00	H							0.1		Cresols	1319-77-3	6.3E+03	n	8.2E+04	n	6.3E+02	n	2.6E+03	n	1.5E+03	n		1.3E+00	n			
				1.0E-03	P			V			1.7E+04	Crotonaldehyde, trans-	123-73-9	3.7E-01	c	1.7E+00	c					4.0E-02	c		8.2E-06	c			
				1.0E-01	I	4.0E-01	I	V			2.7E+02	Cumene	98-82-8	1.9E+03	ns	9.9E+03	ns	4.2E+02	n	1.8E+03	n	4.5E+02	n		7.4E-01	n			
		2.2E-01	C	6.3E-05	C				1	0.1		Cupferron	135-20-6	2.5E+00	c	1.0E+01	c	4.5E-02	c	1.9E-01	c	3.5E-01	c		6.1E-04	c			
		8.4E-01	H			2.0E-03	H		1	0.1		Cyanazine	21725-46-2	6.5E-01	c	2.7E+00	c					8.8E-02	c		4.1E-05	c			
												Cyanides																	
				1.0E-03	I				1			-Calcium Cyanide	592-01-8	7.8E+01	n	1.2E+03	n					2.0E+01	n						
				5.0E-03	I				1			-Copper Cyanide	544-92-3	3.9E+02	n	5.8E+03	n					1.0E+02	n						
				6.0E-04	I	8.0E-04	S	V	1		9.5E+05	-Cyanide (CN-)	57-12-5	2.3E+01	n	1.5E+02	n	8.3E-01	n	3.5E+00	n	1.5E+00	n	2.0E+02	1.5E-02	n	2.0E+00		
				1.0E-03	I			V	1			-Cyanogen	460-19-5	7.8E+01	n	1.2E+03	n					2.0E+01	n						
				9.0E-02	I			V	1			-Cyanogen Bromide	506-68-3	7.0E+03	n	1.1E+05	nm					1.8E+03	n						
				5.0E-02	I			V	1			-Cyanogen Chloride	506-77-4	3.9E+03	n	5.8E+04	n					1.0E+03	n						
				6.0E-04	I	8.0E-04	I	V	1		1.0E+07	-Hydrogen Cyanide	74-90-8	2.3E+01	n	1.5E+02	n	8.3E-01	n	3.5E+00	n	1.5E+00	n		1.5E-02	n			
				2.0E-03	I				1			-Potassium Cyanide	151-50-8	1.6E+02	n	2.3E+03	n					4.0E+01	n						
				5.0E-03	I				0.04			-Potassium Silver Cyanide	506-61-6	3.9E+02	n	5.8E+03	n					8.2E+01	n						
				1.0E-01	I				0.04			-Silver Cyanide	506-64-9	7.8E+03	n	1.2E+05	nm					1.8E+03	n						
				1.0E-03	I				1			-Sodium Cyanide	143-33-9	7.8E+01	n	1.2E+03	n					2.0E+01	n						
				2.0E-04	P				1			-Thiocyanates	E1790664	1.6E+01	n	2.3E+02	n					4.0E+00	n						
				2.0E-04	X			V	1			-Thiocyanic Acid	463-56-9	1.6E+01	n	2.3E+02	n					4.0E+00	n						
				5.0E-02	I				1			-Zinc Cyanide	557-21-1	3.9E+03	n	5.8E+04	n					1.0E+03	n						
						6.0E+00	I	V	1		1.2E+02	Cyclohexane	110-82-7	6.5E+03	ns	2.7E+04	ns	6.3E+03	n	2.6E+04	n	1.3E+04	n		1.3E+01	n			
		2.0E-02	X						0.1			Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	2.7E+01	c*	1.1E+02	c					2.8E+00	c		1.6E-02	c			
				5.0E+00	I	7.0E-01	P	V	1		5.1E+03	Cyclohexanone	108-94-1	2.8E+04	ns	1.3E+05	nms	7.3E+02	n	3.1E+03	n	1.4E+03	n		3.4E-01	n			
				5.0E-03	P	1.0E+00	X	V	1		2.8E+02	Cyclohexene	110-83-8	3.1E+02	ns	3.1E+03	ns	1.0E+03	n	4.4E+03	n	7.0E+01	n		4.6E-02	n			
				2.0E-01	I			V	1		2.9E+05	Cyclohexylamine	108-91-8	1.6E+04	n	2.3E+05	nm					3.8E+03	n		1.0E+00	n			
				2.5E-02	I				0.1			Cyfluthrin	68359-37-5	1.6E+03	n	2.1E+04	n					1.2E+02	n		3.1E+01	n			
				1.0E-03	O				0.1			Cyhalcthrin	68085-85-8	6.3E+01	n	8.2E+02	n					2.0E+01	n		1.4E+01	n			
				6.0E-02	O				0.1			Cypermethrin	52315-07-8	3.8E+03	n	4.9E+04	n					1.2E+03	n		1.9E+02	n			
				1.5E-02	O				0.1			Cyromazine	66215-27-8	9.5E+02	n	1.2E+04	n					3.0E+02	n		7.6E-02	n			
		2.4E-01	I	6.9E-05	C				0.1			DDD	72-54-8	2.3E+00	c	9.6E+00	c	4.1E-02	c	1.8E-01	c	3.2E-02	c		7.5E-03	c			
		3.4E-01	I	9.7E-05	C			V	1			DDE, p,p'-	72-55-9	2.0E+00	c	9.3E+00	c	2.9E-02	c	1.3E-01	c	4.6E-02	c		1.1E-02	c			
		3.4E-01	I	9.7E-05	I	5.0E-04	I		0.03			DDT	50-29-3	1.9E+00	c*	8.5E+00	c*	2.9E-02	c	1.3E-01	c	2.3E-01	c*		7.7E-02	c*			
				3.0E-02	I				0.1			Dalapon	75-99-0	1.9E+03	n	2.5E+04	n					6.0E+02	n	2.0E+02	1.2E-01	n	4.1E-02		
		1.8E-02	C	5.1E-06	C	1.5E-01	I		0.1			Daminozide	1596-84-5	3.0E+01	c	1.3E+02	c	5.5E-01	c	2.4E+00	c	4.3E+00	c		9.5E-04	c			
		7.0E-04	I			7.0E-03	I		0.1			Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	4.4E+02	n	3.3E+03	c**					1.1E+02	c**		6.2E+01	c**			
				4.0E-05	I				0.1			Demeton	8065-48-3	2.5E+00	n	3.3E+01	n					4.2E-01	n						
		1.2E-03	I			6.0E-01	I		0.1			Di(2-ethylhexyl)adipate	103-23-1	4.5E+02	c*	1.9E+03	c					6.5E+01	c	4.0E+02	4.7E+00	c	2.9E+01		
		6.1E-02	H						0.1			Diallylate	2303-16-4	8.9E+00	c	3.8E+01	c					5.4E-01	c		8.0E-04	c			
				7.0E-04	A				0.1			Diazinon	333-41-5	4.4E+01	n	5.7E+02	n					1.0E+01	c		6.5E-02	n			
				1.0E-02	X			V	1			Dibenzothiophene	132-65-0	7.8E+02	n	1.2E+04	n					6.5E+01	n	2.0E-01	1.2E+00	n			
		8.0E-01	P	6.0E-03	P						9.8E+9																		

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #29); H = HEAST; F = See FAQ; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice); c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)																													
Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs			
SFO (mg/kg-day) ¹	K _e (y)	IUR (ug/m ³ -y)	K _e (y)	RfD _o (mg/kg-day)	K _e (y)	RfC ₁ (mg/m ³)	K _e (y)	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
				3.0E-03						1	0.1		Dichloropropanol, 2,3-	616-23-9	1.6E+02	n	2.5E+03	n					5.9E+01	n		1.3E-02	n		
1.0E-01	I	4.0E-06	I	3.0E-02	I	2.0E-02	I	V		1			Dichloropropene, 1,3-	542-75-6	1.8E+00	c*	8.2E+00	c*	7.0E-01	c*	3.1E+00	c*	4.7E-01	c*		1.7E-04	c*		
2.9E-01	I	8.3E-05	C	5.0E-04	I	5.0E-04	I			1	0.1		Dichlorvos	62-73-7	1.9E+00	c*	7.9E+00	c*	3.4E-02	c*	1.5E-01	c*	2.6E-01	c*		8.1E-05	c*		
				7.0E-05	O					1	0.1		Dicrotophos	141-66-2	4.4E+00	n	5.7E+01	n					1.4E+00	n		3.3E-04	n		
1.6E+01	I	4.6E-03	I	8.0E-02	P	3.0E-04	X	V		1		2.6E+02	Dicyclopentadiene	77-73-6	1.3E+00	n	5.4E+00	n	3.1E-01	n	1.3E+00	n	6.3E-01	n		2.2E-03	n		
				5.0E-05	I					1	0.1		Dieldrin	60-57-1	3.4E-02	c*	1.4E-01	c	6.1E-04	c	2.7E-03	c	1.8E-03	c		7.1E-05	c		
				3.0E-04	C					1	0.1		Diesel Engine Exhaust	E17136615					9.4E-03	c	4.1E-02	c							
				2.0E-03	P	2.0E-04	P			1	0.1		Diethanolamine	111-42-2	1.3E+02	n	1.6E+03	n	2.1E-01	n	8.8E-01	n	4.0E+01	n		8.1E-03	n		
				3.0E-02	P	1.0E-04	P			1	0.1		Diethylene Glycol Monobutyl Ether	112-34-5	1.9E+03	n	2.4E+04	n	1.0E-01	n	4.4E-01	n	6.0E+02	n		1.3E-01	n		
				6.0E-02	P	3.0E-04	P			1	0.1		Diethylene Glycol Monoethyl Ether	111-90-0	3.8E+03	n	4.8E+04	n	3.1E-01	n	1.3E+00	n	1.2E+03	n		2.4E-01	n		
3.5E+02	C	1.0E-01	C	1.0E-03	P			V		1		1.1E+05	Diethylformamide	617-84-5	7.8E+01	n	1.2E+03	n					2.0E+01	n		4.1E-03	n		
										1	0.1		Diethylstilbestrol	56-53-1	1.6E-03	c	6.6E-03	c	2.8E-05	c	1.2E-04	c	5.1E-05	c		2.8E-05	c		
				8.3E-02	O					1	0.1		Difenzoquat	43222-48-6	5.2E+03	n	6.8E+04	n					1.7E+03	n		2.6E+02	n		
				2.0E-02	I					1	0.1		Diflubenzuron	35367-38-5	1.3E+03	n	1.6E+04	n					2.9E+02	n		3.3E-01	n		
						4.0E+01	I	V		1		1.4E+03	Difluoroethane, 1,1-	75-37-6	4.8E+04	ns	2.0E+05	nms	4.2E+04	n	1.8E+05	n	8.3E+04	n		2.8E+01	n		
4.4E-02	C	1.3E-05	C					V		1			Dihydrosafrole	94-58-6	9.9E+00	c	4.5E+01	c	2.2E-01	c	9.4E-01	c	3.0E-01	c		1.9E-04	c		
				8.0E-02	I			V		1		2.3E+03	Diisopropyl Ether	108-20-3	2.2E+03	n	9.4E+03	ns	7.3E+02	n	3.1E+03	n	1.5E+03	n		3.7E-01	n		
										1		5.3E+02	Diisopropyl Methylphosphonate	1445-75-6	6.3E+03	ns	9.3E+04	ns					1.6E+03	n		4.5E-01	n		
				2.2E-02	O					1	0.1		Dimethipin	55290-64-7	1.4E+03	n	1.8E+04	n					4.4E+02	n		9.6E-02	n		
1.6E+00	P			2.2E-03	O					1	0.1		Dimethoate	60-51-5	1.4E+02	n	1.8E+03	n					4.4E+01	n		9.9E-03	n		
										1	0.1		Dimethoxybenzidine, 3,3'-	119-90-4	3.4E-01	c	1.4E+00	c					4.7E-02	c		5.8E-05	c		
1.7E-03	P			6.0E-02	P					1	0.1		Dimethyl methylphosphonate	756-79-6	3.2E+02	c*	1.4E+03	c*			2.2E-03	c	9.4E-03	c	4.6E+01	c*	9.6E-03	c*	
4.6E+00	C	1.3E-03	C							1	0.1		Dimethylamino azobenzene [p-]	60-11-7	1.2E-01	c	5.0E-01	c	2.2E-03	c	9.4E-03	c	5.0E-03	c		2.1E-05	c		
5.8E-01	H									1	0.1		Dimethylaniline HCl, 2,4-	21436-96-4	9.4E-01	c	4.0E+00	c					1.3E-01	c		1.2E-04	c		
2.0E-01	P			2.0E-03	X					1	0.1		Dimethylaniline, 2,4-	95-68-1	2.7E+00	c*	1.1E+01	c					3.7E-01	c		2.1E-04	c		
2.7E-02	P			2.0E-03	I			V		1		8.3E+02	Dimethylaniline, N,N-	121-69-7	2.6E+01	c**	1.2E+02	c*					2.5E+00	c*		9.0E-04	c*		
1.1E+01	P									1	0.1		Dimethylbenzidine, 3,3'-	119-93-7	4.9E-02	c	2.1E-01	c					6.5E-03	c		4.3E-05	c		
				1.0E-01	P	3.0E-02	I	V		1		1.1E+05	Dimethylformamide	68-12-2	2.6E+03	n	1.5E+04	n	3.1E+01	n	1.3E+02	n	6.1E+01	n		1.2E-02	n		
5.5E+02	C	1.6E-01	C	1.0E-04	X	2.0E-06	X	V		1		1.7E+05	Dimethylhydrazine, 1,1-	57-14-7	5.7E-02	n	2.4E-01	n	2.1E-03	n	8.8E-03	n	4.2E-03	n		9.3E-07	n		
										1		1.9E+05	Dimethylhydrazine, 1,2-	540-73-8	8.8E-04	c	4.1E-03	c	1.8E-05	c	7.7E-05	c	2.8E-05	c		6.5E-09	c		
				2.0E-02	I					1	0.1		Dimethylphenol, 2,4-	105-67-9	1.3E+03	n	1.6E+04	n					3.6E+02	n		4.2E-01	n		
				6.0E-04	I					1	0.1		Dimethylphenol, 2,6-	576-26-1	3.8E+01	n	4.9E+02	n					1.1E+01	n		1.3E-02	n		
				1.0E-03	I					1	0.1		Dimethylphenol, 3,4-	95-65-8	6.3E+01	n	8.2E+02	n					1.8E+01	n		2.1E-02	n		
4.5E-02	C	1.3E-05	C					V		1		4.7E+02	Dimethylvinylchloride	513-37-1	1.1E+00	c	4.8E+00	c	2.2E-01	c	9.4E-01	c	3.3E-01	c		1.1E-04	c		
				8.0E-05	X					1	0.1		Dinitro-o-cresol, 4,6-	534-52-1	5.1E+00	n	6.6E+01	n					1.5E+00	n		2.6E-03	n		
				2.0E-03	I					1	0.1		Dinitro-o-cyclohexyl Phenol, 4,6-	131-89-5	1.3E+02	n	1.6E+03	n					2.3E+01	n		7.7E-01	n		
				1.0E-04	P					1	0.1		Dinitrobenzene, 1,2-	528-29-0	6.3E+00	n	8.2E+01	n					1.9E+00	n		1.8E-03	n		
				1.0E-04	I					1	0.1		Dinitrobenzene, 1,3-	99-65-0	6.3E+00	n	8.2E+01	n					2.0E+00	n		1.8E-03	n		
				1.0E-04	P					1	0.1		Dinitrobenzene, 1,4-	100-25-4	6.3E+00	n	8.2E+01	n					2.0E+00	n		1.8E-03	n		
				2.0E-03	I					1	0.1		Dinitrophenol, 2,4-	51-28-5	1.3E+02	n	1.6E+03	n					3.9E+01	n		4.4E-02	n		
6.8E-01	I									1	0.1		Dinitrotoluene Mixture, 2,4/2,6	E1615210	8.0E-01	c	3.4E+00	c					1.1E-01	c		1.5E-04	c		
3.1E-01	C	8.9E-05	C	2.0E-03	X					1	0.102		Dinitrotoluene, 2,4-	121-14-2	1.7E+00	c*	7.4E+00	c	3.2E-02	c	1.4E-01	c	2.4E-01	c		3.2E-04	c		
1.5E+00	P			3.0E-04	X					1	0.099		Dinitrotoluene, 2,6-	606-20-2	3.6E-01	c*	1.5E+00	c					4.9E-02	c		6.7E-05	c		
				2.0E-03	S					1	0.006		Dinitrotoluene, 2-Amino-4,6-	35572-78-2	1.5E+02	n	2.3E+03	n					3.9E+01	n		3.0E-02	n		
				2.0E-03	S					1	0.009		Dinitrotoluene, 4-Amino-2,6-	19406-51-0	1.5E+02	n	2.3E+03	n					3.9E+01	n		3.0E-02	n		
4.5E-01	X			9.0E-04	X					1	0.1		Dinitrotoluene, Technical grade	25321-14-6	1.2E+00	c*	5.1E+00	c					1.0E-01	c		1.4E-04	c		
				1.0E-03	I					1	0.1		Dinoseb	88-85-7	6.3E+01	n	8.2E+02	n					1.5E+01	n		1.3E-01	n	6.2E	

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs			
SFO (mg/kg-day)	K _e (y)	IUR (ug/m ³ -d)	K _e (y)	RfD _o (mg/kg-day)	K _e (y)	RfC _o (mg/m ³ -y)	K _e (y)	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
				2.0E-01	I	1.0E+01	I	V		1		2.1E+03	Ethyl Chloride (Chloroethane)	75-00-3	1.4E+04	ns	5.7E+04	ns	1.0E+04	n	4.4E+04	n	2.1E+04	n		5.9E+00	n		
											1.0E+04	Ethyl Ether	60-29-7	1.6E+04	ns	2.3E+05	nms					3.9E+03	n		8.8E-01	n			
												1.1E+03	Ethyl Methacrylate	97-63-2	1.8E+03	ns	7.6E+03	ns	3.1E+02	n	1.3E+03	n	6.3E+02	n		1.5E-01	n		
1.1E-02	C	2.5E-06	C	1.0E-05	I	1.0E+00	I	V		1		4.8E+02	Ethyl-p-nitrophenyl Phosphonate	2104-64-5	6.3E-01	n	8.2E+00	n					8.9E-02	n		2.8E-03	n		
												4.8E+02	Ethylbenzene	100-41-4	5.8E+00	c	2.5E+01	c	1.1E+00	c	4.9E+00	c	1.5E+00	c	7.0E+02	1.7E-03	c	7.8E-01	
				7.0E-02	P					1	0.1	1.9E+05	Ethylene Cyanohydrin	109-78-4	4.4E+03	n	5.7E+04	n					1.4E+03	n		2.8E-01	n		
				9.0E-02	P			V		1		1.9E+05	Ethylene Diamine	107-15-3	7.0E+03	n	1.1E+05	nm					1.8E+03	n		4.1E-01	n		
				2.0E+00	I	4.0E-01	C			1	0.1		Ethylene Glycol	107-21-1	1.3E+05	nm	1.6E+06	nm	4.2E+02	n	1.8E+03	n	4.0E+04	n		8.1E+00	n		
3.1E-01	C	3.0E-03	I	1.0E-01	I	1.6E+00	I			1	0.1	1.2E+05	Ethylene Glycol Monobutyl Ether	111-76-2	6.3E+03	n	8.2E+04	n	1.7E+03	n	7.0E+03	n	2.0E+03	n		4.1E-01	n		
4.5E-02	C	1.3E-05	C	8.0E-05	I					1	0.1		Ethylene Oxide	75-21-8	2.0E-03	c	2.5E-02	c	3.4E-04	c	4.1E-03	c	6.7E-04	c		1.4E-07	c		
													Ethylene Thiourea	96-45-7	5.1E+00	n	5.1E+01	c**	2.2E-01	c	9.4E-01	c	1.6E+00	n		3.6E-04	n		
6.5E+01	C	1.9E-02	C					V			1.5E+05	Ethyleneimine	151-56-4	2.7E-03	c	1.2E-02	c	1.5E-04	c	6.5E-04	c	2.4E-04	c		5.2E-08	c			
				3.0E+00	I					1	0.1		Ethylphthalyl Ethyl Glycolate	84-72-0	1.9E+05	nm	2.5E+06	nm					5.8E+04	n		1.3E+02	n		
				2.5E-04	I					1	0.1		Fenamiphos	22224-92-6	1.6E+01	n	2.1E+02	n					4.4E+00	n		4.3E-03	n		
				2.5E-02	I					1	0.1		Fenpropathrin	39515-41-8	1.6E+03	n	2.1E+04	n					6.4E+01	n		2.9E+00	n		
				2.5E-02	I					1	0.1		Fenvalerate	51630-58-1	1.6E+03	n	2.1E+04	n					5.0E+02	n		3.2E+02	n		
				1.3E-02	I					1	0.1		Flumeturon	2164-17-2	8.2E+02	n	1.1E+04	n					2.4E+02	n		1.9E-01	n		
				4.0E-02	C	1.3E-02	C			1			Fluoride	16984-48-8	3.1E+03	n	4.7E+04	n	1.4E+01	n	5.7E+01	n	8.0E+02	n	4.0E+03	1.2E+02	n		
				6.0E-02	I	1.3E-02	C			1			Fluorine (Soluble Fluoride)	7782-41-4	4.7E+03	n	7.0E+04	n	1.4E+01	n	5.7E+01	n	1.2E+03	n		1.8E+02	n	6.0E+02	
				8.0E-02	I					1	0.1		Fluridone	59756-60-4	5.1E+03	n	6.6E+04	n					1.4E+03	n		1.6E+02	n		
				1.5E-02	O					1	0.1		Flurprimidol	56425-91-3	9.5E+02	n	1.2E+04	n					2.6E+02	n		1.2E+00	n		
				2.0E-03	O					1	0.1		Flusilazole	85509-19-9	1.3E+02	n	1.6E+03	n					3.1E+01	n		5.1E+00	n		
				5.0E-01	O					1	0.1		Flutolanil	66332-96-5	3.2E+04	n	4.1E+05	nm					7.9E+03	n		4.2E+01	n		
				1.0E-02	I					1	0.1		Fluvalinate	69409-94-5	6.3E+02	n	8.2E+03	n					2.0E+02	n		2.9E+02	n		
				9.0E-02	O					1	0.1		Folpet	133-07-3	5.7E+03	n	7.4E+04	n					1.6E+03	n		3.9E-01	n		
				2.5E-03	O					1	0.1		Fomesafen	72178-02-0	1.6E+02	n	2.1E+03	n					4.8E+01	n		1.6E-01	n		
				2.0E-03	I					1	0.1		Fonofos	944-22-9	1.3E+02	n	1.6E+03	n					2.4E+01	n		4.7E-02	n		
1.3E-05	I			2.0E-01	I	9.8E-03	A	V			4.2E+04	Formaldehyde	50-00-0	1.7E+01	c*	7.3E+01	c*	2.2E-01	c*	9.4E-01	c*	4.3E-01	c*		8.7E-05	c*			
				9.0E-01	P	3.0E-04	X	V			1.1E+05	Formic Acid	64-18-6	2.9E+01	n	1.2E+02	n	3.1E-01	n	1.3E+00	n	6.3E-01	n		1.3E-04	n			
				2.5E+00	O					1	0.1		Fosetyl-AL	39148-24-8	1.6E+05	nm	2.1E+06	nm					5.0E+04	n		6.6E+02	n		
				1.0E-03	X					1	0.03	6.2E+03	Furans	132-64-9	7.3E+01	n	1.0E+03	n					7.9E+00	n		1.5E-01	n		
				1.0E-03	I					1	0.03	6.2E+03	-Furan	110-00-9	7.3E+01	n	1.0E+03	n					1.9E+01	n		7.3E-03	n		
3.8E+00	H			9.0E-01	I	2.0E+00	I	V		1	0.1	1.7E+05	-Tetrahydrofuran	109-99-9	1.8E+04	n	9.4E+04	n	2.1E+03	n	8.8E+03	n	3.4E+03	n		7.5E-01	n		
										1	0.1		Furazolidone	57-45-8	1.4E-01	c	6.0E-01	c					2.0E-02	c		3.9E-05	c		
				3.0E-03	I	5.0E-02	H	V		1	0.1	1.0E+04	Furfural	98-01-1	2.1E+02	n	2.6E+03	n	5.2E+01	n	2.2E+02	n	3.8E+01	n		8.1E-03	n		
1.5E+00	C	4.3E-04	C	3.0E-02	I	8.6E-06	C			1	0.1		Furium	531-82-8	3.6E-01	c	1.5E+00	c	6.5E-03	c	2.9E-02	c	5.1E-02	c		6.8E-05	c		
				3.0E-02	I	8.6E-06	C			1	0.1		Furmecycloz	60568-05-0	1.8E-01	c	7.7E-01	c	3.3E-01	c	1.4E+00	c	1.1E+00	c		1.2E-03	c		
				6.0E-03	O					1	0.1		Glufosinate, Ammonium	77182-82-2	3.8E+02	n	4.9E+03	n					1.2E+02	n		2.6E-02	n		
				4.0E-04	I	1.0E-03	H	V		1	0.1	1.1E+05	Glutaraldehyde	111-30-8	1.1E+05	nm	4.8E+05	nm	8.3E-02	n	3.5E-01	n				3.3E-04	n		
				1.0E-01	I					1	0.1		Glycidyl	765-34-4	2.3E+01	n	2.1E+02	n	1.0E+00	n	4.4E+00	n	1.7E+00	n	7.0E+02	8.8E+00	n	3.1E+00	
				1.0E-02	X			V		1			Glyphosate	1071-83-6	6.3E+03	n	8.2E+04	n					2.0E+03	n		4.5E-02	n		
				2.0E-02	P					1	0.1		Guanidine	113-00-8	7.8E+02	n	1.2E+04	n					2.0E+02	n					
				3.0E-02	X					1	0.1		Guanidine Chloride	50-01-1	1.3E+03	n	1.6E+04	n					4.0E+02	n					
4.5E+00	I	1.3E-03	I	5.0E-04	I					1	0.1		Guanidine Nitrate	506-93-4	1.9E+03	n	2.5E+04	n					6.0E+02	n		1.5E-01	n		
				5.0E-05	I					1	0.1		Haloxypol, Methyl	69806-40-2	3.2E+00	n	4.1E+01	n					7.6E-01	n		8.4E-03	n		
				5.0E-04	I					1			Heptachlor	76-44-8	1.3E-01	c	6.3E-01	c	2.2E-03	c	9.4E-03	c	1.4E-03	c	4.0E-01	1.2E-04	c	3.3E-02	
9.1E+00	I	2.6E-03	I	1.3E-05	I					1		5.8E+01	Heptachlor Epoxide	1024-57-3	7.0E-02	c*	3.3E-01	c*	1.1E-03	c	4.7E-03	c	1.4E-03	c*	2.0E-01	2.8E-05	c*	4.1E-03	
				3.0E-04	X	4.0E-01	P	V		1																			

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Toxicity and Chemical-specific Information											Contaminant		Screening Levels											Protection of Ground Water SSLs			
SFO (mg/kg-day)	K _e y	IUR (ug/m ³ -y)	RfD _o (mg/kg-day)	K _e y	RfC _o (mg/m ³)	K _e y	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)	
			2.5E-01	I				1	0.1		Imazaquin	81335-37-7	1.6E+04	n	2.1E+05	nm					4.9E+03	n		2.4E+01	n		
			2.5E+00	O				1	0.1		Imazethapyr	81335-77-5	1.6E+05	nm	2.1E+06	nm					4.7E+04	n		4.1E+01	n		
			1.0E-02	A				1			Iodine	7553-56-2	7.8E+02	n	1.2E+04	n					2.0E+02	n		1.2E+01	n		
			4.0E-02	I				1	0.1		Iprodione	36734-19-7	2.5E+03	n	3.3E+04	n					7.4E+02	n		2.2E+01	n		
			7.0E-01	P				1			Iron	7439-89-6	5.5E+04	n	8.2E+05	nm					1.4E+04	n		3.5E+02	n		
			3.0E-01	I				1		1.0E+04	Isobutyl Alcohol	78-83-1	2.3E+04	ns	3.5E+05	nms					5.9E+03	n		1.2E+00	n		
			2.0E-01	I	2.0E+00	C		1	0.1		Isophorone	78-59-1	5.7E+02	c*	2.4E+03	c*	2.1E+03	n	8.8E+03	n	7.8E+01	c*		2.6E-02	c*		
			1.5E-02	I				1			Isopropalin	33820-53-0	1.2E+03	n	1.8E+04	n					4.0E+01	n		9.2E-01	n		
			2.0E+00	P	2.0E-01	P	V	1		1.1E+05	Isopropanol	67-63-0	5.6E+03	n	2.4E+04	n	2.1E+02	n	8.8E+02	n	4.1E+02	n		8.4E-02	n		
			1.0E-01	I				1	0.1		Isopropyl Methyl Phosphonic Acid	1832-54-8	6.3E+03	n	8.2E+04	n					2.0E+03	n		4.3E-01	n		
			5.0E-02	I				1	0.1		Isoxaben	82558-50-7	3.2E+03	n	4.1E+04	n					7.3E+02	n		2.0E+00	n		
											JP-7	E1737665	4.3E+08	nm	1.8E+09	nm	3.1E+02	n	1.3E+03	n	6.3E+02	n		n	n		
			8.0E-03	O				1	0.1		Lactofen	77501-63-4	5.1E+02	n	6.6E+03	n					1.0E+02	n		4.6E+00	n		
											Lead Compounds																
			5.0E-01	C	1.5E-01	C				0.025	~Lead Chromate	7758-97-6	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c		c	c		
			8.5E-03	C	1.2E-05	C					~Lead Phosphate	7446-27-7	8.2E+01	c	3.8E+02	c	2.3E-01	c	1.0E+00	c	9.1E+00	c		c	c		
			8.5E-03	C	1.2E-05	C				0.1	~Lead acetate	301-04-2	6.4E+01	c	2.7E+02	c	2.3E-01	c	1.0E+00	c	9.2E+00	c		1.8E-03	c		
			8.5E-03	C	1.2E-05	C				0.1	~Lead and Compounds	7439-92-1	4.0E+02	c	8.0E+02	L	1.5E-01	L			1.5E+01	L	1.5E+01	L	1.4E+01	L	
											~Lead subacetate	1335-32-6	6.4E+01	c	2.7E+02	c	2.3E-01	c	1.0E+00	c	9.2E+00	c		2.0E-03	c	1.4E+01	
			1.0E-07	I						2.4E+00	~Tetraethyl Lead	78-00-2	7.8E-03	n	1.2E-01	n					1.3E-03	n		4.7E-06	n		
			5.0E-06	P						3.8E+02	Lewisite	541-25-3	3.9E-01	n	5.8E+00	n					9.0E-02	n		3.8E-05	n		
			7.7E-03	O				1	0.1		Linuron	330-55-2	4.9E+02	n	6.3E+03	n					1.3E+02	n		1.1E-01	n		
			2.0E-03	P				1			Lithium	7439-93-2	1.6E+02	n	2.3E+03	n					4.0E+01	n		1.2E+01	n		
			5.0E-04	I				1	0.1		MCPA	94-74-6	3.2E+01	n	4.1E+02	n					7.5E+00	n		2.0E-03	n		
			4.4E-03	O				1	0.1		MCPB	94-81-5	2.8E+02	n	3.6E+03	n					6.5E+01	n		2.6E-02	n		
			1.0E-03	I				1	0.1		MCPP	93-65-2	6.3E+01	n	8.2E+02	n					1.6E+01	n		4.7E-03	n		
			2.0E-02	I				1	0.1		Malathion	121-75-5	1.3E+03	n	1.6E+04	n					3.9E+02	n		1.0E-01	n		
			1.0E-01	I	7.0E-04	C		1	0.1		Maleic Anhydride	108-31-6	6.3E+03	n	8.0E+04	n	7.3E-01	n	3.1E+00	n	1.9E+03	n		3.8E-01	n		
			5.0E-01	I				1	0.1		Maleic Hydrazide	123-33-1	3.2E+04	n	4.1E+05	nm					1.0E+04	n		2.1E+00	n		
			1.0E-04	P				1	0.1		Malononitrile	109-77-3	6.3E+00	n	8.2E+01	n					2.0E+00	n		4.1E-04	n		
			3.0E-02	H				1	0.1		Mancozeb	8018-01-7	1.9E+03	n	2.5E+04	n					5.4E+02	n		7.6E-01	n		
			5.0E-03	I				1	0.1		Maneb	12427-38-2	3.2E+02	n	4.1E+03	n					9.8E+01	n		1.4E-01	n		
			1.4E-01	I	5.0E-05	I		1			Manganese (Diet)	7439-96-5	1.8E+03	n	2.6E+04	n	5.2E-02	n	2.2E-01	n	4.3E+02	n		2.8E+01	n		
			2.4E-02	S	5.0E-05	I		0.04			Manganese (Non-diet)	7439-96-5	1.8E+03	n	2.6E+04	n	5.2E-02	n	2.2E-01	n	4.3E+02	n		2.8E+01	n		
			9.0E-05	H				1	0.1		Mephosfolan	950-10-7	5.7E+00	n	7.4E+01	n					1.8E+00	n		2.6E-03	n		
			3.0E-02	I				1	0.1		Mepiquat Chloride	24307-26-4	1.9E+03	n	2.5E+04	n					6.0E+02	n		2.0E-01	n		
			4.0E-03	P				1	0.1		Mercaptobenzothiazole 2-	149-30-4	4.9E+01	c**	2.1E+02	c*					6.3E+00	c*		1.8E-02	c*		
			3.0E-04	I	3.0E-04	S		0.07		3.1E+00	Mercury Compounds	7487-94-7	2.3E+01	n	3.5E+02	n	3.1E-01	n	1.3E+00	n	5.7E+00	n	2.0E+00	3.3E-02	n	1.0E-01	
					3.0E-04	I	V	1			~Mercuric Chloride (and other Mercury salts)	7439-97-6	1.1E+01	ns	4.6E+01	ns	3.1E-01	n	1.3E+00	n	6.3E-01	n	2.0E+00	3.3E-02	n	1.0E-01	
			1.0E-04	I				1			~Methyl Mercury	22967-92-6	7.8E+00	n	1.2E+02	n					2.0E+00	n		n	n		
			8.0E-05	I				1	0.1		~Phenylmercuric Acetate	62-38-4	5.1E+00	n	6.6E+01	n					1.6E+00	n		5.0E-04	n		
			3.0E-05	I				1			Merphos	150-50-5	2.3E+00	n	3.5E+01	n					6.0E-01	n		5.9E-02	n		
			1.0E-04	O				1	0.1		Merphos Oxide	78-48-8	6.3E+00	n	8.2E+01	n					2.8E-01	n		1.4E-03	n		
			6.0E-02	I				1	0.1		Metalaxyl	57837-19-1	3.8E+03	n	4.9E+04	n					1.2E+03	n		3.3E-01	n		
			1.0E-04	I	3.0E-02	P	V	1		4.6E+03	Methacrylonitrile	126-98-7	7.5E+00	n	1.0E+02	n	3.1E+01	n	1.3E+02	n	1.9E+00	n		4.3E-04	n		
			5.0E-05	I				1	0.1		Methamidophos	10265-92-6	3.2E+00	n	4.1E+01	n					1.0E+00	n		2.1E-04	n		
			2.0E+00	I	2.0E+01	I	V	1		1.1E+05	Methanol	67-56-1	1.2E+05	nms	1.2E+06	nms	2.1E+04	n	8.8E+04	n	2.0E+04	n		4.1E+00	n		
			1.5E-03	O				1	0.1		Methidathion	950-37-8	9.5E+01	n	1.2E+03	n					2.9E+01	n		7.1E-03	n		
			2.5E-02	I				1	0.1		Methomyl	16752-77-5	1.6E+03	n	2.1E+04	n					5.0E+02	n		1.1E-01	n		
			5.0E-03	I				1	0.1		Methoxy-5-nitroaniline, 2-	99-59-2	1.1E+01	c	4.7E+01	c	2.0E-01	c	8.8E-01	c	1.5E+00	n		5.3E-04	c		
			5.0E-03	I				1	0.1		Methoxychlor	72-43-5	3.2E+02	n	4.1E+03	n					3.7E+01	n	4.0E+01	2.0E+00	n	2.2E+00	
			8.0E-03	P	1.0E-03	P	V	1		1.2E+05	Methoxyethanol Acetate, 2-	110-49-6	1.1E														

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #29); H = HEAST; F = See FAQ; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice); c = cancer; n = noncancer; * = where n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)																													
Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs			
SFO (mg/kg-day) ¹	K _e (y)	IUR (ug/m ³ -y) ¹	K _e (y)	RfD ₀ (mg/kg-day)	K _e (y)	RfC ₀ (mg/m ³)	K _e (y)	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	AnalYTE	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
4.6E-02	I	1.3E-05	C							0.1		Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	1.2E+01	c	5.0E+01	c	2.2E-01	c	9.4E-01	c	4.8E-01	c		2.6E-03	c			
1.6E+00	C	4.6E-04	C			2.0E-02	C		1	0.1		Methylenbisbenzenamine, 4,4'-	101-77-9	3.4E-01	c	1.4E+00	c	6.1E-03	c	2.7E-02	c	4.7E-02	c		2.1E-04	c			
						6.0E-04	I		1	0.1		Methylenediphenyl Diisocyanate	101-68-8	8.5E+05	nm	3.6E+06	nm	6.3E-01	n	2.6E+00	n								
				7.0E-02	H			V	1		5.0E+02	Methylstyrene, Alpha-	98-83-9	5.5E+03	ns	8.2E+04	ns					7.8E+02	n		1.2E+00	n			
				1.5E-01	I				1	0.1		Metolachlor	51218-45-2	9.5E+03	n	1.2E+05	nm					2.7E+03	n		3.2E+00	n			
				2.5E-02	I				1	0.1		Metribuzin	21087-64-9	1.6E+03	n	2.1E+04	n					4.9E+02	n		1.5E-01	n			
				2.5E-01	I				1	0.1		Metsulfuron-methyl	74223-64-6	1.6E+04	n	2.1E+05	nm					4.9E+03	n		1.9E+00	n			
1.8E+01	C	5.1E-03	C	3.0E+00	P			V	1		3.4E-01	Mineral oils	8012-95-1	2.3E+05	nms	3.5E+06	nms					6.0E+04	n		2.4E+03	n			
				2.0E-04	I				1			Mirex	2385-85-5	3.6E-02	c	1.7E-01	c	5.5E-04	c	2.4E-03	c	8.8E-04	c		6.3E-04	c			
				2.0E-03	I				1	0.1		Molinate	2212-67-1	1.3E+02	n	1.6E+03	n					3.0E+01	n		1.7E-02	n			
				5.0E-03	I				1			Molybdenum	7439-98-7	3.9E+02	n	5.8E+03	n					1.0E+02	n		2.0E+00	n			
				1.0E-01	I				1			Monochloramine	10599-90-3	7.8E+03	n	1.2E+05	nm					2.0E+03	n	4.0E+03			n		
				2.0E-03	P				1	0.1		Monomethylaniline	100-61-8	1.3E+02	n	1.6E+03	n					3.8E+01	n		1.4E-02	n			
				2.5E-02	I				1	0.1		Myclobutanil	88671-89-0	1.6E+03	n	2.1E+04	n					4.5E+02	n		5.6E+00	n			
				3.0E-04	X				1	0.1		N,N-Diphenyl-1,4-benzenediamine	74-31-7	1.9E+01	n	2.5E+02	n					3.6E+00	n		3.7E-01	n			
				2.0E-03	I			V	1			Naled	300-76-5	1.6E+02	n	2.3E+03	n					4.0E+01	n		1.8E-02	n			
1.8E+00	C	0.0E+00	C	3.0E-02	X	1.0E-01	P	V	1		0.1	Naphtha, High Flash Aromatic (HFAN)	64742-95-6	2.3E+03	n	3.5E+04	n	1.0E+02	n	4.4E+02	n	1.5E+02	n						
									1	0.1		Naphthylamine, 2-	91-59-8	3.0E-01	c	1.3E+00	c					3.9E-02	c		2.0E-04	c			
				1.2E-01	O				1	0.1		Napropamide	15299-99-7	7.6E+03	n	9.8E+04	n					2.0E+03	n		1.3E+01	n			
2.6E-04	C	1.1E-02	C	1.4E-05	C				1	0.1		Nickel Acetate	373-02-4	6.7E+02	n	8.1E+03	n	1.1E-02	c**	4.7E-02	c**	2.2E+02	n		4.5E-02	n			
2.6E-04	C	1.1E-02	C	1.4E-05	C				1	0.1		Nickel Carbonate	3333-67-3	6.7E+02	n	8.1E+03	n	1.1E-02	c**	4.7E-02	c**	2.2E+02	n						
2.6E-04	C	1.1E-02	C	1.4E-05	C	V			1			Nickel Carbonyl	13463-39-3	8.2E+02	n	1.1E+04	n	1.1E-02	c**	4.7E-02	c**	2.2E+02	c**			c**			
2.6E-04	C	1.1E-02	C	1.4E-05	C			0.04				Nickel Hydroxide	12054-48-7	8.2E+02	n	1.1E+04	n	1.1E-02	c**	4.7E-02	c**	2.0E+02	n			n			
2.6E-04	C	1.1E-02	C	1.4E-05	C			0.04				Nickel Oxide	1313-99-1	8.4E+02	n	1.2E+04	n	1.1E-02	c**	4.7E-02	c**	2.0E+02	n			n			
2.4E-04	I	1.1E-02	C	1.4E-05	C			0.04				Nickel Refinery Dust	E715532	8.2E+02	n	1.1E+04	n	1.2E-02	c**	5.1E-02	c**	2.2E+02	n		3.2E+01	n			
2.6E-04	C	2.0E-02	I	9.0E-05	A			0.04				Nickel Soluble Salts	7440-02-0	1.5E+03	n	2.2E+04	n	1.1E-02	c**	4.7E-02	c**	3.9E+02	n		2.6E+01	n			
1.7E+00	C	4.8E-04	I	1.1E-02	C	1.4E-05	C	0.04				Nickel Suboxide	12035-72-2	4.1E-01	c	1.9E+00	c	5.8E-03	c**	2.6E-02	c**	4.5E-02	c			c			
2.6E-04	C	1.1E-02	C	1.4E-05	C				1	0.1		Nickelocene	1271-28-9	6.7E+02	n	8.1E+03	n	1.1E-02	c**	4.7E-02	c**	2.2E+02	n			n			
				1.6E+00	I				1			Nitrate	14797-55-8	1.3E+05	nm	1.9E+06	nm					3.2E+04	n	1.0E+04	1.0E+04		n		
									1			Nitrate + Nitrite (as N)	E701177																
				1.0E-01	I				1			Nitrite	14797-65-0	7.8E+03	n	1.2E+05	nm					2.0E+03	n	1.0E+03			n		
2.0E-02	P			1.0E-02	X	5.0E-05	X		1	0.1		Nitroaniline, 2-	88-74-4	6.3E+02	n	8.0E+03	n	5.2E-02	n	2.2E-01	n	1.9E+02	n		8.0E-02	n			
				4.0E-03	P	6.0E-03	P		1	0.1		Nitroaniline, 4-	100-01-6	2.7E+01	c**	1.1E+02	c*	6.3E+00	n	2.6E+01	n	3.8E+00	c*		1.6E-03	c*			
		4.0E-05	I	2.0E-03	I	9.0E-03	I	V	1		3.1E+03	Nitrobenzene	98-95-3	5.1E+00	c*	2.2E+01	c*	7.0E-02	c	3.1E-01	c	1.4E-01	c*		9.2E-05	c*			
				3.0E+03	P				1	0.1		Nitrocellulose	9004-70-0	1.9E+08	nm	2.5E+09	nm					6.0E+07	n		1.3E+04	n			
				7.0E-02	H				1	0.1		Nitrofurantoin	67-20-9	4.4E+03	n	5.7E+04	n					1.4E+03	n		6.1E-01	n			
1.3E+00	C	3.7E-04	C						1	0.1		Nitrofurazone	59-87-0	4.2E-01	c	1.8E+00	c	7.6E-03	c	3.3E-02	c	6.0E-02	c		5.4E-05	c			
1.7E-02	P			1.0E-04	P				1	0.1		Nitroglycerin	55-63-0	6.3E+00	n	8.2E+01	n					2.0E+00	n		8.5E-04	n			
				1.0E-01	I				1	0.1		Nitroguanidine	556-88-7	6.3E+03	n	8.2E+04	n					2.0E+03	n		4.8E-01	n			
		8.8E-06	P			5.0E-03	P	V	1		1.8E+04	Nitromethane	75-52-5	5.4E+00	c*	2.4E+01	c*	3.2E-01	c*	1.4E+00	c*	6.4E-01	c*		1.4E-04	c*			
2.7E+01	C	7.7E-03	C	2.0E-02	I	V			1	0.1	4.9E+03	Nitropropane, 2-	79-46-9	1.4E-02	c	6.0E-02	c	1.0E-03	c	4.5E-03	c	2.1E-03	c		5.4E-07	c			
								M				Nitroso-N-ethylurea, N-	759-73-9	4.5E-03	c	8.5E-02	c	1.3E-04	c	1.6E-03	c	9.2E-04	c		2.2E-07	c			
1.2E+02	C	3.4E-02	C						1	0.1		Nitroso-N-methylurea, N-	684-93-5	1.0E-03	c	1.9E-02	c	3.0E-05	c	3.6E-04	c	2.1E-04	c		4.6E-08	c			
5.4E+00	I	1.6E-03	I					V	1			Nitroso-di-N-butylamine, N-	924-16-3	9.9E-02	c	4.6E-01	c	1.8E-03	c	7.7E-03	c	2.7E-03	c		5.5E-06	c			
7.0E+00	I	2.0E-03	C						1	0.1		Nitroso-di-N-propylamine, N-	621-64-7	7.8E-02	c	3.3E-01	c	1.4E-03	c	6.1E-03	c	1.1E-02	c		8.1E-06	c			
2.8E+00	I	8.0E-04	C						1	0.1		Nitrosodiethanolamine, N-	1116-54-7	1.9E-01	c	8.2E-01	c	3.5E-03	c	1.5E-02	c	2.8E-02	c		5.6E-06	c			
1.5E+02	I	4.3E-02	I						1	0.1		Nitrosodiethylamine, N-	55-18-5	8.1E-04	c	1.5E-02	c	2.4E-05	c	2.9E-04	c	1.7E-04	c		6.1E-08	c			
5.1E+01	I	1.4E-02	I	8.0E-06	P	4.0E-05	X	V	M	1	2.4E+05	Nitrosodimethylamine, N-	62-75-9	2.0E-03	c	3.4E-02	c	7.2E-05											

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels										Protection of Ground Water SSLs					
SFO (mg/kg-day) ¹	K _e y	IUR (ug/m ³ -y) ¹	K _e y	RfD _d (mg/kg-day)	K _e y	RfC _i (mg/m ³)	K _e y	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
4.0E-03	X			2.0E-03	P					1	0.1	Pentaerythritol tetranitrate (PETN)	78-11-5	1.3E+02	n	5.7E+02	c**					1.9E+01	c**		2.8E-02	c**			
				1.0E+00	P V					1		Pentane, n-	109-66-0	8.1E+02	ns	3.4E+03	ns	1.0E+03	n	4.4E+03	n	2.1E+03	n		1.0E+01	n			
				7.0E-04	I					1		Perchlorates		5.5E+01	n	8.2E+02	n					1.4E+01	n			n			
				7.0E-04	I					1		~Ammonium Perchlorate	7790-98-9	5.5E+01	n	8.2E+02	n					1.4E+01	n			n			
				7.0E-04	I					1		~Lithium Perchlorate	7791-03-9	5.5E+01	n	8.2E+02	n					1.4E+01	n			n			
				7.0E-04	I					1		~Perchlorate and Perchlorate Salts	14797-73-0	5.5E+01	n	8.2E+02	n					1.4E+01	n	1.5E+01(F)		n			
				7.0E-04	I					1		~Potassium Perchlorate	7778-74-7	5.5E+01	n	8.2E+02	n					1.4E+01	n			n			
				7.0E-04	I					1		~Sodium Perchlorate	7601-89-0	5.5E+01	n	8.2E+02	n					1.4E+01	n			n			
				2.0E-02	P					1	0.1	Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.3E+03	n	1.6E+04	n					4.0E+02	n		1.3E-01	n			
				2.0E-02	P					1	0.1	Perfluorobutanesulfonate	45187-15-3	1.3E+03	n	1.6E+04	n					4.0E+02	n		1.3E-01	n			
				5.0E-02	I					1	0.1	Permethrin	52645-53-1	3.2E+03	n	4.1E+04	n					1.0E+03	n		2.4E+02	n			
2.2E-03	C	6.3E-07	C							1	0.1	Phenacetin	62-44-2	2.5E+02	c	1.0E+03	c	4.5E+00	c	1.9E+01	c	3.4E+01	c		9.7E-03	c			
				2.4E-01	O					1	0.1	Phenmedipham	13684-63-4	1.5E+04	n	2.0E+05	nm					3.8E+03	n		2.1E+01	n			
				3.0E-01	I	2.0E-01	C			1	0.1	Phenol	108-95-2	1.9E+04	n	2.5E+05	nm	2.1E+02	n	8.8E+02	n	5.8E+03	n		3.3E+00	n			
				4.0E-03	I					1	0.1	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1	2.5E+02	n	3.3E+03	n					7.8E+01	n		2.5E-02	n			
				5.0E-04	X					1	0.1	Phenothiazine	92-84-2	3.2E+01	n	4.1E+02	n					4.3E+00	n		1.4E-02	n			
				2.0E-04	X			V		1		Phenyl Isothiocyanate	103-72-0	1.6E+01	n	2.3E+02	ns					2.6E+00	n		1.7E-03	n			
				6.0E-03	I					1	0.1	Phenylenediamine, m-	108-45-2	3.8E+02	n	4.9E+03	n					1.2E+02	n		3.2E-02	n			
1.2E-01	P			4.0E-03	P					1	0.1	Phenylenediamine, o-	95-54-5	4.5E+00	c*	1.9E+01	c					6.5E-01	c		1.7E-04	c			
				1.0E-03	X					1	0.1	Phenylenediamine, p-	106-50-3	6.3E+01	n	8.2E+02	n					2.0E+01	n		5.4E-03	n			
1.9E-03	H			2.0E-04	H					1	0.1	Phenylphenol, 2-	90-43-7	2.8E+02	c	1.2E+03	c					3.0E+01	c		4.1E-01	c			
						3.0E-04	I V			1	0.1	Phorate	298-02-2	1.3E+01	n	1.6E+02	n	3.1E-01	n	1.3E+00	n	3.0E+00	n		3.4E-03	n			
										1	0.1	Phosgene	75-44-5	3.1E-01	n	1.3E+00	n												
				2.0E-02	I					1	0.1	Phosmet	732-11-6	1.3E+03	n	1.6E+04	n					3.7E+02	n		8.2E-02	n			
				4.9E+01	P					1		Phosphates, Inorganic		3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Aluminum metaphosphate	13776-88-0	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Ammonium polyphosphate	68333-79-9	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Calcium pyrophosphate	7790-76-3	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Diammonium phosphate	7783-28-0	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Dicalcium phosphate	7757-93-9	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Dimagnesium phosphate	7782-75-4	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Dipotassium phosphate	7758-11-4	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Disodium phosphate	7558-79-4	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monoaluminum phosphate	13530-50-2	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monoammonium phosphate	7722-76-1	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monocalcium phosphate	7758-23-8	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monomagnesium phosphate	7757-86-0	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monopotassium phosphate	7778-77-0	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Monosodium phosphate	7558-80-7	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Polyphosphoric acid	8017-16-1	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Potassium tripolyphosphate	13845-36-8	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium acid pyrophosphate	7758-16-9	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium aluminum phosphate (acidic)	7785-88-8	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium aluminum phosphate (anhydrous)	10279-59-1	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium aluminum phosphate (tetrahydrate)	10305-76-7	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium hexametaphosphate	10124-56-8	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium polyphosphate	68915-31-1	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium trimetaphosphate	7785-84-4	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Sodium tripolyphosphate	7758-29-4	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Tetrapotassium phosphate	7320-34-5	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Tetrasodium pyrophosphate	7722-88-5	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Trialuminum sodium tetra decahydrogenoctaorthophosphate (dihydrate)	15136-87-5	3.8E+06	nm	5.7E+07	nm					9.7E+05	n			n			
				4.9E+01	P					1		~Tricalcium phosphate	7758-87-4	3.8E+06	nm	5.7E+07	nm					9.7E							

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Toxicity and Chemical-specific Information													Contaminant					Screening Levels										Protection of Ground Water SSLs	
SFO (mg/kg-day) ¹	K _e (y)	IUR (ug/m ³ -y) ¹	K _e (y)	RfD ₀ (mg/kg-day)	K _e (y)	RfC ₀ (mg/m ³)	K _e (y)	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyle	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
2.0E+00	S	5.7E-04	S					V	1	0.14		~Aroclor 1221	11104-28-2	2.0E-01	c	8.3E-01	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-05	c			
2.0E+00	S	5.7E-04	S					V	1	0.14		~Aroclor 1232	11141-16-5	1.7E-01	c	7.2E-01	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-05	c			
2.0E+00	S	5.7E-04	S					V	1	0.14		~Aroclor 1242	53469-21-9	2.3E-01	c	9.5E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		1.2E-03	c			
2.0E+00	S	5.7E-04	S					V	1	0.14		~Aroclor 1248	12672-29-6	2.3E-01	c	9.5E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		1.2E-03	c			
2.0E+00	S	5.7E-04	S	2.0E-05	I			V	1	0.14		~Aroclor 1254	11097-69-1	2.4E-01	c**	9.7E-01	c*	4.9E-03	c	2.1E-02	c	7.8E-03	c*		2.0E-03	c*			
2.0E+00	S	5.7E-04	S					V	1	0.14		~Aroclor 1260	11096-82-5	2.4E-01	c	9.9E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		5.5E-03	c			
				6.0E-04	X			V	1	0.14		~Aroclor 5460	11126-42-4	3.5E+01	n	4.4E+02	n					1.2E+01	n		2.0E+00	n			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189)	39635-31-9	1.3E-01	c*	5.2E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		2.8E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Hexachlorobiphenyl, 2,3',4,4',5,5'- (PCB 167)	52663-72-6	1.2E-01	c*	5.1E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.7E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Hexachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 157)	69782-90-7	1.2E-01	c*	5.0E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.7E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Hexachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 156)	38380-08-4	1.2E-01	c*	5.0E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.7E-03	c			
3.9E+03	E	1.1E+00	E	2.3E-08	E	1.3E-06	E	V	1	0.14		~Hexachlorobiphenyl, 3,3',4,4',5,5'- (PCB 169)	32774-16-6	1.2E-04	c*	5.1E-04	c*	2.5E-06	c	1.1E-05	c	4.0E-06	c		1.7E-06	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123)	65510-44-3	1.2E-01	c*	4.9E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.0E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118)	31508-00-6	1.2E-01	c*	4.9E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.0E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Pentachlorobiphenyl, 3,3',4,4',5,5'- (PCB 105)	32598-14-4	1.2E-01	c*	4.9E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.0E-03	c			
3.9E+00	E	1.1E-03	E	2.3E-05	E	1.3E-03	E	V	1	0.14		~Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114)	74472-37-0	1.2E-01	c*	5.0E-01	c*	2.5E-03	c	1.1E-02	c	4.0E-03	c		1.0E-03	c			
1.3E+04	E	3.8E+00	E	7.0E-09	E	4.0E-07	E	V	1	0.14		~Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126)	57465-28-8	3.6E-05	c*	1.5E-04	c*	7.4E-07	c	3.2E-06	c	1.2E-06	c		3.0E-07	c			
2.0E+00	I	5.7E-04	I					V	1	0.14		~Polychlorinated Biphenyls (high risk)	1336-36-3	2.3E-01	c	9.4E-01	c	4.9E-03	c	2.1E-02	c			5.0E-01	6.8E-03	c	7.8E-02		
4.0E-01	I	1.0E-04	I					V	1	0.14		~Polychlorinated Biphenyls (low risk)	1336-36-3					2.8E-02	c	1.2E-01	c	4.4E-02	c		5.0E-01				
7.0E-02	I	2.0E-05	I					V	1	0.14		~Polychlorinated Biphenyls (lowest risk)	1336-36-3					1.4E-01	c	6.1E-01	c			5.0E-01					
1.3E+01	E	3.8E-03	E	7.0E-06	E	4.0E-04	E	V	1	0.14		~Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77)	32598-13-3	3.8E-02	c*	1.6E-01	c*	7.4E-04	c	3.2E-03	c	6.0E-03	c*		9.4E-04	c*			
3.9E+01	E	1.1E-02	E	2.3E-06	E	1.3E-04	E	V	1	0.14		~Tetrachlorobiphenyl, 3,4,4',5- (PCB 81)	70362-50-4	1.2E-02	c*	4.8E-02	c*	2.5E-04	c	1.1E-03	c	4.0E-04	c		6.2E-05	c			
				6.0E-04	I				1	0.1		Polymeric Methylene Diphenyl Diisocyanate (PMDI)	9016-87-9	8.5E+05	nm	3.6E+06	nm	6.3E-01	n	2.6E+00	n								
				6.0E-02	I			V	1	0.13		Polynuclear Aromatic Hydrocarbons (PAHs)	83-32-9	3.6E+03	n	4.5E+04	n					5.3E+02	n		5.5E+00	n			
				3.0E-01	I			V	1	0.13		~Anthracene	120-12-7	1.8E+04	n	2.3E+05	nm					1.8E+03	n		5.8E+01	n			
1.0E-01	E	6.0E-05	E					V	M	1	0.13	~Benz[a]anthracene	56-55-3	1.1E+00	c	2.1E+01	c	1.7E-02	c	2.0E-01	c	3.0E-02	c		1.1E-02	c			
1.2E+00	C	1.1E-04	C						1	0.13		~Benzo[j]fluoranthene	205-82-3	4.2E-01	c	1.8E+00	c	2.6E-02	c	1.1E-01	c	6.5E-02	c		7.8E-02	c			
1.0E+00	I	6.0E-04	I	3.0E-04	I	2.0E-06	I	M	1	0.13		~Benzo[a]pyrene	50-32-8	1.1E-01	c	2.1E+00	c	1.7E-03	c**	8.8E-03	n	2.5E-02	c	2.0E-01	2.9E-02	c	2.4E-01		
1.0E-01	E	6.0E-05	E					M	1	0.13		~Benzo[b]fluoranthene	205-99-2	1.1E+00	c	2.1E+01	c	1.7E-02	c	2.0E-01	c	2.5E-01	c		3.0E-01	c			
1.0E-02	E	6.0E-06	E					M	1	0.13		~Benzo[k]fluoranthene	207-08-9	1.1E+01	c	2.1E+02	c	1.7E-01	c	2.0E+00	c	2.5E+00	c		2.9E+00	c			
				8.0E-02	I			V	1	0.13		~Chloronaphthalene, Beta-	91-58-7	4.8E+03	n	6.0E+04	n					7.5E+02	n		3.9E+00	n			
1.0E-03	E	6.0E-07	E					M	1	0.13		~Chrysene	218-01-9	1.1E+02	c	2.1E+03	c	1.7E+00	c	2.0E+01	c	2.5E+01	c		9.0E+00	c			
1.0E+00	E	6.0E-04	E					M	1	0.13		~Dibenz[a,h]anthracene	53-70-3	1.1E-01	c	2.1E+00	c	1.7E-03	c	2.0E-02	c	2.5E-02	c		9.6E-02	c			
1.2E+01	C	1.1E-03	C						1	0.13		~Dibenz[a,e]pyrene	192-65-4	4.2E-02	c	1.8E-01	c	2.6E-03	c	1.1E-02	c	6.5E-03	c		8.4E-02	c			
2.5E+02	C	7.1E-02	C						1	0.13		~Dimethylbenz[a]anthracene, 7,12-	57-97-6	4.6E-04	c	8.4E-03	c	1.4E-05	c	1.7E-04	c	1.0E-04	c		9.9E-05	c			
				4.0E-02	I				1	0.13		~Fluoranthene	206-44-0	2.4E+03	n	3.0E+04	n					8.0E+02	n		8.9E+01	n			
				4.0E-02	I			V	1	0.13		~Fluorene	86-73-7	2.4E+03	n	3.0E+04	n					2.9E+02	n		5.4E+00	n			
1.0E-01	E	6.0E-05	E					M	1	0.13		~Indeno[1,2,3-cd]pyrene	193-39-5	1.1E+00	c	2.1E+01	c	1.7E-02	c	2.0E-01	c	2.5E-01	c		9.8E-01	c			
2.9E-02	P			7.0E-02	A			V	1	0.13	3.9E+02	~Methylnaphthalene, 1-	90-12-0	1.8E+01	c	7.3E+01	c					1.1E+00	c		6.0E-03	c			
				4.0E-03	I			V	1	0.13		~Methylnaphthalene, 2-	91-57-6	2.4E+02	n	3.0E+03	n							3.6E+01	n	1.9E-01	n		
				2.0E-02	I	3.0E-03	I	V	1	0.13		~Naphthalene	91-20-3	3.8E+00	c*	1.7E+01	c*	8.3E-02	c*	3.6E-01	c*	1.7E-01	c*		5.4E-04	c*			
1.2E+00	C	1.1E-04	C						1	0.13		~Nitropyrene, 4-	57835-92-4	4.2E-01	c	1.8E+00	c	2.6E-02	c	1.1E-01	c	1.9E-02	c		3.3E-03	c			
				3.0E-02	I			V	1	0.13		~Pyrene	129-00-0	1.8E+03	n	2.3E+04	n					1.2E+02	n		1.3E+01	n			

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Toxicity and Chemical-specific Information											Contaminant		Screening Levels												Protection of Ground Water SSLs			
SFO (mg/kg-day) ¹	K _e (y)	IUR (ug/m ³ -y) ¹	RfD _d (mg/kg-day)	K _e (y)	RfC _i (mg/m ³)	K _e (y)	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)		
			1.4E-01	O				1	0.1		Sethoxydim	74051-80-2	8.8E+03	n	1.1E+05	nm					1.6E+03	n		1.4E+01	n			
			5.0E-03	I	3.0E-03	C		1		0.04	Silica (crystalline, respirable)	7631-86-9	4.3E+06	nm	1.8E+07	nm	3.1E+00	n	1.3E+01	n				8.0E-01	n			
											Silver	7440-22-4	3.9E+02	n	5.8E+03	n					9.4E+01	n						
1.2E-01	H		5.0E-03	I				1	0.1		Simazine	122-34-9	4.5E+00	c*	1.9E+01	c					6.1E-01	c	4.0E+00	3.0E-04	c	2.0E-03		
			1.3E-02	I				1	0.1		Sodium Acifluorfen	62476-59-9	8.2E+02	n	1.1E+04	n					2.6E+02	n		2.1E+00	n			
			4.0E-03	I				1			Sodium Azide	26628-22-8	3.1E+02	n	4.7E+03	n					8.0E+01	n						
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C	M	0.025		Sodium Dichromate	10588-01-9	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c						
2.7E-01	H		3.0E-02	I				1	0.1		Sodium Diethyldithiocarbamate	148-18-5	2.0E+00	c	8.5E+00	c					2.9E-01	c		1.8E-04	c			
			5.0E-02	A	1.3E-02	C		1			Sodium Fluoride	7681-49-4	3.9E+03	n	5.8E+04	n	1.4E+01	n	5.7E+01	n	1.0E+03	n						
			2.0E-05	I				1	0.1		Sodium Fluoroacetate	62-74-8	1.3E+00	n	1.6E+01	n					4.0E-01	n		8.1E-05	n			
			1.0E-03	H				1			Sodium Metavanadate	13718-26-8	7.8E+01	n	1.2E+03	n					2.0E+01	n						
			8.0E-04	P				1			Sodium Tungstate	13472-45-2	6.3E+01	n	9.3E+02	n					1.6E+01	n						
			8.0E-04	P				1			Sodium Tungstate Dihydrate	10213-10-2	6.3E+01	n	9.3E+02	n					1.6E+01	n						
2.4E-02	H		3.0E-02	I				1	0.1		Stirofos (Tetrachlorovinphos)	961-11-5	2.3E+01	c*	9.6E+01	c					2.8E+00	c		8.2E-03	c			
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C	M	0.025		Strontium Chromate	7789-06-2	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c						
			6.0E-01	I				1			Strontium, Stable	7440-24-6	4.7E+04	n	7.0E+05	nm					1.2E+04	n		4.2E+02	n			
			3.0E-04	I				1	0.1		Strychnine	57-24-9	1.9E+01	n	2.5E+02	n					5.9E+00	n		6.5E-02	n			
			2.0E-01	I	1.0E+00	I	V	1		8.7E+02	Styrene	100-42-5	6.0E+03	ns	3.5E+04	ns	1.0E+03	n	4.4E+03	n	1.2E+03	n	1.0E+02	1.3E+00	n	1.1E-01		
			3.0E-03	P				1	0.1		Styrene-Acrylonitrile (SAN) Trimer		1.9E+02	n	2.5E+03	n					4.8E+01	n						
			1.0E-03	P	2.0E-03	X		1	0.1		Sulfolane	126-33-0	6.3E+01	n	8.2E+02	n	2.1E+00	n	8.8E+00	n	2.0E+01	n		4.4E-03	n			
			8.0E-04	P				1	0.1		Sulfonylbis(4-chlorobenzene), 1,1'-	80-07-9	5.1E+01	n	6.8E+02	n					1.1E+01	n		6.5E-02	n			
					1.0E-03	C	V	1			Sulfur Trioxide	7446-11-9	1.4E+06	nm	6.0E+06	nm	1.0E+00	n	4.4E+00	n	2.1E+00	n						
2.5E-02	I	7.1E-06	I	5.0E-02	H			1	0.1		Sulfuric Acid	7664-93-9	1.4E+06	nm	6.0E+06	nm	1.0E+00	n	4.4E+00	n								
								1			Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	140-57-8	2.2E+01	c	9.2E+01	c	4.0E-01	c	1.7E+00	c	1.3E+00	c		1.5E-02	c			
			3.0E-02	H				1	0.1		TCMTB	21564-17-0	1.9E+03	n	2.5E+04	n					4.8E+02	n		3.3E+00	n			
			7.0E-02	I				1	0.1		Tebuthiuron	34014-18-1	4.4E+03	n	5.7E+04	n					1.4E+03	n		3.9E-01	n			
			2.0E-02	H				1	0.1		Temephos	3383-96-8	1.3E+03	n	1.6E+04	n					4.0E+02	n		7.6E-01	n			
			1.3E-02	I				1	0.1		Terbacil	5902-51-2	8.2E+02	n	1.1E+04	n					2.5E+02	n		7.5E-02	n			
			2.5E-05	H			V	1		3.1E+01	Terbufos	13071-79-9	2.0E+00	n	2.9E+01	n					2.4E-01	n		5.2E-04	n			
			1.0E-03	I				1	0.1		Terbutryn	886-50-0	6.3E+01	n	8.2E+02	n					1.3E+01	n		1.9E-02	n			
			1.0E-04	I				1	0.1		Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	5436-43-1	6.3E+00	n	8.2E+01	n					2.0E+00	n		5.3E-02	n			
2.6E-02	I	7.4E-06	I	3.0E-04	I		V	1			Tetrachlorobenzene, 1,2,4,5-	95-94-3	2.3E+01	n	3.5E+02	n					1.7E+00	n		7.9E-03	n			
			3.0E-02	I			V	1		6.8E+02	Tetrachloroethane, 1,1,1,2-	630-20-6	2.0E+00	c	8.8E+00	c	3.8E-01	c	1.7E+00	c	5.7E-01	c		2.2E-04	c			
2.0E-01	I	5.8E-05	C	2.0E-02	I		V	1		1.9E+03	Tetrachloroethane, 1,1,1,2,2,2-	79-34-5	6.0E-01	c	2.7E+00	c	4.8E-02	c	2.1E-01	c	7.6E-02	c	5.0E+00	3.0E-05	c			
2.1E-03	I	2.6E-07	I	6.0E-03	I	4.0E-02	I	V	1	1.7E+02	Tetrachloroethylene	127-18-4	2.4E+01	c**	1.0E+02	c**	1.1E+01	c**	4.7E+01	c**	1.1E+01	c**		5.1E-03	c**	2.3E-03		
			3.0E-02	I				1	0.1		Tetrachlorophenol, 2,3,4,6-	58-90-2	1.9E+03	n	2.5E+04	n					2.4E+02	n		1.8E-01	n			
2.0E+01	H		5.0E-04	I			V	1	0.1		Tetrachlorotoluene, p-alpha, alpha, alpha-	5216-25-1	3.5E-02	c	1.6E-01	c					1.3E-03	c		4.5E-06	c			
					8.0E+01	I	V	1		2.1E+03	Tetraethyl Dithiopyrophosphate	3689-24-5	3.2E+01	n	4.1E+02	n					7.1E+00	n		5.2E-03	n			
								1			Tetrafluoroethane, 1,1,1,2-	811-97-2	1.0E+05	nms	4.3E+05	nms	8.3E+04	n	3.5E+05	n	1.7E+05	n		9.3E+01	n			
			2.0E-03	P				1	0.0007		Tetryl (Trinitrophenylmethylnitramine)	479-45-8	1.6E+02	n	2.3E+03	n					3.9E+01	n		3.7E-01	n			
			2.0E-05	S				1			Thallic Oxide	1314-32-5	1.6E+00	n	2.3E+01	n					4.0E-01	n						
			1.0E-05	X				1			Thallium (I) Nitrate	10102-45-1	7.8E-01	n	1.2E+01	n					2.0E-01	n						
			1.0E-05	X				1			Thallium (Soluble Salts)	7440-28-0	7.8E-01	n	1.2E+01	n					2.0E-01	n	2.0E+00	1.4E-02	n	1.4E-01		
			1.0E-05	X			V	1			Thallium Acetate	563-68-8	7.8E-01	n	1.2E+01	n					2.0E-01	n		4.1E-05	n			
			2.0E-05	X			V	1			Thallium Carbonate	6533-73-9	1.6E+00	n	2.3E+01	n					4.0E-01	n		8.3E-05	n			
			1.0E-05	X				1			Thallium Chloride	7791-12-0	7.8E-01	n	1.2E+01	n					2.0E-01	n						
			1.0E-05	S				1			Thallium Selenite	12039-52-0	7.8E-01	n	1.2E+01	n					2.0E-01	n						
			2.0E-05	X				1			Thallium Sulfate	7446-18-6	1.6E+00	n	2.3E+01	n					4.0E-01	n						
			4.3E-02	O				1	0.1		Thiensiulfuron-methyl	79277-27-3	2.7E+03	n	3.5E+04	n					8.6E+02	n		2.6E-01	n			
			1.0E-02	I				1	0.1		Thiobencarb	28249-77-6	6.3E+02	n	8.2E+03	n					1.6E+02	n		5.5E-01	n			
			7.0E-02	X				1	0.0075		Thiodiglycol	111-48-8	5.4E+03	n	7.9E+04	n					1.4E+03	n		2.8E				

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Toxicity and Chemical-specific Information											Contaminant		Screening Levels											Protection of Ground Water SSLs				
SFO (mg/kg-day)	K _e y	IUR (ug/m ³ -y)	RfD _o (mg/kg-day)	K _e y	RfC _i (mg/m ³)	K _e y	o	muta- gen	GIABS	ABS	C _{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m ³)	key	Industrial Air (ug/m ³)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)	
9.0E-03	P	5.0E-03	I					V		1		Tribromobenzene, 1,2,4-	615-54-3	3.9E+02	n	5.8E+03	n					4.5E+01	n		6.4E-02	n		
		9.0E-03	X							1	0.1	Tribromophenol, 2,4,6-	118-79-6	5.7E+02	n	7.4E+03	n					1.2E+02	n		2.2E-01	n		
		1.0E-02	P							1	0.1	Tributyl Phosphate	126-73-8	6.0E+01	c*	2.6E+02	c*					5.2E+00	c*		2.5E-02	c*		
		3.0E-04	P							1	0.1	Tributyltin Compounds	E1790678	1.9E+01	n	2.5E+02	n					6.0E+00	n			n		
3.0E-04	I							1	0.1		Tributyltin Oxide	56-35-9	1.9E+01	n	2.5E+02	n					5.7E+00	n		2.9E+02	n			
7.0E-02	I										9.1E+02	Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	6.7E+03	ns	2.8E+04	ns	5.2E+03	n	2.2E+04	n	1.0E+04	n		2.6E+01	n		
2.9E-02	H									1	0.1	Trichloroacetic Acid	76-03-9	7.8E+00	c	3.3E+01	c					1.1E+00	c	6.0E+01	2.2E-04	c	1.2E-02	
										1	0.1	Trichloroaniline HCl, 2,4,6-	33663-50-2	1.9E+01	c	7.9E+01	c					2.7E+00	c		7.4E-03	c		
7.0E-03	X									1	0.1	Trichloroaniline, 2,4,6-	634-93-5	1.9E+00	n	2.5E+01	n					4.0E+01	n		3.6E-03	n		
2.9E-02	P	8.0E-04	X					V				Trichlorobenzene, 1,2,3-	87-61-6	6.3E+01	n	9.3E+02	n					7.0E+00	n		2.1E-02	n		
		1.0E-02	I	2.0E-03	P	V			1		4.0E+02	Trichlorobenzene, 1,2,4-	120-82-1	2.4E+01	c**	1.1E+02	c**	2.1E+00	n	8.8E+00	n	1.2E+00	c**	7.0E+01	3.4E-03	c**	2.0E-01	
5.7E-02	I	2.0E+00	I	5.0E+00	I	V					6.4E+02	Trichloroethane, 1,1,1-	71-55-6	8.1E+03	ns	3.6E+04	ns	5.2E+03	n	2.2E+04	n	8.0E+03	n	2.0E+02	2.8E+00	n	7.0E-02	
		4.0E-03	I	2.0E-04	X	V			1		2.2E+03	Trichloroethane, 1,1,2-	79-00-5	1.1E+00	c**	5.0E+00	c**	1.8E-01	c**	7.7E-01	c**	2.8E-01	c**	5.0E+00	8.9E-05	c**	1.6E-03	
4.6E-02	I	4.1E-06	I	5.0E-04	I	2.0E-03	I	V	M			6.9E+02	Trichloroethylene	79-01-6	9.4E-01	c**	6.0E+00	c**	4.8E-01	c**	3.0E+00	c**	4.9E-01	c**	5.0E+00	1.8E-04	c**	1.8E-03
1.1E-02	I	3.0E-01	I					V		1		1.2E+03	Trichlorofluoromethane	75-69-4	2.3E+04	ns	3.5E+05	nms					5.2E+03	n		3.3E+00	n	
		1.0E-01	I						1	0.1		Trichlorophenol, 2,4,5-	95-95-4	6.3E+03	n	8.2E+04	n					1.2E+03	n		4.0E+00	n		
		1.0E-03	P						1	0.1		Trichlorophenol, 2,4,6-	88-06-2	4.9E+01	c**	2.1E+02	c**	9.1E-01	c	4.0E+00	c	4.1E+00	c**		4.0E-03	c**		
		1.0E-02	I						1	0.1		Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	6.3E+02	n	8.2E+03	n					1.6E+02	n		6.8E-02	n		
3.0E+01	I	8.0E-03	I						1	0.1		Trichlorophenoxypropionic acid, -2,4,5	93-72-1	5.1E+02	n	6.6E+03	n					1.1E+02	n		6.1E-02	n	2.8E-02	
		5.0E-03	I					V		1	1.3E+03	Trichloropropane, 1,1,2-	598-77-6	3.9E+02	n	5.8E+03	ns					8.8E+01	n		3.5E-02	n		
		4.0E-03	I	3.0E-04	I	V	M			1	1.4E+03	Trichloropropane, 1,2,3-	96-18-4	5.1E-03	c	1.1E-01	c	3.1E-01	n	1.3E+00	n	7.5E-04	c		3.2E-07	c		
		3.0E-03	X	3.0E-04	P	V			1	3.1E+02	Trichloropropene, 1,2,3-	96-19-5	7.3E-01	n	3.1E+00	n	3.1E-01	n	1.3E+00	n	6.2E-01	n		3.1E-04	n			
2.0E-02	A							1	0.1		Tricresyl Phosphate (TCP)	1330-78-5	1.3E+03	n	1.6E+04	n					1.6E+02	n		1.5E+01	n			
7.7E-03	I	3.0E-03	I						1	0.1		Tridiphenylamine	58138-08-2	1.9E+02	n	2.5E+03	n					1.8E+01	n		1.3E-01	n		
		2.0E+00	P	7.0E-03	I	V			1	2.8E+04	Triethylene Glycol	121-44-8	1.2E+02	n	4.8E+02	n	7.3E+00	n	3.1E+01	n	1.5E+01	n		4.4E-03	n			
				2.0E+01	P	V			1	4.8E+03	Triphenylmethane, 1,1,1-	112-27-6	1.3E+05	nm	1.6E+06	nm					4.0E+04	n		8.8E+00	n			
		7.5E-03	I					V		1		Trifluoromethane, 1,1,1-	420-46-2	1.5E+04	ns	6.2E+04	ns	2.1E+04	n	8.8E+04	n	4.2E+04	n		1.3E+02	n		
2.0E-02	P	1.0E-02	P						1	0.1		Trifluralin	1582-09-8	9.0E+01	c**	4.2E+02	c*					2.6E+00	c*		8.4E-02	c*		
		1.0E-02	P						1			Trimethyl Phosphate	512-56-1	2.7E+01	c*	1.1E+02	c*					3.9E+00	c*		8.6E-04	c*		
3.0E-02	I	1.0E-02	I	6.0E-02	I	V				1	2.9E+02	Trimethylbenzene, 1,2,3-	526-73-8	3.4E+02	ns	2.0E+03	ns	6.3E+01	n	2.6E+02	n	5.5E+01	n		8.1E-02	n		
		1.0E-02	I	6.0E-02	I	V			1	2.2E+02	Trimethylbenzene, 1,2,4-	95-63-6	3.0E+02	ns	1.8E+03	ns	6.3E+01	n	2.6E+02	n	5.6E+01	n		8.1E-02	n			
		1.0E-02	I	6.0E-02	I	V			1	1.8E+02	Trimethylbenzene, 1,3,5-	108-67-8	2.7E+02	ns	1.5E+03	ns	6.3E+01	n	2.6E+02	n	5.6E+01	n		8.7E-02	n			
		1.0E-02	X					V		1	3.0E+01	Trimethylpentane, 2,4,4-	25167-70-8	7.8E+02	ns	1.2E+04	ns					6.5E+01	n		2.2E-01	n		
3.0E-02	I	3.0E-02	I						1	0.019		Trinitrobenzene, 1,3,5-	99-35-4	2.2E+03	n	3.2E+04	n					5.9E+02	n		2.1E+00	n		
		5.0E-04	I						1	0.032		Trinitrotoluene, 2,4,6-	118-96-7	2.1E+01	c**	9.6E+01	c**					2.5E+00	c**		1.5E-02	c**		
		2.0E-02	P						1	0.1		Triphenylphosphine Oxide	791-28-6	1.3E+03	n	1.6E+04	n					3.6E+02	n		1.5E+00	n		
		2.0E-02	A						1	0.1		Tris(1,3-Dichloro-2-propyl) Phosphate	13674-87-8	1.3E+03	n	1.6E+04	n					3.6E+02	n		8.0E+00	n		
3.2E-03	P	1.0E-01	P						1	0.1		Tris(1-chloro-2-propyl)phosphate	13674-84-5	6.3E+02	n	8.2E+03	n					1.9E+02	n		6.5E-01	n		
1.0E+00	C	2.3E+00	C	6.6E-04	C			V		1	4.7E+02	Tris(2,3-dibromopropyl)phosphate	126-72-7	2.8E-01	c	1.3E+00	c	4.3E-03	c	1.9E-02	c	6.8E-03	c		1.3E-04	c		
		2.0E-02	P	7.0E-03	P				1	0.1		Tris(2-chloroethyl)phosphate	115-96-8	2.7E+01	c*	1.1E+02	c*					3.8E+00	c*		3.8E-03	c*		
		3.2E-03	P	1.0E-01	P				1	0.1		Tris(2-ethylhexyl)phosphate	78-42-2	1.7E+02	c*	7.2E+02	c					2.4E+01	c*		1.2E+02	c*		
		8.0E-04	P						1			Tungsten	7440-33-7	6.3E+01	n	9.3E+02	n					1.6E+01	n		2.4E+00	n		
1.0E+00	C	2.0E-04	A	4.0E-05	A				1			Uranium (Soluble Salts)	E715565	1.6E+01	n	2.3E+02	n	4.2E-02	n	1.8E-01	n	4.0E+00	n	3.0E+01	1.8E+00	n	1.4E+01	
		1.0E+00	C	2.9E-04	C			M	1	0.1		Urethane	51-79-6	1.2E-01	c	2.3E+00	c	3.5E-03	c	4.2E-02	c	2.5E-02	c		5.6E-06	c		
		8.3E-03	P	9.0E-03	I	7.0E-06	P			0.026		Vanadium Pentoxide	1314-62-1	4.6E+02	c**	2.0E+03	c**	3.4E-04	c*	1.5E-03	c*	1.5E+02	n			n		
		5.0E-03	S	1.0E-04	A				0.026			Vanadium and Compounds	7440-62-2	3.9E+02	n	5.8E+03	n	1.0E-01	n	4.4E-01	n	8.6E+01	n		8.6E+01	n		
1.0E-03	I					V		1			Vernolate	1929-77-7	7.8E+01	n	1.2E+03	n					1.1E+01	n		8.9E-03	n			
7.2E-01	I	1.2E-03	O						1	0.1		Vinclozolin	50471-44-8	7.6E+01	n	9.8E+02	n					2.1E+01	n		1.6E-02	n		
		3.2E-05	H	1.0E+00	H	2.0E-01	I	V			2.8E+03	Vinyl Acetate	108-05-4	9.1E+02	n	3.8E+03	ns	2.1E+02	n	8.8E+02	n	4.1E+02	n		8.7E-02	n		
		3.0E-04	I						1		2.5E+03	Vinyl Bromide	593-60-2	1.2E-01	c*	5.2E-01	c*	8.8E-02	c*	3.8E-01								

NSW EPA

Waste Classification
Guidelines
Part 1: Classifying waste

November 2014

Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test

For disposal requirements for organic and inorganic chemical contaminants not listed below, contact the EPA. Aluminium, barium, boron, chromium (0 and III oxidation states), cobalt, copper, iron, manganese, vanadium and zinc have not been listed with values in this table and need not be tested for.

Contaminant	Maximum values of <i>specific contaminant concentration (SCC)</i> for classification without TCLP		CAS Registry Number
	General solid waste ¹	Restricted solid waste	
	CT1 (mg/kg)	CT2 (mg/kg)	
Arsenic	100	400	
Benzene	10	40	71-43-2
Benzo(a)pyrene ²	0.8	3.2	50-32-8
Beryllium	20	80	
Cadmium	20	80	
Carbon tetrachloride	10	40	56-23-5
Chlorobenzene	2,000	8,000	108-90-7
Chloroform	120	480	67-66-3
Chlorpyrifos	4	16	2921-88-2
Chromium (VI) ³	100	400	
m-Cresol	4,000	16,000	108-39-4
o-Cresol	4,000	16,000	95-48-7
p-Cresol	4,000	16,000	106-44-5
Cresol (total)	4,000	16,000	1319-77-3
Cyanide (amenable) ⁴	70	280	
Cyanide (total)	320	1,280	
2,4-D	200	800	94-75-7
1,2-Dichlorobenzene	86	344	95-50-1
1,4-Dichlorobenzene	150	600	106-46-7
1,2-Dichloroethane	10	40	107-06-2
1,1-Dichloroethylene	14	56	75-35-4
Dichloromethane	172	688	75-09-2
2,4-Dinitrotoluene	2.6	10.4	121-14-2
Endosulfan ⁵	60	240	See below ⁵
Ethylbenzene	600	2,400	100-41-4
Fluoride	3,000	12,000	
Fluroxypyr	40	160	69377-81-7
Lead	100	400	

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Contaminant	Maximum values of <i>specific contaminant concentration (SCC)</i> for classification without TCLP		CAS Registry Number
	General solid waste ¹	Restricted solid waste	
	CT1 (mg/kg)	CT2 (mg/kg)	
Mercury	4	16	
Methyl ethyl ketone	4,000	16,000	78-93-3
Moderately harmful pesticides ⁶ (total)	250	1,000	See below ⁶
Molybdenum	100	400	
Nickel	40	160	
Nitrobenzene	40	160	98-95-3
C6–C9 petroleum hydrocarbons ⁷	650	2,600	
C10–C36 petroleum hydrocarbons ⁷	10,000	40,000	
Phenol (non-halogenated)	288	1,152	108-95-2
Picloram	60	240	1918-02-1
Plasticiser compounds ⁸	20	80	See below ⁸
Polychlorinated biphenyls ⁹	<50	<50	1336-36-3
Polycyclic aromatic hydrocarbons (total) ¹⁰	200	800	
Scheduled chemicals ¹¹	<50	<50	
Selenium	20	80	
Silver	100	400	
Styrene (vinyl benzene)	60	240	100-42-5
Tebuconazole	128	512	107534-96-3
1,2,3,4-Tetrachlorobenzene	10	40	634-66-2
1,1,1,2-Tetrachloroethane	200	800	630-20-6
1,1,2,2-Tetrachloroethane	26	104	79-34-5
Tetrachloroethylene	14	56	127-18-4
Toluene	288	1,152	108-88-3
1,1,1-Trichloroethane	600	2,400	71-55-6
1,1,2-Trichloroethane	24	96	79-00-5
Trichloroethylene	10	40	79-01-6
2,4,5-Trichlorophenol	8,000	32,000	95-95-4
2,4,6-Trichlorophenol	40	160	88-06-2
Triclopyr	40	160	55335-06-3

Waste Classification Guidelines – Part 1: Classification of waste

Contaminant	Maximum values of <i>specific contaminant concentration (SCC)</i> for classification without TCLP		CAS Registry Number
	General solid waste ¹	Restricted solid waste	
	CT1 (mg/kg)	CT2 (mg/kg)	
Vinyl chloride	4	16	75-01-4
Xylenes (total)	1,000	4,000	1330-20-7

Notes

- Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible).
- There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence.
- These limits apply to chromium in the +6 oxidation state only.
- Analysis for cyanide (amenable) is the established method for assessing potentially leachable cyanide. The EPA may consider other methods if it can be demonstrated that these methods yield the same information.
- Endosulfan (CAS Registry Number 115-29-7) means the total of Endosulfan I (CAS Registry Number 959-98-8), Endosulfan II (CAS Registry Number 891-86-1) and Endosulfan sulfate (CAS Registry Number 1031-07-8).
- The following moderately harmful pesticides are to be included in the total values specified:

Moderately harmful pesticides (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Atrazine	1912-24-9	Imidacloprid	138261-41-3
Azoxystrobin	131860-33-8	Indoxacarb	173584-44-6
Bifenthrin	82657-04-3	Malathion (Maldison)	121-75-5
Brodifacoum	56073-10-0	Metalaxyl	57837-19-1
Carboxin	5234-68-4	Metalaxyl-M	70630-17-0
Copper naphthenate	1338-02-9	Methidathion	950-37-8
Cyfluthrin	68359-37-5	3-Methyl-4-chlorophenol	59-50-7
Cyhalothrin	68085-85-8	Methyl chlorpyrifos	5598-13-0
Cypermethrin	52315-07-08	N-Methyl pyrrolidone	872-50-4
Deltamethrin	52918-63-5	2-octylthiazol-3-one	26530-20-1
Dichlofluanid	1085-98-9	Oxyfluorfen	42874-03-3
Dichlorvos	62-73-7	Paraquat dichloride	1910-42-5
Difenoconazole	119446-68-3	Parathion methyl	298-00-0
Dimethoate	60-51-5	Permethrin	52645-53-1
Diquat dibromide	85-00-7	Profenofos	41198-08-7
Emamectin benzoate	137515-75-4 & 155569-91-8	Prometryn	7287-19-6
Ethion	563-12-2	Propargite	2312-35-8
Fenthion	55-38-9	Pentachloronitrobenzene (Quintozone)	82-68-8
Fenitrothion	122-14-5	Simazine	122-34-9
Fipronil	120068-37-3	Thiabendazole	148-79-8

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Moderately harmful pesticides (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Fluazifop-P-butyl	79241-46-6	Thiamethoxam	153719-23-4
Fludioxonil	131341-86-1	Thiodicarb	59669-26-0
Glyphosate	1071-83-6	Thiram	137-26-8

7. Approximate range of petroleum hydrocarbon fractions: petrol C6–C9, kerosene C10–C18, diesel C12–C18, and lubricating oils above C18. Laboratory results are reported as four different fractions: C6–C9, C10–C14, C15–C28 and C29–C36. The results of total petroleum hydrocarbons (TPH) (C10–C36) analyses are reported as a sum of the relevant three fractions. Please note that hydrocarbons are defined as molecules that only contain carbon and hydrogen atoms. Prior to TPH (C10–C36) analysis, clean-up may be necessary to remove non-petroleum hydrocarbon compounds. Where the presence of other materials that will interfere with the analysis may be present, such as oils and fats from food sources, you are advised to treat the extract that has been solvent exchanged to hexane with silica gel as described in *USEPA Method 1664A* (USEPA 2000).
8. Plasticiser compounds means the total of di-2-ethyl hexyl phthalate (CAS Registry Number 117-81-7) and di-2-ethyl hexyl adipate (CAS Registry Number 103-23-1) contained within a waste.
9. Polychlorinated biphenyls must be managed in accordance with the EPA's polychlorinated biphenyl (PCB) chemical control order 1997, which is available on the EPA website at www.epa.nsw.gov.au/resources/pesticides/pcbcco1997.pdf.
10. The following polycyclic aromatic hydrocarbons (PAHs) are assessed as the total concentration of 16 USEPA Priority Pollutant PAHs, as follows:

Polycyclic aromatic hydrocarbons (total)			
PAH name	CAS Registry Number	PAH name	CAS Registry Number
Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Naphthalene	91-20-3
Benzo(ghi)perylene	191-24-2	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	129-00-0

11. Scheduled chemicals must be managed in accordance with the EPA's scheduled chemical wastes chemical control order 2004, which is available on the EPA website at www.epa.nsw.gov.au/resources/pesticides/scwcco2004.pdf.

The following scheduled chemicals are to be included in the total values specified:

Scheduled chemicals (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Aldrin	309-00-2	Heptachlor	76-44-8
Alpha-BHC	319-84-6	Heptachlor epoxide	1024-57-3
Beta-BHC	319-85-7	Hexachlorobenzene	118-74-1
Gamma-BHC (Lindane)	58-89-9	Hexachlorophene	70-30-4
Delta-BHC	319-86-8	Isodrin	465-73-6

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Scheduled chemicals (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Chlordane	57-74-9	Pentachlorobenzene	608-93-5
DDD	72-54-8	Pentachloronitrobenzene	82-68-8
DDE	72-55-9	Pentachlorophenol	87-86-5
DDT	50-29-3	1,2,4,5-Tetrachlorobenzene	95-94-3
Dieldrin	60-57-1	2,3,4,6-Tetrachlorophenol	58-90-2
Endrin	72-20-8	1,2,4-Trichlorobenzene	120-82-1
Endrin aldehyde	7421-93-4	2,4,5-Trichlorophenoxyacetic acid, salts and esters	93-76-5

Table 2: TCLP and SCC values for classifying waste by chemical assessment

For disposal requirements for organic and inorganic chemical contaminants not listed below, contact the EPA. Aluminium, barium, boron, chromium (0 and III oxidation states), cobalt, copper, iron, manganese, vanadium and zinc have not been listed with values in this table and need not be tested for.

Contaminant	Maximum values for <i>leachable concentration</i> and <i>specific contaminant concentration</i> when used together				CAS Registry Number
	General solid waste ¹		Restricted solid waste		
	Leachable concentration	Specific contaminant concentration	Leachable concentration	Specific contaminant concentration	
	TCLP1 (mg/L)	SCC1 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)	
Arsenic	5.0 ²	500	20	2,000	
Benzene	0.5 ²	18	2	72	71-43-2
Benzo(a)pyrene ³	0.04 ⁴	10	0.16	23	50-32-8
Beryllium	1.0 ⁵	100	4	400	
Cadmium	1.0 ²	100	4	400	
Carbon tetrachloride	0.5 ²	18	2	72	56-23-5
Chlorobenzene	100 ²	3,600	400	14,400	108-90-7
Chloroform	6 ²	216	24	864	67-66-3
Chlorpyrifos	0.2	7.5	0.8	30	2921-88-2
Chromium (VI) ⁶	5 ²	1,900	20	7,600	
m-Cresol	200 ²	7,200	800	28,800	108-39-4
o-Cresol	200 ²	7,200	800	28,800	95-48-7
p-Cresol	200 ²	7,200	800	28,800	106-44-5
Cresol (total)	200 ²	7,200	800	28,800	1319-77-3
Cyanide (amenable) ^{7, 8}	3.5 ⁷	300	14	1,200	
Cyanide (total) ⁷	16 ⁷	5,900	64	23,600	
2,4-D	10 ²	360	40	1,440	94-75-7
1,2-Dichlorobenzene	4.3 ²	155	17.2	620	95-50-1
1,4-Dichlorobenzene	7.5 ²	270	30	1,080	106-46-7
1,2-Dichloroethane	0.5 ²	18	2	72	107-06-2
1,1-Dichloroethylene	0.7 ²	25	2.8	100	75-35-4
Dichloromethane	8.6 ²	310	34.4	1,240	75-09-2
2,4-Dinitrotoluene	0.13 ²	4.68	0.52	18.7	121-14-2
Endosulfan ⁹	3	108	12	432	See below ⁹

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Contaminant	Maximum values for <i>leachable concentration</i> and <i>specific contaminant concentration</i> when used together				CAS Registry Number
	General solid waste ¹		Restricted solid waste		
	Leachable concentration	Specific contaminant concentration	Leachable concentration	Specific contaminant concentration	
	TCLP1 (mg/L)	SCC1 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)	
Ethylbenzene	30 ¹⁰	1,080	120	4,320	100-41-4
Fluoride	150 ¹⁰	10,000	600	40,000	
Fluroxypyr	2	75	8	300	69377-81-7
Lead	5 ²	1,500	20	6,000	
Mercury	0.2 ²	50	0.8	200	
Methyl ethyl ketone	200 ²	7,200	800	28,800	78-93-3
Moderately harmful pesticides ¹¹ (total)	N/A ¹²	250	N/A ¹²	1,000	See below ¹¹
Molybdenum	5 ¹⁰	1,000	20	4,000	
Nickel	2 ¹⁰	1,050	8	4,200	
Nitrobenzene	2 ²	72	8	288	98-95-3
C6–C9 petroleum hydrocarbons ¹³	N/A ¹²	650	N/A ¹²	2,600	
C10–C36 petroleum hydrocarbons ¹³	N/A ¹²	10,000	N/A ¹²	40,000	
Phenol (non-halogenated)	14.4 ¹⁴	518	57.6	2,073	108-95-2
Picloram	3	110	12	440	1918-02-1
Plasticiser compounds ¹⁵	1	600	4	2,400	See below ¹⁵
Polychlorinated biphenyls ¹²	N/A ¹²	< 50	N/A ¹²	< 50	1336-36-3
Polycyclic aromatic hydrocarbons (total) ¹⁶	N/A ¹²	200	N/A ¹²	800	
Scheduled chemicals ¹⁷	N/A ¹²	< 50	N/A ¹²	< 50	See below ¹⁷
Selenium	1 ²	50	4	200	
Silver	5.0 ²	180	20	720	
Styrene (vinyl benzene)	3 ¹⁰	108	12	432	100-42-5
Tebuconazole	6.4	230	25.6	920	107534-96-3
1,2,3,4-Tetrachlorobenzene	0.5	18	2	72	634-66-2

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Contaminant	Maximum values for <i>leachable concentration</i> and <i>specific contaminant concentration</i> when used together				CAS Registry Number
	General solid waste ¹		Restricted solid waste		
	Leachable concentration	Specific contaminant concentration	Leachable concentration	Specific contaminant concentration	
	TCLP1 (mg/L)	SCC1 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)	
1,1,1,2-Tetrachloroethane	10 ²	360	40	1,440	630-20-6
1,1,2,2-Tetrachloroethane	1.3 ²	46.8	5.2	187.2	79-34-5
Tetrachloroethylene	0.7 ²	25.2	2.8	100.8	127-18-4
Toluene	14.4 ¹⁴	518	57.6	2,073	108-88-3
1,1,1-Trichloroethane	30 ²	1,080	120	4,320	71-55-6
1,1,2-Trichloroethane	1.2 ²	43.2	4.8	172.8	79-00-5
Trichloroethylene	0.5 ²	18	2	72	79-01-6
2,4,5-Trichlorophenol	400 ²	14,400	1,600	57,600	95-95-4
2,4,6-Trichlorophenol	2 ²	72	8	288	88-06-2
Triclopyr	2	75	8	300	55335-06-3
Vinyl chloride	0.2 ²	7.2	0.8	28.8	75-01-4
Xylenes (total)	50 ¹⁸	1,800	200	7,200	1330-20-7

Notes

- Values are the same for general solid waste (putrescible) and general solid waste (non- putrescible).
- See *Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule* (USEPA 2012b) for TCLP levels.
- There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence.
- Calculated from *Hazardous Waste: Identification and Listing* (USEPA 2012a).
- Calculated from 'Beryllium' in *The Health Risk Assessment and Management of Contaminated Sites* (DiMarco & Buckett 1996).
- These limits apply to chromium in the +6 oxidation state only.
- Taken from the *Land Disposal Restrictions for Newly Identified and Listed Hazardous Wastes and Hazardous Soil: Proposed Rule* (USEPA 1993).
- Analysis for cyanide (amenable) is the established method used to assess the potentially leachable cyanide. The EPA may consider other methods if it can be demonstrated that these methods yield the same information.
- Endosulfan (CAS Registry Number 115-29-7) means the total of endosulfan I (CAS Registry Number 959-98-8), endosulfan II (CAS Registry Number 891-86-1) and endosulfan sulfate (CAS Registry Number 1031-07-8).
- Calculated from *Australian Drinking Water Guidelines* (NHMRC 2011).
- The following moderately harmful pesticides are to be included in the total values specified:

Waste Classification Guidelines – Part 1: Classification of waste

Moderately harmful pesticides (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Atrazine	1912-24-9	Imidacloprid	138261-41-3
Azoxystrobin	131860-33-8	Indoxacarb	173584-44-6
Bifenthrin	82657-04-3	Malathion (Maldison)	121-75-5
Brodifacoum	56073-10-0	Metalaxyl	57837-19-1
Carboxin	5234-68-4	Metalaxyl-M	70630-17-0
Copper naphthenate	1338-02-9	Methidathion	950-37-8
Cyfluthrin	68359-37-5	3-Methyl-4-chlorophenol	59-50-7
Cyhalothrin	68085-85-8	Methyl chlorpyrifos	5598-13-0
Cypermethrin	52315-07-08	N-Methyl pyrrolidone	872-50-4
Deltamethrin	52918-63-5	2-octylthiazol-3-one	26530-20-1
Dichlofluanid	1085-98-9	Oxyfluorfen	42874-03-3
Dichlorvos	62-73-7	Paraquat dichloride	1910-42-5
Difenoconazole	119446-68-3	Parathion methyl	298-00-0
Dimethoate	60-51-5	Permethrin	52645-53-1
Diquat dibromide	85-00-7	Profenofos	41198-08-7
Emamectin benzoate	137515-75-4 & 155569-91-8	Prometryn	7287-19-6
Ethion	563-12-2	Propargite	2312-35-8
Fenthion	55-38-9	Pentachloronitrobenzene (Quintozone)	82-68-8
Fenitrothion	122-14-5	Simazine	122-34-9
Fipronil	120068-37-3	Thiabendazole	148-79-8
Fluazifop-P-butyl	79241-46-6	Thiamethoxam	153719-23-4
Fludioxonil	131341-86-1	Thiodicarb	59669-26-0
Glyphosate	1071-83-6	Thiram	137-26-8

12. No TCLP analysis is required. Moderately harmful pesticides, petroleum hydrocarbons, polychlorinated biphenyls, polycyclic aromatic hydrocarbons and scheduled chemicals are assessed using SCC1 and SCC2.

Polychlorinated biphenyls must be managed in accordance with the EPA's polychlorinated biphenyl (PCB) chemical control order 1997, which is available on the EPA website at www.epa.nsw.gov.au/resources/pesticides/pcbcco1997.pdf.

13. Approximate range of petroleum hydrocarbon fractions: petrol C6–C9, kerosene C10–C18, diesel C12–C18, and lubricating oils above C18. Laboratory results are reported as four different fractions: C6–C9, C10–C14, C15–C28 and C29–C36. The results of total petroleum hydrocarbons (C10–C36) analyses are reported as a sum of the relevant three fractions. Please note that hydrocarbons are defined as molecules that only contain carbon and hydrogen atoms. Prior to TPH (C10–C36) analysis, clean-up may be necessary to remove non-petroleum hydrocarbon compounds. Where the presence of other materials that will interfere with the analysis may be present, such as oils and fats from food sources, you are advised to treat the extract that has been solvent exchanged to hexane with silica gel as described in USEPA *Method 1664A* (USEPA 2000).
14. Proposed level for phenol and toluene in *Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule* (USEPA 2012b).

Waste Classification Guidelines – Part 1: Classification of waste

15. Plasticiser compounds means the total of di-2-ethyl hexyl phthalate (CAS Registry Number 117-81-7) and di-2-ethyl hexyl adipate (CAS Registry Number 103-23-1) contained within a waste.
16. The following polycyclic aromatic hydrocarbons are assessed as the total concentration of 16 USEPA Priority Pollutant PAHs, as follows:

Polycyclic aromatic hydrocarbons (total)			
PAH name	CAS Registry Number	PAH name	CAS Registry Number
Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Naphthalene	91-20-3
Benzo(ghi)perylene	191-24-2	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	129-00-0

17. Scheduled chemicals must be managed in accordance with the EPA's scheduled chemical wastes chemical control order 2004, which is available on the EPA website at www.epa.nsw.gov.au/resources/pesticides/scwcco2004.pdf.

The following scheduled chemicals are to be included in the total values specified:

Scheduled chemicals (total)			
Name	CAS Registry Number	Name	CAS Registry Number
Aldrin	309-00-2	Heptachlor	76-44-8
Alpha-BHC	319-84-6	Heptachlor epoxide	1024-57-3
Beta-BHC	319-85-7	Hexachlorobenzene	118-74-1
Gamma-BHC (Lindane)	58-89-9	Hexachlorophene	70-30-4
Delta-BHC	319-86-8	Isodrin	465-73-6
Chlordane	57-74-9	Pentachlorobenzene	608-93-5
DDD	72-54-8	Pentachloronitrobenzene	82-68-8
DDE	72-55-9	Pentachlorophenol	87-86-5
DDT	50-29-3	1,2,4,5-Tetrachlorobenzene	95-94-3
Dieldrin	60-57-1	2,3,4,6-Tetrachlorophenol	58-90-2
Endrin	72-20-8	1,2,4-Trichlorobenzene	120-82-1
Endrin aldehyde	7421-93-4	2,4,5-Trichlorophenoxyacetic acid, salts and esters	93-76-5

18. Calculated from *Guidelines for Drinking Water Quality* (WHO 2011).

Table 3: Summary of criteria for chemical assessment to determine waste classification

Waste classification	Criteria¹ for classification by chemical assessment (any of the alternative options given)	Comments
General solid waste	1. SCC test values $\leq$ CT1	TCLP test not required
	2. TCLP test values $\leq$ TCLP1 and SCC test values $\leq$ SCC1	
	3. TCLP test values $\leq$ TCLP1 and SCC test values $>$ SCC1 ²	Classify as restricted solid or hazardous (as applicable) If immobilisation approval applies, classify in accordance with that approval
Restricted solid waste	1. SCC test values $\leq$ CT2	TCLP test not required
	2. TCLP1 $<$ TCLP test values $\leq$ TCLP2 and SCC test values $\leq$ SCC2	
	3. TCLP test values $\leq$ TCLP2 and SCC1 $<$ SCC test values $\leq$ SCC2	
	4. TCLP1 $<$ TCLP test values $\leq$ TCLP2 and SCC test values $>$ SCC2 ²	Classify as hazardous. If immobilisation approval applies, classify in accordance with that approval
Hazardous waste	1. TCLP test values $>$ TCLP 2	
	2. TCLP test values $\leq$ TCLP2 and SCC test values $>$ SCC2	Classify as hazardous if no immobilization approval applies

Notes

1. These criteria apply to each toxic and ecotoxic contaminant present in the waste (see Tables 1 and 2).
2. In certain cases the EPA will consider specific conditions, such as segregation of the waste from all other types of waste in a monofill or monocell in order to achieve a greater margin of safety against a possible failure of the immobilisation in the future. Information about the construction and operation of a monofill/monocell is available in the *Draft Environmental Guidelines for Industrial Waste Landfilling* (EPA 1998).

APPENDIX J

BOREHOLE LOGS



AARGUS PTY LTD



SOIL DESCRIPTION SUMMARY

Borehole ID	Depth Range	Sample Depth	Soil Description
BH1	0-0.4	0-0.1	Topsoil : Clayey Sand, fine grained, dark brown with rootlets
	0.4-0.8	0.4-0.5	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH2	0-0.2	0-0.1	Topsoil : Clayey Sand, fine grained, dark brown with rootlets
	0.2-1.0	0.3-0.4	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH3	0-0.2	-	Concrete
	0.2-0.5	0.3-0.4	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.4-1.5	1.0-1.1	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH4	0-0.2	-	Concrete
	0.2-0.8	0.3-0.4	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.4-1.5	0.8-0.9	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH5	0-0.2	-	Concrete
	0.2-0.6	0.3-0.4	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.6-1.0	0.7-0.8	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH6	0-0.2	-	Concrete
	0.2-0.6	0.3-0.4	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.6-1.0	0.6-0.7	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH7	0-0.2	-	Concrete
	0.2-1.4	0.3-0.4	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
		1-1.1	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	1.4-1.5	0.6-0.7	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH8	0-0.6	0-0.1	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.6-1.0	0.7-0.8	SP: Clayey SAND, fine to medium grained, pale brown, dark brown
BH9	0-0.6	0-0.1	Fill : Clayey Sand, fine to medium grained, dark brown, black, with rocks and gravels
	0.6-1.0	0.7-0.8	SP: Clayey SAND, fine to medium grained, pale brown, dark brown

APPENDIX K

FIELD RECORD FORMS / CALIBRATION CERTIFICATES





Aargus Pty Ltd

PID Certification Report

ES 8803 FIVE DOCK

This PID has been performance checked/calibrated as follows:

- ☒ Calibrate 0.0ppm Reading 0.1 ppm
- ☒ Calibrate 99.3 ppm isobutylene Reading 99.2 ppm
- ☐ Charged
- ☐ Filter check
- ☐ Lamp check

Date: 04-08-2021

Checked by: SAAD BIN SULEMAN

Signature: 

Please check that the following items are contained within the PID Equipment Register

- ☒ PID carry case
- ☒ Model 580 EZ PID meter
- ☒ Charger
- ☒ Adapter for charger
- ☒ Calibration tube
- ☒ Sample Probe
- ☒ Water Filter Trap
- ☒ Computer cable connector
- ☐ Floppy disk software

Serial Number: 2001 2101050001

Site Inspection Daily Worksheet Record



Aargus

PROJECT NAME: DSI		PROJECT NO: ES 8303	
CLIENT: ~~NARY~~ ARI BORNVOUSH		DATE: 04/08/2021	
SITE ADDRESS: 1-7 RAMSAY ROAD & 5-7 HARRA Brook Av. Five Dock NSW			
SITE CONTACT:		PHONE:	
AARGUS REPRESENTATIVE: SADD BIN SOLEMAN			
TITLE: Detailed Site Investigation		PHONE:	
FIELD NOTES:			
Start Time 9:00 am		Finish Time 4:35 PM	
Weather Clear / sunny		Rainfall (mm) None	
Wind Direction South west		Wind Speed 7 km/h	
Humidity 37%			
Odours Present None		Staining Present None	
Environmental and Safety Concerns			
Actions			
Machinery onsite Core Drill		Equipment onsite Hand Augers	
Site Safety Induction completed		Stormwater Control Sand bags	
Dust Suppression Water hose		Traffic Control Not required	



Description of Site Activities

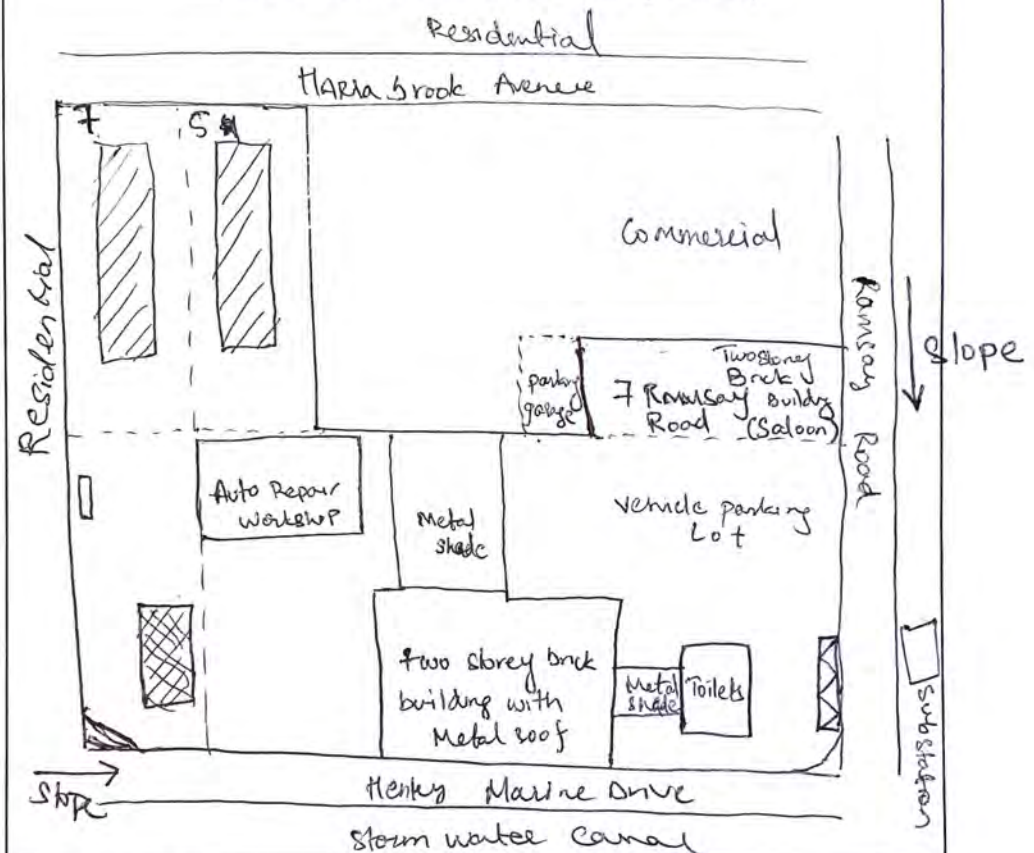
ES 8303 - Five Dock

4/8/21

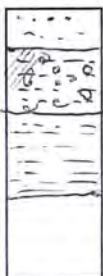
Aargus

SKETCH OF SITE PLAN

(include north, street boundaries & surrounding land uses)



SOIL PROFILE



concrete

fill

Natural

LEGEND / NOTES



Brick building with tiled roof



Wooden shed with tiled roof



Metal shed



Metal containers

APPENDIX L

LABORATORY TECHNICAL INFORMATION



	Water and Wastewater					Soil and Sludge	
Analysis	Container Type	Colour	Volume	Preservation	Hold Time	Container (250mL routine)	Hold Time
Acid Sulphate Soils	N/A	Green	N/A	N/A	N/A	HDPE bag	24 h @ <4 °C 90 days frozen
Acidity/ Alkalinity (HCO ₃ , CO ₃)	P,G	Green	125 mL	Cool 4 °C Exclude Air	24 hours	P,G	N/A
Algae	P	Blue	250/500mL	Cool 4 °C, Exclude light	48 hours	N/A	N/A
Asbestos Identification	P	Blank	125 mL	N/A	N/A	HDPE bag	N/A
Bromide	P, G amber	Green	125mL	Cool 4 °C, Exclude light	28 days	P, G	7 days
BOD	P,G	Green	500mL/1 L	Cool 4 °C, Exclude Air	24 hours (48h, USEPA)	N/A**	N/A**
Boron	P,G	Green	125 mL	None	28 days	N/A**	N/A**
Carbon Dioxide	P,G	Green	125mL	Cool 4 °C, Exclude Air	24 hours	N/A	N/A
Chloride	P,G	Green	125 mL	Cool 4 °C	28 days	P,G	7 days
Chlorine; Total, Free	P,G	Green	500 mL	None	immediate	N/A	N/A
Chloroacetic Acid (HAA)	G-TLS	White	2 x 40mL	Cool 4 °C, Sodium thiosulphate or Sulphite	7 days	N/A	N/A
Chlorophyll; a, b, c	P,G amber	Green	1000 mL	Cool 4 °C, Exclude light Filter on site and freeze	24 hours (30 days frozen on filter)	N/A	N/A
Chromium VI (Hexavalent)	P,G	Green	125 mL	Cool 4 °C	24 hours	P,G USEPA1636	28 days**
COD	P,G	Orange	125/250mL	Cool 4 °C H ₂ SO ₄ to pH< 2	7 days	N/A**	N/A**
Colour	P,G	Green	125 mL	Cool 4 °C	48 hours	N/A	N/A
Conductivity	P,G	Green	125 mL	Cool 4 °C	28 days	P,G	7 days
Cyanide; Free, Total, WAD	P black, G amber	Purple	500 mL	Cool 4 °C NaOH to pH > 12, Exclude light	24 hours (14 d, APHA)	P,G	7 days
Dust (Deposited Solids)	G	White	2.5/4 Litre	CuSO ₄	28 days	N/A	N/A
Fluoride	P	Green	125 mL	Cool 4 °C	28 days	P	7 days
Glyphosate	G amber	Green	125mL	Cool 4 °C	7 days	G	14 days
Iodide	P, G	Green	125 mL	Cool 4 °C	28 days	N/A**	N/A**
Iron, Ferrous	P	Brown	125mL	Cool < 4 °C/HCl to pH<2 exclude Air	24 hours (7 days ISO 5667-3)	N/A**	N/A**
Mercury (Hg) ## APHA states only HNO ₃ is required for metals	G (AW)	White	125 mL	Cool 4 °C K ₂ Cr ₂ O ₇ / HNO ₃ to pH < 2	28 days	P,G	28 days
Metals ## excluding Cr (VI)	P (AW)	Red	125 mL	Total: Cool 4 °C exclude air Soluble: Field Filter Cool 4 °C exclude air - then Lab HNO ₃ to pH<2	6 months	P,G	6 months
Methane (dissolved gases)	G-TLS	Brown	2x40 mL	Cool 4 °C, HCl to pH<2, exclude air	7 days	N/A	N/A
Microbiologicals (eg. E.coli)	G, PET	Blue	600mL	Cool 4 °C, sterile	24 hours	P	24 hours
Nutrients (NO _x -N, NO ₂ -N, NH ₃ -N, SRP)	P,G	Green	125/250mL	Cool 4 °C	48 hours (28 days frozen)	P,G	7 days
Nutrients (TKN, TP)	P,G	Green	125/250mL	Cool 4 °C	48 hours (28 days frozen)	P,G	7 days
Oil and Grease (Total)	G	Orange	500mL/1 L	Cool 4 ° C, H ₂ SO ₄ to pH< 2	28 days	G	28 days
Organometallics (TBT, methyl Hg)	G-TLC	Green	500 mL	Cool 4 ° C	28 days	G-TLC	14 days
Oxygen, Dissolved	G	Green	125mL	Exclude Air	Immediate (8h indicative)	N/A	N/A
pH	P,G	Green	50 mL	Cool 4 ° C, exclude air	6 hours (indicative 24h)	P,G	7 days
Phenol, Total (colourimetric)	G	Orange	500mL	Cool 4 °C, H ₂ SO ₄ to pH< 2	21 days	G-TLC	14 days
Silica, Reactive	P	Green	125 mL	Cool 4 °C	28 days	N/A	N/A
Solids; Total	P,G	Green	500mL	Cool 4 °C	7 days	N/A	N/A
Solids; Volatile	P,G	Green	500mL	Cool 4 °C	7 days	N/A	N/A
Sulfate	P,G	Green	200 mL	Cool 4 °C	28 days	P,G	7 days
Sulfide	P,G	Yellow	500mL/1L	Cool 4 °C Zn acetate and NaOH to pH>9	7 days	P,G	7 days
Sulfite	P,G	Green	200 mL	None	Immediate	N/A	N/A
Surfactants-MBAS	P,G	Green	250 mL	Cool 4 °C	48 hours	N/A	N/A
SVOCs Routine OC, OP, PCB, TRH, PAH , spec. phenols, herbicides, 8270 etc	G-TLC	Green	100mL	Cool 4 ° C	7 days	G-TLC	14 days
SVOCs Low Level OC, OP, PCB, TRH, PAH, spec. phenols, herbicides	G-TLC	Green	2 x 1 L	Cool 4 ° C	7 days	G-TLC	14 days
TOC	G	White	125 mL	Cool 4 °C	7 days	G	7 days
Total Dissolved Solids	P,G	Green	500mL	Cool 4 °C	24hours (APHA 7 days)	N/A	N/A
Total Suspended Solids	P,G	Green	500 mL	Cool 4 °C	24 hours (APHA 7 days)	N/A	N/A
Turbidity	P,G	Green	200 mL	Cool 4 °C	24 hours	N/A	N/A
VOCs / BTEX	G-TLS	White	2x40 mL	Cool 4 °C, Sodium Thiosulphate, exclude air	7 days (USEPA 14 days)	G-TLC	14 days

For dissolved metals, samples should be filtered through 0.45 µm immediately on site, prior to laboratory preservation.

** There is no documented value for this parameter. SGS analyse within 7 days; scientific references may exist but are contradictory or not explicit.

P&T - Purge and Trap 40 mL screw top, P = High Density Polyethylene, G = Glass, TLS = Teflon Lined Septum, TLC = Teflon Lined Cap, AW=Acid Washed. SGS Environmental is not responsible for the accuracy of the information contained in this table. Users are encouraged to refer to the current regulations from which this information is obtained. The hold time listed is the suggested time that samples may be held before analysis and still be considered valid. Sources: AS/NZS 5667.1:1998, ISO 5667-3:2003, *Standard Methods for the Examination of Water and Wastewater*, 21st Edition, 2007, *USEPA SW 846*, 3rd Edition 1986 plus updates. NEPM 2011 DRAFT schB3 table 1 guidelines for soil. Holding times may be met or extended, after laboratory extraction, for some analytes.

Environmental Services, SGS Australia Pty Ltd:

Alexandria NSW
02 8594 0400

Cairns QLD
07 4035 5111

Coburg VIC
03 9350 4800

Newburn WA
08 9373 3500

Rocklea QLD
07 3274 7900

Shepparton VIC
03 5821 1708

Traralgon VIC
03 5172 1555

General Water Sampling Guide

- Fill all sample bottles provided for each sample/sampling location.
- Where a cooler and ice bricks have been provided, please ensure the ice bricks have been frozen prior to sampling such that samples are cooled on collection and during transport to the laboratory.
- Some bottles will contain preservatives – do not wash out or overflow bottle while filling.
- Ensure sample labels are legibly completed and Chain of Custody form completed to include all information relevant to the sampling event.
- Where filtering equipment (syringes and disposable filter cartridges) has been provided to sample for soluble metals or nutrients for example, fill syringe with sample, affix filter cartridge, then discharge the sample through the cartridge directly into the sample bottle.

Sample Types

Trade wastes

Trade wastes should only be sampled when there is a flow and a grab sample is suitable in most instances. An auto-sampler may be used for a 24 hour composite. Preservation or cooling may be required and should be arranged prior to setting the auto-sampler up. Most auto-samplers have provision for the addition of ice or frozen cooler blocks.

Groundwaters

Samples may be taken by two methods:

- a) Pumping - Use a suction pump for shallow bores and pump out at least two bore volumes (preferably three if the bore replenishes quickly) to clear stagnant water. For deep bores a submersible type pump is required.
- b) Bailing - This method is used for small diameter bores (<6 cm) however stagnant water may not be completely removed from the bore. A teflon bailer is suited for sampling volatile organic compounds.

Surface waters

Well mixed waters may be sampled using a bottle placed upside down in the water at a depth of 10-15 cm by the sampler wearing polyethylene gloves. The bottle is inverted to fill, then capped. Difficult locations may be sampled with a bucket fixed to a long pole.

Tapwaters

Collect samples at faucets which are free of contaminating devices such as screens, hoses and purification devices. Thoroughly flush the spigot for thirty to sixty seconds to clear the service line.

Filling Bottles

Multiple bottles

When multiple sample bottles are required to be filled to ensure correct preservation, a 4L beaker or bucket of well mixed sample is used to fill the individual bottles. Exceptions to this procedure are detailed below. Non preserved containers should be rinsed with sample and filled completely so as to exclude air. Pre-dosed containers should be filled to the neck. Do *not* empty out the preservative.

Volatiles

When sampling for volatiles, fill two 40mL glass sample vials completely (per sample) leaving no headspace from a grab sample. Seal the bottle immediately with a teflon lined lid.

Microbiology

Wear new sterile gloves hold the lid in the same hand as the sterile bottle. Fill the bottle to the neck and avoid touching the inside of the lid or thread of the bottle with the hands. Do not place the lid down on any surface. Do not rinse the container with the sample. Note in the sampling record if the water body is chlorinated. If sampling tap water it may be necessary to remove the aeration screen/device. Disinfection of the tap may be performed by swabbing the tap with a 10% solution of sodium hypochlorite, or, flame the spout using a portable butane burner, before flushing the tap for thirty to sixty seconds. Sample directly into the sterile container.

Other organics

Mix the sample well but avoid unnecessary disturbance and avoid contact with any equipment made from plastics apart from teflon. Sample into a 4L glass beaker and then fill amber glass bottles with the collected sample. If any items of sampling equipment are contaminated by petroleum products they can be cleaned with a 10% solution of Decon 90 followed by thorough rinsing with deionised water.

Has anything changed from your original sampling plan?

Your Chain of Custody is a legal document which tells us what you want tested. If you have a pre-printed COC and sample points were not collected, record this. If you want to add or change testing, ensure that your COC accurately reflects each & every sample you are submitting to the laboratory.

Make sure your contact details are with the paperwork in your esky. If we have any questions regarding your samples, the answer is often urgently required to ensure your testing starts within its holding times.

If you have any questions please do not hesitate to contact us.

SGS Environmental Services is accredited by NATA for Chemical Testing (Reg.No.2562) and Quality System compliance to ISO/IEC 17025. The QC parameters contained within are designed to meet NEPM 1999 requirements.

Quality Control samples included in any analytical run are listed below.

Reagent/Analysis Blank (BLK) Method Blank (MB)	Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. A reagent blank is prepared and analysed with every batch of samples plus with each new batch of solvent prior to use.
Sample Matrix Spike (MS) & Matrix Spike Duplicate (MSD)	Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and <u>prior to the extraction/digestion procedure</u> . They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water may be used. A duplicate spiked sample is analysed at least every 20 samples.
Surrogate Spike (SS)	At least one but up to three surrogate compounds are added to all samples requiring analysis for organics prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples. Where possible they are surrogate compounds recommended by the USEPA.
Control Matrix Spike (CMS)	To ensure spike recoveries can be determined for every batch of samples a control matrix is spiked with identical concentrations of target analyte(s) and then analysed. These results allow recoveries to be determined in the event that the matrix spikes are unusable (eg. matrix spikes performed on heavily contaminated samples). These are analysed at least every 20 samples.
Internal Standard (IS)	Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments. Where possible they are standard compounds recommended by the USEPA.
Lab Duplicates (D)	A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Lab Control Standards/Samples (LCS)	Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity. Thereafter they are analysed at least every one in 20 samples plus at the end of each analytical run. This data is not reported.
Continuous Calibration Verification (CCV) or Calibration Check Standard & Blank	A calibration check standard or CCV and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift. Calibration Standards are checked old versus new with a criteria of $\pm 10\%$

Quality Assurance Programs are listed below:

Statistical analysis of Quality Control data (SQC)	Quality control data is plotted on control charts using the APHA procedure with warning and control limits at 2 and 3 standard deviations respectively. See also QMS Procedure "Statistical Quality Control".
Certified Reference Materials (CRM/SRM)	Certified Reference Materials and Standards are regularly analysed. These materials/standards have certified reference values for various parameters.
Proficiency Testing	Regular proficiency test samples are analysed by our laboratories. SGS Environmental participates in a number of programs. Results and proficiency status are compiled and sent to participating laboratory post data interpretation. Failure to comply with acceptable values result in further investigations.
Inter-laboratory & Intra-laboratory Testing	SGS Environmental Services has schedules in the Quality Systems to participate in Inter/Intra laboratory testing conducted internally and by other parties.
Data Acceptance Criteria Unless otherwise specified in the method or method manual the following general criteria apply to all inorganic tests. All recoveries are to be reported to 3 significant figures.	Failure to meet the internal acceptance criteria will result in sample batch repeats dependent upon investigation outcomes. For data to be accepted: <u>Inorganics (water samples)</u> - For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. - The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within $\pm 15\%$. - Control Standards must be 80-120% of the accepted value. - The Calibration Check Blanks must be less than the LOR. - Lab Duplicates RPD to be $<15\%$*. Note: If client <u>field</u> duplicates do not meet this criteria it may indicate heterogeneity and shall be noted on the data reports for QC samples. - Sample (and if applicable Control) Matrix Spike^d Duplicate recovery RPD to be $<30\%$. - Where CRMs are used, results to be within ± 2 standard deviations of the expected value. <u>Inorganics (soil samples)</u> - For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. - The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within $\pm 15\%$. - Control Standards must be 80-120% of the accepted value. - The Calibration Check Blanks must be less than the LOR. - Lab duplicate RPD to be $<30\%$* for sample results greater than 10 times LOR. - Sample Matrix Spike Duplicate (MS^d/MSD) recovery RPD to be $<30\%$. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D). - Where CRMs are used, results to be within ± 2 standard deviations of the expected value.

Data Acceptance Criteria

Unless otherwise specified in the method or method manual the following general criteria apply to all organic tests.

All recoveries are to be reported to 3 significant figures.

Organics

- Volatile & extractable Reagent & Method Blanks must contain levels less than or equal to LOR.
- The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within $\pm 25\%$. Some analytes may have specific criteria.
- Control Standards (LCS/CMS) and Certified Reference Materials (CRM) recoveries are to be within established control limits or as a default 60-140% unless compound specific limits apply.
- Retention times are to vary by no more than 0.2 min.
- **At least two of three** routine level soil sample Surrogate Spike (SS) recoveries are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as acceptance criterion. Any recoveries outside these limits will have comment.
- Water sample Surrogates Spike (SS) recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion. Any recoveries outside these limits will have comment.
- Lab Duplicates (D) must have a RPD $< 30\%^*$.
- Sample Matrix Spike Duplicate (MS^d/MSD) recovery RPD to be $< 30\%$. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D).

*Only if results are at least 10 times the LOR otherwise no acceptance criteria for RPD's apply.

Application of more stringent criteria shall be applied for clean water sample from water boards and any other nominated client contracts. Nominal 10xLOR criteria are dropped to 5xLOR where specified.

^dMatrix do not readily equate to definitive recovery due to inherent matrix interferences and thus do not have recovery compliance values set. As a guide inorganic recoveries should be between 70-130% and for organics 60-130%

Batch Structure Summary

An analytical batch is nominally considered as 20 samples or smaller. As a standard template the following should be **used as a guide** according to the above Quality Control Types:

1	MB	16	UNK_DUP
2	STD1	17	MS
3	STD2	18	MS_DUP
4	STD3	19	UNK 11
5	LCS	20	UNK 12
6	BLK	21	UNK 13
7	UNK 1	22	UNK 14
8	UNK 2	23	UNK 15
9	UNK 3	24	UNK 16
10	UNK 4	25	UNK 17
11	UNK 5	26	UNK 18
12	UNK 6	27	UNK 19
13	UNK 7	28	UNK 20 (SS if applicable)
14	UNK 8	29	UNK_DUP
15	UNK 9	30	CCV
16	UNK 10 (SS if applicable)	31	CRM / SRM / CMS / LCS

Recommended Preservation and Container Guide

Parameter		Container	Lab Analysis Portion (g) ⁽¹⁾	Eurofins Preferred Preservation	Recommended Holding Times
Acid Sulfate Soil (pH _{FIELD} & pH _{FOX})		P	50	Freeze, exclude air	24 hours [#]
Acid Sulfate Soil (SPOCAS/CrS)		P	50	Freeze, exclude air	24 hours [#]
Alcohols		G	20	Cool to less than 6°C, Zero Headspace	14 days*
Asbestos Containing Material (AS4964)		P, Doubled Bag	2 cm x 2cm (minimum)	None, separate sample required	indefinite
Asbestos (AS4964)		P	50	None, separate sample required	indefinite
Asbestos (NEPM or WA Guidelines)		P	500 mL	None, separate sample required	indefinite
BTEX / TRH (>C6-C10)		G	20	Cool to less than 6°C, Zero Headspace	14 days*
Bulk Density		G	500		14 days*
Cation Exchange Capacity, Exchangeable Cations		G	50	Cool to less than 6°C	28 days ^{NEPM 2013}
Chloride, Bromide, Nitrate, Sulfate (1:5 aqueous extract)		G	10	Cool to less than 6°C	28 days ^{NEPM 2013}
Cyanide, Total ⁽²⁾		G	20	Cool to less than 6°C	14 days ^{NEPM 2013}
Dioxins/Furans/DL-PCBs/PBDEs		G	50	Cool to less than 6°C	12 months
Explosives		G	50	Cool to less than 6°C	14 days*
Foreign Materials (RMS NSW Method T276)		P	6000	None, separate sample required	14 days
Iodide		G	20	Cool to less than 6°C	28 days
Metals (except Mercury or Chromium VI)		G	20	Cool to less than 6°C	6 months ^{NEPM 2013}
Mercury or Chromium VI		G	20	Cool to less than 6°C	28 days ^{NEPM 2013}
Micro (E. Coli, FC, TC etc.)		P (sterile)	125	Cool to less than 6°C	48 hours
Moisture		G	20	Cool to less than 6°C	14 days ^{NEPM 2013}
pH		G	20	Cool to less than 6°C	24hours recommended ^{NEPM 2013} 7 days allowed ^{NEPM 2013}
EC		G	20	Cool to less than 6°C	7 days ^{NEPM 2013}
Phenols (Totals or Speciated)		G	20	Cool to less than 6°C	14 days*
Phenoxy Acid Herbicides		G	20	Cool to less than 6°C	14 days*
Semi-Volatile Organic Compounds (SVOC)		G	50	Cool to less than 6°C	14 days ^{NEPM 2013}
PCBs (Dioxin-like PCBs, Aroclor, Congener group)		G	50	Cool to less than 6°C	28 days ^{NEPM 2013}
Per- and Polyfluoroalkyl Substances (PFAS)		P	10	Cool to less than 6°C, no teflon liner	14 days, extracts within 28 days
Total Fluoride		G	20	Cool to less than 6°C	28 days
Total Organic Carbon		G	20	Cool to less than 6°C	28 days
RH (>C6-C10) plus BTEX		G	20	Cool to less than 6°C, Zero Headspace	14 days*
Volatile Organic Compounds (VOC) except Vinyl Chloride, Styrene or 2-Chloroethyl Vinyl Ether		G	20	Cool to less than 6°C, Zero Headspace	14 days ^{NEPM 2013}
Vinyl Chloride, Styrene or 2-Chloroethyl Vinyl Ether		G	20	Cool to less than 6°C, Zero Headspace	7 days ^{NEPM 2013}
TPH/TRH (>C10-C40)		G	20	Cool to less than 6°C, Zero Headspace	14 days*
VOCs / VHCs / VACs / THMs		G	20	Cool to less than 6°C, Zero Headspace	14 days*
Trip Spikes/Blanks for C6-C10/BTEX (prepared in the Lab)		G	full jar	<-10°C, Zero Headspace	14 days***
Biota (Per- and Polyfluoroalkyl Substances (PFAS))					
Fish (fillets, whole)		P	10	Freeze	14 days, extracts within 28 days
Crustacea (whole, white flesh, hepatopancreas)		P	10	Freeze	14 days, extracts within 28 days
Shell fish (whole, edible flesh)		P	10	Freeze	14 days, extracts within 28 days
Meat [Bovine, Ovine, Porcine] (liver, kidney & tissue)		P	10	Cool to less than 6°C	14 days, extracts within 28 days
Meat [Cervine, Leporine, Caprine] (liver, kidney & tissue)		P	50	Cool to less than 6°C	14 days, extracts within 28 days
Milk [Bovine, Ovine, Caprine]		P	500 mL	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Cheese [Bovine, Ovine, Caprine]		P	250	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Eggs (Chicken - white, yolk, whole)		P	6 each	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Vegetables (Lettuce, Cabbage,		P	250	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Fruit (Avocado, Tomato, Olive, Mango)		P	250	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Crops (Sorghum, Wheat, Corn, Canola)		P	250	Cool to less than 6°C. Do not freeze	14 days, extracts within 28 days
Serum - BD Vacutainer®		P	2x per sample	Cool to less than 6°C. Freeze	14 days, extracts within 28 days
Air					
Summa Canister		T	1L, 6L	Room Temperature	30 days
Low Uptake Waterloo Membrane Samplers (LU-WMS™)		T	1	Room Temperature, Cool to less than 6°C	30 days, extracts within 28 days
US EPA Method 325B Passive Sampler		T	1	Room Temperature, Cool to less than 6°C	30 days
Radiello® Passive Sampler RAD130		T	1	Room Temperature, Cool to less than 6°C	30 days, extracts within 28 days
Radiello® Passive Sampler RAD145		T	1	Room Temperature, Cool to less than 6°C	30 days
Radiello® Passive Sampler RAD168		T	1	Cool to less than 6°C	14 days
Radiello® Passive Sampler RAD170		T	1	Cool to less than 6°C	14 days
Typical sample weights contained in standard jars (zero headspace)				250 mL jar = 350-420 g	
Dust Gauges - contact Lab					

REFERENCES: US EPA SW846, NEPM, EPA VIC, ISO5667, Queensland Acid Sulfate Soils Management Advisory Committee (QASSMAC), US EPA Method 821 Please note Maximum THT's may vary upon the guideline document referenced.		
NOTES:	(1)	We recommend that you provide additional sample on the 1st, 11th, 21st, 31st etc sample for performance of Duplicates / Matrix Spikes.
	(2)	Note however that Matrix Spike determinations are not appropriate for all tests.
	*	Soil samples for cyanide analysis (in cores or jars) must be wrapped in dark plastic and kept cool at < 6°C without further treatment.
	**	Extract within 14 days and analyse within 40 days (Eurofins mgt's preference is to extract within 7 days for volatiles where sufficient time available).
	***	Eurofins mgt's preference is to analyse as soon as possible
	#	Shelf life in matrix (sand) is low if not frozen, therefore freeze if storing or return to lab with samples immediately where acidity (hence liming rates) is captured in actual and potential acidity, analysis within one week should be satisfactory. Samples can be dried at 80°C to extend holding time
CONTAINERS:	###	except Metals/OCPs/PCBs 28 days
	P	= Plastic (HDPE or equivalent, NO teflon lined lid)
	G	= Glass (teflon lined lid)
	T	= Tube

Soil Samples are discarded two months from the date received unless otherwise arranged.

Eurofins | Environment Testing - APAC Contact Details

LOCATION	DELIVERY ADDRESS	TELEPHONE	E-MAIL	MOBILE NUMBERS
Adelaide	9 Main Terrace, Richmond SA 5033, AUSTRALIA	+61 8 8154 3100	EnviroSampleSA@eurofins.com	+61 409 801 765
Brisbane	Unit 1, 21 Smallwood Place, Murarrie QLD 4172, AUSTRALIA	+61 7 3902 4600	EnviroSampleQLD@eurofins.com	-
Darwin	Unit 3, 83 Coonawarra Road, Winellie NT 0820, AUSTRALIA	+61 8 8154 3103	EnviroSampleDRW@eurofins.com	+ 61 428 489 614
Melbourne	6 Monterey Road, Dandenong South VIC 3175, AUSTRALIA	+61 3 8564 5000	EnviroSampleVic@eurofins.com	-
Newcastle	Unit 7, 7 Friesian Close, Sandgate, NSW 2304, AUSTRALIA	+61 2 9900 8490	EnviroSampleNTL@eurofins.com	+61 410 220 750
Perth	Unit 2, 91 Leach Hwy, Kewdale WA 6105, AUSTRALIA	+61 8 9251 9600	EnviroSampleWA@eurofins.com	-
Sydney	Unit F3, Lane Cove Business Park, 16 Mars Road, Lane Cove NSW 2066, AUSTRALIA	+61 2 9900 8400	EnviroSampleNSW@eurofins.com	-
Wollongong	Unit 16, 7 Investigator Drive, Unanderra NSW 2526, AUSTRALIA	+61 2 9900 8492	EnviroSampleWOLL@Eurofins.com	+61 447 584 487
Auckland	35 O'Rorke Road, Penrose, Auckland, Auckland 1061, NEW ZEALAND	+64 9 579 2669 X707	EnviroSampleAKL@eurofins.com	-
Christchurch	43 Detroit Drive, Rolleston, Christchurch, 7675, NEW ZEALAND	+64 3 343 5227	EnviroSampleCHC@eurofins.com	+64 277 660 233

Recommended Preservation and Container Guide

Parameter	Container	Lab Analysis Portion mL ^(a)	Eurofins mgt Preferred Preservation	Recommended Holding Times
Acidity/Alkalinity	P or G	200	6°C	14 days**
Alcohols	PT	2 x vials	pH<2 (HCl), 6°C, Zero headspace	14 days ⁽³⁾
Ammonia-N	P or G	200	pH<2 (H ₂ SO ₄), 6°C ⁽¹⁾ / site filter and freeze	28 days
BOD ₅	P or G	2 x 500	6°C, Zero headspace	48 Hours
Bromate	P	50	6°C	28 days
Bromide	P	50	6°C	28 days
BTEX plus TPH (>C6-C10)	PT	2 x vials	pH<2 (HCl or H ₂ SO ₄), 6°C, Zero headspace	14 days ⁽³⁾
Carbamates/Dioxins/Furans	G	500	6°C	1 month
Carbon, Total Organic (TOC)	G	100	pH<2 (H ₂ SO ₄ or HCl), 6°C	28 days
Carbon, Dissolved Organic (DOC)	G	100	Field filter at 0.45µm then pH<2 (H ₂ SO ₄ or HCl), 6°C	28 days
Cations	P	50	6°C, pH<2 (HNO ₃)	6 months ^{APHA}
Chlorate	P	50	6°C	7 days
Chloride	P	50	6°C	28 days
Chlorite	P	50	6°C	24 hours ⁽⁵⁾
Chlorine (residual)	-	--	Field test	Note (5)
Chlorophyll-a (Vol% PQL dependant)	Dark P	500-2000	Unfiltered Dark, 6°C or Filtered residue	24 hours ^{##}
Chromium VI (hexavalent Cr)	P	100	filtered, unpreserved / pH 8-9 (NaOH), 6°C ⁽¹⁾	1 day / 28 days ^{(1)APHA}
COD	G	100	pH<2 (H ₂ SO ₄), 6°C ⁽¹⁾	28 days
Colour	P	100	6°C	2 days ^{AS}
Conductivity (EC) or Salinity	P	50	6°C, Zero headspace, 60C	28 days
Cyanide (Total/Amenable)	P	100	pH >12 (NaOH), 6°C Dark	14 days ⁽⁶⁾
Cyanide (Free / WAD)	P	100	Free neutral, WAD pH >12 (NaOH), 60C Dark	14 days ^{(6)##}
Dissolved Oxygen	-	--	Field test	Note (5)
Explosives	G	500	6°C	7 days*
Ferrous/Ferric Iron ⁽⁴⁾	P	100	filtered pH <2 (HCl), 6°C, Dark, Zero Headspace	7 days ^{SO}
Fluoride	P	50	6°C	28 days
Formaldehyde	G	100	6°C	7 days
Glyphosate & AMPA	G, PET	250	6°C - 0.008% Na ₂ S ₂ O ₃ ⁽⁸⁾	14 days
Hardness	P	50	6°C, pH<2 (HNO ₃)	6 months
Iodate	P	50	6°C	1 month
Iodide	P	50	6°C	1 month
Ion Balance	P	500-1000	See Individual Analytes in price book	--
Metals – Total (Recoverable)	P	100	pH<2 (HNO ₃)	6 months
Metals – Dissolved	P	100	Field Filter at 0.45 µm then pH<2 (HNO ₃)	6 months
Mercury – (Total Recoverable)	P	100	pH<2 (HNO ₃)	28 days
Mercury – Dissolved	P	100	Field Filter at 0.45 µm then pH<2 (HNO ₃)	28 days
Methane (Ethane/Ethane)	PT	2 x vials	pH<2 (HCl or H ₂ SO ₄), 6°C, Zero headspace ⁽⁷⁾	14 days
Nitrogen: TKN	P or G	100	pH<2 (H ₂ SO ₄), 6°C ⁽¹⁾	28 days
Nitrate / NOx	P or G	50	unpreserve 6°C / pH<2 (H ₂ SO ₄), 6°C	2 days ^{##} / 7 days
Nitrite	P or G	50	unpreserve 6°C	2 days
Nitrogen: Total N	-	--	TKN and NOx sample bottles are required	--
Oil & Grease	G	2 x 500	pH<2 (H ₂ SO ₄ or HCl), 6°C	28 days
OC/OP Pesticides – see SVOCs	G	see SVOC	6°C	7 days*
PAHs – see SVOCs below	G	see SVOC	6°C	7 days*
PFOS/PFOA/Fluorotelomers	PET	250	6°C add 0.008% Na ₂ S ₂ O ₃ ⁽⁸⁾	14 days
pH / free CO ₂ / total CO ₂	P or G	100	Field Test, 6°C	Note (5)
Phenolics (total)	P or G	100	pH<2 (H ₂ SO ₄), 6°C	28 days ^{APHA}
Phenols – speciated	G	see SVOC	6°C	7 days*
Phenoxy Acid Herbicides	G	500	6°C, pH 1-2 HCl	14 days
Phosphate (ortho)	P or G	50	6°C	2 days ^{##} 1 month filtered ^{SO}
Phosphorus (Total filtered or unfiltered)	P	100	pH<2 (HNO ₃)	1 month
Solids (suspended, dissolved etc)	P	500-1000	6°C	7 days
Sulphate	P	50	6°C	28 days
Sulphide (Total)	P	200	6°C (Zinc Acetate/NaOH pH>9) zero headspace	7 Days
Sulphide (Dissolved)	P	100	6°C	24 hours
Surfactants – anionic (MBAS)	G	250	6°C	2 days
SVOCs including – OCs, OPs, PCBs, PAHs, Phthalates (normal level) plus TPH (>C10-C40)	G	2 x 500	6°C	7 days*
Low or Trace level Organics		4 x 500		
SVOC's (USEPA 8270 list)	G	see SVOC	6°C	7 days*
TPH (>C6-C10)	PT	As for BTEX no additional vials needed	pH<2 (HCl), 6°C, Zero headspace	14 days ⁽³⁾
TPH (>C10-C40)	G	As for SVOC 'normal' no additional needed	6°C	7 days*
Turbidity	P or G	100	Analyse Immediately, dark, 6°C	48 Hours
VOCs / VHCs / VACs / THMs / MTBEs ^	PT	2xvials	pH<2 (HCl or H ₂ SO ₄), 6°C, Zero headspace ⁽⁷⁾	14 days ⁽³⁾
Microbiological	PET/S	120	6°C	24 hours
Micro' – (in Chlorinated Water) Coliforms - Ecoli	PET/S	500 (4*120)	6°C - 0.008% Na ₂ S ₂ O ₃	24 hours
Micro' – (in Chlorinated Water)	PET/S	120	6°C - 0.008% Na ₂ S ₂ O ₃	24 hours

REFERENCES: APHA 22nd Edition, USEPA SW846, ISO 5667.3, EPA VIC and AS/NZS 5667.1 1998 Please note Maximum HT's may vary upon the guideline document referenced.

NOTES:

- (1) This test may not require preservation if received and analysed within 24 hours of sampling; this must be pre-arranged with the laboratory.
- (2) We recommend that you provide additional sample on the 1st, 11th, 21st, 31st etc sample for performance of Duplicates / Matrix Spikes. (Note however that Matrix spike are not appropriate for all tests).
- (3) USEPA recommends 14 days, Australian Standard recommends 7 days.
- (4) If Dissolved Metals are requested, the Ferrous Iron sample must be field filtered before being preserved
- (5) This analyte should be determined in the field, these tests will not be measured for compliance to holding time but are analysed on receipt
- (6) Holding Time is reduced to 24hrs with the presence of sulphides. Contact the laboratory if the presence of sulphides is suspected
- (7) Sodium Bisulfate is an alternative preservation for VOC analysis upon request
- (8) If residual chlorine is present then add 0.008% Na₂S₂O₃

* This holding time requires the samples to be extracted within 7 days and analysed within 40 days.

** The Eurofins | mgt aim is to perform these analyses within 2 days (where sufficient time available).

The holding times may be extended to 28 days if the sample is filtered then frozen.

^ Excepting vinyl chloride, styrene or 2-chloroethyl vinyl ether, for which the holding time is 7 days with the same preservation

CONTAINERS:

P = Plastic (HDPE or equivalent, all teflon lined), batch tested
 PT = Purge & Trap VOA Vial (with teflon liner), batch tested
 PET = Plastic (polyterephthalate), batch tested
 PP = Plastic (polypropylene, no Teflon), batch tested
 G = Glass (all teflon lined), batch tested
 P/S = Plastic Sterile, batch tested

Liquid samples are discarded 4 weeks from the date received

ANALYTICAL METHOD SUMMARIES

Analyte	Method	Reference Method
Organics		
1,4-Dioxane*	A water sample that has been dechlorinated and preserved with a microbial inhibitor is fortified with the isotopically labelled SUR, 1,4-dioxane-d8. The sample is extracted by one of two SPE options. In option 1, a 500-mL sample is passed through an SPE cartridge containing 2 g of coconut charcoal to extract the method analyte and SUR. In option 2, a 100-mL sample is extracted on a Waters AC-2 Sep-Pak or Supelco Supelclean ENVI-Carb Plus cartridge. In either option, the compounds are eluted from the solid phase with a small amount of dichloromethane (DCM), approximately 9 mL or 1.5 mL, respectively. The extract volume is adjusted, and the IS, tetrahydrofuran-d8 (THF-d8), is added. Finally, the extract is dried with anhydrous sodium sulfate. Analysis of the extract is performed by GC/MS. The data provided in this method were collected using splitless injection with a high-resolution fused silica capillary GC column that was interfaced to an MS operated in the SIM mode. The analyte, SUR and IS are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical GC/MS conditions. The concentration of the analyte is determined by comparison to its response in calibration standards relative to the IS.	US EPA Method 522 DETERMINATION OF 1,4-DIOXANE IN DRINKING WATER BY SOLID PHASE EXTRACTION (SPE) AND GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC/MS) WITH SELECTED ION MONITORING (SIM): EPA/600/R-08/101
Methamphetamine in Swabs	TARGET ANALYTES: • Ephedrine • Pseudoephedrine • Amphetamine • Methamphetamine • MDA • MDMA SAMPLING: 1. Using a new pair of nitrile gloves, remove the wipe from its protective package that is contained in the supplied kit. NOTE: Do not use vinyl gloves due to the potential for leaching of phthalate	NIOSH Method 9111 - METHAMPHETAMINE on Wipes by Liquid Chromatography/Mass Spectrometry

Analyte	Method	Reference Method
	plasticisers and contamination of the samples. 2. Place the supplied 10 cm x 10 cm template over the area to be sampled (may tape in place along outside edge of template). Wipe the surface to be sampled with firm pressure, using vertical S-strokes. Fold the exposed side of the pad in and wipe the area with horizontal S-strokes. Fold the pad once more and wipe the area again with vertical S-strokes. 3. Fold the pad, exposed side in, and place in supplied shipping container and seal with cap. NOTE: Keep samples refrigerated (<6 °C). While nicotine and related compounds are stable on the recommended wipe media for at least 7 days at room temperature, refrigeration is recommended as soon as possible. 4. Clean the template before use for the next sample or use a new disposable template. 5. Label each sample clearly with a unique sample identifier. 6. Prepare a minimum of two field blanks with one field blank for every ten samples. SAMPLE PREPARATION: 7. Desorption from media: a. Remove cap from shipping container. Sample media should fit loosely in the container. If not, rearrange media carefully with rinsed forceps or transfer to a larger container. If the sample media are transferred to a larger container, do not discard the original container. Samples may consist of more than one wipe. If this is the case, internal standard and desorption solution volumes may be adjusted accordingly. b. Spike exactly 50 µL of internal standard spiking solution onto each wipe sample. c. Add 30 mL desorption solution. If the samples were transferred to a larger container, the original shipping container must be rinsed with the desorption solution first, shaken, and the rinsate decanted into the larger container. d. Cap securely and mix contents by inverting the tubes end over end on a rotary mixer at 10-30 rpm for at least one hour. NOTE 1: The desorption solution must percolate freely through the gauze wipes.	

Analyte	Method	Reference Method
	e. Filter an aliquot of the sample through a 0.45 µm membrane. 8. Transfer the filtered sample into a vial and cap. 9. Analyse samples, standards, blanks, and Quality Control samples (QCs) by LC-MS/MS or LC-QToF-MS using in-house method LTM-ORG-2240.	
Methane in Water	The measurement of dissolved gases such as methane, ethane, and ethylene in ground water is important in determining whether intrinsic bioremediation is occurring in a fuel- or solvent contaminated aquifer. A helium headspace is generated above a water-filled bottle. Gases that are dissolved in the water partition between the gas and liquid phases and equilibrate rapidly. An aliquot of this headspace is analysed by gas chromatography to determine the gases' concentration in this phase. The concentration of the gas dissolved in the water can then be calculated based on its partitioning properties, as indicated by its Henry's Law constant using in-house LTM-ORG-2070	Analysis of Dissolved Methane, Ethane, and Ethylene in Ground Water by a Standard Gas Chromatographic Technique., Don H. Kampbell* and Steve A. Vandegrift., U.S. Environmental Protection Agency, Journal of Chromatographic Science, Vol. 36, May 1998
Per- and Polyfluoroalkyl Substances (PFAS) in Water	A water sample is fortified with isotopically labelled surrogates and passed through an IXR solid phase extraction (SPE) cartridge to extract the method analytes and surrogates. The compounds are eluted from the solid phase with a small amount of methanol with modifier. The extract is concentrated to near dryness under reduced pressure in an automated system and then adjusted to a final volume with mobile phase after adding the injection standards IS(s). An injection is made into an LC equipped with a C18 column that is interfaced to a tandem mass spectrometer (MS/MS) operating in scheduled MRM mode. The analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC-MS/MS conditions. The concentration of each analyte is determined by using the isotope dilution technique. Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available – see Table below. Labelled compounds are enriched with deuterium to produce ²H-labeled analogues, stable isotopes of oxygen-18 to	US EPA Method 533: Determination of Per- And Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry., November 2019 US EPA Method 537.1 Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction And Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) Version 1.0, November 2018

Analyte	Method	Reference Method
	produce ^{18}O -labelled analogues or carbon-13 to produce ^{13}C-labeled analogues. The labelled analogues are spiked into each sample to allow identification and correction of the concentration of the native compounds in the extraction, clean-up and the analytical process. Correction of reported results along with a statement of the recovery for labelled analogues are included in the certificate of analysis. Typical recoveries are between 50-150% ($\pm 50\%$) depending on media and the specific analyte. An initial calibration is prepared for each native compound. Internal standard calibration is applied to the determination of the native compounds that do not have exact labelled analogues and that are not being quantified by isotope dilution. The recoveries of the labelled analogues themselves are determined by internal standard quantitation (ISTD) and used as a quality control check on the overall analytical process. Branched and linear isomers are used for calibration standards when they are commercially available as a certified standard. Table 2 lists standards that are currently commercially available and used. The target analyte response for analytes containing branched and linear isomer result from the summation of peaks from all isomers. Limit of reporting is listed in Table 3: PFAS LORs - Water, Soil/Sediments & Biotic Matrices. The LOR obtainable is dependent on the matrix and method. The limit of reporting may be affected by the presence of other contaminants or components in individual samples that cause analytical interferences that raise the achievable LOR. This problem is more likely to occur in complex matrices such as soil, waste, biosolids and biota samples.	US EPA Method 8327 - Per- and polyfluoroalkyl substances (PFAS) using external standard calibration and multiple reaction monitoring (MRM) liquid chromatography/tandem mass spectrometry (LC/MS/MS) United States of America's Department of Defense (DoD) Environmental Data Quality Workgroup (EDQW) and the Department of Energy (DOE) Consolidated Audit Program (DOECAP) Operations Team developed the Quality Systems Manual (QSM) for Environmental Laboratories. Version 5.3 May 2019 UNITED STATES DEPARTMENT OF DEFENSE Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15 Environmental Data Quality Workgroup 1 May 2020
Per- and Polyfluoroalkyl Substances (PFAS) in Soils	The sample is homogenised, spiked with isotopically labelled surrogates solution and digested with 1M NaOH by heating and ultrasonic agitation, followed by incubation. Samples are neutralised with	USEPA Method EPA-821-R-11-007 Draft Procedure for Analysis of Perfluorinated Carboxylic Acids and Sulfonic Acids

Analyte	Method	Reference Method
	HCl and extracted with solvent. Solvent extraction and clean-up is then performed using 50:50/ACN:MeOH (v/v) and then cleaned up using a carbon solid-phase extraction (SPE) cartridge. An injection is made into an LC equipped with a C18 column that is interfaced to a tandem mass spectrometer (MS/MS). The analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC-MS/MS conditions. The concentration of each analyte is determined by using the isotope dilution technique. Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available – see Table below. Labelled compounds are enriched with deuterium to produce ²H-labeled analogues, stable isotopes of oxygen-18 to produce ¹⁸O - labelled analogues or carbon-13 to produce ¹³C-labeled analogues. The labelled analogues are spiked into each sample to allow identification and correction of the concentration of the native compounds in the extraction, clean-up and the analytical process. Correction of reported results along with a statement of the recovery for labelled analogues are included in the certificate of analysis. Typical recoveries are between 50-150% (± 50%) depending on media and the specific analyte. An initial calibration is prepared for each native compound. Internal standard calibration is applied to the determination of the native compounds that do not have exact labelled analogues and that are not being quantified by isotope dilution. The recoveries of the labelled analogues themselves are determined by internal standard quantitation (ISTD) and used as a quality control check on the overall analytical process. Branched and linear isomers are used for calibration standards when they are commercially available as a certified standard. Table 2 lists standards that are currently commercially available and used. The target analyte response for analytes	in Sewage Sludge and Biosolids by HPLC/MS/MS December 2011 US EPA Method 8327 - Per- and polyfluoroalkyl substances (PFAS) using external standard calibration and multiple reaction monitoring (MRM) liquid chromatography/tandem mass spectrometry (LC/MS/MS) USEPA Method 533: Determination of Per- And Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry., November 2019 United States of America's Department of Defense (DoD) Environmental Data Quality Workgroup (EDQW) and the Department of Energy (DOE) Consolidated Audit Program (DOECAP) Operations Team developed the Quality Systems Manual (QSM) for Environmental Laboratories. Version 5.3 May 2019 UNITED STATES DEPARTMENT OF DEFENSE

Analyte	Method	Reference Method
	containing branched and linear isomer result from the summation of peaks from all isomers. Limit of reporting is listed in Table 3: PFAS LORs - Water, Soil/Sediments & Biotic Matrices. The LOR obtainable is dependent on the matrix and method. The limit of reporting may be affected by the presence of other contaminants or components in individual samples that cause analytical interferences that raise the achievable LOR. This problem is more likely to occur in complex matrices such as soil, waste, biosolids and biota samples.	Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15 Environmental Data Quality Workgroup 1 May 2020
Per- and Polyfluoroalkyl Substances (PFAS) in Biotic Matrices	The sample is cryogenically milled with dry ice, a homogenate taken and spiked with isotopically labelled surrogates solution. The sample is sonicated and vortexed and then neutralised with HCl before adding acetonitrile and again sonicated and vortexed before QuEChERS extraction is undertaken. Depending on the particular biotic matrix ENVI-carb SPE may be utilised prior to mixed-mode reversed phase WAX SPE was used before concentration to a known volume. An injection is made into an LC equipped with a C18 column that is interfaced to a tandem mass spectrometer (MS/MS). The analytes are separated and identified by comparing the acquired mass spectra and retention times to reference spectra and retention times for calibration standards acquired under identical LC-MS/MS conditions. The concentration of each analyte is determined by using the isotope dilution technique. Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available – see Table below. Labelled compounds are enriched with deuterium to produce 2H-labeled analogues, stable isotopes of oxygen-18 to produce 18O - labelled analogues or carbon-13 to produce 13C-labeled analogues. The labelled analogues are spiked into each sample to allow identification and correction of the concentration of the native compounds in the extraction, clean-up and the analytical process. Correction	US EPA Method 8327 - Per- and polyfluoroalkyl substances (PFAS) using external standard calibration and multiple reaction monitoring (MRM) liquid chromatography/tandem mass spectrometry (LC/MS/MS) USEPA Method 533: Determination of Per- And Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry., November 2019 United States of America's Department of Defense (DoD) Environmental Data Quality Workgroup (EDQW) and the Department of Energy (DOE) Consolidated Audit Program (DOECAP) Operations Team

Analyte	Method	Reference Method
	of report results along with a statement of the recovery for labelled analogues are included in the certificate of analysis. Typical recoveries are between 50-150% ($\pm 50\%$) depending on media and the specific analyte. An initial calibration is prepared for each native compound. Internal standard calibration is applied to the determination of the native compounds that do not have exact labelled analogues and that are not being quantified by isotope dilution. The recoveries of the labelled analogues themselves are determined by internal standard quantitation (ISTD) and used as a quality control check on the overall analytical process. Branched and linear isomers are used for calibration standards when they are commercially available as a certified standard. Table 2 lists standards that are currently commercially available and used. The target analyte response for analytes containing branched and linear isomer result from the summation of peaks from all isomers. Limit of reporting is listed in Table 3: PFAS LORs - Water, Soil/Sediments & Biotic Matrices. The LOR obtainable is dependent on the matrix and method. The limit of reporting may be affected by the presence of other contaminants or components in individual samples that cause analytical interferences that raise the achievable LOR. This problem is more likely to occur in complex matrices such as soil, waste, biosolids and biota samples.	developed the Quality Systems Manual (QSM) for Environmental Laboratories. Version 5.3 May 2019 UNITED STATES DEPARTMENT OF DEFENSE Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15 Environmental Data Quality Workgroup 1 May 2020
Total Oxidisable Precursor Analysis (TOPA) - Screen	Samples are treated via hydroxyl radical oxidation using an activated agent with overnight heating which converts the masked fluorinated precursors to their equivalent detectable perfluoroalkyl carboxylic acids (PFCAs) and perfluoroalkyl sulfonates (PFSA). LC-MS/MS is done before and after TOP Analysis.	Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff, Erika F. Houtz and David L. Sedlak, Environ. Sci. Technol. 2012

Analyte	Method	Reference Method
Total Oxidisable Precursor Analysis (TOPA) – Detailed	Detailed TOPA includes multiple mass-labelled analogues added prior to the “cooking” step and the recoveries provided along with dilutions required are reported in the certificate of analysis. Sum of all PFAS are reported pre- and post TOPA along with. Results for total PFAS concentration post-TOPA should be greater or equal to the total PFAS concentration pre-TOPA, (signifies no material losses observed in preparation steps, noting a decrease of up to 10% might be expected due to normal analytical variability). – the sum of PFCA post-TOPA should be equal to or greater than the sum of PFCA pre-TOPA, which signifies any precursors being converted to PFCA products. – the sum of PFSA post-TOPA should approximate the sum of PFSA pre-TOPA, signifying that precursors did not convert to PFSA products. – for a full oxidation, no PFAA precursors (e.g. 6:2 FTS, FOSA) are detectable post oxidation, signifying complete oxidation. – for situations where a near complete oxidation is acceptable, minimal PFAA precursors are detectable post oxidation signified by: • for aqueous samples, sum of [PFAA precursors] divided by sum of [Total PFAS] <5%. • for soil samples, sum of [PFAA precursors] divided by sum of [Total PFAS] <10%. • noting greater leniency may be applied for samples where PFAS were detected ≤ 10 times LOR.	PFAS National Environmental Management Plan JANUARY 2020

Analyte	Method	Reference Method

Table 1: Per- and Polyfluoroalkyl Substances (PFAS)

Native PFASs	Extracted Internal Standard Analytes (EIS)
Perfluoroalkyl carboxylic acids (PFCAs)	Isotope Dilution Quantification Standard
Perfluorobutanoic acid (PFBA)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]butanoic acid
Perfluoropentanoic acid (PFPeA)	Perfluoro-n-[1,2,3,4,5- ¹³ C ₅]pentanoic acid
Perfluorohexanoic acid (PFHxA)	Perfluoro-n-[1,2,3,4,5- ¹³ C ₆]hexanoic acid
Perfluoroheptanoic acid (PFHpA)	Perfluoro-n-[1,2,3,4- ¹³ C ₇]heptanoic acid
Perfluorooctanoic acid (PFOA)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octanoic acid
Perfluorononanoic acid (PFNA)	Perfluoro-n-[1,2,3,4,5- ¹³ C ₉]nonanoic acid
Perfluorodecanoic acid (PFDA)	Perfluoro-n-[1,2,3,4,5,6- ¹³ C ₁₀]decanoic acid
Perfluoroundecanoic acid (PFUnA)	Perfluoro-n-[1,2- ¹³ C ₁₁]undecanoic acid
Perfluorododecanoic acid (PFDoA)	Perfluoro-n-[1,2- ¹³ C ₁₂]dodecanoic acid
Perfluorotridecanoic acid (PFTeDA)	Perfluoro-n-[1,2- ¹³ C ₁₃]tridecanoic acid
Perfluorotetradecanoic acid (PFTeDA)	Perfluoro-n-[1,2- ¹³ C ₁₄]tetradecanoic acid
Perfluoroalkane sulfonic acids (PFASs)	
Perfluoropropanesulfonic acid (PFPrS)	Sodium perfluoro-n-[2,3,4- ¹³ C ₃]butane sulfonate ISTD
Perfluorobutanesulfonic acid (PFBS)	Sodium perfluoro-n-[2,3,4- ¹³ C ₃]butane sulfonate
Perfluoropentane sulfonic acid (PFPeS)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]octane sulfonic acid ISTD
Perfluorohexane sulfonate (PFHxS)	Sodium perfluoro-n-[¹⁸ O ₂]hexanesulfonate
Potassium perfluorohexanesulfonate (linear and branched isomers) (br-PFHxSK)	Sodium perfluoro-n-[¹⁸ O ₂]hexanesulfonate
Perfluoroheptane sulfonate (PFHpS)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]octane sulfonic acid
Perfluorooctane sulfonate (PFOS)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octane sulfonate
Potassium perfluorooctanesulfonate (linear and branched isomers) (br-PFOSK)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octane sulfonate
Perfluorononanesulfonic acid (PFNS)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]octane sulfonic acid ISTD
Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]octane sulfonic acid ISTD
Perfluoroalkane sulfonamides (FASAs), Perfluoroalkane sulfonamido ethanols (FASEs) and N-alkyl perfluoroalkane sulfonamido ethanols (MeFASAs, EtFASAs) Perfluoroalkane sulfonamido acetic acids (FASAs) and N-alkyl perfluoroalkane sulfonamido acetic acids (MeFASAs, EtFASAs)	
Perfluorooctane sulfonamide (FOSA)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octane sulfonamide
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N-methyl-d ₃ -perfluoro-n-octanesulfonamide
N-ethylperfluoro-1-octanesulfonamide (N-EtFOSA)	N-ethyl-d ₅ -perfluoro-n-octanesulfonamide
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	2-(N-methyl-d ₃ -perfluoro-1-octane sulfonamido)-ethanol-d ₄
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	2-(N-ethyl-d ₅ -perfluoro-1-octane sulfonamido)-ethanol-d ₄
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N-ethyl-d ₅ -perfluoro-n-octanesulfonamidoacetic acid
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N-methyl-d ₃ -perfluoro-1-octanesulfonamidoacetic acid
Fluorotelomers	
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)	
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2 FTSA)	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]hexane sulfonate (4:2 FTSA)
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTSA)	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]octane sulfonate (6:2 FTSA)
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2 FTSA)	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]decane sulfonate (8:2 FTSA)
1H, 1H, 2H, 2H-perfluorododecane sulfonic Acid (10:2 FTSA)	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂ , D ₄]dodecane sulfonate (10:2 FTSA)
Additional PFAS Compounds	
Hexafluoropropylene oxide dimer acid (HFPO-DA) [GenX]	¹³ C ₃ -Hexafluoropropylene oxide dimer acid (¹³ C ₃ -HFPO-DA)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS) [11Cl-F53B]	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octane sulfonate
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS) [9Cl-F53B]	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octane sulfonate ISTD
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octanoic acid ISTD
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]heptanoic acid ISTD
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	Sodium perfluoro-n-[2,3,4- ¹³ C ₃]butane sulfonate ISTD
Perfluoro-3-methoxypropanoic acid (PFMPA)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]butanoic acid ISTD
Perfluoro-4-methoxybutanoic acid (PFMBA)	Perfluoro-n-[1,2,3,4,5- ¹³ C ₅]pentanoic acid ISTD
6:2 fluorotelomer sulfonamide alkylbetaine (6:2 FTAB)	N-ethyl-d ₅ -perfluoro-n-octanesulfonamide ISTD
3:3 Fluorotelomercarboxylic acid (3:3 FTCA)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octanoic acid ISTD
5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	Perfluoro-n-[1,2,3,4,5,6,7,8- ¹³ C ₈]octanoic acid ISTD
Perfluoroethylcyclohexane sulfonate (PFECHS)	Perfluoro-n-[1,2,3,4- ¹³ C ₄]octane sulfonic acid ISTD

Analyte	Method	Reference Method
	Table 2: Currently Available Certified PFAS Standards Containing Branched and Linear Isomers Perfluorohexanesulfonic acid (PFHxS) Perfluorooctanesulfonic acid (PFOS) 2-(N-methylperfluorooctanesulfonamido) acetic acid (NMeFOSAA) 2-(N-ethylperfluorooctanesulfonamido) acetic acid (NEtFOSAA)	
Adsorbable Organofluorine (AOF)	For the trace level determination of adsorbable organic fluorine (AOF) in water, the sample must first be passed through a mixed-mode weak anion exchange solid-phase extraction (SPE) cartridge thereby adsorbing the PFAS compounds. AOF is then determined by eluting the contents of the SPE cartridge with NaOH in methanol, evaporating and reconstituting the extract, and finally determining the fluoride content of the extract by CIC. The LOR is dependent on the volume passed through the SPE, so the presence of suspended solids does impose limits on the procedure, but for clean waters the LOR is 0.001 mg F/L. Where significant levels of suspended solids are encountered the LOR may be limited to 0.01 mg F/L and the suspended solids may be determined separately by direct combustion.	ASTM D7359-18 ASTM D7359 Standard Test Method for Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC).
Extractable Organofluorine (EOF)	For solid samples, where LORs lower than the direct combustion method of 0.05 mg F/kg are required, extraction can be performed using the same solvent systems used for conventional targeted LC-MS/MS methods. The resulting concentrate is then combusted giving an extractable organofluorine result. A LOR of 0.02 mg F/kg is achievable.	ASTM D7359-18 Standard Test Method for Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC).
TRH (Volatile)/BTEX C6-C10 – 2013 NEPM Fractions C6-C9 – 1999 NEPM Fractions	10g soil extracted with 20mL methanol, tumbled for 1 hour, and analysed with solvent and instrument check surrogates. Clay samples must be completely disintegrated before an aliquot is taken for analysis. Water direct injection of supplied sample (unopened) and analysis with solvent and instrument check surrogates. Analysis by capillary column Purge and Trap GCMS (Eurofins in-house method numbers: Total Recoverable	USEPA Method 8260D NEPM 2013 Schedule B3 Appendix 1: Determination of total recoverable hydrocarbons (TRH) in soil

Analyte	Method	Reference Method
	Hydrocarbons (TPH), Method: LTM-ORG-2010, Method: LTM-GEN-7080 Moisture). Owing to the differential responses of mass spectrometric detectors towards aliphatic and aromatic compounds, it is essential that the standard contain representatives of both groups. This standard should therefore consist of about 40% aromatic and 60% aliphatic target analytes, to be representative of a typical Australian fuel. The aromatic compounds shall comprise the components of BTEX. The aliphatics shall comprise equal proportions of all n-alkanes in the C6 to C10 range.	
Total Recoverable Hydrocarbons C10-C36 – 1999 NEPM Fractions >C10-C40 – 2013 NEPM Fractions	Soil - 10g soil and anhydrous sodium sulfate extracted with 20mL dichloromethane/acetone (1:1), and tumbled for a minimum of 1 hour. Clay samples must be completely disintegrated before an aliquot is taken for analysis. Water - One 250ml of water sequentially extracted in a separatory funnel three times with 20mL dichloromethane. Analysis by capillary column GC/FID (Eurofins in-house method numbers: Total Recoverable Hydrocarbons (TRH), Method: LTM-ORG-2010, Method: LTM-GEN-7080 Moisture)	USEPA Method 8015C NEPM 2013 Schedule B3 Appendix 1: Determination of total recoverable hydrocarbons (TRH) in soil
TRH (Silica Gel)	Sample extracts obtained from the appropriate TRH method are exchanged to a non-polar solvent and are passed through a column containing 1 gram of 100% activated silica gel. Elution is achieved with a small volume of 1:1 DCM:pentane or 1:1 DCM:hexane. The eluted solvent is then concentrated and analysed by the appropriate TRH analysis procedure. A decanoic acid reverse surrogate is used to provide assurance of the effectiveness of the silica-gel clean-up.	USEPA Method 3630C NEPM Appendix 1: Determination of total recoverable hydrocarbons (TRH) in soil
VOCs	10g soil extracted with 20mL methanol, tumbled for 1 hour, and analysed with solvent and instrument check surrogates. Clay samples must be completely disintegrated before an aliquot is taken for analysis. Water direct injection of supplied sample (unopened) and analysis with solvent and instrument check surrogates. Analysis by capillary column Purge and Trap GC-MS (Eurofins in-house method numbers	US EPA Method 8260D

Analyte	Method	Reference Method
	Method: LTM-ORG-2150, LTM-ORG-2160, Method: LTM-GEN-7080 Moisture).	
Semi-volatile Organic Compounds (SVOCs)	The samples are prepared for analysis by gas chromatography/mass spectrometry (GC/MS) using the appropriate sample preparation (refer to Method 3500) and, if necessary, sample clean-up procedures (refer to Method 3600). The semi-volatile compounds are introduced into the GC/MS by injecting the sample extract into a gas chromatograph (GC) with a narrow-bore fused-silica capillary column. The GC column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) connected to the gas chromatograph. Analytes eluted from the capillary column are introduced into the mass spectrometer via a jet separator or a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact (or electron impact-like) spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve. NOTE: This method can be used in conjunction with the following sample preparation procedures: Water (including TCLP leachates) - Methods 3510, 3520, 3535 Soil/sediment - Methods 3540, 3541, 3545, 3546 3550, 3560, 3561	USEPA Method 8270E
Phenols/PAHs/PCBs/OPPs/OCs	Soil - 10g soil, surrogates, mixed with anhydrous sodium sulfate and extracted with 20mL dichloromethane/acetone (1:1), and tumbled for a minimum of 1 hour. Clay samples must be completely disintegrated before an aliquot is taken for analysis. Water - 250ml water sample plus surrogates triple extracted with dichloromethane (base and neutrals). Leachate - 250ml water sample plus surrogates triple extracted with dichloromethane (base and neutrals). Analysis by capillary column GC/MS (Eurofins in-house Methods LTM-ORG-	USEPA Method 8270E

Analyte	Method	Reference Method
	2130, LTM-ORG-2140 Method: LTM-GEN-7080 Moisture).	
Analysis of Phenoxy Acid Herbicides in Aqueous and Soil Samples by HPLC	A 100-mL water sample is adjusted to a basic pH with sodium hydroxide, shaken, and allowed to set for 1 hour to hydrolyse chlorinated esters. The sample is acidified with H_3PO_4, filtered, and the chlorinated acids are extracted from a 20-mL aliquot. The aliquot is pumped through a high performance liquid chromatography (HPLC) cartridge (containing C-18-silica), trapping the chlorinated acids. The concentrator cartridge is valved in-line with the C-18 analytical column following extraction. The acids are separated by HPLC and detected using an ultraviolet (UV) absorption spectrometer. LABORATORY TEST METHOD NUMBER: LTM-ORG-2180 Soil - 10g soil, surrogates, mixed with anhydrous sodium sulfate are extracted using acetonitrile in an ultrasonic bath, or shaker filtered, diluted with water as appropriate, adjusted to a basic pH with sodium hydroxide, shaken, and allowed to set for 1 hour to hydrolyse chlorinated esters. The sample is acidified with H_3PO_4, filtered, and the chlorinated acids are extracted from a 20-mL aliquot. The aliquot is pumped through a high performance liquid chromatography (HPLC) cartridge (containing C-18-silica), trapping the chlorinated acids. The concentrator cartridge is valved in-line with the C-18 analytical column following extraction. The acids are separated by HPLC and detected using an ultraviolet (UV) absorption spectrometer. LABORATORY TEST METHOD NUMBER: LTM-ORG-2180	US EPA -NERL: Method 555: Chlorinated Acids in Water Using HPLC/UV
EXPLOSIVES Nitroaromatics, nitramines, and nitrate esters by high performance liquid chromatography (HPLC)	Soil - 10g soil, surrogates, mixed with anhydrous sodium sulfate are extracted using acetonitrile in an ultrasonic bath, or shaker filtered, diluted with water as appropriate, and analysed by HPLC with UV/DAD detection. Clay samples must be completely disintegrated before an aliquot is taken for analysis. Water - 250ml water sample plus surrogates are pre-concentrated using solid-phase extraction, as described in USEPA Method 3535 and then diluted with	USEPA Method 8330B

Analyte	Method	Reference Method																		
	water as appropriate for the selected separations. Leachate - 250ml water sample plus surrogates extracted with SPE.																			
DIOXINS Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS[†]	This method is for determination of tetra-through octa-chlorinated dibenzo-p-dioxins (CDDs) and dibenzofurans (CDFs) in water, soil, sediment, sludge, tissue, and other sample matrices by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). The seventeen 2,3,7,8-substituted CDDs/CDFs may be determined by this method. Specifications are also provided for separate determination of 2,3,7,8-tetrachloro-dibenzo-p-dioxin (2,3,7,8-TCDD) and 2,3,7,8-tetrachloro-dibenzofuran (2,3,7,8-TCDF). The detection limits and quantitation levels in this method are usually dependent on the level of interferences rather than instrumental limitations. [†]Analysis subcontracted to Eurofins GfA Lab Service GmbH – Hamburg, Germany	USEPA Method 1613B																		
PBDEs Polybrominated diphenyl ethers by HRGC/HRMS[†]	This method is for determination of polybrominated diphenyl ethers in water, soil, sediment, sludge, tissue, and other sample matrices by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). <table border="1"> <thead> <tr> <th>TriBDE</th><th>TetraBDE</th><th>PentaBDE</th></tr> </thead> <tbody> <tr> <td>BDE-17 BDE-28</td><td>BDE-47 BDE-49 BDE-66 BDE-71 BDE-77</td><td>BDE-85 BDE-99 BDE-100 BDE-119 BDE-126</td></tr> <tr> <th>HexaBDE</th><th>HeptaBDE</th><th>OctaBDE</th></tr> <tr> <td>BDE-138 BDE-153 BDE-154 BDE-156</td><td>BDE-183 BDE-184 BDE-191</td><td>BDE-196 BDE-197</td></tr> <tr> <th>NonaBDE</th><th>DecaBDE</th><td></td></tr> <tr> <td>BDE-206 BDE-207</td><td>BDE-209</td><td></td></tr> </tbody> </table> The detection limits and quantitation levels in this method are usually dependent on the level of interferences rather than instrumental limitations. [†]Analysis subcontracted to Eurofins GfA Lab Service GmbH – Hamburg, Germany	TriBDE	TetraBDE	PentaBDE	BDE-17 BDE-28	BDE-47 BDE-49 BDE-66 BDE-71 BDE-77	BDE-85 BDE-99 BDE-100 BDE-119 BDE-126	HexaBDE	HeptaBDE	OctaBDE	BDE-138 BDE-153 BDE-154 BDE-156	BDE-183 BDE-184 BDE-191	BDE-196 BDE-197	NonaBDE	DecaBDE		BDE-206 BDE-207	BDE-209		Method 1614A Brominated Diphenyl Ethers in Water, Soil, Sediment, and Tissue by HRGC/HRMS May 2010
TriBDE	TetraBDE	PentaBDE																		
BDE-17 BDE-28	BDE-47 BDE-49 BDE-66 BDE-71 BDE-77	BDE-85 BDE-99 BDE-100 BDE-119 BDE-126																		
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BDE-138 BDE-153 BDE-154 BDE-156	BDE-183 BDE-184 BDE-191	BDE-196 BDE-197																		
NonaBDE	DecaBDE																			
BDE-206 BDE-207	BDE-209																			

Analyte	Method	Reference Method
Inorganics		
Total Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)	A portion of soil or water undergoes acidic digestion using either microwave or automated hot block. Analysis by ICP-AES or ICP-MS. (Eurofins in-house method ICP-AES LTM-MET-3030, ICP-MS LTM-MET-3040 LTM-GEN-7080 Moisture).	USEPA Method 6010D USEPA Method 3050B USEPA Method 3051A USEPA Method 6020B USEPA Method 3010A USEPA Method 3015A
Total Mercury (Hg)	A portion of soil or water undergoes acidic digestion using either microwave or automated hot block. Analysis by ICP/MS. (Eurofins in-house method LTM-MET-3030, LTM-GEN-7080 Moisture).	USEPA Method 6010D USEPA Method 3050B USEPA Method 3051A
Filtered Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)	Filtered (0.45µm) and acidified in the field prior to analysis. Analysis by ICP-MS. (Eurofins in-house method LTM-MET-3040).	USEPA Method 6020B USEPA Method 3010A USEPA Method 3015A
Filtered Mercury (Hg)	Filtered, oxidation and final reduction. Analysis by FIMS. (Eurofins in-house method LTM-MET-3040).	USEPA Method 7471B USEPA Method 3010A USEPA Method 3015A
Water Laboratory		
Alkalinity	Alkalinity is a measure of the acid neutralising capacity of waters. It is a measure of how much acid (H⁺) is required to lower the pH to a specific level. In most waters, alkalinity is a function of the concentrations of carbonate [CO₃²⁻], bicarbonate [HCO₃⁻] and hydroxyl [OH⁻] ions present. For this method it is assumed that other weak inorganic or organic acids, such as silicic, phosphoric and boric acids are absent. Measuring alkalinity is important in determining a stream's ability to neutralise acidic pollutants from rainfall or wastewater. Total alkalinity is affected by environmental factors; rain, acidic sanitisers, addition of fill water and other product applications can all change the alkalinity over time. Most alkalinity in surface water comes from calcium carbonate (CaCO₃), being leached from rocks and soil. This process is enhanced if the rocks and soil have been broken up for any reason, such as mining or urban development. Alkalinity is significant in the treatment of wastewater and drinking water because it will influence treatment process such as anaerobic digestion. Water may be unsuitable for use in irrigation if the	APHA 2320 B.

Analyte	Method	Reference Method
	alkalinity level in the water is higher than the natural level of alkalinity in the soil. This method covers the determination of alkalinity of all types of water. Alkaline ions present in the sample are neutralised by titration with a standard acid solution. Titration to different pH endpoints allows ion speciation to be determined. This method determines alkalinity relative to pre-designated endpoints measured by a pH meter. The end-points designated are pH 8.3 (Phenolphthalein Alkalinity) and pH 4.5 (Total Alkalinity). Titration by colour can also be used to analyse alkalinity, refer to APHA Method 2320 B (2.1) for details. Alkalinity is expressed in terms of the amount of calcium carbonate that would need to be dissolved in fresh water to give the same alkalinity. Alkalinity is reported as mg CaCO₃/L. The typical range of applicability is 20 – 4000 mg CaCO₃/L. Range can be extended with smaller sample volume and/or alternate titrant concentration(s).	
Ammonia in Water	Alkaline phenol and hypochlorite react with ammonia to form indophenol blue that is proportional to the ammonia concentration. The blue colour is intensified with sodium nitroprusside. This method determines ammonia in drinking, surface, and saline waters; domestic and industrial wastes.	APHA 4500-NH₃ B, C, D, F, H
Anions in Water	Bromide; bromate; chloride; chlorite; chlorate; fluoride; iodide; nitrate; nitrite; phosphate; sulfate by IC using in-house E045.1/ LM-LTM- INO-4300.	APHA 4110 B
Anions in Soils	Tests for water-soluble anions on milled air-dry sample are suitable for use on all soils in clarified/filtered 1:5 soil/water extracts. Bromide; bromate; chloride; chlorite; chlorate; fluoride; iodide; nitrate; nitrite; phosphate; sulfate by IC using in-house E045.1/ LM-LTM- INO-4300.	APHA 4110 B
Biochemical Oxygen Demand (5 days, 20°C)	The BOD test is an empirical bioassay-type test which measures the dissolved oxygen consumed by microbial life while assimilating and oxidising organic matter in a sample. A waste sample (or dilution) is incubated for five days 20°C in the dark. Dissolved oxygen is measured before and after incubation using a modified Winkler or oxygen probe method. The reduction in	APHA 5210.

Analyte	Method	Reference Method
	dissolved oxygen during the incubation period yields a measure of BOD.	
Chemical Oxygen Demand (COD)	Most types of organic matter are oxidized by a boiling mixture of chromic and sulfuric acids. A sample is refluxed in strongly acid solution with a known excess of potassium dichromate ($K_2Cr_2O_7$). After digestion, the remaining unreduced $K_2Cr_2O_7$ is titrated with ferrous ammonium sulfate to determine the amount of $K_2Cr_2O_7$ consumed and the oxidisable matter is calculated in terms of oxygen equivalent. Keep ratios of reagent weights, volumes, and strengths constant when sample volumes other than 50 mL are used. The standard 2-h reflux time may be reduced if it has been shown that a shorter period yields the same results. Some samples with very low COD or with highly heterogeneous solids content may need to be analysed in replicate to yield the most reliable data. Results are further enhanced by reacting a maximum quantity of dichromate, provided that some residual dichromate remains.	APHA 5220 C.
Chloride - 1:5 soil/water extract	Tests for water-soluble chloride (Cl^-) on milled air-dry sample are suitable for use on all soils. For method 5A1, Cl^- in clarified 1:5 soil/water extracts is determined by potentiometric titration with $AgNO_3$ in conjunction with an $Ag/AgNO_3$ electrode array. For method 5A2a, Cl^- in clarified 1:5 soil/water extracts is determined by an automated, continuous flow colorimetric procedure based on the formation — in the presence of ferric ions and free thiocyanate ions — of highly coloured ferric thiocyanate in proportion to the Cl^- concentration. Method 5A2b is similar, except it pertains to the use of flow injection analysis (FIA). For 5A1 and 5A2 methods, it is assumed there are no chemical interferences of significance. Moreover, Method 5A2a has proven more precise than method 5A1, particularly at soil concentrations <50 mg Cl^-/kg. Other analytical finish options involve chemically-suppressed ion chromatography (5A3a), single-column electronically suppressed ion chromatography (5A3b), and direct measurement by ICPAES (Method 5A4). The methodology specifies reporting results on an air-dry basis.	APHA Method 4500-Cl^- Rayment & Higginson 1992, "Australian Laboratory Handbook of Soil and Water Chemical Methods". NEPM 2013 - Schedule B3 - Guideline on Laboratory Analysis of Potentially Contaminated Soil

Analyte	Method	Reference Method
Chromium - hexavalent	This procedure measures only hexavalent chromium, (Cr6+). The hexavalent chromium is determined colorimetrically by reaction with diphenylcarbazide in acid solution. A red-violet coloured complex of unknown composition is produced. The colorimetric method is useful for the determination of hexavalent chromium in a natural or treated water in the range from 0.005 to 1 mg/L. This range can be extended by appropriate sample dilution or concentration and/or use of longer cell paths. Normal level analyses in waters uses in-house LTM- INO-4100 Analysis of hexavalent chromium in water by discrete analyser.	APHA Standard Methods for the Examination of Water & Wastewater. 23rd Edition 2017. 3500-Cr-B
Colour - Visual Comparison Method	Colour is determined by visual comparison of the sample with known concentrations of coloured solutions. Comparison also may be made with special, properly calibrated glass colour disks. The platinum-cobalt method of measuring colour is the standard method, the unit of colour being that produced by 1 mg platinum/L in the form of the chloroplatinate ion. The ratio of cobalt to platinum given (2120B.4) matches the colour of natural waters.	APHA 2120 B.
Cyanide	Free Cyanide (CN_F) Only hydrogen cyanide and the cyanide ion in solution can be classed as "free" cyanide. The proportions of HCN and CN⁻ in solution are according to their equilibrium equation; this is influenced by the solution pH. Methods used to detect free cyanide should not alter the stability of weaker cyanide complexes, as they may otherwise be included in the free cyanide result. Methods used to detect free cyanide should be clear of interferences due to the presence of high concentrations of more stable cyanide complexes or other cyanide forms. If not, the interference must be quantified and allowed for in the result. Weak Acid Dissociable Cyanide (CN_{WAD}) Unlike the definition of "free cyanide" which identifies the specific cyanide species being measured, WAD cyanide refers to those cyanide species measured by specific analytical techniques. WAD cyanide includes those cyanide species	APHA 4500-CN B, C, D, E, I, N, O and USEPASW 846 9010, 9013, 9014, 9213.

Analyte	Method	Reference Method
	liberated at moderate pH of 4.5 such as HCN(aq) and CN⁻, the majority of Cu, Cd, Ni, Zn, Ag complexes and others with similar low dissociation constants. Methods used to measure WAD should be free from interferences due to the presence of high concentrations of more stable cyanide complexes or other cyanide forms. If not, the interference must be quantified and allowed for in the result. Total Cyanide (CN_T) This measurement of cyanide includes all free cyanide, all dissociable cyanide complexes and all strong metal cyanide including ferro-cyanide Fe(CN)₆⁴⁻, ferri-cyanide Fe(CN)₆³⁻, and portions of hexacyano cobaltate Co(CN)₆³⁻, and those of gold and platinum. Only the related or derived compounds cyanate (CNO⁻) and thiocyanate (SCN⁻) are excluded from the definition of total cyanide. Methods used to determine total cyanide must be shown to be capable of quantitatively determining all stable complexes of cyanide, including the cobalt cyanide complex. If methods determine other analytes as well (e.g. include SCN⁻), those analytes need to be determined separately and allowed for in the total result. In-house method LTM-INO-4020 Total and Free plus Weak Acid Dissociable Cyanide by Continuous Flow Analysis	
Electrical Conductivity/Resistivity	This in-house method will determine the concentration of ions in a soil-water suspension, expressed in µS/cm units. The conductivity is measured electrometrically at constant temperature (e.g. 25°C). E032.2 in soil type matrices by conductivity meter	NEPM Schedule B3
Ferrous (Fe²⁺)	Iron is brought into solution, reduced to the ferrous state by boiling with acid and hydroxylamine, and treated with 1,10-phenanthroline at pH 3.2 to 3.3. Three molecules of phenanthroline chelate each atom of ferrous iron to form an orange-red complex. The coloured solution obeys Beer's law; its intensity is independent of pH from 3 to 9. A pH between 2.9 and 3.5 insures rapid colour development in the presence of an excess of phenanthroline. Colour standards are stable for at least 6	APHA 3500-Fe B Phenanthroline Method

Analyte	Method	Reference Method
	months. Ferrous iron by DA using in-house LTM-INO-4190.	
Fluoride in Water	Fluoride is determined potentiometrically using a fluoride electrode in conjunction with a standard single junction sleeve-type reference electrode and a pH meter having an expanded millivolt scale or a selective ion meter having a direct concentration scale for fluoride using APHA 4500-F C. This method determines fluoride in drinking, surface, and saline waters; domestic and industrial wastes.	APHA 4500-F⁻ C.
Fluoride in Soils	Total fluoride by combustion ion chromatography (CIC) using in-house LTM-INO-4150 (Part A)	ASTM D7359 Standard Test Method for Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC).
Methylene blue active substances (MBAS)	Methylene blue active substances (MBAS) bring about the transfer of methylene blue, a cationic dye, from an aqueous solution into an immiscible organic liquid upon equilibration. This occurs through ion pair formation by the MBAS anion and the methylene blue cation. The intensity of the resulting blue colour in the organic phase is a measure of MBAS. Anionic surfactants are among the most prominent of many substances, natural and synthetic, showing methylene blue activity. The MBAS method is useful for estimating the anionic surfactant content of waters and wastewaters, but the possible presence of other types of MBAS always must be kept in mind. This method is relatively simple and precise. It comprises three successive extractions from acid aqueous medium containing excess methylene blue into chloroform (CHCl ₃), followed by an aqueous backwash and measurement of the blue colour in the CHCl ₃ by spectrophotometry at 652 nm using in-house LTM-INO-4030 MBAS as MW: 288 (filtered).	APHA 5540 C
Nitrite, Total Oxidised Nitrogen	A discrete analysis is a system of quantitative spectrophotometric	APHA 4500-NO₃⁻

Analyte	Method	Reference Method
(NO _x) and Nitrate with photometric detection using Discrete Analyser	determinations utilising automated analytical techniques to perform chemical reactions with high precision and reliability. The sample and the reagents are pipetted by the instrument into a cell and mixed before incubation. After incubation, the absorbance of the solution is measured at the wavelength applicable to the determination. Nitrite (NO₂⁻) is determined through formation of a reddish purple azo dye produced at pH 2.0 to 2.5 by coupling diazotised sulfanilamide with N-(1-naphthyl)-ethylenediamine dihydrochloride (NED dihydrochloride). The colour system is measured at 540 nm. The applicable detection range of spectrophotometric measurements, as dictated by Beer's Law, is 10 to 1000 µg NO₂⁻ N/L, with Method Detection Limits (MDL) and Limits of Reporting (LOR) determined within this range. See method validation for detail. Higher concentrations can be determined by diluting the sample. Total Oxidised Nitrogen (NO_x) Nitrate (NO₃⁻) is reduced to nitrite (NO₂⁻) by vanadium chloride. The total nitrite ions (Total Oxidised Nitrogen, TON, NO_x) are then reacted with sulphanilamide and NED dihydrochloride under acidic conditions to form a pink azo-dye. The absorbance is measured at 540 nm and is related to the NO_x concentration by means of a calibration curve. Higher concentrations can be determined by diluting the sample. Nitrate concentration is a result of the calculation of NO_x concentration minus nitrite concentration noting the need for standardised units (i.e. mg N/L, or "as N"). Nitrogen-nitrate, nitrite, oxides of nitrogen, total by DA using in-house LTM-INO-4350	
Oil and Grease	This method is for determination of n-hexane extractable material (HEM; oil and grease) and n-hexane extractable material that is not adsorbed by silica gel (SGT-HEM; non-polar material) in surface and saline waters and industrial and domestic aqueous wastes. Extractable materials that may be determined are relatively non-volatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and	USEPA Method 1664, Revision A n-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated n-Hexane Extractable Material (SGT-HEM; Non-polar Material)

Analyte	Method	Reference Method
	related materials. The method is based on prior United States Environmental Protection Agency (US EPA) methods for determination of "oil and grease" and "total petroleum hydrocarbons". The term "n-hexane extractable material" reflects that this method can be used to determine materials other than oils and greases. Similarly, the term "silica gel treated n-hexane extractable material" reflects that this method can be used to determine material that is not adsorbed by silica gel (non-polar material). This method is not applicable to measurement of materials that volatilise at temperatures below approximately 85°C. Petroleum fuels from gasoline through #2 fuel oil may be partially lost in the solvent removal operation. Some crude oils and heavy fuel oils contain a significant percentage of materials that are not soluble in n-hexane. Accordingly, recoveries of these materials may be low. This method is capable of measuring HEM and SGT-HEM in the range of 10 to 1000 mg/L, and may be extended to higher levels by analysis of a smaller sample volume collected separately.	by Extraction and Gravimetry
% Organic Matter	Gravimetric determination based on ashing at >600 °C	NEPM Schedule B3
pH in Soils (1:5 aqueous extract) pH in Soils (1:5 CaCl₂ extract)	This in-house method will determine the concentration of hydrogen ions (H ⁺) in a soil-water or soil-calcium chloride suspension, expressed in pH units. The pH is measured electrometrically at constant temperature (e.g. 25°C). LTM-GEN-7090_R0 pH electrometric measurement in water & soil-type matrices by ISE.	NEPM Schedule B3
Phosphorus	Phosphorus analyses embody two general procedural steps: (a) conversion of the phosphorus form of interest to dissolved orthophosphate, and (b) colorimetric determination of dissolved orthophosphate. The separation of phosphorus into its various forms is defined analytically but the analytical differentiations have been selected so that they may be used for interpretive purposes. Filtration through a 0.45-µm-pore-diam membrane filter separates dissolved from suspended forms of phosphorus. No claim	APHA 4500 P.

Analyte	Method	Reference Method
	is made that filtration through 0.45-µm filters is a true separation of suspended and dissolved forms of phosphorus; it is merely a convenient and replicable analytical technique designed to make a gross separation. Pre-filtration through a glass fibre filter may be used to increase the filtration rate. Phosphates that respond to colorimetric tests without preliminary hydrolysis or oxidative digestion of the sample are termed “reactive phosphorus.” While reactive phosphorus is largely a measure of orthophosphate, a small fraction of any condensed phosphate present usually is hydrolysed unavoidably in the procedure. Reactive phosphorus occurs in both dissolved and suspended forms. Acid hydrolysis at boiling-water temperature converts dissolved and particulate condensed phosphates to dissolved orthophosphate. The hydrolysis unavoidably releases some phosphate from organic compounds, but this may be reduced to a minimum by judicious selection of acid strength and hydrolysis time and temperature. The term “acid-hydrolysable phosphorus” is preferred over “condensed phosphate” for this fraction. The phosphate fractions that are converted to orthophosphate only by oxidation destruction of the organic matter present are considered “organic” or “organically bound” phosphorus. The severity of the oxidation required for this conversion depends on the form—and to some extent on the amount—of the organic phosphorus present. Like reactive phosphorus and acid-hydrolysable phosphorus, organic phosphorus occurs both in the dissolved and suspended fractions. The total phosphorus as well as the dissolved and suspended phosphorus fractions each may be divided analytically into the three chemical types that have been described: reactive, acid hydrolysable, and organic phosphorus. As indicated, determinations usually are conducted only on the unfiltered and filtered samples. Suspended fractions generally are determined by difference; however, they may be determined directly by digestion of the material retained on a glass-fibre filter.	

Analyte	Method	Reference Method
Sulfate (as SO₄²⁻)	Sulfate ion (SO ₄ ²⁻) is precipitated in an acetic acid medium with barium chloride (BaCl ₂) so as to form barium sulfate (BaSO ₄) crystals of uniform size. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ ²⁻ concentration is determined by comparison of the reading with a standard curve using in-house LTM-INO-4110 Sulfate by Discrete Analyser	APHA 4500- SO₄²⁻ E. Turbidimetric Method*
Total Organic Carbon in Water	Total Carbon (TC) is measured by injecting a portion of the water sample into a heated combustion tube packed with an oxidation catalyst. The water is vaporised and TC, the organic carbon and the inorganic carbon, is converted to carbon dioxide (CO₂). The carbon dioxide is carried with the carrier gas stream from the combustion tube to a NDIR (non-dispersive infrared gas analyser) and concentration of carbon dioxide is measured. The TC concentration of the sample is obtained by using the calibration curve prepared with standard solutions. Inorganic Carbon (IC) is measured by injecting a portion of the sample into an IC reaction chamber filled with phosphoric acid solution. All IC is converted to carbon dioxide and concentration of carbon dioxide is measured with a NDIR. TOC may be obtained as the difference of TC and IC.	APHA 5310 B
Total Dissolved Solids (TDS) Dried at 180°C	A well-mixed sample is filtered through a standard glass fibre filter. The filtrate is evaporated and dried to constant weight at 180°C. This method determines filterable residue in drinking, surface, and saline waters; domestic and industrial wastes. (A) Mineral Waters: Highly mineralized waters containing significant concentrations of calcium, magnesium, chloride and/or sulfate may be hygroscopic and will require prolonged drying, desiccation and rapid weighing. (B) Bicarbonate: Samples containing high concentrations of bicarbonate will require careful and possibly prolonged drying at 180°C to insure that all the bicarbonate is converted to carbonate. (C) High Residue Levels: Too much residue in the evaporating dish will crust over and entrap water that will not be	APHA 2540 C.

Analyte	Method	Reference Method
	driven off during drying. Total residue should be limited to about 200 mg. in-house method LTM-INO-4170.	
Total Suspended Solids (TSS) Dried at 103–105°C	Suspended solids are those that are retained on a glass-fibre filter. The unfiltered sample is mixed thoroughly and an appropriate volume is rapidly poured into a graduated cylinder. The suspended solids are collected on a glass fibre filter, and the insoluble residue is dried at 104 ± 1°C and weighed. This method may be used to determine the suspended-solids concentration of any natural or treated water or industrial waste. In-house method LTM-INO-4070	APHA 2540 D.
Fixed and Volatile Solids Ignited at 550°C	The residue from LTM-INO-4070 or LTM-INO-4170 is ignited to constant weight at 550°C. The remaining solids represent the fixed total, dissolved, or suspended solids while the weight lost on ignition is the volatile solids. The determination is useful in control of wastewater treatment plant operation because it offers a rough approximation of the amount of organic matter present in the solid fraction of wastewater, activated sludge, and industrial wastes.	APHA 2540 E.
Residue, Volatile (Gravimetric, Ignition at 550°C)	The residue obtained from the determination of total, filterable or non-filterable residue is ignited at 550°C in a muffle furnace. The loss of weight on ignition is reported as mg/L volatile residue. This method determines the weight of solid material combustible at 550°C. The test is useful in obtaining a rough approximation of the amount of organic matter present in the solid fraction of sewage, activated sludge, industrial wastes, or bottom sediments.	APHA 2540 E.
General		
Cation exchange capacity (CEC)	Cation exchange capacity (CEC) is a measure of the soil's ability to hold positively charged ions. It is a very important soil property influencing soil structure stability, nutrient availability, soil pH and the soil's reaction to fertilisers and other ameliorants (Hazleton and Murphy 2007). The clay mineral and organic matter components of soil have negatively charged sites on their surfaces which	NEPM Schedule B3

Analyte	Method	Reference Method
	adsorb and hold positively charged ions (cations) by electrostatic force. This electrical charge is critical to the supply of nutrients to plants because many nutrients exist as cations (e.g. magnesium, potassium and calcium). In general terms, soils with large quantities of negative charge are more fertile because they retain more cations (McKenzie et al. 2004) however, productive crops and pastures can be grown on low CEC soils. The main ions associated with CEC in soils are the exchangeable cations calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^+) and potassium (K^+) (Rayment and Higginson 1992), and are generally referred to as the base cations. In most cases, summing the analysed base cations gives an adequate measure of CEC ("CEC by bases"). However, as soils become more acidic these cations are replaced by H^+, Al^{3+} and Mn^{2+}, and common methods will produce CEC values much higher than what occurs in the field (McKenzie et al. 2004). NOTE: Only CEC & ESP are calculated by this method. Conducted by in-house Method LTM-MET-3060 – Cation Exchange Capacity (CEC) by bases & Exchangeable Sodium Percentage (ESP).	
Clay Content	This method is based on the Soil Classification assessment by Hydrometer outlined in the Australian Standard 1289.3.6.3 (Determination of the particle size distribution of a soil – Standard method of fine analysis using a hydrometer). This method quantitatively determines the physical proportions of three sizes of primary soil particles, by determining their settling rates in an aqueous solution using a hydrometer. The three categories of particles measured are defined as follows:- 1. Sand Ranges from 2000 to 50μm 2. Silt Ranges from 50-2μm 3. Clay Less than 2μm Settling rates of primary soil particles are measured using a hydrometer.	AS1289.3.6.3
Moisture	Gravimetric determination based on drying at 103-105 °C. MOISTURE CONTENT IN SOIL OR OTHER SOLID MATRICES BY GRAVIMETRY LTM-GEN-7080 Moisture.	NEPM Schedule B3

Analyte	Method	Reference Method
Leaching Procedures	This in-house method is for the preparation of leachates collected from soil, sediments, sludges, and other solid matrices using a rotary vessel extraction procedure. The method allows for the substitution of laboratory grade de-ionised water, EP or SPLP fluids, or site water supplied by the client as the extraction fluid. The solid portion of the sample is reduced in particle size, if necessary, and leached by rotary vessel agitation with a selected leaching fluid. The sample leachate is then extracted/ analysed by an additional test method, as per client request. (Eurofins in-house method LEACHING PROCEDURE FOR VOLATILE AND NON-VOLATILE ANALYTES FROM SOILS AND SOLID WASTES LTM-GEN-7010.	Toxicity Characteristic Leaching Procedure (TCLP) USEPA Method 1311 Australian Standard Leaching Procedure (ASLP) AS 4439.2: 2019; AS4439.3: 2019
LEAF 1313	Liquid –Solid Partitioning as a Function of Extract pH for Constituents in Solid Materials using a Parallel Batch Extraction Procedure. Nine (9) Parallel extractions of a particle sized reduced solid material in dilute acid or base and reagent water. Series of eluates having pH values ranging from 2-13. Liquid solid ratio of 10:1. Eluate is centrifuged and filtered for COPCs. Designed to provide aqueous extracts representing the liquid-solid portioning [LSP] curve as a function of pH for inorganics and non-volatile organics in solid materials	EPA SW-846 Method 1313
LEAF 1314	Liquid –Solid Partitioning as a Function of Liquid-Solid Ratio for Constituents in Solid Materials using an Up-Flow Percolation Column Procedure Eluent is introduced into a column with packed particle sized reduced solid material in an up-flow pumping mode. Flow rate is maintained between 0.5-1.0 LS/Day. Eluent is collected at predetermined times, filtered and analysed for COPCs. Total time of test is approximately 14 days. Designed to provide the liquid – solid portioning [LSP] of inorganic constituents and non-volatile organics in granular solid material as a function of liquid to solid [LS] ratio under percolation conditions.	EPA SW-846 Method 1314

Analyte	Method	Reference Method
LEAF 1315	Mass Transfer Rates of Constituents in Monolithic or Compacted Granular Materials using a Semi-dynamic Tank Leaching Procedure. Leaching of continuously water saturated monolithic or compacted granular material in an eluent-filled tank with periodic renewal of the leaching solution. LS ratio of 9 mL eluent per cm² of surface area. Eluent is collected at predetermined times and analysed for COPCs. Eluate is centrifuged and filtered for COPCs. Total time of test is 63 days. Designed to provide the mass transfer [release rates] of inorganic analytes contained in a monolith or compacted granular material. Under diffusion controlled release conditions, as a function of leaching time.	EPA SW-846 Method 1315
LEAF 1315	Mass Transfer Rates of Constituents in Monolithic or Compacted Granular Materials using a Semi-dynamic Tank Leaching Procedure. Leaching of continuously water saturated monolithic or compacted granular material in an eluent-filled tank with periodic renewal of the leaching solution. LS ratio of 9 mL eluent per cm² of surface area. Eluent is collected at predetermined times and analysed for COPCs. Eluate is centrifuged and filtered for COPCs. Total time of test is 63 days. Designed to provide the mass transfer [release rates] of inorganic analytes contained in a monolith or compacted granular material. Under diffusion controlled release conditions, as a function of leaching time.	EPA SW-846 Method 1315
LEAF 1316	Liquid- Solid Partitioning as a Function of Liquid-Solid Ratio for Constituents in Solid Materials using a Parallel Batch Extraction Procedure. Five (5) Parallel extractions of a particle-size reduced solid material in reagent water over a range of L/S values from 0.5 to 10 mL eluant/g dry material. Depending on particle size, sample is tumbled between 24 and 72 hours. Eluate is centrifuged and filtered for COPCs. Designed to provide the liquid-solid partitioning[LSP] of inorganic and non-	EPA SW-846 Method 1316

Analyte	Method	Reference Method
	volatile organics at the natural pH of the solid material as a function of liquid to solid ratio [L/S] under conditions that approach liquid-solid chemical equilibrium.	
Asbestos		
Asbestos in Soils	The whole sample submitted is first dried and then sieved through a 10mm sieve followed by a 2mm sieve. All fibrous matter viz greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) Iron ores - Sampling and Sample preparation procedures is employed. Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis in accordance with AS 4964-2004. Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. Bulk samples include building materials, soils and ores	AS 4964–2004
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated and where required interfering organic fibres or matter may be removed by treating the sample for several hours at a temperature not exceeding 400 ± 30°C. The resultant material is then ground and examined in accordance with AS 4964-2004.and ores	AS 4964–2004
Asbestos fibres in Air	Conducted in accordance with the National Occupational Health & Safety Commission - Guidance Note on The Membrane Filter Method For Estimating Airborne Asbestos Fibres 2 nd Edition [NOHSC:3003(2005)] and in-house Method LTM-ASB-8010.	NOHSC:3003(2005)
Air		

Analyte	Method	Reference Method
Filters - Total Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)	The filter is digested in a hot block set to 95°C for 2.5 hours using an extraction fluid containing hydrochloric acid (HCl) and nitric acid (HNO ₃). Two aliquots of hydrogen peroxide (H ₂ O ₂) are added after 1.5 hours and 2.0 hours of extraction and are allowed to effervesce. After extraction, the samples are filtered and diluted to a final volume of 50 mL. The extract is analysed by ICP-MS and the data are collected using the manufacturer's software.	EQL-0512-201 - US Environmental Protection Agency
Microbiology		
Method for Isolation, Enumeration and Confirmation of Sulfite Reducing Clostridia and <i>Clostridium perfringens</i> from Raw, Potable, Process and Recreational Waters by Membrane Filtration	Tests for sulfite-reducing clostridia play only a subsidiary role in water examination. The organisms form spores which are environmentally resistant and their presence may indicate soil contamination, although some species may grow in deposits, and be associated with corrosion of distribution pipes. <i>Clostridium perfringens</i> is a sulfite-reducing species and is associated with faecal contamination. The method involves a volume of sample that is filtered and the membrane filter placed on the surface of an agar medium containing sulfite, iron(III) and D-cycloserine (which inhibits other bacteria and reduces the size of colonies that develop). The agar medium is then incubated under anaerobic conditions at 37 °C. Sulfite-reducing clostridia usually produce black colonies as a result of the reduction of sulfite to sulfide, which then reacts with the iron(III) salt. If only a spore count is required then the sample is heat-treated at 60 °C prior to filtration in order to kill vegetative bacteria. In-house method Sulfite-Reducing Clostridia - Membrane Filtration Method: LTM-MIC-6617	UK Environment Agency, The Microbiology of Drinking Water (2010), Part 6 – Methods for the isolation and enumeration of sulphite-reducing clostridia and <i>Clostridium perfringens</i> by membrane filtration.
Detection of Male-specific & Somatic Coliphages in Water	Method uses the single agar layer (SAL) procedure. A 100-mL ground water sample is assayed by adding MgCl ₂ (magnesium chloride), log-phase host bacteria (<i>E. coli</i> F _{amp} for F+ coliphage and <i>E. coli</i> CN-13 for somatic coliphage), and 100 mL of double-strength molten tryptic soy agar to the	USEPA Method 1602: Male-specific (F+) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure April 2001

Analyte	Method	Reference Method
	sample. The sample is thoroughly mixed and the total volume is poured into 5 to 10 plates (dependent on plate size). After an overnight incubation, circular lysis zones (plaques) are counted and summed for all plates from a single sample. The quantity of coliphage in a sample is expressed as plaque forming units (PFU) / 100 mL. For quality control purposes, both a coliphage positive reagent water sample and a negative reagent water sample (method blank) are analysed for each type of coliphage with each sample batch.	
Air Toxics Laboratory		
TRH by Modified US EPA TO-15*	The laboratory performed analysis following modified EPA TO-15 for Total Recoverable Hydrocarbon (TRH) fractions using electron ionisation GC/MS in full scan mode. The method involves concentrating up to 0.2 litres of air. The concentrated aliquot is then flash vaporised and swept through a water management system to remove water vapour. Following dehumidification, the sample passes directly into the GC-MS for analysis. All sample-related peaks including BTEX and naphthalene eluting within their respective carbon range are included in the TRH result. The >C6-C10 TRH range is defined as the total ion area of peaks eluting after n-Hexane and including n-Decane referenced to the response factor of Toluene. The >C10-C12 TRH range is defined as the total area of peaks eluting after n-Decane and including n-Dodecane and reference to the response factor of n-Decane. Hydrocarbons heavier than C12 do not reliably recover from summa canisters due to their low vapour pressure. As a result, the reported range was limited to C12 rather than C16 as defined in Table C1¹. If requested, the fraction >C6-C10 minus BTEX (F1) and >C10-C12 minus naphthalene (modified F2) were reported following the definition listed in the previous paragraph except BTEX and	USEPA Compendium Method TO-15 Determination Of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)

¹ CRC CARE 2013, Petroleum hydrocarbon vapour intrusion assessment: Australian guidance, CRC CARE Technical Report no. 23, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

Analyte	Method	Reference Method
	naphthalene peaks were removed from the total ion peak area. Naphthalene elutes outside the >C10-C12 range on the system used for sample analysis. As a result, >C10-C12 TRH value is equivalent to the modified F2 value.	
Modified US EPA TO-15 & VPH Fractions*	The laboratory performed analysis via EPA Method TO-15 and Eurofins Air Toxics VPH (Volatile Petroleum Hydrocarbon) methods for the Determination of VPH Fractions using GC/MS in the full scan mode. The method involves concentrating up to 0.5 litres of air. The concentrated aliquot is then flash vaporised and swept through a water management system to remove water vapour. Following dehumidification, the sample passes directly into the GC/MS for analysis. This method is designed to measure gaseous phase aliphatic and aromatic compounds in ambient air and soil gas collected in stainless steel Summa canisters. Eurofins Air Toxics VPH method is a hybrid of EPA TO-15 method viz chromatographic peaks were identified via mass spectrum as either aliphatic or aromatic petroleum hydrocarbons and included in the appropriate range as defined by the method. The volatile Aliphatic hydrocarbons are collectively quantified within the C5 to C6 range, C6 to C8 range, C8 to C10 range and the C10 to C12 range. Additionally, the volatile Aromatic hydrocarbons are collectively quantified within the C8 to C10 range and the C10 to C12 range. The Aromatic ranges refer to the equivalent carbon (EC) ranges. (Please note that benzene constitutes the >C5-C7 aromatic range and toluene constitutes the >C7-C8 aromatic range. Benzene and toluene concentrations are reported on the TO-15 workorder fraction.) Aliphatic data is calculated from the Total Ion Chromatogram (TIC) which has been reprocessed in a duplicate file differentiated from the original by the addition of an alphanumeric extension. The Aromatic calculation also uses the information contained in the associated extracted ion file.	USEPA Compendium Method TO-15 Determination Of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)
Modified Natural Gas Analysis by ASTM D-1946*	The laboratory performed analysis via Modified ASTM Method D-1946 for Methane and fixed gases in air using	ASTM D1946-77

Analyte	Method	Reference Method	
	GC/FID or GC/TCD. The method involves direct injection of 1.0 mL of sample. On the analytical column employed for this analysis, Oxygen co-elutes with Argon. The corresponding peak is quantitated as Oxygen.	Standard Method for Analysis of Reformed Gas by Gas Chromatography	
Analysis of volatile and semivolatile organic compounds in vapor by thermal desorption GC/MS full scan using modified EPA method TO-17, SOP#109	The laboratory performed analysis via The laboratory performed the analysis via modified EPA Method TO-17 using GC/MS in the full scan mode. TO-17 'VI' sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for compound separation and detection.		
	A modification that may be applied to EPA Method TO-17 at the client's discretion is the requirement to transport sorbent tubes at 4 deg C. Laboratory studies demonstrate a high level of stability for VOCs on the TO-17 'VI' tube at room temperature for periods of up to 14 days. Tubes can be shipped to and from the field site at ambient conditions as long as the 14-day sample hold time is upheld. Trip blanks and field surrogate spikes are used as additional control measures to monitor recovery and background contribution during tube transport. Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications outlined in the table below.		
	Specific project requirements may override the Eurofins Air Toxics modifications.		
	Requirement	TO-17	Eurofins Air Toxics Modifications
	Initial Calibration	%RSD ≤ 30% with 2 allowed out up to 40%	VOC list: %RSD ≤ 30% with 2 allowed out up to 40%
SVOC list: %RSD≤/30 % with 2 allowed out up to 40%			
Daily Calibration	%D for each target compound within ± 30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene,	
		Modified EPA Method TO-17 (VI Tubes)*	

Analyte	Method			Reference Method
			and Pyrene within $\pm 40\%D$	
	Audit Accuracy	70-130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60-140%.	
	Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to insure high quality.	If site is well-characterised or performance previously verified, single tube sampling may be appropriate. Distributed pairs may be impractical for soil gas collection due to configuration and volume constraints.	
	Analytical Precision	$\leq 20\%$ RPD	$\leq 30\%$ RPD for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene.	
Volatile organic compounds (VOCs) - chemically desorbed with CS₂	Code RAD130 cartridge is a stainless steel net cylinder, with 100 mesh grid opening and 5.8 mm diameter, packed with 530 $\pm$ 30 mg of activated charcoal, particle size is 35-50 mesh. Volatile organic compounds are trapped by adsorption and recovered by carbon disulfide desorption, analysis is performed by GC-MS. white diffusive body code RAD120 supporting plate code RAD121 vertical adapter code RAD122 (optional) Chemi-adsorbing cartridge code RAD130			Passive Sampler – radiello® User Manual 2019

Analyte	Method	Reference Method
	Extraction: A volume of 2.0 ml of CS₂ and 100 µL of internal standard solution is added directly in the radiello glass tube. The tube is shaken gently for 30 minutes. Sampling rates varies from the value at 298 K on the effect of temperature (in Kelvin) as expressed by the following equation: $Q_K = Q_{298} \left(\frac{K}{298} \right)$ where Q_K is the sampling rate at the temperature K and Q₂₉₈ is the reference value at 298 K. This produces a variation of ±5% for 10 °C variation (upwards or downwards) from 25 °C. Sampling rate is invariant with humidity in the range 15 - 90% and with wind speed between 0.1 and 10 m.s⁻¹. NOTE: where uptake rates (Q_K) are unpublished then they have been estimated from like compounds. Results for these compounds are semi-quantitative. Average concentration (in µg.m⁻³) over the whole exposure time is calculated according to the following expression: $C (\mu g.m^{-3}) = \frac{m (\mu g)}{Q_K (mL.min^{-1}). t(min)} . 10^6$ m = mass of analyte in µg determined by GC-MS t = exposure time in minutes	
Volatile organic compounds (VOCs) - thermally desorbed	Code RAD145 is a stainless steel net cylinder, with 3 x 8 µm mesh opening and 4.8 mm diameter, packed with 350 ± 10 mg of graphitised charcoal (Carbograph 4), particle size is 35-50 mesh. Volatile organic compounds are trapped by adsorption and recovered by thermal desorption, analysis is performed by GC-MS. yellow diffusive body code RAD1202 	Passive Sampler – radiello® User Manual 2019

Analyte	Method	Reference Method
	supporting plate code RAD121  vertical adapter code RAD122 (optional)  Chemi-adsorbing cartridge code RAD145  Code RAD145 cartridge has been dimensioned to fit the diameter of the Markes Unity thermal desorption system that is used in conjunction with an Agilent GC-MS. Sampling rates varies from the value at 298 K on the effect of temperature (in Kelvin) as expressed by the following equation: $Q_K = Q_{298} \left(\frac{K}{298} \right)$ where Q_K is the sampling rate at the temperature K and Q_{298} is the reference value at 298 K. This produces a variation of $\pm 5\%$ for 10 °C variation (upwards or downwards) from 25 °C. Sampling rate is invariant with humidity in the range 15 - 90% and with wind speed between 0.1 and 10 m.s⁻¹. Do not expose directly radiello to rain: even if small amounts of water are adsorbed by Carbograph 4, they can nevertheless interfere with analysis. NOTE: where uptake rates (Q_K) are unpublished then they have been estimated from like compounds. Results for these compounds are semi-quantitative. Average concentration (in $\mu\text{g.m}^{-3}$) over the whole exposure time is calculated according to the following expression: $C (\mu\text{g.m}^{-3}) = \frac{m (\mu\text{g})}{Q_K (\text{mL.min}^{-1}). t (\text{min})} \cdot 10^6$ m = mass of analyte in μg determined by GC-MS t = exposure time in minutes	

Analyte	Method	Reference Method
Volatile organic compounds (VOCs) – passive samplers	Companion EPA Methods 325A (Sampler Deployment and VOC Sample Collection) and 325B (Sampler Preparation and Laboratory Analysis) select benzene as the representative compound to evaluate the overall emissions from refineries. Passive sampling onto sorbent tubes followed by Thermal Desorption-Gas-Chromatography/Mass Spectrometry (TD-GC/MS) analysis has been established as the standard air monitoring technology for the EPA's new rule. Passive sampling tube shelter assemblies will be hung at various locations along the fence line/property boundary surrounding refineries. After two weeks (14 days) passive sampling tubes can be detached from their shelters, re-sealed and sent to a laboratory equipped with TD-GC/MS for analysis. Per EPA Method 325, all tubes must be replaced with freshly conditioned and qualified sampling tubes every 14 days to ensure continuous monitoring. The methods provide a low cost alternative to screen fugitive or area emissions as compared to active sampling methods that involve pumped sorbent tubes or time weighted average canister sampling. While the rule is currently limited to the monitoring of benzene, Method 325 can also be extended to include other compounds of concern at ambient monitoring sites. Additional target VOCs include 1,3-Butadiene, Toluene, Ethyl Benzene, and Xylenes as well as other chemicals for which diffusive sampling rates have been determined. Reporting limits less than 1 µg/m³ can be easily achieved over a 7-day period. Extending the sampling period to 14 days translates to reporting limits less than 0.5 µg/m³.	US EPA Method 325B— Volatile Organic Compounds from Fugitive and Area Sources: Sampler Preparation and Analysis

Table 3: PFAS LORs - Water, Soil/Sediments & Biotic Matrices

Per- and Polyfluoroalkyl Substances (PFASs)	CAS No. ^a	MW	WATER (Potable, surface, groundwater, saline)		SOLIDS (Soil, sediment, biosolids)		BIOTA [*]			
			LOR (µg/L)	LOR Trace (µg/L)	LOR (µg/kg)	LOR Trace (µg/kg)	Type 1 LOR (ng/mL)	Type 2 LOR (µg/kg)	Type 3 LOR (µg/kg)	Type 2 Trace LOR (µg/kg)
Perfluoroalkyl carboxylic acids (PFCAs)										
Perfluorobutanoic acid (PFBA)	375-22-4	214.04	0.05	0.005	5	0.1	0.5	0.5	1	0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	264.05	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorohexanoic acid (PFHxA)	307-24-4	314.05	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluoroheptanoic acid (PFHpA)	375-85-9	364.06	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorooctanoic acid (PFOA)	335-67-1	414.07	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorononanoic acid (PFNA)	375-95-1	464.08	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorodecanoic acid (PFDA)	335-76-2	514.08	0.01	0.001	5	0.1	0.5	0.5	1	0.5
Perfluoroundecanoic acid (PFUnA)	2058-94-8	564.09	0.01	0.001	5	0.1	0.5	0.5	1	0.5
Perfluorododecanoic acid (PFDoA)	307-55-1	614.10	0.01	0.001	5	0.1	0.5	0.5	1	0.5
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	664.11	0.01	0.001	5	0.1	0.5	0.5	1	0.5
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	714.11	0.01	0.001	5	0.1	0.5	0.5	1	0.5
Perfluoroalkyl sulfonic acids (PFSAs)										
Perfluoropropanesulfonic acid (PFPrS)	423-41-6	250.09	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorobutanesulfonic acid (PFBS)	375-73-5	300.10	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	350.11	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorohexane sulfonate (PFHxS)	355-46-4	400.11	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Potassium perfluorohexanesulfonate (linear and branched isomers) (br-PFHxS)			0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluoroheptane sulfonate (PFHpS)	375-92-8	450.12	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorooctane sulfonic acid (PFOS) ^{a, h}	1763-23-1	500.13	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Potassium perfluorooctanesulfonate (linear and branched isomers) (br-PFOS)			0.01	0.001	5	0.1	0.5	0.5	1	0.1

Per- and Polyfluoroalkyl Substances (PFASs)	CAS No. ^a	MW	WATER (Potable, surface, groundwater, saline)		SOLIDS (Soil, sediment, biosolids)		BIOTA*			
			LOR (µg/L)	LOR Trace (µg/L)	LOR (µg/kg)	LOR Trace (µg/kg)	Type 1 LOR (ng/mL)	Type 2 LOR (µg/kg)	Type 3 LOR (µg/kg)	Type 2 Trace LOR (µg/kg)
Perfluorononanesulfonic acid (PFNS)	68259-12-1	550.13	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluorodecanesulfonic acid (PFDS)	67906-42-7	617.18	0.01	0.001	5	0.1	0.5	0.5	1	0.1
Perfluoroalkane sulfonamides (FASAs), Perfluoroalkane sulfonamido ethanols (FASEs) and N-alkyl perfluoroalkane sulfonamido ethanols (MeFASEs, EtFASEs) Perfluoroalkane sulfonamido acetic acids (FASAAAs) and N-alkyl perfluoroalkane sulfonamido acetic acids (MeFASAAAs, EtFASAAAs)										
Perfluorooctane sulfonamide (FOSA)	754-91-6	499.14	0.05	0.005	10	1	5	0.5	5	0.5
N-Methylperfluorooctane sulfonamide (MeFOSA)	31506-32-8	513.17	0.05	0.005	10	1	5	0.5	5	0.5
N-Ethylperfluorooctane sulfonamide (EtFOSA)	4151-50-2	527.19	0.05	0.005	10	1	5	2	5	0.5
N-Methylperfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	557.22	0.05	0.005	10	1	5	1	5	0.5
N-Ethylperfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	571.25	0.05	0.005	10	1	5	1	5	0.5
N-Ethylperfluorooctanesulfonamido acetic acid (EtFOSAA)	2991-50-6	585.23	0.05	0.005	10	1	5	0.5	5	0.5
N-Methylperfluorooctanesulfonamido acetic acid (N-MeFOSAA)	2355-31-9	571.21	0.05	0.005	10	1	5	0.5	5	0.5
n:2 Fluorotelomer sulfonic acids (n:2 FTSAAs)										
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2 FTSA)	757124-72-4	328.15	0.01	0.001	5	0.5	5	0.5	5	0.1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2 FTSA)	27619-97-2	428.16	0.01	0.001	5	0.5	5	0.5	5	0.1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2 FTSA)	39108-34-4	528.18	0.01	0.001	5	0.5	5	1	5	0.1
1H, 1H, 2H, 2H-perfluorododecane sulfonate (10:2 FTSA)	120226-60-0	628.20	0.01	0.001	5	0.5	5	1	5	0.5
Additional PFAS Compounds										
Hexafluoropropylene oxide dimer acid (HFPO-DA) [GenX]	13252-13-6 ^b	285 ^f	0.01		5					
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF ₃ OUdS) [11Cl-F53B]	763051-92-9 ^c	631	0.01		5					
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF ₃ ONS) [9Cl-F53B]	756426-58-1 ^d	531	0.01		5					
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4 ^e	377	0.01		5					

Per- and Polyfluoroalkyl Substances (PFASs)	CAS No. ^a	MW	WATER (Potable, surface, groundwater, saline)		SOLIDS (Soil, sediment, biosolids)		BIOTA [*]			
			LOR (µg/L)	LOR Trace (µg/L)	LOR (µg/kg)	LOR Trace (µg/kg)	Type 1 LOR (ng/mL)	Type 2 LOR (µg/kg)	Type 3 LOR (µg/kg)	Type 2 Trace LOR (µg/kg)
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	296.045	0.01		5					
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	113507-82-7	316.09	0.01		5					
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	230.038	0.01		5					
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	280.046	0.01		5					
6:2 fluorotelomer sulfonamide alkylbetaine (6:2 FTAB) ⁱ	34455-29-3	570.37	0.01		5					
3:3 Fluorotelomercarboxylic acid (3:3 FTCA)	356-02-5	242.093	0.01		5					
5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	914637-49-3	342.108	0.01		5					
Perfluoropropane sulfonic acid (PFPrS)	423-41-6	248.90	0.01		5					
Perfluoroethylcyclohexane sulfonate (PFECHS)	67584-42-3	500.22	0.01		5					

^a Some PFAS are commercially available as ammonium, sodium and potassium salts. This method measures all forms of the analytes as anions while the counterion is inconsequential. Analytes may be purchased as acids or as any of the corresponding salts (see [Section 7.2.3](#) regarding correcting the analyte concentration for the salt content).

^b HFPO-DA is one component of the GenX processing aid technology.

^c 11CI-PF₃OUdS is available in salt form (e.g. CASRN of potassium salt is 83329-89-9).

^d 9CI-PF₃ONS analyte is available in salt form (e.g. CASRN of potassium salt is 73606-19-6).

^e ADONA is available as the sodium salt (no CASRN) and the ammonium salt (CASRN is 958445-448).

^f HFPO-DA is not stable in the ESI source and the [M-H]⁻ is not observed under typical ESI conditions. The precursor ion used during method development was [M-CO₂]⁻.

^g Analyte has multiple resolved chromatographic peaks due to linear and branched isomers. All peaks summed for quantitation purposes.

^h To reduce bias regarding detection of branched and linear isomers, the m/z 80 product ion must be used for this analyte.

ⁱ NICNAS [6:2 Fluorotelomer sulfonamide surfactants: Environment tier II assessment](#) 12 December 2019

BIOTA Key

Type 1 - Human and Animal Blood (whole blood & plasma)

Type 2 - Citrus, tomato, zucchini, grasses, squash; muscle tissue of fish, crustaceans, cheese, cow, sheep; kidney tissue of sheep and cow; milk and chicken egg

Type 3 - Sheep and cow liver; olives and avocado

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Recommended Holding Times and Preservations for Soil and Air



APPLICABLE LOCATIONS

The bottles, preservation and holding times following are for the ALS Environmental operations excluding the ALS Water Resources Group (WRG). The ALS operations covered by this document include;

Adelaide Unit 2, 1 Burma Road Pooraka, Adelaide, SA 5095 P +6- 8-8162-5130 ALSEnviro.Adelaide@alsglobal.com	Melbourne 2-4 Westall Road Springvale VIC 3171 P +61-3-8549-9600 ALSEnviro.Melbourne@alsglobal.com	Roma Lot 4, 73 Beaumont Drive Roma QLD 4455 P +61-7-4622-8978 ALSEnviro.Roma@alsglobal.com
Brisbane 2 Byth Street (Corner Byth and Shand St) Stafford QLD 4053 P +61-7-3243-7222 ALSEnviro.Brisbane@alsglobal.com	Mudgee 29 Sydney Road Mudgee NSW 2850 P +61-2-6372-6735 ALSEnviro.Mudgee@alsglobal.com	Sydney 277-289 Woodpark Road Smithfield NSW 2164 P +61-2-8784-8555 ALSEnviro.Sydney@alsglobal.com
Darwin 4/16 Charlton Court Woolner, NT 0820 P +61-488-073-271 ALSEnviro.Darwin@alsglobal.com	Newcastle 5 Rosegum Road Warabrook NSW 2304 P +61-2-4968-9433 ALSEnviro.Newcastle@alsglobal.com	Townsville 14-15 Desma Court Bohle, QLD 4818 P +61-7-4796-0600 ALSEnviro.Townsville@alsglobal.com
Gladstone 46 Callemondah Drive Clinton Gladstone, QLD 4680 P +61-7-4971-5600 ALSEnviro.Gladstone@alsglobal.com	Nowra 4/13 Geary Place North Nowra NSW 2541 P +61-2-4423-2063 ALSEnviro.Nowra@alsglobal.com	Wollongong 99 Kenny Street Wollongong NSW 2500 P +61-2-4225-3125 ALSEnviro.Wollongong@alsglobal.com
Mackay 78 Harbour Road Mackay, QLD 4740 P +61-7-4944-0177 ALSEnviro.Mackay@alsglobal.com	Perth 10 Hod Way Malaga WA 6090 P +61-8-9209-7655 ALSEnviro.Perth@alsglobal.com	

SOIL AND SEDIMENT SAMPLE CHILLING AND SUBMISSION

Most soils should be chilled to <4°C or <6°C (guideline dependent) and transported to the laboratory within 24 hours. Sediments may also benefit from being frozen. ALS recommends placing samples on ice immediately upon sampling for best practice chilling with either repacking into another esky or draining of free water and replacement of ice just prior to dispatch. Chilling overnight in a fridge may also benefit. The post-chilling addition of ice bricks is also recommended where samples are air freighted or dispatched long distance and where couriers will not freight ice.

Please note that where possible samples should be submitted to the laboratory with at least half the recommended holding time remaining and it is preferable to avoid submitting holding time critical tests and full VOC suites late on Fridays without prior arrangement.

GENERAL NOTES

The following soil testing services are centralized in specialist laboratory locations. These tests require additional separate jars or bags to optimize service delivery and holding time compliance;

- Dioxins, Total S, TOC, TBT (Brisbane),
- PFOS/PFOA/AFFs, PBDEs, Explosives, Herbicides, Pesticides and Ultra trace Organics (Sydney).
- Sizings, Asbestos and Foreign Materials Testing (Newcastle);
- TRH Speciation (Perth and Melbourne),
- ASS/AMD (Perth and Brisbane).

KEY			
G	Glass	G(T)	Glass Jar with Teflon Lined Lid
(ZH)	Zero Headspace required	PB	Plastic (Polyethylene) Bag
HVAS	High Volume Air Sampler Paper	PTFE	Polytetrafluoroethylene Filter
PUF	Polyurethane Filter	P	Plastic Container

SOIL SAMPLES						
Parameter		ALS Preferred Container	Preservation	Holding Time	Reference	
INORGANICS, METALS, RADIONUCLIDES, ACID SULFATE SOILS AND PHYSICAL PARAMETERS						
General Anions and Cations: Chloride, Bromide, Fluoride, Sulfate, CEC & exchangeable Cations		PB, P or G	Chill, preferably to <6°C	28 days ⁽⁴⁾	NEPM 2013	
Asbestos		PB (double bagged)	Nil	Indefinite	AS4964-2004	
Cyanide		P or G	Chill, Store in dark	14 days ⁽⁴⁾	NEPM 2013	
Electrical conductivity		PB, P or G	Chill, preferably to <6°C	7 days ⁽⁴⁾	NEPM 2013	
Gross alpha, Gross beta		PB, P or G	Nil	180 days	ISO9696, ISO9697, ASTM D7283-06.	
Hexavalent Chromium (Alkali extract)		P or G	Chill, Store in dark	28 days (plus 7 for extract)	NEPM 2013	
Metals - General		PB, P or G	Nil	6 months	NEPM 2013	
Mercury		P or G	Chill, Store in dark	28 days	NEPM 2013	
Methyl Mercury	Option 1	G(T)	Chill, Store in dark	40 days	Horvat et al, 1993	
	Option 2	G(T)	Freeze, Store in dark	8 months	Horvat et al, 1993	
Moisture Content		PB, P or G	Chill, preferably to <6°C	14 days	NEPM 2013	
Organic Carbon / TOC	Option 1	G	Chill, to <6°C store in dark	28 days	NEPM 2013	
	Option 2	G	Freeze for sediments	6 months	NAGD 2009	
pH		PB, P or G	Chill, preferably to <6°C	7 days	NEPM 2013	
Radium 226, 228		PB or G	Nil	180 days	ISO10703, ASTM D7283-06.	
SPOCAS, TOS, Chromium Suite	Option 1	PB (exclude air)	Freeze	Indefinite	AS4969.1-2008	
	Option 2		Chill, preferably to <6°C	24 hours		
	Option 3		Dry at 80°C	Indefinite		
Sizings and Foreign Material Tests		PB or G	Nil for sediments	Indefinite	NAGD 2009	
Sulfur - total		PB or G	Chill, preferably to <6°C	7 days (6 months once prepared)	NEPM 2013 plus in house	
Sulfide		PB or G	Chill, preferably to <6°C	28 days (if Total S hold' time met)	NEPM 2013 plus in house	
ORGANICS - SEMIVOLATILE COMPOUNDS (SVOCs)						
General less persistent Semi-Volatile Organic chemicals including: • Carbamate Pesticides • Explosive residues • OC, OP Pesticides & PCBs • Phenoxy acid Herbicides • General Herbicides • TRH/TPH (C₁₀-C₁₈), • PAHs and Phenols • Phthalate Esters • Pyrethroids (Synthetic) • Semi Volatile Chlorinated Compound • Tributyl Tin (TBT)		G(T)	Place immediately in the esky and chill to <6°C using ice. Avoid exposure to light	14 days (plus holding of extracts typically for up to 40 days)	NEPM 2013	
		Dioxins & Furans & PCBs		G(T)	1 year in dark, freeze to -10 ⁰ C	USEPA 1613
		PBDEs		G(T)	1 year in dark, freeze to -10 ⁰ C	USEPA 1614
		PFOS & PFOA/ 6:2-Fts / AFFFs		G(T)	6 months	In house - POPs
Tributyl Tin, OCPs, OPPs, Phenols, PAHs and PCBs		G(T)	Freeze within 12 hours of sampling for sediments	56 days (plus 40 days for extracts)	NAGD 2009	
ORGANICS - VOLATILE COMPOUNDS (VOCs)						
VOCs <i>except</i> vinyl chloride, styrene and/or 2-chloroethyl vinyl ether		G(T)	Rapidly sample, minimize headspace and Chill to <6°C. Avoid exposure to light	14 days	NEPM 2013	
Vinyl chloride and styrene		G(T)		7 days (Previously 14 days under NEPM 1999)	NEPM 2013	
AMBIENT AIR, SOIL GAS AND OCCUPATIONAL HYGIENE						
ORGANICS - VOLATILE AND SEMIVOLATILE COMPOUNDS						
Parameter		Media	Preservation	Holding Time	Reference	
VOCs in whole air samples		Silonite Canister	Nil	30 days	USEPA TO15r	
VOCs on Sorbents		Charcoal Tubes/ Passive Badge	Nil	30 Days	NIOSH 1500/1501/1003	
Semi-Volatile Organics including: PAHs		XAD-2 Resin	Protect from light. Store in the dark submit as soon as possible	7-14 Days	USEPA TO4A/TO10A/TO13A NIOSH 5515/5517	
Chlorinated Benzenes		PTFE/GFF/MCE Filters		7 Days	NIOSH 5515/5517	
Chlorinated Phenols		PUF		7 Days	USEPA TO4A/TO13A	
		HVAS		7 Days	USEPA TO4A/TO13A	

NOTES

1. Samples for ZHE TCLP or ASLP require a separate additional jar.
2. TCLP and other leaching procedures need to be conducted within the solid sample holding time of the analyte of interest.
3. When a moisture determination is used for dry weight basis reporting, no holding time applies when performed on the same day as the chemical analytes of interest.
4. Holding times for extracted parameters (e.g. Chloride, Bromide, EC, Sulfate, Sulfide & Cyanide) are until extraction. Extract solution holding times also apply.



APPLICABLE LOCATIONS

The bottles, preservation and holding times following are for the ALS Environmental operations excluding the ALS Water Resources Group Victoria and ACT operations (WRG). The ALS operations covered by this document include;

Adelaide Unit 2, 1 Burma Road Pooraka, Adelaide, SA 5095 Phone: 61-8-8162 5130 Email: ALSEnviro.Adelaide@alsglobal.com	Melbourne 2 - 4 Westall Road Springvale VIC 3171 Phone: 61-3-8549 9600 Email: ALSEnviro.Melbourne@alsglobal.com	Roma Lot 4, 73 Beaumont Drive Roma QLD 4455 Phone: 61-7-4622 8978 Email: ALSEnviro.Roma@alsglobal.com
Brisbane 2 Byth Street (Corner Byth and Shand St) Stafford QLD 4053 Phone: 61-7-3243 7222 Email: ALSEnviro.Brisbane@alsglobal.com	Mudgee 29 Sydney Road Mudgee NSW 2850 Phone: 61-2-6372 6735 Email: ALSEnviro.Mudgee@alsglobal.com	Sydney 277-289 Woodpark Road Smithfield NSW 2164 Phone: 61-2-8784 8555 Email: ALSEnviro.Sydney@alsglobal.com
Darwin 4/16 Charlton Court Woolner, NT 0820 Phone: 61-488 073 271 Email: ALSEnviro.Darwin@alsglobal.com	Newcastle 5 Rosegum Close Warabrook NSW 2304 Phone: 61-2-4968 9433 Email: ALSEnviro.Newcastle@alsglobal.com	Townsville 14-15 Desma Court Bohle, QLD 4818 Phone: 61-7-4796 0600 Email: ALSEnviro.Townsville@alsglobal.com
Gladstone 48 Callemondah Drive Clinton Gladstone, QLD 4680 Phone: 61-7-4971 5600 Email: ALSEnviro.Gladstone@alsglobal.com	Nowra 4/13 Geary Place North Nowra NSW 2541 Phone: 61-2-4423 2063 Email: ALSEnviro.Nowra@alsglobal.com	Wollongong 99 Kenny Street Wollongong NSW 2500 Phone : 61-2-4225 3125 Email: ALSEnviro.Wollongong@alsglobal.com
Mackay 78 Harbour Road Mackay, QLD 4740 Phone: 61-7-4944 0177 Email: ALSEnviro.Mackay@alsglobal.com	Perth 10 Hod Way Malaga WA 6090 Phone: 61-8-9209 7655 Email: ALSEnviro.Perth@alsglobal.com	

SAMPLE PRESERVATION, CHILLING AND SUBMISSION

Care must be taken not to rinse out or spill preservatives during sampling for OH&S reasons and to avoid cross contaminating other bottles (e.g. Nitric acid used for metals can contaminate nitrate analysis). Field filtration is mandatory or recommended for many tests and other tests must have exposure to air minimized to avoid analyte losses. Samples should generally be chilled to <4°C or <6°C (guideline dependent) and transported to the laboratory within 24 hours. ALS recommends placing samples in ice immediately upon sampling for best practice chilling with either repacking into another esky or draining of free water and replacement of ice just prior to dispatch. Chilling overnight in a fridge may also benefit. The post-chilling addition of ice bricks is also recommended where samples are air freighted or dispatched long distance and where couriers will not freight ice. Samples taken from chlorinated water sources require the addition of sodium thiosulfate for microbiological, volatile organics and semi volatile organics. Please advise ALS accordingly to facilitate supply of appropriate containers. Please note that where possible samples should be submitted to the laboratory with at least half the recommended holding time remaining and it is preferable to avoid submitting holding time critical tests late on Fridays without prior arrangement.

ALS RECOMMENDED HOLDING TIMES AND PRESERVATIONS FOR WATER

Parameter		Container	Preservation	Holding Time	Reference
GENERAL INORGANICS (METALS, NUTRIENTS, CATIONS, ANIONS, PHYSICAL TESTS)					
Acidity / Alkalinity		P	Chill	14 days	APHA Table 1060:I
Ammonia Nitrogen	Option 1	P	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
	Option 2	P	Chill	1 day	APHA Table 1060:I
Anions General: Chloride, Sulfate, Fluoride, Bromide		P	Chill	28 days	APHA Table 1060:I
BOD		P	Chill	2 days	APHA Table 1060:I
Cations & Hardness: (Calcium, Magnesium, Sodium, Potassium)	Option 1	P	HNO ₃ to pH<2, Chill	28 days (All)	AS/NZS 5667.1:1998
	Option 2	P	Nil, Chill	7 days (Ca, Mg, Hardness) 28 days (Na, K)	AS/NZS 5667.1:1998
Carbon Total Organic (TOC)		G	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
Carbon Dissolved Organic (DOC)		G	H ₂ SO ₄ to pH<2, Field filter ⁽²⁾ , Chill	28 days	APHA Table 1060:I
Chlorophyll a		P - Opaque	Chill, Store in dark	2 days	APHA Table 1060:I
			(filter, store filtrate frozen in foil)	28 days	
Chromium VI		P	NaOH, Chill	28 days	USEPA 1669
COD		P	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
Colour		P	Chill	2 days	APHA Table 1060:I
Conductivity (EC)		P	Chill	28 days	APHA Table 1060:I
Cyanide		P - Opaque	NaOH to pH>12, Chill ⁽¹⁾	14 days	APHA 1060:I
Ferrous (Fe ²⁺)		P (A)	HCl to pH<2. (ZH), Field filter ⁽²⁾ , Chill	7 days	ISO 5667-3:2003
Formaldehyde		P	Chill	2 days	ASTM D6303-98
Mercury	Option 1	P (A)	HNO ₃ to pH<2, Chill ⁽²⁾	28 days	APHA Table 1060:I
	Option 2	P (A)	Nil - Lab Acidify in <14 days, Chill ⁽²⁾	28 days	USEPA 200.8
Metals General	Option 1	P (A)	HNO ₃ to pH<2, Chill ⁽²⁾	6 months	APHA Table 1060:I
	Option 2	P (A)	Nil - Lab Acidify in <14 days, Chill ⁽²⁾	6 months	USEPA 200.8
Nitrate Nitrogen		P	Chill	2 days	APHA Table 1060:I
Nitrite Nitrogen		P	Chill	2 days	APHA Table 1060:I
Nitrogen - Oxidised Nitrogen (NOx)		P	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I/
			Chill	2 days	AS/NZS 5667.1:1998
Nitrogen and Phosphorous - Total (Persulfate Method)		P	Nil, Chill	1 day	AS/ NZS 5667.1:1998
Nitrogen - Total		P	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
Oil & Grease		G	NaHSO ₄ or H ₂ SO ₄ to pH<2,Chill	28 days	APHA Table 1060:I
Perchlorate		P	Filter, Chill, Store in dark	28 days	USEPA 6850
pH		P	Nil	6 hours	AS/NZS 5667.1:1998
Phenols - Total		P, G	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
Phosphorus - Reactive		P	Nil, Chill	2 days	APHA Table 1060:I
Phosphorus - Total		P	H ₂ SO ₄ to pH<2, Chill	28 days	AS/NZS 5667.1:1998
Radionuclides incl' Gross alpha, Gross beta & Radium 226, 228		P, G	Lab Acidify in <5 days, Chill or HNO ₃ to pH<2, Chill	6 months	APHA 7010B
Solids (TS, TSS, TDS)		P	Chill	7 days	APHA Table 1060:I
Surfactants (NIS, MBAS)		G	Chill	2 days	AS/NZS 5667.1:1998
			Chill, submit in 2 days, preserve in Lab	4 days (MBAS) 28 days (NIS)	
Silica		P	Chill	28 days	APHA Table 1060:I
Sulfide		P	Zn Acetate/NaOH, Chill	7 days	AS/NZS 5667.1:1998
Sulfite		P	EDTA/Zn Acetate, Chill	2 days	AS/NZS 5667.1:1998
Speciated Arsenic and Selenium		P (A)	HCl to pH<2, Chill, (Zero Headspace)	28 days	USEPA1632-2001
Thiocyanate		P	HNO ₃ to pH<2, Chill	6 months	APHA 4500CN M
TKN (Total Kjeldahl Nitrogen)		P	H ₂ SO ₄ to pH<2, Chill	28 days	APHA Table 1060:I
Turbidity		P	Store in dark, Chill	2 days	APHA Table 1060:I
ALGAE AND MICROBIOLOGICAL TESTS					
Algae Analysis	Option 1	P	Lugols at 1% v/v ratio	6 months	Hotzel and Croome 1999
	Option 2	P	Nil	48 hours	Hotzel and Croome 1999
General Microbiological Tests (e.g. Faecal coliforms, E-coli, HPC etc)		P (sterile)	Na ₂ S ₂ O ₃ ,(if chlorinated)/ Chill	1 day	APHA 9060B

NOTES

⁽¹⁾ When samples are suspected of containing Sulfide, a Sulfide Pre-treatment bottle (containing Lead Acetate) should be used to remove Sulfide prior to decanting into the 'Cyanide' bottle.

⁽²⁾ Dissolved Metals, Ferrous Iron and DOC should be field filtered using a 0.45µm filter prior to placing in the container.

KEY

G	Glass	Amber (T)	Amber Glass Bottle with Teflon Lined Lid
P (A)	Plastic (verified metal free)	P	Plastic (Polyethylene)
(TS)	40mL Vial with Teflon Lined Septum	(ZH)	Zero Headspace required

ALS RECOMMENDED HOLDING TIMES AND PRESERVATIONS FOR WATER

ORGANICS - SEMIVOLATILE COMPOUNDS (SVOCs)				
Parameter	Container	Preservation	Holding Time	Reference
Acrylamide	Amber (T)	Chill	7 days	USEPA SW846 8316 1998
Alkyl phenol Ethoxylates	Amber (T)	Chill	2 days	AS/NZS 5667.1:1998
		Chill, submit in 2 days, preserve in Lab	7 days	In house
Carbamates	Amber (T)	Chill	7 days ⁽³⁾	USEPA 632
Chlorinated Hydrocarbons (SV)	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Dioxins	Amber (T)	Chill	1 year	USEPA 1613.B
Explosives	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Glyphosate	Amber (T)	Chill	14 days ⁽³⁾	USEPA 547
Glycols	Vial (TS)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Herbicides (Phenoxy Acid)	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
N-Nitrosodimethylamine (NDMA)	Amber (T)	Chill	7 days ⁽³⁾	USEPA 607
Organochlorine Pesticides & PCBs	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Organophosphorus Pesticides	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Paraquat/Diquat	P	Chill	7 days ⁽³⁾	USEPA SW846 2007
Petroleum Hydrocarbons (C ₁₀ -C ₄₀)	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
Phenols and Phthalate Esters	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
PFOS & PFOA/ 6:2-FTS and AFFFs	P (PTFE free)	Chill	6 months	In house - POPs
Polyaromatic Hydrocarbons (PAHs)	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
PPCPs	Amber (T)	Nil	7 days ⁽³⁾	AGWR 2008, USEPA 1694
Synthetic Pyrethroids	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846-8270D
Tributyl Tin (TBT)	Amber (T)	Chill	7 days ⁽³⁾	USEPA SW846 2007
ORGANICS - VOLATILE COMPOUNDS (VOCs) / DISSOLVED GASES				
Parameter	Container	Preservation	Holding Time	Reference
BTEXN plus TRH/TPH Hydrocarbons (C ₆ -C ₁₀)	Vial (TS)	H ₂ SO ₄ or NaHSO ₄ to pH<2, Chill, (ZH)	14 days	USEPA SW846 2007
C ₁ -C ₄ Gases (including Methane)	Vial (TS)	H ₂ SO ₄ or NaHSO ₄ to pH<2, Chill, (ZH)	14 days	USEPA SW846 2007/ NATATTEN.WPD 2002
Chloroacetic Acids	Vial (TS)	NH ₄ Cl, Chill, (ZH)	28 days	USEPA 552.1
Acrylonitrile, 1,4-Dioxane, Pyridine	Vial (TS)	H ₂ SO ₄ or NaHSO ₄ to pH<2, Chill, (ZH)	14 days	USEPA 603, 1671 & 524.2, USEPA SW846 2007
Acrolein	Vial (TS)	Chill, (ZH)	3 days	USEPA 603
		Chill, submit in 3 days, preserve in Lab	14 days	
Halo Acetic Acids	Vial (TS)	NH ₄ Cl, Chill, (ZH)	28 days	USEPA 552.1
MIB/Geosmin	Vial (TS)	Chill, (ZH)	3 days	APHA 6040
		Chill, submit in 3 days, preserve in Lab	7 days	
VOCs including: Halogenated Aliphatics, Aromatics, Monocyclic Aromatics (MAHs), Trihalomethanes (THMs) and Alcohols	Vial (TS)	H ₂ SO ₄ or NaHSO ₄ to pH<2, Chill, (ZH)	14 days	USEPA SW846 2007

KEY

G	Glass	Amber (T)	Amber Glass Bottle with Teflon Lined Lid
P (A)	Plastic (verified metal free)	P	Plastic (Polyethylene)
(TS)	40mL Vial with Teflon Lined Septum	(ZH)	Zero Headspace required

NOTES

⁽³⁾ Samples can also be extracted within 7 days and the resulting extracts analysed within 40 days.

APPENDIX M

LABORATORY CERTIFICATES



CERTIFICATE OF ANALYSIS

Work Order : **ES2128521**
Client : **AARGUS PTY LTD**
Contact : **MR MARK KELLY**
Address : **PO BOX 398**
DRUMMOYNE NSW, AUSTRALIA 2047
Telephone : **1300137038**
Project : **ES8303 DSI**
Order number : **----**
C-O-C number : **----**
Sampler : **SBS**
Site : **FIVE DOCK**
Quote number : **EN/222**
No. of samples received : **1**
No. of samples analysed : **1**

Page : 1 of 8
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 05-Aug-2021 17:50
Date Analysis Commenced : 09-Aug-2021
Issue Date : 16-Aug-2021 07:58



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP068: Positive result has been confirmed by re-extraction and re-analysis.
- EA200N: Asbestos weights and percentages are not covered under the Scope of NATA Accreditation.
Weights of Asbestos are based on extracted bulk asbestos, fibre bundles, and/or ACM and do not include respirable fibres (if present)
The Asbestos (Fines and Fibrous) weight is calculated from the extracted Fibrous Asbestos and Asbestos Fines as an equivalent weight of 100% Asbestos
Percentages for Asbestos content in ACM are based on the 2013 NEPM default values.
All calculations of percentage Asbestos under this method are approximate and should be used as a guide only.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200N: ALS laboratory procedures and methods used for the identification and quantitation of asbestos are consistent with AS4964-2004 and the requirements of the 2013 NEPM for Assessment of Site Contamination
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.



-
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SS1	----	----	----	----
Sampling date / time					04-Aug-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2128521-001	-----	-----	-----	-----
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		12.0	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	----	----	----
Asbestos Type	1332-21-4	-	--		-	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	----	----	----	----
Sample weight (dry)	----	0.01	g		952	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg		No	----	----	----	----
Organic Fibre	----	0.1	g/kg		No	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		A. SMYLIE	----	----	----	----
EA200N: Asbestos Quantification (non-NATA)									
∅ Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g		<0.0004	----	----	----	----
∅ Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)		<0.001	----	----	----	----
∅ Asbestos Containing Material	1332-21-4	0.1	g		<0.1	----	----	----	----
∅ Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	% (w/w)		<0.01	----	----	----	----
∅ Weight Used for % Calculation	----	0.0001	kg		0.952	----	----	----	----
∅ Fibrous Asbestos >7mm	----	0.0004	g		<0.0004	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		10	----	----	----	----
Copper	7440-50-8	5	mg/kg		63	----	----	----	----
Lead	7439-92-1	5	mg/kg		41	----	----	----	----
Nickel	7440-02-0	2	mg/kg		49	----	----	----	----
Zinc	7440-66-6	5	mg/kg		134	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SS1	----	----	----	----
Sampling date / time					04-Aug-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2128521-001	-----	-----	-----	-----
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	----	----	----
4,4'-DDD	72-54-8	0.05	mg/kg		0.12	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	----
4,4'-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		0.12	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		0.6	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		1.3	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		1.3	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		0.6	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		0.6	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		0.8	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SS1	----	----	----	----
Sampling date / time				04-Aug-2021 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2128521-001	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.7	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	5.9	----	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	0.8	----	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	1.1	----	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.4	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SS1	----	----	----	----
Sampling date / time					04-Aug-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2128521-001	-----	-----	-----	-----
					Result	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		84.4	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		83.2	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		101	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		86.9	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		85.8	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		58.6	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.9	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		92.2	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		92.7	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		104	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		99.0	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		108	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SS1 - 04-Aug-2021 00:00	Soil sample.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200N: Asbestos Quantification (non-NATA)

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order	: ES2128521	Page	: 1 of 8
Client	: AARGUS PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR MARK KELLY	Contact	: Customer Services ES
Address	: PO BOX 398 DRUMMOYNE NSW, AUSTRALIA 2047	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 1300137038	Telephone	: +61-2-8784 8555
Project	: ES8303 DSI	Date Samples Received	: 05-Aug-2021
Order number	: ----	Date Analysis Commenced	: 09-Aug-2021
C-O-C number	: ----	Issue Date	: 16-Aug-2021
Sampler	: SBS		
Site	: FIVE DOCK		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3836604)									
ES2128475-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	6	28.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	22	24	5.8	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	27	24	13.5	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	6	5	0.0	No Limit
ES2128536-008	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	22	7.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	3	3	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	50	50	0.0	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	21	20	5.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	7	8	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3836605)									
ES2128522-001	Anonymous	EA055: Moisture Content	----	0.1	%	18.6	18.8	1.0	0% - 50%
ES2128536-011	Anonymous	EA055: Moisture Content	----	0.1	%	19.1	19.8	3.6	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3836603)									
ES2128536-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3832317)									
ES2128461-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3832314)									
ES2128461-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3832314) - continued									
ES2128461-001	Anonymous	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3832316)									
ES2128461-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

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 Work Order : ES2128521
 Client : AARGUS PTY LTD
 Project : ES8303 DSI



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3832316) - continued									
ES2128461-001	Anonymous	EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3832315)									
ES2128461-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3834553)									
ES2128521-001	SS1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2128537-009	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3832315)									
ES2128461-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3834553)									
ES2128521-001	SS1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2128537-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 3834553)									
ES2128521-001	SS1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2128537-009	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit		

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) LowHigh	
Result				
<5	121.1 mg/kg	93.5	88.0	113
<1	0.74 mg/kg	93.0	70.0	130
<2	19.6 mg/kg	113	68.0	132
<5	52.9 mg/kg	99.2	89.0	111
<5	60.8 mg/kg	94.3	82.0	119
<2	15.3 mg/kg	100	80.0	120
<5	139.3 mg/kg	88.2	66.0	133
<0.1	0.087 mg/kg	95.4	70.0	125
<0.1	1 mg/kg	96.4	62.0	126
<0.05	0.5 mg/kg	90.0	69.0	113
<0.05	0.5 mg/kg	87.1	65.0	117
<0.05	0.5 mg/kg	94.3	67.0	119
<0.05	0.5 mg/kg	86.0	68.0	116
<0.05	0.5 mg/kg	89.8	65.0	117
<0.05	0.5 mg/kg	88.9	67.0	115
<0.05	0.5 mg/kg	92.0	69.0	115
<0.05	0.5 mg/kg	91.0	62.0	118
<0.05	0.5 mg/kg	91.2	63.0	117
<0.05	0.5 mg/kg	98.2	66.0	116
<0.05	0.5 mg/kg	89.6	64.0	116
<0.05	0.5 mg/kg	101	66.0	116
<0.05	0.5 mg/kg	93.2	67.0	115
<0.05	0.5 mg/kg	106	67.0	123
<0.05	0.5 mg/kg	100	69.0	115
<0.05	0.5 mg/kg	96.8	69.0	121
<0.05	0.5 mg/kg	80.3	56.0	120
<0.05	0.5 mg/kg	86.4	62.0	124
<0.2	0.5 mg/kg	81.5	66.0	120
<0.05	0.5 mg/kg	83.9	64.0	122
<0.2	0.5 mg/kg	82.2	54.0	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3832316) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	92.9	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	83.7	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.5	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	86.8	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	89.7	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	90.4	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	86.3	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	86.3	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	78.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	88.8	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	81.4	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	85.6	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	83.7	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	83.1	61.0	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.0	62.0	118
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	81.6	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3832315)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	111	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	103	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	102	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3834553)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	93.3	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3832315)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	108	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	100	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	101	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3834553)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	96.1	68.4	128
EP080: BTEXN (QCLot: 3834553)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.3	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.5	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.3	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	97.2	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	95.2	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	93.1	63.0	119

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Matrix Spike (MS) Report

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3836604)							
ES2128475-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	77.9	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	70.3	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	91.8	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	85.8	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	80.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.8	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	72.2	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3836603)							
ES2128475-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	93.1	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3832317)							
ES2128461-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	110	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3832314)							
ES2128461-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	85.8	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	87.2	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	92.4	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	88.3	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	118	70.0	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	94.9	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3832316)							
ES2128461-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	84.4	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	84.0	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3832315)							
ES2128461-001	Anonymous	EP071: C10 - C14 Fraction	----	480 mg/kg	110	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	110	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	114	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3834553)							
ES2128521-001	SS1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	101	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3832315)							
ES2128461-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	106	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	110	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	125	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3834553)							

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 Client : AARGUS PTY LTD
 Project : ES8303 DSI



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3834553) - continued							
ES2128521-001	SS1	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	103	70.0	130
EP080: BTEXN (QCLot: 3834553)							
ES2128521-001	SS1	EP080: Benzene	71-43-2	2.5 mg/kg	95.4	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	93.5	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.1	70.0	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	96.5	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	97.4	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	88.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2128521	Page	: 1 of 6
Client	: AARGUS PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR MARK KELLY	Telephone	: +61-2-8784 8555
Project	: ES8303 DSI	Date Samples Received	: 05-Aug-2021
Site	: FIVE DOCK	Issue Date	: 16-Aug-2021
Sampler	: SBS	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Total Mercury by FIMS	1	20	5.00	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) SS1	04-Aug-2021	----	----	----	09-Aug-2021	18-Aug-2021	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200) SS1	04-Aug-2021	----	----	----	09-Aug-2021	31-Jan-2022	✓
EA200N: Asbestos Quantification (non-NATA)							
Snap Lock Bag: Separate bag received (EA200N) SS1	04-Aug-2021	----	----	----	09-Aug-2021	31-Jan-2022	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) SS1	04-Aug-2021	09-Aug-2021	31-Jan-2022	✓	10-Aug-2021	31-Jan-2022	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) SS1	04-Aug-2021	09-Aug-2021	01-Sep-2021	✓	10-Aug-2021	01-Sep-2021	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	10-Aug-2021	18-Sep-2021	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	10-Aug-2021	18-Sep-2021	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	09-Aug-2021	18-Sep-2021	✓

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Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	09-Aug-2021	18-Sep-2021	✓
Soil Glass Jar - Unpreserved (EP080) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	10-Aug-2021	18-Aug-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	09-Aug-2021	18-Sep-2021	✓
Soil Glass Jar - Unpreserved (EP080) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	10-Aug-2021	18-Aug-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) SS1	04-Aug-2021	09-Aug-2021	18-Aug-2021	✓	10-Aug-2021	18-Aug-2021	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Asbestos Classification and Quantitation per NEPM 2013	* EA200N	SOIL	Asbestos Classification and Quantitation per NEPM with Confirmation of Identification by AS 4964 - Gravimetric determination of Asbestos Containing Material, Fibrous Asbestos, Asbestos Fines and sample weight and calculation of percentage concentrations per NEPM protocols. Asbestos (Fines and Fibrous FA+AF) is reported as the equivalent weight in the sample received after accounting for sub-sampling (where applicable for the <7mm and/or <2mm fractions).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions

Page : 6 of 6
Work Order : ES2128521
Client : AARGUS PTY LTD
Project : ES8303 DSI



Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.



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AARGUS PTY LTD

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Lidcombe, NSW 2141
P O Box 398 Tel: 1300 137 038
DRUMMOYNE NSW 1470 Fax: 1300 136 038

Laboratory Test Request / Chain of Custody Record

Email reports: cynthia@aargus.net; mark.kelly@aargus.net; ningye@aargus.net
Email invoices: anika@aargus.net; cynthia@aargus.net; goku@aargus.net; mark.kelly@aargus.net; ningye@aargus.net

1 of 1

TO: ALS (Australian Laboratory Services) Environmental 277 - 289 Woodpark Road SMITHFIELD, NSW 2164				Sampling Date: 04.08.2021				Job No: ES8303							
PH: 02 8784 8555				FAX: 02 8784 8500				Sampled By: SBS				Project: DSI			
ATTN: Samples Receipt				Project Manager: MK				Location: FIVE DOCK							

Sampling details				Sample type				Results required by: STANDARD							
Location	Depth (m)	Date	Relinquished by	Soil	Water (Filled Up)	Air	Metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn)	TPH & BTEX	PAH	OC	PCB	Asbestos %w/w	Analysis Suite(s)	KEEP SAMPLE?	
SS1	-	04.08.2021	DSG, DSP				✓	✓	✓	✓	✓	✓	S8	YES	
Legend: WG Water sample, glass bottle WP Water sample, plastic bottle GV Glass vial				Received by: Name: <i>SBS</i> Signature: <i>[Signature]</i> Date: <i>25/8/21</i> Disturbed soil sample (small plastic bag) Test required: <i>ACAN</i> Air sample, canister											

Subcon / Forward Lab / Spill WO
Lab / Analyst: *News case*
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attached by / Date:



AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET95237 / 98417 / 1 - 11
Your ref : ES8303 – DSI – Five Dock
NATA Accreditation No: 14484

10 August 2021

Aargus Pty Ltd
6 Carter Street
Lidcombe NSW 2141



Attn: Mr Mark Kelly

Accredited for compliance with ISO/IEC 17025 - Testing.

Dear Mark

Asbestos Identification

This report presents the results of eleven samples, forwarded by Aargus Pty Ltd on 5 August 2021, for analysis for asbestos.

1.Introduction:Eleven samples forwarded were examined and analysed for the presence of asbestos on 6 August 2021.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Australian Standard AS 4964 - 2004 and Safer Environment Method 1 as the supplementary work instruction) (Qualitative Analysis only).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos) and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines).

3. Results : **Sample No. 1. ASET95237 / 98417 / 1. ES8303 - BH1-0-0.1.**
Approx dimensions 10.0 cm x 10.0 cm x 5.6 cm
Approximate total dry weight of soil = 556.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of paint flakes, plastic, wood chips and plant matter.
No asbestos detected.

Sample No. 2. ASET95237 / 98417 / 2. ES8303 - BH2-0-0.1.
Approx dimensions 10.0 cm x 10.0 cm x 6.6 cm
Approximate total dry weight of soil = 656.0g.
The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, slag, wood chips and plant matter.
No asbestos detected.

Sample No. 3. ASET95237 / 98417 / 3. ES8303 - BH3-0.3-0.4.
Approx dimensions 10.0 cm x 10.0 cm x 8.2 cm
Approximate total dry weight of soil = 815.0g.
The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement, glass, plastic, sandstone and plant matter.
No asbestos detected.

SUITE 710 / 90 GEORGE STREET, HORNSBY NSW 2077 – P.O. BOX 1644 HORNSBY WESTFIELD NSW 1635
PHONE: (02) 99872183 FAX: (02)99872151 EMAIL: info@ausset.com.au WEBSITE: www.Ausset.com.au

OCCUPATIONAL HEALTH & SAFETY STUDIES • INDOOR AIR QUALITY SURVEYS • HAZARDOUS MATERIAL SURVEYS • RADIATION SURVEYS • ASBESTOS SURVEYS
ASBESTOS DETECTION & IDENTIFICATION • REPAIR & CALIBRATION OF SCIENTIFIC EQUIPMENT • AIRBORNE FIBRE & SILICA MONITORING



Sample No. 4. ASET95237 / 98417 / 4. ES8303 - BH4-0.3-0.4.

Approx dimensions 10.0 cm x 10.0 cm x 7.0 cm

Approximate total dry weight of soil = 703.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of wood chips and plant matter.

No asbestos detected.

Sample No. 5. ASET95237 / 98417 / 5. ES8303 - BH5-0.3-0.4.

Approx dimensions 10.0 cm x 10.0 cm x 7.0 cm

Approximate total dry weight of soil = 704.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement and plant matter.

No asbestos detected.

Sample No. 6. ASET95237 / 98417 / 6. ES8303 - BH6-0.3-0.4.

Approx dimensions 10.0 cm x 10.0 cm x 4.5 cm

Approximate total dry weight of soil = 448.0g.

The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of shale, animal and plant matter.

No asbestos detected.

Sample No. 7. ASET95237 / 98417 / 7. ES8303 - BH7-0.3-0.4.

Approx dimensions 10.0 cm x 10.0 cm x 9.3 cm

Approximate total dry weight of soil = 928.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement and plant matter.

No asbestos detected.

Sample No. 8. ASET95237 / 98417 / 8. ES8303 - BH7-1-1.1.

Approx dimensions 10.0 cm x 10.0 cm x 7.4 cm

Approximate total dry weight of soil = 741.0g.

The sample consisted of a mixture of clayish sandy soil, stones and plant matter.

No asbestos detected.

Sample No. 9. ASET95237 / 98417 / 9. ES8303 - BH8-0-0.1.

Approx dimensions 10.0 cm x 10.0 cm x 6.2 cm

Approximate total dry weight of soil = 624.0g.

The sample consisted of a mixture of clayish sandy soil, stones and plant matter.

No asbestos detected.

Sample No. 10. ASET95237 / 98417 / 10. ES8303 - BH9-0-0.1.

Approx dimensions 10.0 cm x 10.0 cm x 5.4 cm

Approximate total dry weight of soil = 540.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, plastic, slag, wood chips and plant matter.

No asbestos detected.



Sample No. 11. ASET95237 / 98417 / 11. ES8303 - D1.

Approx dimensions 10.0 cm x 10.0 cm x 8.9 cm

Approximate total dry weight of soil = 892.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement and plant matter.

No asbestos detected.

Reported by,

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Identifier.

Approved Signatory



Accredited for compliance with ISO/IEC 17025 - Testing.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service.

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported. This weight disclaimer also covers weight / weight percentages if given.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust.

*** denotes asbestos detected in ACM in bonded form.**

denotes friable asbestos as soft fibro plaster and/ or highly weathered ACM that will easily crumble.

Ω Sample volume criteria of 500mL have not been satisfied.

The results contained in this report relate only to the sample/s submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample/s is/are representative. Results indicating "No asbestos detected" indicates a reporting limit specified in AS4964 -2004 which is 0.1g/ Kg (0.01%). Any amounts detected at assumed lower level than that would be reported, however those assumed lower levels may be treated as "No asbestos detected" as specified and recommended by A4964-2004. Trace / respirable level asbestos will be



reported only when detected and trace analysis have been performed on each sample as required by AS4964-2004. When loose asbestos fibres/ fibre bundles are detected and reported that means they are larger handpicked fibres/ fibre bundles, and they do not represent respirable fibres. Dust/soil samples are always subjected to trace analysis except where the amounts involved are extremely minute and trace analysis is not possible to be carried out. When trace analysis is not performed on dust samples it will be indicated in the report that trace analysis has not been carried out due to the volume of the sample being extremely minute.

Estimation of asbestos weights involves the use of following assumptions;

Volume of each kind of Asbestos present in broken edges have been visually estimated and its been assumed that volumes remain similar throughout the binding matrix and those volumes are only approximate and not exact. Material densities have been assumed to be similar to commonly found similar materials and may not be exact.

All samples indicating "No asbestos detected" are assumed to be less than 0.001% for friable AF and FA portions detected and 0.01 % for ACM detected unless the approximate weight is given.

ASET95237/98417/1-11

AARGUS PTY LTD

6 Carter Street
LIDCOMBE NSW 2141

P O Box 398 Tel: 1300 137 038
DRUMMOYNE NSW 1470 Fax: 1300 136 038

Laboratory Test Request / Chain of Custody Record

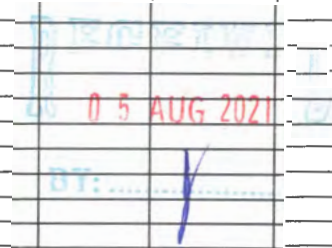
Email to: cynthia@aargus.net; gokul@aargus.net; mark.kelly@aargus.net; sara@aargus.net

1 of 1

TO: ASET - Australian Safer Environment & Technology Pty Ltd, Sydney Suite 710 / 90 George Street HORNSBY, NSW 2077		PO Box 1644 HORNSBY WESTFIELD NSW 1635		Sampling Date: 04.08.2021	Job No: ES8303
PH: 02 9987 2183 ATTN: Samples Receipt		FAX: 02 9987 2151 EMAIL: aset@bigpond.net.au		Sampled By: SBS	Project: DSI
				Project Manager: MK	Location: FIVE DOCK

Results required by: STANDARD

Sampling details			Sample type											KEEP SAMPLE?
Location	Depth (m)	Date	Soil Samples	Asbestos presence/absence	Asbestos %w/w									
BH1	0-0.1	04.08.2021	DSP		✓									YES
BH2	0-0.1	04.08.2021	DSP		✓									YES
BH3	0.3-0.4	04.08.2021	DSP		✓									YES
BH3	1-1.1	04.08.2021	DSP											YES
BH4	0.3-0.4	04.08.2021	DSP		✓									YES
BH5	0.3-0.4	04.08.2021	DSP		✓									YES
BH6	0.3-0.4	04.08.2021	DSP		✓									YES
BH7	0.3-0.4	04.08.2021	DSP		✓									YES
BH7	1-1.1	04.08.2021	DSP		✓									YES
BH8	0-0.1	04.08.2021	DSP		✓									YES
BH9	0-0.1	04.08.2021	DSP		✓									YES
D1	-	04.08.2021	DSP		✓									YES



Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Saad	SBS	05.08.2021			5/8/21

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required
GV	Glass vial	OTH	Other	ACAN	Air sample, canister

@ mole H /tonne

Aargus Pty Ltd
6 Carter Street
Lidcombe
NSW 2141



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: - ALL INVOICES/SRA - Mark Kelly

Report **815178-W**
 Project name **DSI**
 Project ID **ES8303**
 Received Date **Aug 05, 2021**

Client Sample ID			RINSATE R1
Sample Matrix			Water
Eurofins Sample No.			S21-Au10867
Date Sampled			Aug 04, 2021
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic	0.001	mg/L	< 0.001
Cadmium	0.0002	mg/L	< 0.0002
Chromium	0.001	mg/L	< 0.001
Copper	0.001	mg/L	< 0.001
Lead	0.001	mg/L	< 0.001
Mercury	0.0001	mg/L	< 0.0001
Nickel	0.001	mg/L	< 0.001
Zinc	0.005	mg/L	< 0.005

Sample History

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

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description

Metals M8

Testing Site

Sydney

Extracted

Aug 06, 2021

Holding Time

180 Days

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

Auckland
35 O'Rourke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Aargus Pty Ltd
Address: 6 Carter Street
Lidcombe
NSW 2141

Project Name: DSI
Project ID: ES8303

Order No.:
Report #: 815178
Phone: 02 9568 6159
Fax: 02 9566 6179

Received: Aug 5, 2021 4:56 PM
Due: Aug 12, 2021
Priority: 5 Day
Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	BH1 0-0.1	Aug 04, 2021		Soil	S21-Au10854						X		X		
2	BH1 0.4-0.5	Aug 04, 2021		Soil	S21-Au10855		X								
3	BH2 0-0.1	Aug 04, 2021		Soil	S21-Au10856				X		X				
4	BH2 0.3-0.4	Aug 04, 2021		Soil	S21-Au10857	X		X	X		X	X			
5	BH3 0.3-0.4	Aug 04, 2021		Soil	S21-Au10858					X	X		X		
6	BH4 0.3-0.4	Aug 04, 2021		Soil	S21-Au10859					X	X		X		
7	BH5 0.3-0.4	Aug 04, 2021		Soil	S21-Au10860					X	X		X		
8	BH6 0.3-0.4	Aug 04, 2021		Soil	S21-Au10861					X	X		X		
9	BH7 0.3-0.4	Aug 04, 2021		Soil	S21-Au10862					X	X		X		

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Aargus Pty Ltd
Address: 6 Carter Street
Lidcombe
NSW 2141

Project Name: DSI
Project ID: ES8303

Order No.:
Report #: 815178
Phone: 02 9568 6159
Fax: 02 9566 6179

Received: Aug 5, 2021 4:56 PM
Due: Aug 12, 2021
Priority: 5 Day
Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
10	BH7 1-1.1	Aug 04, 2021		Soil	S21-Au10863						X		X		
11	BH8 0-0.1	Aug 04, 2021		Soil	S21-Au10864					X	X		X		
12	BH9 0-0.1	Aug 04, 2021		Soil	S21-Au10865					X	X		X		
13	DUPLICATE B1	Aug 04, 2021		Soil	S21-Au10866					X	X		X		
14	RINSATE R1	Aug 04, 2021		Water	S21-Au10867				X						
15	TRIP SPIKE 1	Aug 04, 2021		Soil	S21-Au10868										X
16	TRIP BLANK 1	Aug 04, 2021		Soil	S21-Au10870									X	
17	BH3 1-1.1	Aug 04, 2021		Soil	S21-Au10871		X								
18	BH3 1.4-1.5	Aug 04, 2021		Soil	S21-Au10872		X								
19	BH4 0.8-0.9	Aug 04, 2021		Soil	S21-Au10873		X								

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Company Name: Aargus Pty Ltd
Address: 6 Carter Street
Lidcombe
NSW 2141

Project Name: DSI
Project ID: ES8303

Order No.:
Report #: 815178
Phone: 02 9568 6159
Fax: 02 9566 6179

Received: Aug 5, 2021 4:56 PM
Due: Aug 12, 2021
Priority: 5 Day
Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
20	BH5 0.7-0.8	Aug 04, 2021		Soil	S21-Au10874		X								
21	BH6 0.6-0.7	Aug 04, 2021		Soil	S21-Au10875		X								
22	BH7 1.4-1.5	Aug 04, 2021		Soil	S21-Au10876		X								
23	BH8 0.7-0.8	Aug 04, 2021		Soil	S21-Au10877		X								
24	BH9 0.7-0.8	Aug 04, 2021		Soil	S21-Au10967		X								
Test Counts						1	9	1	3	8	12	1	10	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ug/L: micrograms per litre
ppm: Parts per million	ppb: Parts per billion	%: Percentage
org/100mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Arsenic			mg/L	< 0.001			0.001	Pass	
Cadmium			mg/L	< 0.0002			0.0002	Pass	
Chromium			mg/L	< 0.001			0.001	Pass	
Copper			mg/L	< 0.001			0.001	Pass	
Lead			mg/L	< 0.001			0.001	Pass	
Mercury			mg/L	< 0.0001			0.0001	Pass	
Nickel			mg/L	< 0.001			0.001	Pass	
Zinc			mg/L	< 0.005			0.005	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	94			80-120	Pass	
Cadmium			%	96			80-120	Pass	
Chromium			%	91			80-120	Pass	
Copper			%	88			80-120	Pass	
Lead			%	88			80-120	Pass	
Mercury			%	87			80-120	Pass	
Nickel			%	91			80-120	Pass	
Zinc			%	91			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Au10624	NCP	%	102			75-125	Pass	
Cadmium	S21-Au10637	NCP	%	102			75-125	Pass	
Chromium	S21-Au10637	NCP	%	89			75-125	Pass	
Copper	S21-Au10624	NCP	%	97			75-125	Pass	
Lead	S21-Au10637	NCP	%	83			75-125	Pass	
Mercury	S21-Au10637	NCP	%	84			75-125	Pass	
Nickel	S21-Au10637	NCP	%	80			75-125	Pass	
Zinc	S21-Au10637	NCP	%	81			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Au10504	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	S21-Au10504	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	S21-Au10504	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	S21-Au10504	NCP	mg/L	0.012	0.013	7.0	30%	Pass	
Lead	S21-Au10504	NCP	mg/L	0.003	0.003	12	30%	Pass	
Mercury	S21-Au10504	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	S21-Au10504	NCP	mg/L	< 0.001	0.001	25	30%	Pass	
Zinc	S21-Au10504	NCP	mg/L	2.2	2.3	6.0	30%	Pass	

Comments
Sample Integrity

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

Authorised by:

Asim Khan
John Nguyen

Analytical Services Manager
Senior Analyst-Metal (NSW)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

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Company Name: Aargus Pty Ltd
Address: 6 Carter Street
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NSW 2141

Project Name: DSI
Project ID: ES8303

Order No.:
Report #: 815178
Phone: 02 9568 6159
Fax: 02 9566 6179

Received: Aug 5, 2021 4:56 PM
Due: Aug 12, 2021
Priority: 5 Day
Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	BH1 0-0.1	Aug 04, 2021		Soil	S21-Au10854						X		X		
2	BH1 0.4-0.5	Aug 04, 2021		Soil	S21-Au10855		X								
3	BH2 0-0.1	Aug 04, 2021		Soil	S21-Au10856				X		X				
4	BH2 0.3-0.4	Aug 04, 2021		Soil	S21-Au10857	X		X	X		X	X			
5	BH3 0.3-0.4	Aug 04, 2021		Soil	S21-Au10858					X	X		X		
6	BH4 0.3-0.4	Aug 04, 2021		Soil	S21-Au10859					X	X		X		
7	BH5 0.3-0.4	Aug 04, 2021		Soil	S21-Au10860					X	X		X		
8	BH6 0.3-0.4	Aug 04, 2021		Soil	S21-Au10861					X	X		X		
9	BH7 0.3-0.4	Aug 04, 2021		Soil	S21-Au10862					X	X		X		

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Project Name: DSI
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Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
10	BH7 1-1.1	Aug 04, 2021		Soil	S21-Au10863						X		X		
11	BH8 0-0.1	Aug 04, 2021		Soil	S21-Au10864					X	X		X		
12	BH9 0-0.1	Aug 04, 2021		Soil	S21-Au10865					X	X		X		
13	DUPLICATE B1	Aug 04, 2021		Soil	S21-Au10866					X	X		X		
14	RINSATE R1	Aug 04, 2021		Water	S21-Au10867				X						
15	TRIP SPIKE 1	Aug 04, 2021		Soil	S21-Au10868										X
16	TRIP BLANK 1	Aug 04, 2021		Soil	S21-Au10870									X	
17	BH3 1-1.1	Aug 04, 2021		Soil	S21-Au10871		X								
18	BH3 1.4-1.5	Aug 04, 2021		Soil	S21-Au10872		X								
19	BH4 0.8-0.9	Aug 04, 2021		Soil	S21-Au10873		X								



Environment Testing

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Received: Aug 5, 2021 4:56 PM
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Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
20	BH5 0.7-0.8	Aug 04, 2021		Soil	S21-Au10874		X								
21	BH6 0.6-0.7	Aug 04, 2021		Soil	S21-Au10875		X								
22	BH7 1.4-1.5	Aug 04, 2021		Soil	S21-Au10876		X								
23	BH8 0.7-0.8	Aug 04, 2021		Soil	S21-Au10877		X								
24	BH9 0.7-0.8	Aug 04, 2021		Soil	S21-Au10967		X								
Test Counts						1	9	1	3	8	12	1	10	1	1

Aargus Pty Ltd
6 Carter Street
Lidcombe
NSW 2141



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: - ALL INVOICES/SRA - Mark Kelly

Report **815178-S**
Project name **DSI**
Project ID **ES8303**
Received Date **Aug 05, 2021**

Client Sample ID			BH1 0-0.1	BH2 0-0.1	BH2 0.3-0.4	BH3 0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10854	S21-Au10856	S21-Au10857	S21-Au10858
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	300	-	-	< 50
TRH C29-C36	50	mg/kg	230	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	530	-	-	< 50
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	-	< 20
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	480	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	480	-	-	< 100
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	88	-	-	94
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	8.8	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	8.8	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	8.8	-	-	1.2
Acenaphthene	0.5	mg/kg	< 0.5	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	< 0.5
Anthracene	0.5	mg/kg	0.8	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	4.1	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	5.9	-	-	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	3.8	-	-	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	4.6	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	6.7	-	-	< 0.5
Chrysene	0.5	mg/kg	6.9	-	-	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	0.9	-	-	< 0.5

Client Sample ID			BH1 0-0.1 Soil S21-Au10854 Aug 04, 2021	BH2 0-0.1 Soil S21-Au10856 Aug 04, 2021	BH2 0.3-0.4 Soil S21-Au10857 Aug 04, 2021	BH3 0.3-0.4 Soil S21-Au10858 Aug 04, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Fluoranthene	0.5	mg/kg	8.6	-	-	< 0.5
Fluorene	0.5	mg/kg	< 0.5	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	3.8	-	-	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	-	-	< 0.5
Phenanthrene	0.5	mg/kg	3.8	-	-	< 0.5
Pyrene	0.5	mg/kg	10	-	-	< 0.5
Total PAH*	0.5	mg/kg	59.9	-	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	96	-	-	76
p-Terphenyl-d14 (surr.)	1	%	76	-	-	67
Heavy Metals						
Arsenic	2	mg/kg	7.5	7.2	6.5	< 2
Cadmium	0.4	mg/kg	1.3	2.1	0.4	< 0.4
Chromium	5	mg/kg	11	12	15	10
Copper	5	mg/kg	52	75	43	6.0
Lead	5	mg/kg	1500	460	140	9.9
Mercury	0.1	mg/kg	0.2	0.3	0.2	< 0.1
Nickel	5	mg/kg	7.8	13	7.0	< 5
Zinc	5	mg/kg	780	780	320	14
% Moisture	1	%	23	38	18	12
% Clay	1	%	-	-	10	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	< 10	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	7.3	-
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	-	-	14	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	-	< 0.1
4,4'-DDD	0.05	mg/kg	-	-	-	< 0.05
4,4'-DDE	0.05	mg/kg	-	-	-	< 0.05
4,4'-DDT	0.05	mg/kg	-	-	-	< 0.05
α-HCH	0.05	mg/kg	-	-	-	< 0.05
Aldrin	0.05	mg/kg	-	-	-	< 0.05
β-HCH	0.05	mg/kg	-	-	-	< 0.05
δ-HCH	0.05	mg/kg	-	-	-	< 0.05
Dieldrin	0.05	mg/kg	-	-	-	< 0.05
Endosulfan I	0.05	mg/kg	-	-	-	< 0.05
Endosulfan II	0.05	mg/kg	-	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	-	< 0.05
Endrin	0.05	mg/kg	-	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	-	< 0.05
Endrin ketone	0.05	mg/kg	-	-	-	< 0.05
γ-HCH (Lindane)	0.05	mg/kg	-	-	-	< 0.05
Heptachlor	0.05	mg/kg	-	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	-	< 0.05
Methoxychlor	0.05	mg/kg	-	-	-	< 0.05
Toxaphene	0.1	mg/kg	-	-	-	< 0.1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	-	< 0.05

Client Sample ID			BH1 0-0.1	BH2 0-0.1	BH2 0.3-0.4	BH3 0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10854	S21-Au10856	S21-Au10857	S21-Au10858
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchloredate (surr.)	1	%	-	-	-	90
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	79
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	-	-	< 0.5
Aroclor-1221	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1232	0.5	mg/kg	-	-	-	< 0.5
Aroclor-1242	0.5	mg/kg	-	-	-	< 0.5
Aroclor-1248	0.5	mg/kg	-	-	-	< 0.5
Aroclor-1254	0.5	mg/kg	-	-	-	< 0.5
Aroclor-1260	0.5	mg/kg	-	-	-	< 0.5
Total PCB*	0.5	mg/kg	-	-	-	< 0.5
Dibutylchloredate (surr.)	1	%	-	-	-	90
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	79

Client Sample ID			BH4 0.3-0.4	BH5 0.3-0.4	BH6 0.3-0.4	BH7 0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10859	S21-Au10860	S21-Au10861	S21-Au10862
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	160	< 50	< 50	290
TRH C29-C36	50	mg/kg	130	< 50	< 50	240
TRH C10-C36 (Total)	50	mg/kg	290	< 50	< 50	530
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	260	< 100	< 100	470
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	130
TRH >C10-C40 (total)*	100	mg/kg	260	< 100	< 100	600
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	93	89	96	100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	1.6	< 0.5	0.5	4.0
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.8	0.6	0.9	4.3
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	2.1	1.2	1.2	4.5
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			BH4 0.3-0.4	BH5 0.3-0.4	BH6 0.3-0.4	BH7 0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10859	S21-Au10860	S21-Au10861	S21-Au10862
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.9
Benz(a)anthracene	0.5	mg/kg	1.0	< 0.5	< 0.5	2.4
Benzo(a)pyrene	0.5	mg/kg	1.2	< 0.5	0.5	3.1
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	0.8	< 0.5	< 0.5	1.6
Benzo(g,h,i)perylene	0.5	mg/kg	0.8	< 0.5	< 0.5	2.5
Benzo(k)fluoranthene	0.5	mg/kg	1.2	< 0.5	< 0.5	3.2
Chrysene	0.5	mg/kg	1.8	< 0.5	0.5	3.8
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	2.3	< 0.5	0.6	6.4
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	0.7	< 0.5	< 0.5	1.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	1.4	< 0.5	< 0.5	3.7
Pyrene	0.5	mg/kg	2.8	0.5	0.7	7.0
Total PAH*	0.5	mg/kg	14	0.5	2.3	36.1
2-Fluorobiphenyl (surr.)	1	%	79	95	88	82
p-Terphenyl-d14 (surr.)	1	%	51	79	78	68
Heavy Metals						
Arsenic	2	mg/kg	7.7	20	9.1	7.1
Cadmium	0.4	mg/kg	1.1	< 0.4	0.9	< 0.4
Chromium	5	mg/kg	23	47	23	17
Copper	5	mg/kg	90	31	46	75
Lead	5	mg/kg	430	140	130	440
Mercury	0.1	mg/kg	0.2	0.1	0.2	0.5
Nickel	5	mg/kg	19	15	12	8.3
Zinc	5	mg/kg	630	190	540	200
% Moisture	1	%	20	18	22	18
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 1	< 0.1	< 0.1	< 1
4,4'-DDD	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
4,4'-DDE	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
4,4'-DDT	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
a-HCH	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Aldrin	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
b-HCH	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
d-HCH	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Dieldrin	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endosulfan I	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endosulfan II	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endosulfan sulphate	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endrin	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endrin aldehyde	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Endrin ketone	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
g-HCH (Lindane)	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Heptachlor	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Heptachlor epoxide	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Hexachlorobenzene	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5

Client Sample ID			BH4 0.3-0.4	BH5 0.3-0.4	BH6 0.3-0.4	BH7 0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10859	S21-Au10860	S21-Au10861	S21-Au10862
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Methoxychlor	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Toxaphene	0.1	mg/kg	< 10	< 0.1	< 0.1	< 10
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.5	< 0.05	< 0.05	< 0.5
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 1	< 0.1	< 0.1	< 1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 1	< 0.1	< 0.1	< 1
Dibutylchloroendate (surr.)	1	%	57	100	135	66
Tetrachloro-m-xylene (surr.)	1	%	76	77	134	81
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Aroclor-1221	0.1	mg/kg	< 1	< 0.1	< 0.1	< 1
Aroclor-1232	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Aroclor-1242	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Aroclor-1248	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Aroclor-1254	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Aroclor-1260	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Total PCB*	0.5	mg/kg	< 1	< 0.5	< 0.5	< 1
Dibutylchloroendate (surr.)	1	%	57	100	135	66
Tetrachloro-m-xylene (surr.)	1	%	76	77	134	81

Client Sample ID			BH7 1-1.1	BH8 0-0.1	BH9 0-0.1	DUPLICATE B1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10863	S21-Au10864	S21-Au10865	S21-Au10866
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 40	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	800	89	100	< 50
TRH C29-C36	50	mg/kg	500	97	110	< 50
TRH C10-C36 (Total)	50	mg/kg	1300	186	210	< 50
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 100	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 100	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	1200	160	190	< 100
TRH >C34-C40	100	mg/kg	< 200	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	1200	160	190	< 100
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	93	99	95	81

Client Sample ID			BH7 1-1.1 Soil S21-Au10863 Aug 04, 2021	BH8 0-0.1 Soil S21-Au10864 Aug 04, 2021	BH9 0-0.1 Soil S21-Au10865 Aug 04, 2021	DUPLICATE B1 Soil S21-Au10866 Aug 04, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	14	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	14	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	14	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	1.8	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	8.0	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	10	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	6.4	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	6.7	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	9.0	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	11	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	1.2	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	17	< 0.5	< 0.5	0.6
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	5.8	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	7.0	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	19	< 0.5	0.6	0.6
Total PAH*	0.5	mg/kg	102.9	< 0.5	0.6	1.2
2-Fluorobiphenyl (surr.)	1	%	92	93	91	70
p-Terphenyl-d14 (surr.)	1	%	68	74	60	60
Heavy Metals						
Arsenic	2	mg/kg	11	12	2.4	3.2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	0.9	< 0.4
Chromium	5	mg/kg	21	19	13	19
Copper	5	mg/kg	83	29	29	73
Lead	5	mg/kg	270	110	100	130
Mercury	0.1	mg/kg	0.3	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	12	11	7.8	55
Zinc	5	mg/kg	200	110	110	210
% Moisture	1	%	13	9.9	20	12
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
4,4'-DDD	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05

Client Sample ID			BH7 1-1.1	BH8 0-0.1	BH9 0-0.1	DUPLICATE B1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Au10863	S21-Au10864	S21-Au10865	S21-Au10866
Date Sampled			Aug 04, 2021	Aug 04, 2021	Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
g-HCH (Lindane)	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Toxaphene	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Dibutylchloredate (surr.)	1	%	-	110	95	110
Tetrachloro-m-xylene (surr.)	1	%	-	99	87	80
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aroclor-1221	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aroclor-1242	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aroclor-1248	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aroclor-1254	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aroclor-1260	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Total PCB*	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Dibutylchloredate (surr.)	1	%	-	110	95	110
Tetrachloro-m-xylene (surr.)	1	%	-	99	87	80

Client Sample ID			TRIP SPIKE 1	TRIP BLANK 1
Sample Matrix			Soil	Soil
Eurofins Sample No.			S21-Au10868	S21-Au10870
Date Sampled			Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons				
TRH C6-C9	20	mg/kg	-	< 20
Naphthalene ^{N02}	0.5	mg/kg	-	< 0.5
TRH C6-C10	20	mg/kg	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	< 20
BTEX				
Benzene	0.1	mg/kg	-	< 0.1
Toluene	0.1	mg/kg	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	< 0.2
o-Xylene	0.1	mg/kg	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	89
TRH C6-C10	1	%	110	-
Total Recoverable Hydrocarbons				
Naphthalene	1	%	120	-
TRH C6-C9	1	%	110	-

Client Sample ID			TRIP SPIKE 1	TRIP BLANK 1
Sample Matrix			Soil	Soil
Eurofins Sample No.			S21-Au10868	S21-Au10870
Date Sampled			Aug 04, 2021	Aug 04, 2021
Test/Reference	LOR	Unit		
BTEX				
Benzene	1	%	120	-
Ethylbenzene	1	%	110	-
m&p-Xylenes	1	%	110	-
o-Xylene	1	%	110	-
Toluene	1	%	110	-
Xylenes - Total	1	%	110	-
4-Bromofluorobenzene (surr.)	1	%	149	-

Sample History

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

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 07, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 07, 2021	14 Days
Total Recoverable Hydrocarbons - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 07, 2021	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 07, 2021	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Sydney	Aug 07, 2021	14 Days
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Sydney	Aug 12, 2021	14 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Sydney	Aug 07, 2021	180 Days
% Moisture - Method: LTM-GEN-7080 Moisture	Sydney	Aug 06, 2021	14 Days
% Clay - Method: LTM-GEN-7040	Brisbane	Aug 11, 2021	14 Days
pH (1:5 Aqueous extract at 25°C as rec.) - Method: LTM-GEN-7090 pH in soil by ISE	Sydney	Aug 07, 2021	7 Days
Conductivity (1:5 aqueous extract at 25°C as rec.) - Method: LTM-INO-4030 Conductivity	Sydney	Aug 11, 2021	7 Days
Cation Exchange Capacity - Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage	Melbourne	Aug 11, 2021	180 Days
Organochlorine Pesticides - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Sydney	Aug 07, 2021	14 Days
Polychlorinated Biphenyls - Method: LTM-ORG-2220 OCP & PCB in Soil and Water	Sydney	Aug 07, 2021	28 Days

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NATA # 1261 Site # 20794

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Company Name: Aargus Pty Ltd
Address: 6 Carter Street
Lidcombe
NSW 2141

Project Name: DSI
Project ID: ES8303

Order No.:
Report #: 815178
Phone: 02 9568 6159
Fax: 02 9566 6179

Received: Aug 5, 2021 4:56 PM
Due: Aug 12, 2021
Priority: 5 Day
Contact Name: - ALL INVOICES/SRA - Mark Kelly

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID										
1	BH1 0-0.1	Aug 04, 2021		Soil	S21-Au10854						X		X		
2	BH1 0.4-0.5	Aug 04, 2021		Soil	S21-Au10855		X								
3	BH2 0-0.1	Aug 04, 2021		Soil	S21-Au10856				X		X				
4	BH2 0.3-0.4	Aug 04, 2021		Soil	S21-Au10857	X		X	X		X	X			
5	BH3 0.3-0.4	Aug 04, 2021		Soil	S21-Au10858					X	X		X		
6	BH4 0.3-0.4	Aug 04, 2021		Soil	S21-Au10859					X	X		X		
7	BH5 0.3-0.4	Aug 04, 2021		Soil	S21-Au10860					X	X		X		
8	BH6 0.3-0.4	Aug 04, 2021		Soil	S21-Au10861					X	X		X		
9	BH7 0.3-0.4	Aug 04, 2021		Soil	S21-Au10862					X	X		X		

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Sample Detail						% Clay	HOLD	pH (1:5 Aqueous extract at 25°C as rec.)	Metals M8	Suite B13: OCP/PCB	Moisture Set	Cation Exchange Capacity	Eurofins Suite B7	BTEXN and Volatile TRH	BTEXN and Volatile TRH
Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
10	BH7 1-1.1	Aug 04, 2021		Soil	S21-Au10863						X		X		
11	BH8 0-0.1	Aug 04, 2021		Soil	S21-Au10864					X	X		X		
12	BH9 0-0.1	Aug 04, 2021		Soil	S21-Au10865					X	X		X		
13	DUPLICATE B1	Aug 04, 2021		Soil	S21-Au10866					X	X		X		
14	RINSATE R1	Aug 04, 2021		Water	S21-Au10867				X						
15	TRIP SPIKE 1	Aug 04, 2021		Soil	S21-Au10868										X
16	TRIP BLANK 1	Aug 04, 2021		Soil	S21-Au10870									X	
17	BH3 1-1.1	Aug 04, 2021		Soil	S21-Au10871		X								
18	BH3 1.4-1.5	Aug 04, 2021		Soil	S21-Au10872		X								
19	BH4 0.8-0.9	Aug 04, 2021		Soil	S21-Au10873		X								

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Melbourne Laboratory - NATA Site # 1254											X	X			
Sydney Laboratory - NATA Site # 18217							X	X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794						X									
Perth Laboratory - NATA Site # 23736															
Mayfield Laboratory - NATA Site # 25079															
External Laboratory															
20	BH5 0.7-0.8	Aug 04, 2021		Soil	S21-Au10874		X								
21	BH6 0.6-0.7	Aug 04, 2021		Soil	S21-Au10875		X								
22	BH7 1.4-1.5	Aug 04, 2021		Soil	S21-Au10876		X								
23	BH8 0.7-0.8	Aug 04, 2021		Soil	S21-Au10877		X								
24	BH9 0.7-0.8	Aug 04, 2021		Soil	S21-Au10967		X								
Test Counts						1	9	1	3	8	12	1	10	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4,4'-DDD	mg/kg	< 0.05			0.05	Pass	
4,4'-DDE	mg/kg	< 0.05			0.05	Pass	
4,4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-HCH	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-HCH	mg/kg	< 0.05			0.05	Pass	
d-HCH	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.5			0.5	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.5			0.5	Pass	
Aroclor-1242	mg/kg	< 0.5			0.5	Pass	
Aroclor-1248	mg/kg	< 0.5			0.5	Pass	
Aroclor-1254	mg/kg	< 0.5			0.5	Pass	
Aroclor-1260	mg/kg	< 0.5			0.5	Pass	
Total PCB*	mg/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	75			70-130	Pass	
TRH C10-C14	%	90			70-130	Pass	
Naphthalene	%	99			70-130	Pass	
TRH C6-C10	%	73			70-130	Pass	
TRH >C10-C16	%	90			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	85			70-130	Pass	
Toluene	%	88			70-130	Pass	
Ethylbenzene	%	89			70-130	Pass	
m&p-Xylenes	%	90			70-130	Pass	
o-Xylene	%	88			70-130	Pass	
Xylenes - Total*	%	90			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	109			80-120	Pass	
Cadmium	%	117			80-120	Pass	
Chromium	%	106			80-120	Pass	
Copper	%	101			80-120	Pass	
Lead	%	111			80-120	Pass	
Mercury	%	120			80-120	Pass	
Nickel	%	101			80-120	Pass	
Zinc	%	101			80-120	Pass	
LCS - % Recovery							
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	98			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	71			70-130	Pass	
4,4'-DDD	%	75			70-130	Pass	
4,4'-DDE	%	84			70-130	Pass	
4,4'-DDT	%	77			70-130	Pass	
a-HCH	%	79			70-130	Pass	
Aldrin	%	81			70-130	Pass	
b-HCH	%	84			70-130	Pass	
d-HCH	%	81			70-130	Pass	
Dieldrin	%	80			70-130	Pass	
Endosulfan I	%	87			70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan II				%	78			70-130	Pass	
Endosulfan sulphate				%	71			70-130	Pass	
Endrin				%	83			70-130	Pass	
Endrin aldehyde				%	72			70-130	Pass	
Endrin ketone				%	73			70-130	Pass	
g-HCH (Lindane)				%	87			70-130	Pass	
Heptachlor				%	77			70-130	Pass	
Heptachlor epoxide				%	71			70-130	Pass	
Hexachlorobenzene				%	81			70-130	Pass	
Methoxychlor				%	72			70-130	Pass	
LCS - % Recovery										
Polychlorinated Biphenyls										
Aroclor-1016				%	101			70-130	Pass	
Aroclor-1260				%	125			70-130	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Total Recoverable Hydrocarbons					Result 1					
TRH C6-C9	S21-Au14877	NCP	%		86			70-130	Pass	
Naphthalene	S21-Au14877	NCP	%		110			70-130	Pass	
TRH C6-C10	S21-Au14877	NCP	%		89			70-130	Pass	
Spike - % Recovery										
BTEX					Result 1					
Benzene	S21-Au14877	NCP	%		93			70-130	Pass	
Toluene	S21-Au14877	NCP	%		95			70-130	Pass	
Ethylbenzene	S21-Au14877	NCP	%		94			70-130	Pass	
m&p-Xylenes	S21-Au14877	NCP	%		97			70-130	Pass	
o-Xylene	S21-Au14877	NCP	%		92			70-130	Pass	
Xylenes - Total*	S21-Au14877	NCP	%		95			70-130	Pass	
Spike - % Recovery										
Polycyclic Aromatic Hydrocarbons					Result 1					
Acenaphthene	S21-Au23166	NCP	%		85			70-130	Pass	
Acenaphthylene	S21-Au23166	NCP	%		82			70-130	Pass	
Anthracene	S21-Au23166	NCP	%		81			70-130	Pass	
Benz(a)anthracene	S21-Au23166	NCP	%		78			70-130	Pass	
Benzo(a)pyrene	S21-Au23166	NCP	%		84			70-130	Pass	
Benzo(b&j)fluoranthene	S21-Au23166	NCP	%		78			70-130	Pass	
Benzo(g,h,i)perylene	S21-Au23166	NCP	%		93			70-130	Pass	
Benzo(k)fluoranthene	S21-Au23166	NCP	%		89			70-130	Pass	
Chrysene	S21-Au23166	NCP	%		86			70-130	Pass	
Dibenz(a,h)anthracene	S21-Au23166	NCP	%		104			70-130	Pass	
Fluoranthene	S21-Au10854	CP	%		108			70-130	Pass	
Fluorene	S21-Au23166	NCP	%		89			70-130	Pass	
Indeno(1,2,3-cd)pyrene	S21-Au23166	NCP	%		90			70-130	Pass	
Naphthalene	S21-Au23166	NCP	%		89			70-130	Pass	
Phenanthrene	S21-Au10854	CP	%		83			70-130	Pass	
Pyrene	S21-Au10854	CP	%		120			70-130	Pass	
Spike - % Recovery										
Heavy Metals					Result 1					
Lead	S21-Au10500	NCP	%		104			75-125	Pass	
Zinc	S21-Au10500	NCP	%		111			75-125	Pass	
Spike - % Recovery										
Organochlorine Pesticides					Result 1					
Chlordanes - Total	S21-Au23120	NCP	%		98			70-130	Pass	
4,4'-DDD	S21-Au23120	NCP	%		90			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDE	S21-Au23120	NCP	%	100			70-130	Pass	
4.4'-DDT	S21-Au23120	NCP	%	88			70-130	Pass	
a-HCH	S21-Au23120	NCP	%	90			70-130	Pass	
Aldrin	S21-Au23120	NCP	%	99			70-130	Pass	
b-HCH	S21-Au23120	NCP	%	91			70-130	Pass	
d-HCH	S21-Au23120	NCP	%	88			70-130	Pass	
Dieldrin	S21-Au23120	NCP	%	97			70-130	Pass	
Endosulfan I	S21-Au23120	NCP	%	94			70-130	Pass	
Endosulfan II	S21-Au23120	NCP	%	89			70-130	Pass	
Endosulfan sulphate	S21-Au23120	NCP	%	85			70-130	Pass	
Endrin	S21-Au23120	NCP	%	92			70-130	Pass	
Endrin ketone	S21-Au23120	NCP	%	92			70-130	Pass	
g-HCH (Lindane)	S21-Au23120	NCP	%	92			70-130	Pass	
Heptachlor	S21-Au23120	NCP	%	90			70-130	Pass	
Heptachlor epoxide	S21-Au23120	NCP	%	96			70-130	Pass	
Hexachlorobenzene	S21-Au23120	NCP	%	105			70-130	Pass	
Methoxychlor	S21-Au23120	NCP	%	77			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	S21-Au23120	NCP	%	119			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Au10861	CP	%	104			75-125	Pass	
Cadmium	S21-Au10861	CP	%	112			75-125	Pass	
Chromium	S21-Au10861	CP	%	99			75-125	Pass	
Copper	S21-Au10861	CP	%	76			75-125	Pass	
Mercury	S21-Au10861	CP	%	116			75-125	Pass	
Nickel	S21-Au10861	CP	%	95			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	S21-Au10863	CP	%	110			70-130	Pass	
TRH >C10-C16	S21-Au10863	CP	%	112			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S21-Au10499	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Naphthalene	S21-Au10499	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S21-Au10499	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S21-Au10499	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S21-Au10499	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S21-Au10499	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S21-Au10499	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S21-Au10499	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S21-Au10499	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Au10854	CP	mg/kg	7.5	5.0	39	30%	Fail	Q15
Cadmium	S21-Au10854	CP	mg/kg	1.3	1.2	7.0	30%	Pass	
Chromium	S21-Au10854	CP	mg/kg	11	28	85	30%	Fail	Q15
Copper	S21-Au10854	CP	mg/kg	52	56	7.0	30%	Pass	
Mercury	S21-Au10854	CP	mg/kg	0.2	0.2	16	30%	Pass	
Nickel	S21-Au10854	CP	mg/kg	7.8	8.0	2.0	30%	Pass	
Zinc	S21-Au10854	CP	mg/kg	780	480	48	30%	Fail	Q02

Duplicate								
				Result 1	Result 2	RPD		
Conductivity (1:5 aqueous extract at 25°C as rec.)	S21-Au10172	NCP	uS/cm	52	53	2.1	30%	Pass
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Au10172	NCP	pH Units	6.8	6.7	<1	30%	Pass
Duplicate								
Cation Exchange Capacity				Result 1	Result 2	RPD		
Cation Exchange Capacity	M21-Au12932	NCP	meq/100g	7.1	7.6	6.0	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S21-Au10860	CP	mg/kg	20	16	21	30%	Pass
Cadmium	S21-Au10860	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	S21-Au10860	CP	mg/kg	47	61	26	30%	Pass
Copper	S21-Au10860	CP	mg/kg	31	24	25	30%	Pass
Lead	S21-Au10860	CP	mg/kg	140	140	1.0	30%	Pass
Mercury	S21-Au10860	CP	mg/kg	0.1	< 0.1	75	30%	Fail Q15
Nickel	S21-Au10860	CP	mg/kg	15	44	98	30%	Fail Q15
Zinc	S21-Au10860	CP	mg/kg	190	170	14	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S21-Au10860	CP	%	18	16	11	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD		
TRH C10-C14	S21-Au10862	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	S21-Au10862	CP	mg/kg	290	240	20	30%	Pass
TRH C29-C36	S21-Au10862	CP	mg/kg	240	210	12	30%	Pass
TRH >C10-C16	S21-Au10862	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	S21-Au10862	CP	mg/kg	470	400	17	30%	Pass
TRH >C34-C40	S21-Au10862	CP	mg/kg	130	120	9.0	30%	Pass
Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
Chlordanes - Total	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
4,4'-DDD	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
4,4'-DDE	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
4,4'-DDT	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
a-HCH	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Aldrin	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
b-HCH	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
d-HCH	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dieldrin	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endosulfan I	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endosulfan II	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endosulfan sulphate	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endrin	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endrin aldehyde	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Endrin ketone	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
g-HCH (Lindane)	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Heptachlor	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Heptachlor epoxide	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Hexachlorobenzene	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Methoxychlor	S21-Au10862	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Toxaphene	S21-Au10862	CP	mg/kg	< 10	< 10	<1	30%	Pass

Duplicate								
Polychlorinated Biphenyls				Result 1	Result 2	RPD		
Aroclor-1016	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1221	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1232	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1242	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1248	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1254	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Aroclor-1260	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass
Total PCB*	S21-Au10862	CP	mg/kg	< 1	< 1	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Asim Khan	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Charl Du Preez	Senior Analyst-Inorganic (NSW)
John Nguyen	Senior Analyst-Metal (NSW)
Roopesh Rangarajan	Senior Analyst-Volatile (NSW)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

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Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

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IANZ # 1327

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Aargus Pty Ltd
Contact name: - ALL INVOICES/SRA - Mark Kelly
Project name: DSI
Project ID: ES8303
Turnaround time: 5 Day
Date/Time received: Aug 5, 2021 4:56 PM
Eurofins reference: 815178

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Received BH9 0.7-0.8 not on COC, logged on hold.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Asim Khan on phone : or by email: AsimKhan@eurofins.com

Results will be delivered electronically via email to - ALL INVOICES/SRA - Mark Kelly - mark.kelly@aargus.net.

AARGUS PTY LTD

6 Carter Street
Lidcombe, NSW 2141

P O Box 398 Tel: 1300 137 038
DRUMMOYNE NSW 1470 Fax: 1300 136 038

Laboratory Test Request / Chain of Custody Record

Email reports: cynthia@aargus.net; gokul@aargus.net; mark.kelly@aargus.net; sara@aargus.net
Email invoices: anika@aargus.net; cynthia@aargus.net; gokul@aargus.net; mark.kelly@aargus.net; sara@aargus.net

1 of 2

TO: MGT EUROFINS UNIT F3, BUILDING F 16 MARS ROAD LANE COVE WEST NSW 2066		Sampling Date: 04.08.2021		Job No: ES8303
PH: 028215 6222		Sampled By: SBS		Project: DSI
ATTN:		Project Manager: MK		Location: FIVE DOCK
FAX: 02 9420 2977				

Results required by: STANDARD

Sampling details			Sample type													
Location	Depth (m)	Date	Soil	Water (Filled Up)	Air	Metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn)	TPH	BTEXN	PAH	OCP	PCB		pH, CEC &%Clay		Analysis Suite(s)	KEEP SAMPLE?
BH1	0-0.1	04.08.2021	DSG			✓	✓	✓	✓						B7	YES
BH1	0.4-0.5	04.08.2021	DSG													YES
BH2	0-0.1	04.08.2021	DSG			✓									M8	YES
BH2	0.3-0.4	04.08.2021	DSG			✓							✓		M8	YES
BH3	0.3-0.4	04.08.2021	DSG			✓	✓	✓	✓	✓	✓				B7, B13	YES
BH3	1-1.1	04.08.2021	DSG													YES
BH3	1.4-1.5	04.08.2021	DSG			✓	✓	✓		✓	✓				B7, B13	YES
BH4	0.3-0.4	04.08.2021	DSG													YES
BH4	0.8-0.9	04.08.2021	DSG			✓		✓	✓	✓	✓				B7, B13	YES
BH5	0.3-0.4	04.08.2021	DSG				✓									YES
BH5	0.7-0.8	04.08.2021	DSG			✓	✓	✓	✓	✓	✓				B7, B13	YES
BH6	0.3-0.4	04.08.2021	DSG													YES
BH6	0.6-0.7	04.08.2021	DSG			✓	✓	✓	✓	✓	✓				B7, B13	YES
BH7	0.3-0.4	04.08.2021	DSG			✓	✓	✓	✓						B7	YES
BH7	1-1.1	04.08.2021	DSG													YES
BH7	1.4-1.5	04.08.2021	DSG			✓	✓	✓	✓	✓	✓				B7, B13	YES
BH8	0-0.1	04.08.2021	DSG													YES
BH8	0.7-0.8	04.08.2021	DSG			✓									B7, B13	YES
BH9	0-0.1	04.08.2021	DSG			✓	✓	✓	✓	✓	✓				B7, B13	YES
															M8	

Relinquished by	Signature	Date	Name	Received by	Signature	Date
Saad	SBS	05.08.2021	W/C			5/8/21 4:56PM
Legend:	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic bag)	@ mole H*home
WG	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required	
WP	Water sample, plastic bottle	OTH	Other	ACAN	Air sample, canister	
GV	Glass vial					

11.7C 815178

Laboratory Test Request / Chain of Custody Record

Email reports: cynthia@aargus.net; mark.kelly@aargus.net; sara@aargus.net; gokul@aargus.net
Email invoices: anika@aargus.net; cynthia@aargus.net; mark.kelly@aargus.net; sara@aargus.net; gokul@aargus.net

Job No:	ES8303
Project:	DSI
Location:	FIVE DC

2000

Results required by: STANDARD

Date 8/6/21 4:50 PM

ACAN	Air sample, canister

11.7°C 8.5178

APPENDIX N

SUMMARY OF RESULTS



TABLE 1
SCHEDULE OF LABORATORY TESTING

Analyte / Analyte Group		TYPE	SAMPLING DATE	DUPLICATE	SPLIT	MET-8	TPH	BTEX	PAH	OC	PCB	ASBESTOS	pH, CEC, %Clay
Sample	Depth (m)												
BH1	0-0.1	T	04.08.2021			✓	✓	✓	✓			✓	
BH1	0.4-0.5	N	04.08.2021										
BH2	0-0.1	T	04.08.2021			✓						✓	
BH2	0.3-0.4	N	04.08.2021			✓							✓
BH3	0.3-0.4	F	04.08.2021	D1	SS1	✓	✓	✓	✓	✓	✓	✓	
BH3	1-1.1	N	04.08.2021										
BH3	1.4-1.5	N	04.08.2021										
BH4	0.3-0.4	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	
BH4	0.8-0.9	N	04.08.2021										
BH5	0.3-0.4	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	
BH5	0.7-0.8	N	04.08.2021										
BH6	0.3-0.4	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	
BH6	0.6-0.7	N	04.08.2021										
BH7	0.3-0.4	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	
BH7	1-1.1	F	04.08.2021			✓	✓	✓	✓			✓	
BH7	1.4-1.5	N	04.08.2021										
BH8	0-0.1	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	
BH8	0.7-0.8	N	04.08.2021										
BH9	0-0.1	F	04.08.2021			✓	✓	✓	✓	✓	✓	✓	

Notes

MET-8: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc

OC : Organochlorine Pesticides

PCB : Polychlorinated Biphenyls

PAH: Polycyclic Aromatic Hydrocarbons

TPH: Total Petroleum Hydrocarbons

BTEX: Benzene, Toluene, Ethyl Benzene, Xylene

F,T,N: Fill, Topsoil, Natural

TABLE A1
HEAVY METALS TEST RESULTS FOR HILs & EILs

Analyte		HEAVY METALS (mg/kg)							
		ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD ^g	MERCURY	NICKEL	ZINC
Sample Location	Depth (m)								
Proposed Building Area									
BH3	0.3-0.4	< 2	< 0.4	10	6	9.9	< 0.1	< 5	14
BH4	0.3-0.4	7.7	1.1	23	90	430	0.2	19	630
BH6	0.3-0.4	9.1	0.9	23	46	130	0.2	12	540
BH7	0.3-0.4	7.1	< 0.4	17	75	440	0.5	8.3	200
BH7	1-1.1	11	< 0.4	21	83	270	0.3	12	200
BH8	0-0.1	12	< 0.4	19	29	110	< 0.1	11	110
BH9	0-0.1	2.4	0.9	13	29	100	< 0.1	7.8	110
DUPLICATE D1	-	3.2	< 0.4	19	73	130	< 0.1	55	210
SPLIT SS1	-	<5	<1	10	63	41	<0.1	49	134
Proposed Deep Soil Landscaping Area									
BH1	0-0.1	7.5	1.3	11	52	1500	0.2	7.8	780
BH2	0-0.1	7.2	2.1	12	75	460	0.3	13	780
BH2	0.3-0.4	6.5	0.4	15	43	140	0.2	7	320
BH5	0.3-0.4	20	< 0.4	47	31	140	0.1	15	190
Practical Quantitation Limits (PQL)		5	0.4	5	5	5	0.1	5	5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)									
Health Investigation Levels (HIL) - Table 1A (1)									
HIL A ^a		100	20	100	6000	300	40 ^e / 10 ^f	400	7400
HIL B ^b		500	150	500	30,000	1,200	120 ^e / 30 ^f	1200	60,000
HIL C ^c		300	90	300	17,000	600	80 ^e / 13 ^f	1200	30,000
HIL D ^d		3000	900	3600	240,000	1,500	730 ^e / 180 ^f	6000	400,000
Ecological Investigation Levels (EIL) - Table 1B (5)									
Areas of ecological significance		40 ^h							
Urban residential and public open space ⁱ		100 ^h							
Commercial and industrial		160 ^h							

- Notes
- a: Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
 - b: Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
 - c: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate
 - d: Commercial/industrial, includes premises such as shops, offices, factories and industrial sites
 - e: Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,
 - f: Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis should be considered.
 - g: Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
 - h: Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
 - i: Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.

TABLE A2
CATION EXCHANGE CAPACITY (CEC), %CLAY & pH TEST RESULTS FOR THE SOIL PROPERTIES
FOR EILs

Analyte		CEC (cmol/kg)	%CLAY (%)	pH (pH units)
Sample Location	Depth (m)			
BH2	0.3-0.4	14	10	7.3

TABLE A3
SITE DERIVED EILs

Analyte		HEAVY METALS (mg/kg)			
		COPPER	LEAD	NICKEL	ZINC
Sample Location	Depth (m)				
<u>Added Contaminant Limit (ACL)</u> ^a					
BH2	0.3-0.4	190	1100	170	400
<u>Ambient Background Concentration (ABC)</u>					
BH2	0.3-0.4	43	140	7	320
<u>Calculated EIL (ABC + ACL)</u>					
BH2	0.3-0.4	233	1240	177	720
<u>FINAL SITE EIL AFTER ROUNDING</u> ^b					
BH2	0.3-0.4	230	1200	180	720

Notes a: The ACL for Cu may be determined by pH or CEC and the lower of the determined values should be selected for EIL calculation.

 b: The following rounding rules are applicable to the EILs:

<1	to nearest 0.1
1 - <10	to nearest interger
10 - <100	to nearest 5
100 - <1000	to nearest 10
>1000	to nearest 100

TABLE A4
METAL TEST RESULTS FOR EILs

Analyte		HEAVY METALS (mg/kg)			
		COPPER	LEAD	NICKEL	ZINC
Sample Location	Depth (m)				
BH1	0-0.1	52	1500	7.8	780
BH2	0-0.1	75	460	13	780
BH2	0.3-0.4	43	140	7	320
BH5	0.3-0.4	31	140	15	190
Practical Quantitation Limits (PQL)		5	5	5	5
Site Derived Ecological Investigation Levels (EIL)		230	1200	180	720

Notes a: none

TABLE B1
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND NAPHTHALENE TEST RESULTS
FOR HSLs IN SAND

Analyte		TRH (mg/kg)		BTEX (mg/kg)				
		F1 ^a	F2 ^b	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	NAPHTHALENE
Sample Location	Depth (m)							
BH1	0-0.1	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH3	0.3-0.4	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH4	0.3-0.4	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH5	0.3-0.4	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH6	0.3-0.4	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH7	0.3-0.4	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH7	1-1.1	< 20	< 100	<0.1	<0.1	<0.1	<0.3	<0.5
BH8	0-0.1	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
BH9	0-0.1	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
DUPLICATE D1	-	< 20	< 50	<0.1	<0.1	<0.1	<0.3	<0.5
SPLIT SS1	-	<10	<50	<0.1	<0.1	<0.1	<0.3	<0.5
Practical Quantitation Limits (PQL)		20	50	0.1	0.1	0.1	0.3	0.5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)								
Health Screening Levels (HSL) - Table 1A (3)								
<i>HSL A & HSL B: Low-high density residential</i>								
Source depth - 0m to <1m		45	110	0.5	160	55	40	3
Source depth - 1m to <2m		70	240	0.5	220	NL	60	NL
Source depth - 2m to <4m		110	440	0.5	310	NL	95	NL
Source depth - 4m +		200	NL	0.5	540	NL	170	NL

Notes

a: To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.

b: To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

NL: Not Limiting

TABLE B2
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND BENZO(a)PYRENE TEST RESULTS
ESLs FOR COARSE GRAINED SOIL TEXTURE

Analyte		TRH (mg/kg)				BTEX (mg/kg)				PAH (mg/kg)
		F1 (C ₆ -C ₁₀) ^a	F2 (>C ₁₀ -C ₁₆) ^b	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₄₀)	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	BENZO(a)PYRENE
Sample Location	Depth (m)									
BH1	0-0.1	< 20	< 50	480	< 100	<0.1	<0.1	<0.1	<0.3	5.9
BH5	0.3-0.4	< 20	< 50	< 100	< 100	<0.1	<0.1	<0.1	<0.3	<0.5
Practical Quantitation Limits (PQL)		20	50	100	100	0.1	0.1	0.1	0.3	0.5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)										
Ecological Screening Levels (ESL) - Table 1B (6)										
Areas of ecological significance		125*	25*	-	-	8	10	1.5	10	0.7
Urban residential and public open space		180*	120*	300	2800	50	85	70	105	0.7
Commercial and industrial		215*	170*	1700	3300	75	135	165	180	1.4

Notes

a: To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.

b: To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

*: ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.

"-": "-" indicates that insufficient data was available to derive a value.

TABLE B3
TOTAL RECOVERABLE HYDROCARBONS (TRH) TEST RESULTS
MANAGEMENT LIMITS FOR COARSE GRAINED SOIL TEXTURE

Analyte TRH (mg/kg)					
		F1 (C ₆ -C ₁₀) ^a	F2 (>C ₁₀ -C ₁₆) ^a	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₄₀)
Sample Location	Depth (m)				
BH1	0-0.1	< 20	< 50	480	< 100
BH3	0.3-0.4	< 20	< 50	< 100	< 100
BH4	0.3-0.4	< 20	< 50	260	< 100
BH5	0.3-0.4	< 20	< 50	< 100	< 100
BH6	0.3-0.4	< 20	< 50	< 100	< 100
BH7	0.3-0.4	< 20	< 50	470	130
BH7	1-1.1	< 20	< 100	1200	< 200
BH8	0-0.1	< 20	< 50	160	< 100
BH9	0-0.1	< 20	< 50	190	< 100
DUPLICATE D1	-	< 20	< 50	< 100	< 100
SPLIT SS1	-	<10	<50	<100	<100
Practical Quantitation Limits (PQL)		20	50	100	100
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)					
Management Limits - Table 1B (7)					
Residential parkland and public open space		700	1000	2500	10,000
Commercial and industrial		700	1000	3500	10,000

- Notes
- a: Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.
- b: Management limits are applied after consideration of relevant ESLs and HSLs.

TABLE C
POLYCYCLIC AROMATIC HYDROCARBONS (PAH), ORGANOCHLORINE PESTICIDES (OCP) AND POLYCHLORINATED BIPHENYLS (PCB)
TEST RESULTS FOR HILs, EILs & ESLs

Analyte		PAH (mg/kg)				Organochlorine Pesticides (mg/kg)								PCB ^j
		Carcinogenic PAHs (as BaP TEQ) ^a	TOTAL PAHs ^f	BENZO(a)PYRENE	NAPHTHALENE	DDT + DDE + DDD	ALDRIN & DIELDRIN	CHLORDANE	ENDOSULFAN	ENDRIN	HEPTACHLOR	HCB	METHOXYCHLOR	
Sample Location	Depth (m)													
Proposed Building Area														
BH3	0.3-0.4	0.6	< 0.5	< 0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
BH4	0.3-0.4	1.8	14	1.2	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1
BH6	0.3-0.4	0.9	2.3	0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
BH7	0.3-0.4	4.3	36.1	3.1	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1
BH7	1-1.1	14	102.9	10	< 0.5	-	-	-	-	-	-	-	-	-
BH8	0-0.1	0.6	< 0.5	< 0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
BH9	0-0.1	0.6	0.6	< 0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
DUPLICATE D1	-	0.6	1.2	< 0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
SPLIT SS1	-	1.1	5.9	0.7	< 0.5	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.2	< 0.1
Proposed Deep Soil Landscaping Area														
BH1	0-0.1	8.8	59.9	5.9	< 0.5	-	-	-	-	-	-	-	-	-
BH5	0.3-0.4	0.6	0.5	< 0.5	< 0.5	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.5
Practical Quantitation Limits (PQL)		0.5	0.5	0.5	0.5	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.2	0.5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)														
Health Investigation Levels (HIL) - Table 1A (1)														
HIL A ^a		3	300			240	6	50	270	10	6	10	300	1
HIL B ^b		4	400			600	10	90	400	20	10	15	500	1
HIL C ^c		3	300			400	10	70	340	20	10	10	400	1
HIL D ^d		40	4000			3600	45	530	2000	100	50	80	2500	7
Ecological Investigation Levels (EIL) - Table 1B (5)														
Areas of ecological significance					10 ^g	3 ^{g, k}								
Urban residential and public open space ^h					170 ^g	180 ^{g, k}								
Commercial and industrial					370 ^g	640 ^{g, k}								
Ecological Screening Levels (ESL) - Table 1B (6)														
Areas of ecological significance					0.7 ⁱ									
Urban residential and public open space					0.7 ⁱ									
Commercial and industrial					1.4 ⁱ									

- Notes
- a: Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
 - b: Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
 - c: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate
 - d: Commercial/Industrial, includes premises such as shops, offices, factories and industrial sites
 - e: Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

Where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk.

- f: Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.
- g: Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
- h: Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
- i: For coarse and fine grained texture soils.
- j: PCBs: HIL relates to non-dioxin-like PCBs only. Where a PCB source is known, or suspected, to be present at a site, a site-specific assessment of exposure to all PCBs (including dioxin-like PCBs) should be undertaken.
- k: For DDT only.

TABLE D
ASBESTOS TEST RESULTS

Analyte			Field Observations* Visible ACM detected (>7mm)	Material Sampled for Analysis	Laboratory Results Asbestos Present / Absent	Type of Asbestos Present	Laboratory Results Asbestos %w/w
Sample Location	Date Sampled	Depth (m)					
BH1	04.08.2021	0-0.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH2	04.08.2021	0-0.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH3	04.08.2021	0.3-0.4	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH3	04.08.2021	1-1.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH4	04.08.2021	0.3-0.4	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH5	04.08.2021	0.3-0.4	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH6	04.08.2021	0.3-0.4	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH7	04.08.2021	0.3-0.4	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH7	04.08.2021	1-1.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH8	04.08.2021	0-0.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
BH9	04.08.2021	0-0.1	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
DUPLICATE D1	04.08.2021	-	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
SPLIT SS1	04.08.2021	-	No visible ACM observed	Soil	No Asbestos detected	-	<0.001
WA Guidelines for the Assessment, Remediation and Management of Asbestos - Contaminated Sites in Western Australia - May 2009							
National Environment Protection (Assessment of Site Contamination) Measure 2013 Schedule B1							
%w/w asbestos for FA and AF							0.001%
%w/w asbestos for ACM - Residential use, childcare centres, preschools etc.							0.01%
%w/w asbestos for ACM - Residential, minimal soil access (fully sealed surfaces)							0.04%
%w/w asbestos for ACM - Parks, public open spaces, playing fields etc.							0.02%
%w/w asbestos for ACM - Commercial / Industrial							0.05%
All forms of Asbestos							No visible asbestos for surface soils

Note:

ACM = Asbestos Containing Materials >7mm x 7mm (visible by eye)

FA = Friable and Fibrous Asbestos Materials >7mm x 7mm and <7mm x 7mm

AF = Asbestos Fines <7mm x 7mm ACM including free fibres (visible by microscope only)

* Field Observations: All ACM observed are assumed to contain Asbestos until otherwise tested and recorded as such.

NT = Not Tested

APPENDIX O

**IMPORTANT INFORMATION
ABOUT YOUR REPORT**





IMPORTANT INFORMATION ABOUT YOUR ENVIRONMENTAL SITE ASSESSMENT

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

REASONS FOR CONDUCTING AN ESA

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

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

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

THE LIMITATIONS OF AN ESA

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

or may migrate to areas which showed no signs of contamination when sampled.

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

Your environmental report should not be used:

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

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

ESA "FINDINGS" ARE PROFESSIONAL ESTIMATES

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

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

SUBSURFACE CONDITIONS CAN CHANGE

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

ESA SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

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

AN ESA REPORT IS SUBJECT TO MISINTERPRETATION

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

LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

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

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

READ RESPONSIBILITY CLAUSES CLOSELY

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