Intersection Upgrade at Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive, Bella Vista

Contaminated Site Investigation

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Executive Summary

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Transport for NSW to deliver the Professional Services Contract for the Intersection Upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive in Bella Vista, NSW (referred to hereinafter as the study area).

The upgrade will include the removal of the roundabout and installation of traffic control signals at the Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection, the upgrade of Norwest Boulevard from a four-lane divided carriageway to a six-lane divided carriageway on approach and departure from Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection and provision of shared footpath facilities.

To assist in the delivery of the Review of Environmental Factors (REF), a limited Stage 2 Contaminated Site Investigation (CSI) was undertaken to assess risk (with respect to contamination) associated with potential historical and current contaminating activities and/or operations undertaken on or adjacent to the study area.

Contaminated site investigations comprising general site inspections and intrusive ground investigations were conducted between 9 December and 13 December 2019 (Round 1) in conjunction with geotechnical investigations, at the request of Transport for NSW. An additional ground investigation (specific to contamination) was undertaken on 30 January 2020 (Round 2), to provide further information on ground conditions along Lexington Drive.

Intrusive ground investigation sites as part of Round 1 investigations (9 December – 13 December) were selected by Transport for NSW at nominated geotechnical testing locations. Intrusive ground investigation sites as part of Round 2 investigations comprised targeted contamination investigations along Lexington Drive, utilising a tracked 5t excavator.

Contamination sampling was conducted at the nominated investigation locations to determine contamination status of the subsurface soils. Intrusive ground investigation methods comprised both test pitting and geotechnical boring programmes. Selected samples collected from the investigation locations were submitted to a National Association of Testing Authority (NATA) accredited laboratory for analytical testing for a broad suite of contamination compounds.

To address potential impacts to human and environmental receptors from exposure to contamination during construction of the upgrades, Jacobs compared the analytical testing results against the relevant health-based and ecological based soil investigation and screening. Jacobs also compared the analytical testing results against waste classification criteria to identify suitable preliminary disposal / beneficial re-use strategies for excavated surplus materials.

The results of the CSI have identified the presence of fill materials of variable composition extending to a maximum depth of 0.75m across the study area, overlying natural soils generally comprising clay and silty clay overlying a bedrock of sandstone and silty sandstone. Fill material at three of the seven investigation locations contained construction / demolition wastes (i.e. concrete, asphalt, glass). No groundwater was encountered to the depth limit of the investigations.

Results from the analytical testing of soil samples were screened against human health exposure criteria and ecological criteria for a commercial industrial land use. The adopted criteria were considered to be representative of the likely exposure scenarios associated with the current and proposed land-use (road corridor) and principal zoning around the proposal area. The results did not identify any gross contamination that may present a risk to construction workers / maintenance staff, surrounding commercial industrial estate, or ecological receptors. However, the presence of a fragment of asbestos containing material (ACM) recovered from the surface of the site could indicate that the potential for further asbestos to be present within the substratum of areas not investigated, especially within fill materials containing other construction / demolition wastes. As such, the Construction

Environment Management Plan (CEMP) should account for potential of exposure of ACM / contaminated soils as part of an unexpected finds procedures.

Results from analytical testing of soil samples were also screened against waste classification criteria to provide a preliminary assessment of potential requirements for offsite disposal, or on-site beneficial re-use.

The preliminary waste classification indicated that fill materials may be classified as general solid waste based on laboratory testing results, however the presence of ACM recorded at the surface during the investigation requires a preliminary classification of special waste.

Preliminary testing indicates that, where present, In-situ natural materials that have not been historically disturbed (reworked) may be classified as virgin excavated natural material (VENM) for the purpose of waste classification; however it should be noted that upper soil layers across the proposal area have the potential to contain ACM as a result of historical and more recent construction activities.

Preliminary testing indicates that, where present, natural materials that have been historically disturbed (reworked) may be classified as excavated natural material (ENM) subject to further assessment in accordance with the ENM resource recovery exemption for the purpose of beneficial reuse; however it should be noted that upper soil layers across the proposal area have the potential to contain ACM as a result of historic and more recent construction activities.

Important note about your report

The sole purpose of this report is to present the findings of a limited Stage 2 Contaminated Site Investigation (CSI) carried out by Jacobs for Transport for NSW ('the Client') in connection with the proposed intersection upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive, Bella Vista. This report was produced in accordance with and is limited to the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

All reports and conclusions that deal with sub-surface conditions are based on interpretation and judgement and as a result have uncertainty attached to them. You should be aware that this report contains interpretations and conclusions which are uncertain, due to the nature of the investigations. No study can investigate every risk, and even a rigorous assessment and/or sampling programme may not detect all problem areas within a site.

This report is based on assumptions that the site conditions as revealed through sampling are indicative of conditions throughout the site. The findings are the result of standard assessment techniques used in accordance with normal practices and standards, and (to the best of Jacobs' knowledge) they represent a reasonable interpretation of the current conditions on the site.

Sampling techniques, by definition, cannot determine the conditions between the sample points and so this report cannot be taken to be a full representation of the sub-surface conditions. This report only provides an indication of the likely sub surface conditions.

Conditions encountered when site work commences may be different from those inferred in this report, for the reasons explained in this limitation statement. If site conditions encountered during site works are different from those encountered during Jacobs' site investigation, Jacobs reserves the right to revise any of the findings, observations and conclusions expressed in this report.

The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

In preparing this report, Jacobs has relied upon, and presumed accurate, information provided by the Client and from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, the Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

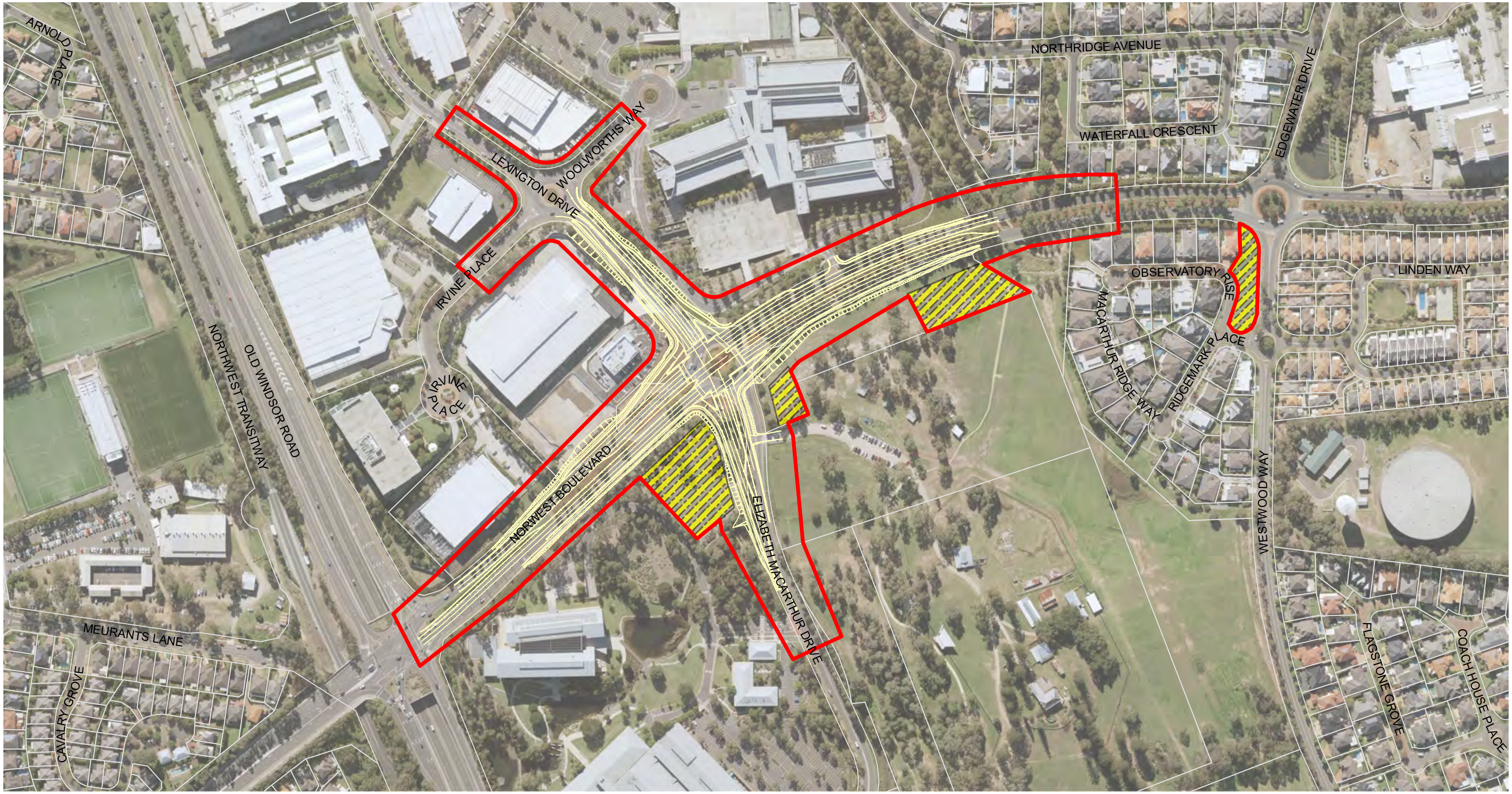
Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Transport for NSW to deliver the Professional Services Contract for the Intersection Upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive in Bella Vista, NSW (referred to hereinafter as the study area).

The upgrade will include the removal of the roundabout and installation of traffic control signals at the Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection, the upgrade of Norwest Boulevard from a four-lane divided carriageway to a six-lane divided carriageway on approach and departure from Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection and provision of shared footpath facilities.

The proposed upgrades and study area are presented in **Figure 1-1.**

The intersection upgrade is key to easing the congestion experienced along the route during peak hours and in anticipation of the increased pressure the intersection will experience from development in the area and Sydney Metro Bella Vista and Norwest Train stations. The intersection improvements have been designed to increase its capacity and improve the customer experience through the intersection as well as improving road safety and safety for cyclists and pedestrians.

A limited Stage 2 Contaminated Site Investigation (CSI) has been undertaken to investigate areas of potential contamination and acid sulfate soil risk identified in the preceding preliminary contaminated site investigation (PCSI) (Jacobs, 2019)



☐ Cadastre

— Concept Design (20191022)

▨ Potential construction compound location - Options

🟥 Study area

0 125 250 m

N

1:5,000 at A4

Data sources

RMS 2019
Metromap Imagery May 2019

GDA94 MGA56

Figure 1-1 Site location and Layout

2. Background

2.1 The Proposal

The objective of this proposal is to provide Transport for NSW with a concept design that meets the project needs and mitigates risks associated with utilities impacts, constructability and staging, and traffic management during construction. To achieve these objectives Jacobs is delivering a utilities mitigation strategy, identifying and addressing constructability issues and undertaking an environment assessment via a Review of Environmental Factors (REF) that will inform the development of a detailed design.

Key features of the proposal include:

- Widening of Norwest Boulevard from two lanes to three lanes in each direction, from its intersection with Old Windsor Road, to a point just to the west of the existing pedestrian underpass west of Westwood Way
- Removal of the existing roundabout at the intersection of Norwest Boulevard and Elizabeth Macarthur Drive / Lexington Drive, and construction of a new signalised intersection
- Adding new right turn capacity and providing a single dedicated left turn lane on each leg of the intersection
- Widening of Lexington Drive from one to two lanes in each direction, between Norwest Boulevard and the existing roundabout at Irvine Place / Woolworths Way
- Tie-ins to the existing adjoining road network
- New pedestrian and cycle facilities
- Removal of portions of the existing Norwest Boulevard landscaped median and roadside vegetation on Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive to accommodate proposed road widening
- New stormwater drainage and utilities relocation to suit the proposed road configuration
- New or adjusted private property access driveways
- Property adjustments and partial acquisition of private properties to accommodate the proposed roadworks
- New retaining walls along the Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive proposed road boundary
- New landscaping along the modified median and verge to maintain the character of the existing landscaping in Norwest Boulevard
- New raised concrete medians and pedestrian refuge islands.

2.2 Objectives

2.2.1 Report Context and Objectives

To assist in the delivery of the REF, a limited Stage 2 CSI was undertaken to assess risk (with respect to contamination) associated with potential historical and current contaminating activities and/or operations undertaken on or adjacent to the study area.

The objectives of the limited Stage 2 CSI were as follows:

- To investigate and document potential contamination that could impact upon the proposal, based on the findings and recommendations of the preliminary CSI

- To assess the risks to human health from potentially contaminated soils/ groundwater associated with activities undertaken within and/or adjoining the study area
- To provide a preliminary assessment of the requirements for offsite disposal / beneficial re-use of soil materials during construction
- Assess the need for further investigations and/or remediation.

2.3 Scope of works

The following scope of works was undertaken to address the project objectives:

- Preparation of a safe work method statement (SWMS) prior to commencement of site works
- Review and summary of previous reports relevant to the proposal and the limited Stage 2 CSI
- A limited Stage 2 CSI undertaken as part of geotechnical investigations between 9 December and 13 December 2019 (Round 1), comprising:
    - On-site attendance by an experienced contaminated land practitioner
    - Excavation of six (6) test pits and one (1) borehole to inform contamination assessment
    - Descriptive logging of subsurface materials encountered within excavations / boreholes, including material classification and visual / olfactory indications of contamination
    - Collection of environmental samples for laboratory testing by a National Association of Testing Authority (NATA) accredited laboratory
    - Preparation of a limited Stage 2 CSI report.
- An additional contamination investigation undertaken on 30 January 2020 (Round 2), to provide additional information on ground conditions along Lexington Drive, comprising
    - On-site attendance by an experienced contaminated land practitioner
    - Excavation of three (3) test pits for contamination assessment
    - Descriptive logging of subsurface materials encountered within excavations / boreholes, including material classification and visual / olfactory indications of contamination
    - Collection of environmental samples for laboratory testing by a NATA accredited laboratory
    - Update of the limited Stage 2 CSI report.

The Stage 2 CSI was undertaken in general accordance with the following guidelines:

- National Environment Protection (Assessment of Site Contamination) Measure 1999, as revised 2013 (NEPM, 2013)
- NSW EPA (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2011)
- RMS (2013) Guideline for the Management of Contamination (RMS, 2013)
- NSW EPA (2014) Waste Classification Guidelines (NSW EPA 2014).

2.4 Previous reports

2.4.1 Stage 1 Contaminated Site Investigation

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Transport for NSW to undertake a preliminary contaminated site investigation (PCSI) for the study area (Jacobs, 2019).

The PCSI was undertaken to assess the qualitative risk (with respect to contamination) associated with potential historical and current contaminating activities and/or operations on and/or adjacent to the site.

The findings of the PCSI identified potential areas of environmental impact (AEI) within and around the site area; including one high risk AEI comprising two locations where evidence of fill containing waste material was observed. The findings also identified the presence of asbestos containing material (ACM) at surface within the identified potential construction compound location on the ResMed site.

The PCSI report identified the need for further investigation to assess the potential presence of unidentified surface and subsurface contamination in areas within the proposed intersection upgrade works. The PSCI report recommended that the further investigation should be used to inform potential risk to construction / maintenance workers that may be exposed to site contamination and seek to provide appropriate waste classification of materials for offsite disposal / on-site beneficial re-use.

The PCSI report has been included as Appendix A.

3. Site setting

3.1 Site description and layout

The study area comprises an intersection centred around a round-about that connects Norwest Boulevard (east and west), Lexington Drive (north) and Elizabeth Macarthur Drive (south). The upgrade section is approximately 720 meters in length from west to east (Norwest Boulevard), and approximately 590 meters north to south (Lexington Drive and Elizabeth Macarthur Drive).

The total study area footprint, including the potential construction compound location options detailed in **Figure 1-1**, is approximately 9.2 hectares.

3.2 Land zoning

The main zonings of land within and adjacent to study area under the Hills Shire Local Environmental Plan (LEP) 2012 are:

- B7– Business Park (eg multiple large-scale commercial activities)
- RE1 – Public Recreation (eg Bella Vista Farm Park)
- R2 – Low density Residential
- R3 – Medium density Residential

Other additional zonings surrounding the study area but not directly adjacent to the study area include:

- B2– Local Centres
- R4 – High Density Residential
- E2 – Environmental Conservation

3.3 Topography and drainage

The topography of the study area is characterized by rolling hills with elevations typically ranging from between 85- and 94-meters Australian Height Datum (AHD), with a maximum elevation of 105 meters AHD at Bella Vista Farm Park.

The study area is covered by both unsealed grassed areas, open space adjacent to the road (e.g. Bella Vista Farm Park and parts of the ResMed Innovation Centre, houses and reserves) and sealed areas (e.g. Norwest Boulevard, Lexington Drive, Elizabeth Macarthur Drive, pedestrian footpaths and commercial premises). The topography suggests that rainfall falling onto the unsealed areas is likely to infiltrate directly into study area sub-soils. Rain falling onto both the sealed areas of the roads and sealed surfaces on adjacent properties is likely to drain into stormwater network drainage systems, which would discharge into natural watercourses across the alignment.

Multiple stormwater drains were observed across the study area as well as two unnamed semi-constructed creeks / waterway systems (one that flows into Strangers Lake to the north east and the other located on the ResMed Innovation Centre that flows in a south west direction). Both systems appear to be fed by stormwater network drainage channels that flow under Norwest Boulevard and Elizabeth Macarthur Drive respectively. A third unnamed creek / waterway system associated with the Waterfall Crescent Reserve was also observed north of Norwest Boulevard. This system which divides the business park (located east of Lexington Drive) to the west and low density residential to the east appears to flow in a northerly direction into Elizabeth Macarthur Creek and through

Waterfall Crescent Reserve. This system appears to be fed by drainage lines that direct overland stormwater flows away from Norwest Boulevard, but is likely to also be fed from other stormwater flows coming from the residential precinct to the east and the commercial precinct to the west.

3.4 Soils and geology

3.4.1 Soils

Reference to the the Penrith 1:100,000 Soil Landscape Map indicates that the study area traverses two soil landscapes. It is expected that whilst soils at north end of the study area (Lexington Drive) will comprise the Blacktown (REbt) soil unit, the remainder of the study area is expected to comprise the Luddenham (ERlu) soil unit.

The Luddenham soil unit is described as an erosional soil with shallow soils (less than100 centimetres) dark podzolic or massive earthy clays in crests whilst moderately (70-150 centimetres) soils are red podzolic on upper slopes, and yellow podzols and prairie soils on lower slopes and drainage line. The Luddenham soil landscape is underlain by the Ashfield and Bringelly Shale formation (Bannerman and Hazelton 1990).

The Blacktown soil unit is described as a residual soil with shallow to moderately deep (less than100 centimetres) soils comprised of hard-setting mottled texture contrast soils and red and brown podzols on crests grading to yellow podzols on lower slopes in drainage lines (Bannerman and Hazelton 1990).

3.4.2 Acid sulfate soils

Acid sulfate soil risks maps prepared for the NSW coastal areas were developed from geomorphic principles and identification of landforms understood to contribute to the generation of acidic leachate.

Information and mapping on the occurrence ASS and ASS risk along the coast of NSW is obtained through the Australian Government Bioregional Assessment Programme. The maps predict the distribution of acid sulfate soils (ASS) based on an assessment of the geomorphic environment of landforms at elevations up to 10mAHD, supported by subsequent fieldwork and sampling from selected sites where ASS or potential acid sulfate soils (PASS) were suspected to occur.

Review of the available mapping for PASS and ASS from the Lotsearch (November 2019) report was undertaken to assess the risk of encountering ASS within the Site or within areas surrounding the Site. The mapping indicates that the probability of encountering potential ASS either within the Site or within areas surrounding the Site is extremely low, defined as 1-5% chance of occurrence with occurrences in small localised areas.

3.4.3 Geology

The proposal site and surrounding area are located within the Cumberland Plain of the Sydney Basin. Sydney Basin strata are relatively under formed, and may be described as a layer cake of horizontally-bedded Permian-Triassic sediments largely comprising sandstones capped with shale, underlain with coal measures and older sandstones, with a scattering of minor volcanic plugs and intrusions outcropping mainly on local erosion fronts.

Reference to the Penrith 1:100,000 Map Series, indicates the majority of the study area and surrounding area is underlain by Triassic Ashfield Shale (major Ashfield Shale with minor Minchinbury Sandstone and Bringelly Shale) and underlying Hawkesbury Sandstone (seen in the drainage line of Toongabbie Creek, Baulkham Hills).

The Wianamatta Group consists of laminite, black and grey shales, lithic sandstone and rare coal. The Hawkesbury Sandstone is composed of medium to coarse-grained quartz sandstone with minor shale and laminite lenses.

Alluvial sands and gravels derived from the surrounding Wianamatta Group shales and Hawkesbury Sandstone are present along natural drainage lines.

3.5 Groundwater

The different geological units within the Sydney Basin may be categorised into generic aquifer classes based on the predominant mode of groundwater occurrence in each system. These are:

- Unconsolidated sediments – Coastal sand bed deposits and alluvium
- Porous rock – Hawkesbury Sandstone Formation and Narrabeen Group sandstones
- Fractured rock – Wianamatta Group Shale and Hawkesbury Sandstone.

The study area and surrounding areas are situated within the Baulkham Hills Hydrogeological Landscape (HGL), which is characterised by rolling low hills on Triassic shale overlying tilted Triassic Sandstone.

Review of the Baulkham Hills Hydrogeological Landscape report sheet indicates that the depth to groundwater is generally greater than 5 metres below ground level (bgl). The hydraulic conductivity is low to moderate ($<10^{-2}$ - 10m /day). Groundwater salinity is fresh to marginal (800-1,600 µs/cm). Recharge is moderate to high with short to medium residence times (months to years).

4. Site investigation

4.1 Overview

Two rounds of site investigations have been conducted as part of the site assessment process.

The first round of site investigation comprised general site inspections and intrusive ground investigations conducted between 9 December and 13 December 2019 in conjunction with geotechnical investigations, at the request of Transport for NSW. Intrusive ground investigation sites as part of the first round of investigation were selected by Transport for NSW to satisfy geotechnical testing requirements. Contamination sampling was conducted at the pre-selected geotechnical investigation locations to determine contamination status of the subsurface soils. Intrusive ground investigation methods comprised both test pitting and geotechnical boring programmes.

The second round of site investigation comprised additional ground investigations undertaken on 30 January 2020 as part of a targeted contamination assessment along Lexington Drive.

The locations of test pits and boreholes where contamination samples were collected as part of both round 1 and round 2 investigations are presented in **Figure 4-1**. Visual and olfactory observations of soil condition were also made at these sites for validation of subsequent laboratory testing results and assessment of general aesthetics in accordance with the NEPM (2013) guidelines.

4.2 Test pit investigations

Test pit investigations were conducted at the pre-selected geotechnical investigation locations (round 1), and targeted contamination investigation locations (round 2) using a 5-tonne tracked excavator to expose subsurface materials and enable logging / field testing of soils for geotechnical / contamination assessments; and to enable the collection of representative samples for laboratory testing.

4.2.1 Test pit locations

Contamination assessments (soil sampling and observations) were conducted at a total of six (6) sites as part of round 1 investigation works and three (3) locations as part of round 2 investigation works. Details of the test pits are presented in **Table 4-1** and **Table 4-2**. Test pits were advanced to a maximum depth of approximately 1.90m.

Table 4-1 Summary of Test Pit Locations Round 1

Test Pit ID	Location	Completion Depth (m BGL)	Surface Elevation (m AHD)	Easting (m)	Northing (m)
TP101	RESMED Site Garden	1.75	101.0	310104.3	6264895.1
TP102	Elizabeth McCarthur Drive – Reserve Road	1.10	99.16	310136.9	6264871.4
TP103	Woolworths – Lexington Drive	0.90	98.24	310075.4	6265002.1
TP104	Woolworths – Norwest Boulevard	1.70	99.98	310142.2	6264991.8
TP05	Bella Vista Farm	1.50	102.90	310162.7	6264912.4

Test Pit ID	Location	Completion Depth (m BGL)	Surface Elevation (m AHD)	Easting (m)	Northing (m)
TP06	Bella Vista Farm	1.90	103.20	310207.0	6264970.5

Table 4-2 Summary of Test Pit Locations Round 2 (Lexington Drive)

Test Pit ID	Location	Completion Depth (m BGL)	Surface Elevation (m AHD)	Easting (m)	Northing (m)
TP201	Lexington Drive	0.40	92.16	309989.4	6265060.1
TP202	Lexington Drive	0.70	93.83	310011.6	6265037.4
TP203	Lexington Drive / Norwest Boulevard	0.80	99.94	310077.3	6264939.2

The materials that were encountered, and their relative condition (with respect to contamination) were logged during the course of the test pit investigations. Test pit logs are presented and discussed further in Section 8.1.

4.2.2 Test pit sampling intervals

A number of soil samples were collected from each test pit with selected samples submitted for analytical testing at a NATA accredited laboratory. The soil samples collected from test pit sites for the contamination assessment were obtained from the surface of each test pit (prior to excavation), and from underlying soils / materials regular intervals (0.0-0.3m, and at 0.5m intervals thereafter) until to the maximum specified depth for the test pit or bedrock refusal was achieved (whichever was shallower). Representative samples were also collected at other discrete depths within test pits where evidence of potential contamination (e.g. malodorous and/or discoloured materials, presence of waste materials) was observed.

Table 4-3 presents a summary of the primary samples that were collected from test pits as part of the investigations to provide a representative assessment of soil conditions with respect to contamination.

Table 4-3 Summary of primary samples collected from test pits during site investigations

Sample Location	Sample ID	Sample Depth Interval (m BGL)
TP101	TP101_0.0	Surface
	TP101_0.0-0.3	0.0 - 0.3
	TP101_0.5	0.5
	TP101_1.0	1.0
	TP101_1.7	1.7
TP102	TP102_0.0	Surface
	TP102_0.0-0.3	0.0 - 0.3
	TP102_0.5	0.5
	TP102_1.0	1.0
TP103	TP103_0.0	Surface

Sample Location	Sample ID	Sample Depth Interval (m BGL)
	TP103_0.0-0.3	0.0 - 0.3
	TP103_0.5	0.5
TP104	TP104_0.0	Surface
	TP104_0.0-0.3	0.0 - 0.3
	TP104_0.5	0.5
	TP104_1.0	1.0
	TP104_1.5-1.7	1.5 - 1.7
TP05	TP05_0.0	Surface
	TP05_0.0-0.3	0.0 - 0.3
	TP05_0.5	0.5
	TP05_1.0	1.0
TP06	TP06_0.0	Surface
	TP06_0.0-0.3	0.0 - 0.3
	TP06_0.5	0.5
	TP06_0.5-1.0	0.5 - 1.0
	TP06_1.0-1.9	1.0-1.9
	TP06_1.9	1.9
TP201	TP201_0.1	0.1
TP202	TP202_0.1	0.1
	TP202_0.5	0.5
TP203	TP203_0.1	0.1
	TP203_0.7	0.7

4.3 Borehole investigations

Borehole investigations were conducted at a number of pre-selected geotechnical investigation locations using a Hanjin D&B drilling rig with interchangeable solid stem auger and Standard Penetration Test (SPT) hammers / rods to enable in-situ testing of subsurface materials and collection of representative samples for laboratory analysis.

4.3.1 Borehole locations

Contamination assessments were conducted at one (1) borehole site, identified in **Table 4-4**. The borehole was advanced to a maximum depth of approximately 8.20m.

Table 4-4 Summary of Test Pit Locations

Test Pit ID	Termination Depth (m BGL)	Surface Elevation (m AHD)	Easting (m)	Northing (m)
BH04	8.20	103.336	310161.7	6264937.4

The materials that were encountered, and their relative condition (with respect to contamination) were logged during the course of the borehole investigation. Borehole logs are presented and discussed further in Section 8.1.

4.3.2 Borehole sampling intervals

Selected soil samples collected from the borehole were submitted for analytical testing at a NATA accredited laboratory. The soil samples collected from the borehole location for contamination testing were obtained from the surface of the borehole prior to boring, and from underlying soils / materials at regular intervals (0.0-0.3m, and at 0.5m intervals thereafter) until to the maximum specified depth for the borehole or bedrock refusal was achieved (whichever was shallower).

Representative samples were also collected at other discrete depths within boreholes where evidence of potential contamination (e.g. malodorous and/or discoloured materials, presence of waste materials) was observed. **Table 4-5** presents a summary of the primary samples collected from boreholes during the investigation.

Table 4-5 Summary of primary samples collected from boreholes during site investigation

Sample Location	Sample ID	Sample Depth Interval (m BGL)
BH04	BH04_0.0	Surface
	BH04_0.5	0.5
	BH04_1.0	1.0
	BH04_2.0	2.0

Data sources

RMS 2019
Metromap Imagery May 2019

GDA94 MGA56

Figure 4-1 Contamination investigation locations: boreholes and test pits

4.4 Sampling methodology

4.4.1 Surface samples

All surface soil samples were collected as direct grab samples using a decontaminated stainless-steel trowel,

4.4.2 Subsurface samples – test pits

Samples from less than 0.5m bgl within test pits were collected from the sidewalls of the test pit excavation using a decontaminated stainless-steel soil trowel. Soil samples from a depth of equal to and / or greater than 0.5m bgl were collected directly from the centre of the soil mass present within the excavator bucket.

Appropriate care was taken to ensure that representative samples were obtained from the depth required and that the integrity was maintained, which is particularly important when dealing with potentially volatile components.

4.4.3 Subsurface samples – boreholes

Subsurface samples from boreholes were collected directly from decontaminated a SPT sampler Appropriate care was taken to ensure that representative samples were obtained from the depth required and that the integrity was maintained, which is particularly important when dealing with potentially volatile components.

Single-use disposable nitrile gloves (changed between samples) were used in collection of all soil samples.

4.5 Decontamination procedures

The stainless-steel trowel and SPT sampler were decontaminated between sample depths / locations by washing with a solution of phosphate free, laboratory grade detergent (Decon 90) and potable water and rinsing with potable water.

4.6 Sample containers, storage and handling

All soil samples were placed in jars provided by the primary laboratory Envirolab Services (Envirolab). All sample jars were fitted with Teflon lined lids. The jars were completely filled with soil, labelled with the date, unique sampling point identification and sampler information.

The soil jars once filled with sample and sealed, were immediately placed in an esky / cool box in which a cooling medium had been added to keep the samples below a temperature of approximately 4ºC. At the end of the sampling program the samples in the cool box were transported to the primary and secondary laboratories. Custody seals were placed on the esky / cool box for delivery to the laboratory.

4.7 Material logging

All subsurface materials encountered during test pitting and borehole drilling were logged by an experienced Jacobs contaminated land practitioner. The following information was logged at each location:

- Location ID
- Location co-ordinates (easting / northings)
- Start / finish date
- Surface conditions
- Method of excavation / drilling

- Subsurface materials (i.e. soil description, classification, colour, consistency, moisture content, visual / olfactory indications of contamination)
- Total depth of excavation / borehole
- Depth of free water (if encountered).

A summary of the units encountered during site investigation works is presented in Section 8 of this report.

4.8 Sample logging

All surface and subsurface samples collected during test pitting and borehole drilling were collected and recorded by an experienced Jacobs contaminated land practitioner. Samples were recorded on material logging sheets with unique identification codes corresponding with location ID and sample depth interval.

4.9 Laboratory testing

Soil samples were selected for analysis from a number of pre-selected geotechnical investigation locations as part of Round 1 investigation works, and at contamination investigation locations as part of Round 2 investigation works.

A summary of the laboratory testing undertaken as part of Round 1 investigation works is detailed in **Table 4-6**.

Table 4-6: Laboratory testing schedule summary – Round 1 (9-13 December 2019)

Laboratory Test	Primary Samples	Duplicate Samples
Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) – acid extractable	14	1
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN)	14	1
Total Recoverable Hydrocarbon (TRH) fractions C6-C10	14	1
Total Recoverable Hydrocarbon (TRH) fractions C10-C40	14	1
Polycyclic Aromatic Hydrocarbons (PAH)	14	1
Organochlorine Pesticides (OCPs)	14	1
Polychlorinated Biphenyls (PCBs)	14	1
Asbestos in soil identification (NEPM)	7	0
Asbestos in soil identification	14	1
Asbestos material identification	1	0

One (1) trip blank sample and one (1) trip spike sample were also submitted to the laboratory for testing of TRH C6-C10 fractions + BTEX to check for potential cross contamination during transport of samples from the field to the receiving laboratory.

A summary of the laboratory testing undertaken as part of Round 2 investigation works is detailed in **Table 4-7**.

Table 4-7: Laboratory testing schedule summary – Round 2 (30 January 2020)

Laboratory Test	Primary Samples	Duplicate Samples
Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) – acid extractable	5	0
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN)	5	0
Total Recoverable Hydrocarbon (TRH) fractions C6-C10	5	0
Total Recoverable Hydrocarbon (TRH) fractions C10-C40	5	0
Polycyclic Aromatic Hydrocarbons (PAH)	5	0
Organochlorine Pesticides (OCPs)	5	0
Polychlorinated Biphenyls (PCBs)	5	0
Asbestos in soil identification (NEPM)	5	0

4.10 Analytical parameters and methods

Jacobs commissioned Envirolab as the primary laboratory and Eurofins as the secondary laboratory. Envirolab and Eurofins are NATA accredited for the testing undertaken.

Where appropriate, the soil samples were analysed in accordance with NEPM (2013) guidelines using methods based on US Environment Protection Agency (US EPA) and American Public Health Association (APHA) approved analytical methods.

5. Quality assurance / quality control plan

Quality assurance (QA) is 'all the planned and systematic activities implemented within the quality system and demonstrated as needed to provide adequate confidence that an entity will fulfil requirements for quality (ISO 8402–1994). This encompasses all actions, procedures, checks and decisions undertaken to ensure the accuracy and reliability of analysis results (NEPM, 2013).

Quality control (QC) is 'the operational techniques and activities that are used to fulfil the requirements for quality (ISO 8402–1994). These are the QA components that serve to monitor and measure the effectiveness of other QA procedures by comparing them with previously decided objectives (NEPM, 2013).

Field and laboratory QA/QC requirements compliant with NEPC (2013) requirements (where applicable) were undertaken as part of the fieldwork program as outlined below.

5.1 Field QA/QC programme

Field QA/QC for this project consisted of the collection of one (1) blind replicate sample, one (1) split replicate sample, one (1) trip blank, and one (1) trip spike for laboratory testing in conjunction with primary samples.

5.1.1 Blind replicate samples

Blind replicate samples provide a check of the repeatability of a laboratory's analysis. One (1) blind replicate sample was collected through splitting of soil collected from a primary sampling location. Both primary and blind replicate samples were preserved, stored, transported, prepared and analysed in identically at the primary testing laboratory.

The accuracy (repeatability) of analytical results has been assessed by calculating the Relative Percentage Differences (RPDs) between the results of the blind replicate and the primary sample. In accordance with QA/QC compliance assessment decision rules outlined in **Table 5-1**, If/where the RPD value for a tested analyte exceeds the adopted acceptance criteria additional investigation, or justification for not conducting additional investigation has been discussed.

Blind replicate samples were generally collected at a rate of one (1) duplicate for every twenty (20) environmental samples in accordance with AS 4482.1-2005: Guide to the sampling and investigation of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds (AS 4482.1-2005).

5.1.2 Split replicate samples

Split replicate samples provide a check on the analytical accuracy of the primary and secondary laboratories. One (1) split replicate sample was collected through splitting of soil collected from a primary sampling location. Both primary and split replicate samples were preserved, stored and transported in an identical manner to both primary and secondary laboratories. The split replicate sample was analysed by the secondary laboratory.

The accuracy (repeatability) of analytical results has been assessed by calculating the Relative Percentage Differences (RPDs) between the results of the split replicate and the primary sample. In accordance with QA/QC compliance assessment decision rules outlined in **Table 5-1**, If/where the RPD value for a tested analyte exceeds the adopted acceptance criteria additional investigation, or justification for not conducting additional investigation has been discussed.

Split replicate samples were generally collected at a rate of one duplicate for every 20 environmental samples in accordance with AS 4482.1-2005.

5.1.3 Trip blank

A trip blank comprises a sample of analyte free media (supplied by the laboratory) taken to the site and returned to the laboratory unopened. The laboratory prepares the trip blank. A duplicate of the trip blank prepared at the same time is retained at the laboratory in a contaminant free location.

The trip blank identifies any potential cross-contamination that may occur from other samples, ambient conditions, or other sources that samples may be exposed.

One (1) trip blank supplied by the primary testing laboratory was submitted for laboratory testing alongside primary samples for Round 1 investigations, and one (1) trip blank supplied by the primary testing laboratory was submitted for laboratory testing alongside primary samples for Round 2 investigations. The trip blanks were preserved, stored and transported in an identical manner to primary samples.

5.1.4 Trip spike

A trip spike comprises a sample prepared by the laboratory that is fortified with a known concentration of target analytes. This sample is shipped along with containers and is to be taken into the field but returned unopened to the laboratory. Analysis is conducted and recoveries are reported expressed as a percentage.

The trip spike monitors the breakdown or loss of analytes during the sampling process. Holding time, and temperature effects on concentration can be accessed.

5.1.5 Rinsate

All equipment must be cleaned in a way to minimise sample cross-contamination; this can be confirmed by analysing equipment rinsates and/or control samples.

One (1) rinsate sample was submitted to the primary laboratory for testing, to check for potential cross-contamination from sampling equipment. The rinsate sample was preserved, stored and transported in an identical manner to primary samples.

5.2 Laboratory QA/QC programme

The reliability of test results from the analytical laboratories was monitored according to the QA/QC procedures used by the NATA accredited laboratory. The QA/QC programme employed by Envirolab (the primary laboratory) and Eurofins (secondary laboratory) specified holding times, extraction dates, method descriptions, CoC requirements, analysis, laboratory levels of reporting (LORs) and acceptance criteria for the results. Laboratory QA/QC requirements undertaken by Envirolab and Eurofins are based on NEPC (2013) requirements and are outlined below.

5.2.1 Laboratory duplicate samples

Laboratory duplicates provided data on analytical precision for each batch of samples. Laboratory duplicates were performed at a rate of one duplicate for batches of 8-10 samples with an additional duplicate for each subsequent ten samples.

5.2.2 Laboratory control samples

Laboratory control samples consisted of a clean matrix (de-ionised water or clean sand) spiked with a known concentration of the analyte being measured. These samples monitored method recovery in clean samples and were used (where required) to evaluate matrix interference by comparison with matrix spikes.

5.2.3 Surrogates

For organic analyses, a surrogate was added at the extraction stage in order to verify method effectiveness. The surrogate was then analysed with the batch of samples and percentage recovery calculated.

5.2.4 Matrix spike

Matrix spikes consisted of samples spiked with a known concentration of the analyte being measured, in order to identify properties of the matrix that may hinder method effectiveness. Samples were spiked with concentrations equivalent to 5 to 10 times the LOR and percentage recovery calculated.

5.2.5 Method blanks

Method blanks (de-ionised water or clean sand) were carried through all stages of sample preparation and analysis at a rate of approximately 10%. Analyte concentrations in blanks should be less than the stated LOR. Reagent blanks were run if the method blank exceeded the LOR. The purpose of method blanks was to detect laboratory contamination.

5.3 Data acceptance criteria

The QA/QC of samples has been assessed against the Data Acceptance Criteria (DAC) provided in **Table 5-1**.

Table 5-1: QA/QC compliance assessment

QA/QC sample	DQI	Objectives	Acceptance criteria
Field QA/QC samples			
Blind and split replicate samples	Precision Comparability	To ensure the primary data is reliable and fit for purpose. The assessment of blind duplicate and split replicate samples is undertaken by calculating the Relative Percent Difference (RPD) of the replicate or split concentration compared with the original sample concentration. The RPD is defined as: $\text{RPD} = 100 \times \frac{\lvert X1 - X2 \rvert}{\text{Average}}$ Where: X1 and X2 are the concentration of the original and blind or split samples.	Analysed for the same chemicals as the primary sample. Typical RPDs are noted in AS 4482.1-2005 as between 30 – 50%. RPDs exceeding the acceptable range may be considered acceptable for heterogeneous material or where: ▪ No Limit (When the average concentration is < 10 times the Limit of Reporting (LOR)) ▪ 0 – 50% RPD (When the average concentration is 10 to 20 times the LOR) ▪ 30% (when the average concentration is >30 times the LOR)
Field (trip) blanks and rinsate samples	Precision Accuracy Representativeness	Ensure that cross contamination has not occurred from sampling equipment, sampling procedure, or during storage and transport of samples.	Each field blank and rinsate sample is analysed as per the primary samples. Analytical result < LOR.
Field (trip) spikes	Representativeness	Ensure that there has been no breakdown or loss of analytes during the sampling process, storage, or transport from the field to the receiving	• 60%-130% for majority of VOCs

		laboratory as a result of holding time, temperature or other factors.	- 50%-140% for vinyl chloride, bromomethane, chloromethane, freon-12, acetone, MIK and MIBK.
Laboratory QA/QC			
Laboratory duplicates	Precision	To ensure precision of the analysis method and replicability of analysis due to potential sample heterogeneity. Assessment as per blind replicates and split samples	As per laboratory QC report Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase
Matrix spike recoveries Laboratory Control Samples Surrogates	Accuracy	To assess the effect of the matrix, laboratory control samples and surrogates on the accuracy of the analytical method used. Assessment is undertaken by determining the percent recovery of the known spike or addition to the sample. $\% \text{ Recovery} = 100 \text{ x } \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; C = Calculated Concentration.	As per laboratory QC report Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.
Method blanks	Accuracy	To assess potential bias introduced by the laboratory analytical method for a relevant analyte. A method blank assesses the component of the analytical result introduced from laboratory equipment. Each blank is analysed as per the original samples.	Analytical result < LOR

6. Quality assurance / quality control results

For the purpose of assessing the quality of data presented in this report, Jacobs collected and analysed Quality Control (QC) samples comprising one (1) blind replicate and one (1) split replicate sample, one (1) trip blank, one (1) trip spike, and one (1) rinsate; while the laboratory completed their own internal QC.

The following subsections present the results of QC samples against the quality assurance (QA) acceptance criteria, and discussion of deviations if present.

6.1 Field quality control

6.1.1 Replicate samples

The following QA/QC samples were collected for laboratory analysis:

- Blind replicate: QC101_101219 (blind replicate of primary sample TP101_0.0)
- Split replicate: QC102_101219 (split replicate of primary sample TP101_0.0).

One blind and split replicate sample were analysed to assess the quality control during the field sampling program. This equates to just over 5% blind and split replicate analysis. This blind and split replicate analysis exceeds and therefore conforms to the AS 4482.1 – 2005 requirement of 5%.

The RPDs for all analytes in the soil blind replicate sample conformed to the decision assessment criteria (DAC) for consistency against the primary sample.

The RPDs for all analytes in the soil split replicate sample conformed to the decision assessment criteria (DAC) for consistency against the primary sample, with the exception of lead (57%) and zinc (46%); which showed RPDs marginally exceeding the DAC for samples greater than 30 times the LOR (i.e. 30%).

The RPD discrepancy may be associated with the inherent heterogeneity of soil. As a conservative approach Jacobs have assessed soil quality using the higher reported concentrations of lead and zinc (i.e. those from the split replicate sample).

RPD results for soil are detailed in Table B presented in Appendix C.

6.1.2 Trip blank / Trip spike

One (1) trip blank and one (1) trip spike were submitted to the primary laboratory to assess potential cross contamination during transport from the site to the receiving laboratory.

The results from laboratory testing of the trip blank sample returned concentrations of all tested analytes below the laboratory LOR, and thus conform with the DAC. The results from laboratory testing the trip spike sample showed recoveries ranging from between 91 and 98%, and thus conform with the DAC.

6.1.3 Rinsate

One (1) rinsate sample was submitted to the primary laboratory for testing, to check for potential cross-contamination from sampling equipment.

The results from laboratory testing returned concentrations of all analytes below the laboratory LOR, with the exception of zinc (recorded at a value equivalent to LOR (i.e. 1 µg/L)), TRHC6-C10, TRH >C10 - C16 less

Naphthalene, and TPH C15 - C28. The presence of hydrocarbon fractions at concentrations above LOR are associated with a single peak with no hydrocarbon profile. Discussions with the testing laboratory indicate that these results may be attributed to leaching from the laboratory supplied plastic containers.

6.2 Laboratory quality assurance

All analysis was undertaken by NATA accredited laboratories using NATA accredited analytical methods.

6.3 Laboratory quality control

Where undertaken, laboratory QC data is presented in full in the laboratory certificates in Appendix D.

6.3.1 Laboratory duplicates

Where undertaken, RPDs for all laboratory duplicates conformed to the laboratory acceptance criteria with the exception for the RPD reported for zinc (51%), which exceeded acceptance criteria for samples greater than 10 times the LOR (i.e. 50%). A triplicate result was subsequently issued, which conformed with the laboratory acceptance criteria, with a result of approximately 42%.

6.3.2 Laboratory control samples

Recoveries for all laboratory control samples conformed to the DAC.

6.3.3 Surrogates

Recoveries for all laboratory surrogate samples conformed to the DAC.

6.3.4 Matrix spikes

Recoveries for all matrix spikes conformed to the DAC with the exception of lead, mercury, nickel and copper, which marginally exceeded the acceptance criteria of 60%-140% for inorganics and metals, with values between 151 and 156%. An acceptable recovery was however obtained for the laboratory control sample, indicating matrix interference in the results. As these values are marginal, they are not considered to significantly affect the results.

6.3.5 Method blanks

All method blanks reported analyte concentrations below the laboratory LOR and therefore conformed to the DAC.

6.3.6 Sample holding times

All samples were extracted and analysed within the specified holding times.

6.3.7 Sample condition

All samples were received by the analytical laboratories in correctly preserved and chilled containers with no reported breakages. The individual sample receipts are presented with the laboratory reports in Appendix D.

6.4 QA/QC assessment

It is concluded that the laboratory data are of acceptable quality and are considered useable in making conclusions and recommendations regarding the condition of the site.

7. Site assessment criteria

To address potential health impacts at the site, Jacobs compared the analytical testing results against a set of health-based and ecological soil investigation and screening levels to be referred to as Site Assessment Criteria (SAC) appropriate for the current land use (i.e. commercial/industrial guidelines, given the current land use / on-site activities). That is, the SAC has been set at levels that provide confidence that contaminant concentrations below the SAC will not adversely affect human health (health risks to construction workers and future users of the site), or the ecology of potential receiving environments.

The SAC developed for the investigation was derived (where applicable) from the following guidelines.

- NEPM (2013) - Schedule B1 Guideline on Investigation levels for Soil and Groundwater.

7.1 Aesthetics

Aesthetics on sites relates to the presence of observable odours, discoloration and erroneous wastes materials in soil which could possibly indicate contamination. Such olfactory evidence can point to how receptors can be impacted by vapours on and migrating from the site. Odour threshold for organic substances can be exceeded in off-site settings (through groundwater transmission of hydrocarbons) and whilst may not represent a direct health risk, could possibly prompt civil action. Aesthetics were continually assessed during the investigation and reported (where present) on the field logs.

7.2 Health investigation levels / Health screening levels

To address potential health impacts at the site, Jacobs compared the soil analytical testing results against a set of health-based Soil Investigation Levels (SILs) in context of the contaminants of potential concern (COPC's) associated with the current land use of the site and surrounding areas (road and pavement adjacent to commercial / industrial estate). Consideration has also been taken on the potential for contamination in soil to impact upon groundwater and to generate vapours, which have the potential to impact on human receptors. The health based SILs have been derived from the NEPM (2013) guidelines. The adopted SILs are summarised in Table 7-1.

Health investigation levels (HILs) have been developed for a broad range of metals and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and generally apply generally to a depth of 3 metres below the surface for residential land uses. The guidance does not specify a depth range for commercial/industrial use; however, as a conservative measure, Jacobs have adopted a soil depth of 3m below the surface to assess contamination risk.

Health screening levels (HSLs) have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physio-chemical properties, land use scenarios, and the characteristics of building structures.

Soil vapour HSLs vary according to soil types, land use, and depths below surface. Further details on their use are provided in Friebel and Nadebaum (2011a, 2011b & 2011c); Direct contact HSLs vary according land use, and depth below surface. Further details on their use are provided in to NEPC (2013).

Jacobs has adopted the lower value from the following criteria as a conservative measure:

- NEPM (2013) Health Investigation Level recommended from exposure setting 'D' which includes premises such as shops, offices, factories and industrial sites (i.e. sites with minimal exposure opportunities).

- Friebel, E & Nadebaum, P (September 2011) Technical Report No.10, Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document - HSL-D Commercial / Industrial Criteria and Intrusive Maintenance Worker (Table A4).

The adopted HSLs are detailed in **Table 7-1**.

NEPM (2013) provides health-based screening levels for different forms of asbestos contamination in soil. To apply these screening levels, significant investigations, excavation and sample volumes are required to assess the volume of asbestos relative to soil. Jacobs have adopted a high-level criterion to assess the presence / absence of asbestos in soil samples and to determine whether additional investigations are required to assess the risk to site users. The high-level criterion adopted by Jacobs is no asbestos in any form present in soil samples or observed on surface soils and in excavated materials.

7.3 Ecological Investigation levels / Ecological screening levels

To address potential ecological impacts at the site, Jacobs compared the soil analytical testing results against a set of ecological-based Soil Investigation Levels (SILs) in context of the contaminants of potential concern (COPC's) associated with the current land use of the site and surrounding areas (road and pavement adjacent to commercial / industrial estate).

Ecological investigation levels (EILs) have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2 m of soil. The adopted EILs are summarised in Table 7-1.

Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon (TPH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil. The adopted ESLs are summarised in Table 7-1.

Table 7-1: Soil investigation levels (expressed mg/kg)

Compounds / Fraction	Soil Investigation Levels
Heavy Metals – Direct Contact Health Investigation Levels (HIL) – D [1]	
Arsenic (total)	3,000 [1]
Cadmium	900 [1]
Chromium (VI)	3,600 [1]
Copper	240,000 [1]
Lead	1,500 [1]
Mercury (inorganic)	730[1]
Nickel	6,000 [1]
Zinc	400,000 [1]
Polychlorinated Biphenyls (PCBs) – Direct Contact Health Investigation Levels (HIL) – D [1]	
PCBs	7 [1]
Polycyclic Aromatic Hydrocarbons (PAHs) – Direct Contact Health Investigation Levels (HIL) – D [1]	
Naphthalene	NL [2]

Compounds / Fraction	Soil Investigation Levels			
BaP TEQ	40 [1]			
Total PAH	4,000 [1]			
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN) – Direct Contact Health Screening Levels (HSL)-D [3]				
Benzene	430			
Toluene	99,000			
Ethylbenzene	27,000			
Xylene	81,000			
Naphthalene	11,000			
Total Recoverable Hydrocarbons (TRH) - Direct Contact Health Screening Levels (HSL) – D [3]				
C6-C10	26,000			
>C10-C16	20,000			
>C16-C34	27,000			
>C34-C40	38,000			
Organochlorine Pesticides (OCP) – Direct Contact Health Investigation Level (HIL) - D [1]				
DDT+DDE+DDD	3,600			
Aldrin and dieldrin	45			
Chlordane	530			
Endosulfan	2,000			
Endrin	100			
Heptachlor	50			
HCB	80			
Methoxychlor	2,500			
Mirex	100			
Toxaphene	160			
F1, F2 and BTEX (based on SAND soil type) – Health Screening Level (HSL) Vapour Intrusion [2]				
Depth (m)	0 – <1	1 – <2	2 – <4	>4
F1 (C6-C10 minus sum of BTEX concentrations)	260	370	630	NL
F2 (>C10-C16 minus naphthalene)	NL	NL	NL	NL
Benzene	3	3	3	3
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	230	NL	NL	NL
Naphthalene	NL	NL	NL	NL

Compounds / Fraction	Soil Investigation Levels	
F1-F4 and BTEX (based on COARSE and FINE soil types) – Ecological Screening Level (ESL) [2]		
Soil Type	FINE	COARSE
F1 (C6-C10 minus sum of BTEX concentrations)	215	215
F2 (>C10-C16 minus naphthalene)	170	170
F3 (C16-C34)	2,500	1,700
F4 (C34-C40)	6,600	3,300
Benzene	95	75
Toluene	135	135
Ethylbenzene	185	165
Xylenes	95	180
Benzo(a)pyrene	0.7	1.4
Asbestos		
All forms of asbestos	No asbestos in any form present in soil samples or observed on surface soils and in excavated materials	

[1] NEPM (2013) Table 1 A(1) Health investigations levels for soil contaminants – Direct Contact Commercial / Industrial D.

[2] NEPCM(2013) Table 1 A(3) Soil HSLs for vapour intrusion – commercial/industrial, 0 to <1, 1 - <2, 2 - <4, >4 m CLAY.

[3] HSL-D Commercial / Industrial Criteria Soil Vapour and Direct Contact detailed within Table A4, Friebel, E & Nadebaum, P 2011, Soil Health screening levels for direct contact, Technical Report 10.

[4] NEPM (2013) Table 1A(3) Soil HSLs for Vapour Intrusion (mg/kg) HSL D Commercial / Industrial.

[5] NEPM (2013) Table 1A(3) Soil ESLs for Coarse soils (mg/kg) Commercial / Industrial land use.

NL – NL indicates the HSL is not limiting (see Footnote 5, Table 1A(3)).

TEQ – Toxic Equivalent.

Soil Vapour as the primary Exposure Pathway to impact potential receptors.

It should be noted here that direct contact HSL-D has been adopted for direct contact exposure of BTEXN and TRH compounds as a conservative approach. Direct contact HSLs for intrusive maintenance workers may be adopted for further assessment where exceedances of HSL-D criteria are observed.

7.4 Waste classification

Classification of waste materials facilitates the appropriate management and disposal of wastes to mitigate potential environmental and human health impacts. To assist waste generators in classifying the wastes they produce, the EPA has developed the Waste Classification Guidelines (NSW EPA, 2014). The NSW EPA (2014) guidelines are relevant to the offsite disposal or beneficial re-use of any material that is excavated from a site.

The NSW EPA (2014) guidelines provide a step-by-step methodology for the classification of waste materials, under which the following classes of waste (in accordance with clause 49 of Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO Act)) may be identified:

- Special waste
- Liquid waste
- Hazardous waste
- Restricted solid waste

- General solid waste (putrescible)
- General solid waste (non-putrescible).

Jacobs has conducted an initial (in-situ) screening of materials recovered from the site, in accordance with the step-by-step procedures outlined in the NSW EPA (2014) guidelines, to provide a preliminary waste classification of subsurface materials that may be encountered as part of site works.

8. Results

8.1 Ground conditions

Intrusive ground investigations (round 1) were conducted as part of geotechnical investigations to determine ground conditions. A contamination specialist from Jacobs attended site to log, and sample subsurface materials to identify potential site contamination.

The investigation locations are shown in Figure 4-1.

A total of six (6) test pits and one (1) borehole were advanced to a maximum depth of 8.2m as part of Round 1 investigations. Geotechnical logs associated with test pits and boreholes are presented in Appendix B.

A total of three (3) test pits were excavated to a maximum depth of 0.8m as part of Round 2 investigations. Test pit logs associated with the excavations are presented in Appendix B alongside geotechnical logs from Round1 investigations.

Table 8-1 presents a summary of the materials encountered within each of the test pits and boreholes as part of Round 1 and Round 2 investigations, including any visual and olfactory indications of contamination.

Table 8-1: Summary of sub-surface materials and indications of contamination

Location ID	Material Description and Depth	Visual / Olfactory Indications of Contamination
TP101	SILTY SANDY CLAY: 0.0m – 0.15m (TOPSOIL / FILL) CLAYEY SILT: 0.15m - 0.75m (FILL) CLAY: 0.75m – 1.5m (RESIDUAL SOIL) SILTY SANDSTONE: 1.5m – 1.75m (BEDROCK)	None observed
TP102	GRAVELLY SILTY CLAY: 0.0m – 0.20m (FILL) SILTY GRAVELLY SAND: 0.20m – 0.35m (FILL) SILTY SAND: 0.35m – 0.45m (FILL) CLAY: 0.45m – 1.05m (RESIDUAL SOIL) SILTY SANDSTONE: 1.05m – 1.10m (BEDROCK)	None observed
TP103	GRAVELLY CLAYEY SILT: 0.0m – 0.25m (TOPSOIL / FILL) CLAY: 0.25m – 0.55m (RESIDUAL SOIL) SANDY SILTSTONE AND SANDSTONE: 0.55m – 0.90m (BEDROCK)	None observed
TP104	CLAYEY SILT: 0.0m – 0.1m (TOPSOIL / FILL) CLAYEY SAND: 0.10m – 0.40m (FILL) GRAVELLY CLAY: 0.40m – 0.60m (FILL) CLAY: 0.60m – 1.50m (RESIDUAL SOIL) CLAY: 1.50m – 1.70m (RESIDUAL SOIL BECOMING BEDROCK)	Trace carbonaceous coal at 0.6m
TP05	CLAYEY SANDY SILT: 0.0m – 0.10m (TOPSOIL / FILL) CLAYEY SANDY GRAVEL: 0.10m – 0.50m (FILL)	Trace concrete, asphalt and glass from 0.0-0.5m

Location ID	Material Description and Depth	Visual / Olfactory Indications of Contamination
	CLAY: 0.50m – 1.10m (RESIDUAL SOIL) SILTY SANDSTONE: 1.10m – 1.40m (WEATHERED BEDROCK) SILTY SANDSTONE: 1.40m – 1.50m (BEDROCK)	
TP06	MIXTURE OF SAND, SILT AND BOULDERS: 0.0m – 1.70m (FILL) SILTY SANDSTONE: 1.70m – 1.90m (BEDROCK)	Trace concrete
BH04	GRAVELLY SILTY CLAY SAND: 0.0m – 0.50m (FILL) SILTY CLAY: 0.50m – 1.00m (RESIDUAL SOIL) SILTY SANDSTONE: 1.00m – 8.20m (BEDROCK)	Trace concrete
TP201	TOPSOIL MULCH: 0.0-0.1m (TOPSOIL) SANDY CLAY: 0.10m – 0.40m (FILL) REFUSAL ON HARD CLAY. RESTRICTED BY IRRIGATION LINES.	None observed
TP202	SANDY SILT: 0.0m – 0.40m (FILL) SAND: 0.40m – 0.70m (FILL) REFUSAL ON HARD CLAY. RESTRICTED BY IRRIGATION LINES.	None observed
TP203	TOPSOIL MULCH: 0.0m – 0.10m (TOPSOIL) SILTY CLAY: 0.10m – 0.80m (FILL)	Trace brick fragments

8.2 Aesthetics

Fill was identified overlying natural materials at most test pit and borehole locations. The fill material generally comprised gravelly silts, sands and clays. A fragment of potential asbestos containing material (ACM) was identified at surface in the potential construction compound between Norwest Boulevard and Elizabeth Macarthur Drive, identified in Figure 4-1.

8.3 Results

Results from laboratory testing of soil samples that were collected during test pit and borehole investigations are discussed below with reference to the adopted soil assessment criteria (SAC), including commercial / industrial Health Screening Levels (HSLs), Health Investigation Levels (HILs) and Ecological Investigation Levels (EILs). Tables of the laboratory analytical testing results are provided in Table A, Appendix C. The corresponding laboratory certificates of analysis are presented in Appendix D.

8.3.1 Heavy metals

Concentrations of heavy metals in all samples analysed were below the SAC.

8.3.2 BTEX

Concentrations of BTEX compounds in all samples analysed were below the SAC.

8.3.3 TRH

Concentrations of TRH in all samples analysed were below the SAC.

8.3.4 PAH

Concentrations of all PAH compounds in all samples analysed were below the SAC.

8.3.5 OCP

Concentrations of all OCP compounds in all samples were below the LOR and below the SAC.

8.3.6 PCB

Concentrations of all PCB compounds in all samples analysed were below the LOR and below the SAC.

8.3.7 Asbestos in soil

No asbestos or respirable fibres were identified in any of the soil samples submitted for asbestos identification.

8.3.8 Asbestos containing materials

One fragment of potential ACM was recovered from the surface of the site between Norwest Boulevard and Elizabeth Macarthur Drive. The fragment was submitted to the primary testing laboratory for analysis and was positively identified as a grey fibre cement material containing chrysotile and amosite asbestos.

8.4 Preliminary waste classification

Jacobs has conducted an initial (in-situ) screening of materials recovered from the site, in accordance with the step-by-step procedures outlined in the NSW EPA (2014) guidelines, to provide a preliminary waste classification of subsurface materials that may be encountered as part of site works. The following sections provide a summary of the findings of the preliminary waste classification.

8.4.1 Step 1: Is the waste a special waste?

Asbestos containing material (ACM) has been positively identified at surface on the site. Subsequent soil testing did not identify asbestos fibres or asbestos containing materials, however this does not preclude the presence of asbestos containing materials within the site boundaries. The observation of ACM at surface indicates subsurface materials may contain and therefore be classified as special waste (as a minimum waste classification).

8.4.2 Step 2: Is the waste a liquid waste?

The materials encountered on site and those tested in the laboratory do not meet the criteria outlined for classification as liquid waste. Accordingly, the materials encountered are not classified as liquid waste.

8.4.3 Step 3: Is the waste pre-classified?

Pre-classification of the waste in accordance with the NSW EPA (2014) guidelines indicates subsurface materials may be classified as special waste due to the presence of asbestos at surface. However, as no ACM or asbestos fibres were encountered elsewhere (i.e. within test pits, recovered samples, or other areas of the site) further steps of classification are warranted.

8.4.4 Step 4: Does the waste possess hazardous characteristics?

The material encountered is not considered to possess hazardous characteristics and thus is not classified as hazardous waste.

8.4.5 Step 5: What is the chemical classification of the waste material

Chemical classification of the waste material indicates that subsurface materials may be classified as a General Solid Waste (GSW) where ACM is not present.

8.4.6 Summary

Due to the presence of ACM and chemical classification of other materials samples as GSW within the study area, preliminary waste classification indicates that the subsurface materials where comprising fill may be classified as special waste. Natural, undisturbed materials, where present, may be classified as VENM, or where reworked may be classified as excavated natural material (ENM), subject to further assessment in accordance with the ENM resource recovery exemption.

The results of this assessment should not be relied upon during construction stages for off-site disposal or beneficial re-use and serve only as a preliminary waste classification. Additional testing of surplus materials will be required prior to off-site disposal and/or beneficial re-use to appropriately classify wastes generated during construction.

9. Conclusions and recommendations

9.1 Findings and Conclusions

The following findings and conclusions can be drawn from the results of the contamination investigations (Round 1 and Round 2) conducted as part of this assessment:

- Ground conditions across the site comprise a variable thickness of fill material overlying residual soils and bedrock of silty sandstone, proven to a maximum depth of 8.2m
- Fill material is present up to a maximum depth of approximately 0.80m within the site areas. Construction / demolition wastes (i.e. concrete, asphalt and glass) were observed in four of the ten investigation locations.
- No groundwater was encountered during site works conducted (to the limits of the investigations) to inform contamination assessment; and the current depth to groundwater has not been identified
- QA/QC procedures for collection and testing of samples has resulted in satisfactory outcomes, indicating that results from laboratory testing can be relied upon
- A fragment of cement bound asbestos containing material (ACM) was identified at surface during the course of site investigations. The observed ACM may be as a result of historic and more recent construction activities
- With the exception of the asbestos detected, all other soil samples scheduled for laboratory testing returned concentrations below the adopted SAC
- The preliminary waste classification indicated that fill materials may be classified as general solid waste based on laboratory testing results, however the presence of an asbestos fragment recorded at surface during the investigation necessitates a preliminary classification of special waste
- Preliminary testing indicates that, where present, in-situ natural materials that have not been historically disturbed (reworked) may be classified as virgin excavated natural material (VENM) for the purpose of waste classification; however it should be noted that upper soil layers across the proposal area have the potential to contain ACM as a result of historic and more recent construction activities
- Preliminary testing indicates that, where present, natural materials that have been historically disturbed (reworked) may be classified as excavated natural material (ENM) subject to further assessment in accordance with the ENM resource recovery exemption for the purpose of reuse; however it should be noted that upper soil layers across the proposal area have the potential to contain ACM as a result of historic and more recent construction activities

9.2 Recommendations

In consideration of these findings and of the construction activities to be undertaken across the Site, the adoption of an ‘unexpected finds’ protocol within construction documents (such as Construction Environmental Management Plan or similar) should be implemented to provide measures to manage other contamination (if present) which may be encountered as part of construction activities.

All excavated materials should be stockpiled and tested at an appropriate laboratory to identify the appropriate waste classification stream for offsite disposal or on-site beneficial reuse. Surface soils and subsoils should be stockpiled separately to mitigate potential cross-contamination and promote beneficial re-use of topsoil materials where practicable.

If groundwater is encountered during excavations and dewatering is undertaken, water should be tested and disposed of at an appropriately licensed facility. These measures can be managed under a CEMP.

Appendix A. Stage 1 contamination investigation

Intersection Upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive, Bella Vista

Preliminary Contaminated Site Investigation

Transport for NSW

Final

31 January 2020

Interesection Upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive, Bella Vista

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Revision	Date	Description	By	Review	Approved
V1	22/11/2019	Draft PCSI	KM	MS	MS
V2	31/01/2020	Final PCSI	JS	TC	TC

Contents

Limitations

The sole purpose of this report and the associated services performed by Jacobs was to provide a preliminary assessment of site contamination conditions in accordance with the scope of services set out in the contract between Jacobs and Transport for NSW (TfNSW) (the Client, formerly Roads and Maritime Services). That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the public domain, the Client (if any) and from observations made during the site inspection. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by TfNSW to deliver the Professional Services Contract for the Intersection Upgrade of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive in Bella Vista, NSW (the proposal).

The upgrade will include the removal of the roundabout and installation of traffic control signals at the Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection, the upgrade of Norwest Boulevard from a four-lane divided carriageway to a six-lane divided carriageway on approach and departure from Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive intersection and provision of shared footpath facilities.

The proposal and study area is presented as **Figure 1**.

The intersection upgrade is key to easing the congestion experienced along the route during peak hours and in anticipation of the increased pressure the intersection will experience from development in the area and Sydney Metro Bella Vista and Norwest Train stations. The intersection improvements have been designed to increase its capacity and improve the customer experience through the intersection as well as improving road safety and safety for cyclists and pedestrians.

Data sources

RMS 2019
Metromap Imagery May 2019

GDA94 MGA56

Figure 1 The proposal

1.1 The proposal

The objective of this proposal is to provide TfNSW with a concept design that meets the project needs and mitigates risks associated with utilities impacts, constructability and staging, and traffic management during construction. To achieve these objectives Jacobs is delivering a utilities mitigation strategy, identifying and addressing constructability issues and undertaking an environment assessment via a Review of Environmental Factors (REF) that will inform the development of a detailed design.

Key features of the proposal include:

- Widening of Norwest Boulevard from two lanes to three lanes in each direction, from its intersection with Old Windsor Road, to a point just to the west of the existing pedestrian underpass west of Westwood Way
- Removal of the existing roundabout at the intersection of Norwest Boulevard and Elizabeth Macarthur Drive / Lexington Drive, and construction of a new signalised intersection
- Adding new right turn capacity and providing a single dedicated left turn lane on each leg of the intersection
- Widening of Lexington Drive from one to two lanes in each direction, between Norwest Boulevard and the existing roundabout at Irvine Place / Woolworths Way
- Tie-ins to the existing adjoining road network
- New pedestrian and cycle facilities
- Removal of portions of the existing Norwest Boulevard landscaped median and roadside vegetation on Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive to accommodate proposed road widening
- New stormwater drainage and utilities relocation to suit the proposed road configuration
- New or adjusted private property access driveways
- Property adjustments and partial acquisition of private properties to accommodate the proposed roadworks
- New retaining walls along the Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive proposed road boundary
- New landscaping along the modified median and verge to maintain the character of the existing landscaping in Norwest Boulevard.
- New raised concrete medians and pedestrian refuge islands.

1.2 This report

To assist in the delivery of the REF, a Preliminary Contaminated Site Investigation (PCSI) was undertaken to assess the qualitative risk (with respect to contamination) associated with potential historical and current contaminating activities and/or operations undertaken on or adjacent to the study area.

The PCSI was undertaken in general accordance with the following guidelines:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999, as revised 2013* (NEPM, 2013)
- NSW EPA (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 2011)
- RMS (2013) *Guideline for the Management of Contamination* (RMS, 2013).

2. Objectives and scope of works

2.1 Objectives

The objectives of the PCSI are:

- To identify and document the potential for contamination that could impact upon the proposal, based on a review of current and historical information detailing activities undertaken within and/or adjoining the study area
- To assess the qualitative risk (with respect to contamination) associated with potential historical and current contaminating activities and/or operations undertaken within and/or adjoining the study area.
- Assess the need for further investigations and/or remediation.

2.2 Scope of works

The scope of works undertaken to address the objectives was as follows:

- A desktop review of information (where available) from the following sources:
    - Historical aerial photographs (from 1956 to 2019)
    - Published geological, topographic, soil and acid sulphate soil maps
    - Available hydrogeological information including a search for groundwater bores along the proposed alignment
    - Search of the NSW EPA contaminated land database for notices and records pertaining to licensed activities or investigation and/or remediation orders
    - Other information pertaining to potential contamination as detailed in the Environmental Risk and Planning Report (Lotsearch, 8 November 2019)

- Observations from a site inspection to assess potential contaminating activities undertaken within and / or adjacent to the study area

- Preparation of a PCSI report presenting the results of the desktop assessment and observation from the site inspection and detailing the potential contamination risks (if any) to human health and environmental receptors associated with the proposal.

3. Study area setting

The information presented below is based on a review of readily available government information sources, information provided in the Lotsearch (November 2019) report and observations from the site inspection completed on 1 November 2019 which relate to the study area. A copy of the Lotsearch (November 2019) report is provided in **Appendix A**.

3.1 Study area identification

The study area comprises an intersection centred around a round-about that connects Norwest Boulevard (east and west), Lexington Drive (north) and Elizabeth Macarthur Drive (south). Heading in a west to east direction (Norwest Boulevard) the upgrade section is approximately 720 metres in length whilst heading in a north to south direction (Lexington Drive and Elizabeth Macarthur Drive) the upgrade Section is approximately 590 metres. The total study area footprint, including the potential construction compound location options detailed in **Figure 1**, is about 9.2 hectares.

3.2 Study area zoning and land use

The study area is located along the existing alignment of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive in the suburb of Bella Vista in the Hills Shire local government area (LGA). At the time of undertaking the PCSI, the study area was occupied by and adjacent to a combination of land uses including:

- North of Norwest Boulevard and Lexington Drive:
    - Multiple commercial premises (business park) to the north of Norwest Boulevard and north, east and west of Lexington Drive (immediately adjacent)
    - Elizabeth Macarthur Creek, Waterfall Crescent Reserve and Rowanbrae Crescent Reserve north of Norwest boulevard
    - Low to medium density residential north of Norwest Boulevard
- East of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive:
    - Multiple commercial premises (business park) immediately east of Lexington Drive
    - Strangers Lake, to the north east of the proposal
    - Commercial premises (Norwest Business Park) to the north and east of the proposal
    - Recreational area (Bella Vista Farm Park) east of and adjacent to Elizabeth Macarthur Drive and south of and adjacent to Norwest Boulevard
    - Low to medium density residential to the north, east and south of Norwest Boulevard
    - Parklea Reservoir and Water Pumping Station approximately 230 metres south east of the proposal
- South of Norwest Boulevard and Elizabeth Macarthur Drive:
    - Multiple commercial premises (business park) including the ResMed Innovation Centre south of Norwest Boulevard and south and west of Elizabeth Macarthur Drive
    - Recreational area (Bella Vista Farm Park immediately south of Norwest Boulevard and immediately east of Elizabeth Macarthur Drive)
- West of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive:
    - Old Windsor Road (A2 Motorway) running in a north-south direction.
    - Multiple commercial premises west of Lexington Drive and Norwest Boulevard, within the Norwest Business Park
    - Further west of Old Windsor Road is low density residential mixed with recreational areas.
    - West of Elizabeth Macarthur Drive on the ResMed Innovation Centre in an unnamed creek / drainage line flowing in south west direction

The main zonings of land within and adjacent to study area under the Hills Shire Local Environmental Plan (LEP) 2012 are:

- B7– Business Park (eg multiple large scale commercial activities)
- RE1 – Public Recreation (eg Bella Vista Farm Park)
- R2 – Low density Residential
- R3 – Medium density Residential

Other additional zonings surrounding the study area but not directly adjacent to the study area include:

- B2 – Local Centres
- R4 – High Density Residential
- E2 – Environmental Conservation

Land use zoning is presented in the Lotsearch (November 2019) report in **Appendix A.**

3.3 Topography and drainage

Topography and elevation data presented in the Lotsearch (November 2019) report depicts land characterised by rolling hills within and surrounding the study area. The elevation varies between approximately 85 metres Australian Height Datum (AHD) at the northern of the Lexington Drive upgrade section, 94 metres AHD at the southern end of the Elizabeth Macarthur Drive upgrade section, 82 metres AHD at the western end of Norwest Boulevard upgrade section and 92 metres AHD at the eastern end of the Norwest Boulevard upgrade end. The highest elevation of the study area was 105 metres AHD on Bella Vista Farm Park.

Based on an inspection of the study area, the gradient of land along the length of alignment making up the study area is characterised by generally gentle undulating terrain. South of Norwest Boulevard and west of Elizabeth Macarthur Drive, land slopes away in a general south west direction toward Old Windsor Road. To the north of the western half of Norwest Boulevard land slopes away in a general north to north west direction before rising again towards the end of the Lexington Drive upgrade section. On the eastern half of the Norwest Boulevard upgrade section, land has a general slight slope towards the east and away to the north east from Norwest Boulevard. Bella Vista Farm Park at its highest point was raised above Norwest Boulevard to the north and Elizabeth Macarthur Drive to the west. The northern section of Bella Vista Farm Park sloped to the north east towards Norwest Boulevard while the western end sloped west to south west towards Elizabeth Macarthur Drive.

The study area is covered by both unsealed grassed areas, open space adjacent to the road (eg Bella Vista Farm Park and parts of the ResMed Innovation Centre, houses and reserves) and sealed areas (eg Norwest Boulevard, Lexington Drive, Elizabeth Macarthur Drive, pedestrian footpaths and commercial premises). The topography suggests that rainfall falling onto the unsealed areas is likely to infiltrate directly into study area sub-soils. Rain falling onto both the sealed areas of the roads and sealed surfaces on adjacent properties is likely to drain into formalised drainage systems which would discharge into natural drainage lines across the alignment.

Multiple stormwater drains were observed across the study area as well as two unnamed semi-constructed creeks / waterway systems (one that flows into Strangers Lake to the north east and the other located on the ResMed Innovation Centre that flows in a south west direction). Both systems appear to be fed by formalised stormwater channels that flow under Norwest Boulevard and Elizabeth Macarthur Drive respectively. A third unnamed creek / waterway system, associated with the Waterfall Crescent Reserve was also observed north of Norwest Boulevard. This system which divides the business park (located east of Lexington Drive) to the west and low density residential to the east appears to flow in a northerly direction into Elizabeth Macarthur Creek and through Waterfall Crescent Reserve. This system appears to be fed by drainage lines that direct overland stormwater flows away from Norwest Boulevard, but is likely to also be fed from other stormwater flows coming from the residential precinct to the east and the commercial precinct to the west.

3.4 Hydrogeology

The Lotsearch (November 2019) report search of the NSW Department of Primary Industries – Office of Water registered groundwater bore database indicated that there were 11 registered groundwater bores located within a one kilometre radius of the study area. A summary of key information for these groundwater bores is presented in **Table 3.1**, while a full list of all registered bores identified within two kilometres of the study area is provided in the Lotsearch (November 2019) report. A review of the registered bores located within one kilometre of the Study area and the associated work summary reports found there was no standing water level (SWL) information for any of the bores. Widening the review to include a two kilometre radius identified two bores. GW106457, located 1.293 kilometres to the north for the purpose of domestic and stock use had a SWL of 1.60 metre. GW101762, located 1.904 kilometres to the north west for the purpose of domestic use had a SWL of 8.92 metres. Given the distance of these bores from the study area and considering the undulating nature of the terrain in the area, likely groundwater depths within and adjacent to the study area could not be determined.

Table 3.1: Registered Groundwater Bores within 2 km of the Study area

Well ID	Year of Installation	Registered Use	Total Depth (m)	Standing Water Level	Distance from study area (m)	Direction from study area
GW114328	2011	Monitoring bore	4.90	Unknown	602	NW
GW114327	2011	Monitoring bore	4.90	Unknown	604	NW
GW114329	2011	Monitoring bore	4.90	Unknown	613	NW
GW114330	2011	Monitoring bore	4.0	Unknown	614	NW
GW114332	2011	Monitoring bore	4.0	Unknown	614	NW
GW114331	2011	Monitoring bore	4.0	Unknown	614	NW
GW111244	2007	Monitoring bore	8.10	Unknown	658	NE
GW111243	2007	Monitoring bore	8.40	Unknown	881	NE
GW111241	2007	Monitoring bore	8.0	Unknown	941	NE
GW107581	2007	Monitoring bore	27.48	Unknown	942	NE
GW111242	2007	Monitoring bore	8.30	Unknown	981	NE
GW106457[1]	2004	Domestic, Stock	87.0	1.6	1293	N

Well ID	Year of Installation	Registered Use	Total Depth (m)	Standing Water Level	Distance from study area (m)	Direction from study area
GW101762[1]	1995	Domestic	83	8.92	1904	NW

1 – Located outside a 1 km radius of the study area with recorded SWL

3.5 Geology

Reference to the Lotsearch (November 2019) report geology maps which sourced the Penrith 1:100,000 Map Series, indicates the majority of the study area and surrounding area is underlain by Ashfield Shale formation (Rwa) which is part of the Wianamatta Group from the Middle Triassic. Ashfield Shale is typically characterised as dark grey to black claystone to siltstone and fine sandstone to siltstone laminate.

Also present and situated underneath the central portion of the study area and to the south east is the Bringelly Shale (Rwb) formation overlying the Minchinbury Sandstone (Rwm) formation which are also part of Wianamatta Group and from the Middle Triassic. Bringelly Shale is typically characterised as shale, carbonaceous claystone, claystone laminate, fine to medium grained lithic sandstone with rare coal and tuff. It overlays the Minchinbury Sandstone which is typically characterised as fine to medium grained quartz lithic sandstone.

3.6 Soils

The Lotsearch (November 2019) report review of the Penrith 1:100,000 Soil Landscape Map indicates that the study area traverses two soil landscapes. It is expected that whilst soils at north end of the study area (Lexington Drive) will comprise the Blacktown (REbt) soil unit, the remainder of the study area is expected to comprise the Luddenham (ERlu) soil unit.

The Luddenham soil unit is described as an erosional soil with shallow soils (less than100 centimetres) dark podzolic or massive earthy clays in crests whilst moderately (70-150 centimetres) soils are red podzolic on upper slopes, and yellow podzols and prairie soils on lower slopes and drainage line. The Luddenham soil landscape is underlain by the Ashfield and Bringelly Shale formation (Bannerman and Hazelton 1990).

The Blacktown soil unit is described as a residual soil with shallow to moderately deep (less than100 centimetres) soils comprised of hard-setting mottled texture contrast soils and red and brown podzols on crests grading to yellow podzols on lower slopes in drainage lines (Bannerman and Hazelton 1990).

3.7 Acid sulfate soils

Acid sulfate soils (ASS) are the common name given to naturally occurring sediments and soils containing iron sulfides (principally iron sulfide or iron disulfide or their precursors). The exposure of the sulfide in these soils to oxygen by drainage or excavation leads to the generation of sulfuric acid. Areas of ASS can typically be found in low lying and flat locations which are often swampy or prone to flooding.

A review of the ASS risk maps from the Lotsearch (November 2019) report was undertaken to assess the risk of encountering ASS within the study area or within areas surrounding the study area. The mapping indicates that the probability of encountering potential ASS either within the study area or within areas surrounding the study area is extremely low, defined as one to five per cent chance of occurrence with occurrences in small localised areas.

4. Site history

The proposal area history has been sourced from publicly available information and the Lotsearch (November 2019) report which is provided in **Appendix A**.

4.1 Aerial photography review

Aerial imagery was reviewed for the years 1956, 1961, 1965, 1970, 1982, 1991, 2000, 2007, 2018 and 2019 to assess land use and changes in general conditions within and adjacent to the study area. The findings of the aerial imagery review are summarised in **Table 4.1**. Historical aerial imagery is presented in the Lotsearch (November 2019) report provided in **Appendix A**.

Table 4.1: Summary of Historical Aerial Imagery

Year	Study area	Surrounding Area
1956	The study area consists of largely cleared land utilised for agricultural purposes (ie grazing). There is minor tree coverage. There is an unsealed track running through the study area (east to west). There is a drainage line intersecting the study area in the east and another in the south. The drainage line to the east appears to flow in a northerly direction towards a dam and the one in the south appears to flow in a westerly to south westerly direction towards another dam.	Largely agricultural/pastoral land use. To the south east of the study area, there are some structures including sheds and possibly a house. To the west there is an unsealed road (Old Windsor Road) heading in a north by south direction and to the south/south east there is another unsealed track heading in a north east by south west direction. Two dams are also present. The dam to the north east has drainage lines flowing north and south whilst the dam in the south west has a drainage line flowing west towards the dam.
1961	Relatively unchanged from the 1956 imagery. The agricultural use appears to include cropping. The image shows farm sheds present in the middle of the study area with tracks heading west/south west and south east. There is another track (between fence line) heading in a north east by south west direction intersecting the study area's eastern edge. The same drainage lines are present.	Relatively unchanged from the 1956 imagery, however, the structures to the south east are more defined with a house visible and additional sheds present. There are also structures to the west including a house, sheds and warehousing type buildings.
1965	Relatively unchanged from the 1961 imagery.	Relatively unchanged from the 1961 imagery.
1970	Relatively unchanged from the 1965 imagery.	Relatively unchanged from the 1965 imagery.
1982	Relatively unchanged from the 1970 imagery. Sheds that were located in the middle of the study area are gone. The tracks running through the study area have been expanded and are more defined.	The property to the south east (Bella Vista Farm) is relatively unchanged, however there is a track running around its entire perimeter. Old Windsor Road to the west of the study area appears to have been sealed and the warehousing type buildings on the property adjacent to it have been rebuilt into one structure. There is a second dam south west of the dam that was first identified in the 1956 image. To

Year	Study area	Surrounding Area
		the south there is an operational quarry. Stockpiles of excavated materials are visible within the quarry.
1991	Relatively unchanged from the 1982 imagery. There are additional tracks running through the study area.	Relatively unchanged from the 1982 imagery. Appears to be more vegetation to the south. There is also a farm property with house and some sheds to the north/north east.
2000	A two lane and two-way road (Norwest Boulevard) is present as well as Lexington Drive in the east. Both are sealed and include multiple roundabouts. There is a large commercial premises/warehouse adjacent to Lexington Drive, just off Norwest Boulevard. The study area has undergone additional clearing	Old Windsor Road has expanded in width. Residential development to the east, south east and the south west is under construction. Westwood Way, east of the study area and south of Norwest Boulevard is present. The dams to the south west have expanded into a network of dams fed by a drain running underneath Old Windsor Road.
2007	Elizabeth Macarthur Drive has been built. The study area and adjacent properties have undergone extensive development with multiple commercial premises (commercial business park) north of Norwest Boulevard and east of Elizabeth Macarthur Drive (ResMed Innovation Centre). Residential estates are present north and south of Norwest Boulevard.	Old Windsor Road has been further expanded and is now a two lane, two-way carriage way with multiple on and off ramps. Residential estates are present west of Old Windsor Road and east of the eastern end of the upgrade section. The ResMed Innovation Centre is completely built, with the exception of portion of a car park and includes a creek / waterway system with multiple dams that are fed from a drain flowing underneath Elizabeth Macarthur Drive. The system continues to the south west and underneath Old Windsor Road. The quarry to the south is being converted into a commercial estate. Waterfall Crescent Reserve and Strangers Lake are present.
2014	Relatively unchanged from the 2007 imagery. Bella Vista Farm Park has been converted into an open space recreational area with picnic shelters and footpaths.	The residential estates in the north east and south east have expanded. Bella Vista Farm has been cleared in the south east to an open space recreational area. Commercial premises to the south have been built with some spaces cleared and levelled. Rowanbrae Crescent Reserve is present to the north of Norwest Boulevard. Some additional commercial premises are present to the north of Lexington Drive.
2018	Relatively unchanged from the 2014 imagery.	Relatively unchanged from the 2014 imagery. Some additional houses north of the Norwest Boulevard in the east have been built.
2019	Relatively unchanged from the 2018 imagery.	Relatively unchanged from the 2018 imagery.

A review of historical aerial imagery identified that much of the land that was once used for agricultural purposes has undergone extensive development with commercial premises to the north of Norwest Boulevard and east of Elizabeth Macarthur Drive. Housing has also increased with residential developments in the east, north east and south east as well as west of Old Windsor Road. There are a number of built reserves heading north off Norwest Boulevard with the main public open space being Bella Vista Farm Park located south of Norwest Boulevard and east of Elizabeth Macarthur Drive.

4.2 NSW contaminated land registers

A search of the list of contaminated sites notified to the NSW Environmental Protection Authority (EPA) under *section 60* of the *Contaminated Land Management Act 1997* (CLM Act, 1997)) and the NSW EPA record of notices issued under *section 58* of the *Contaminated Land Management Act 1997* was conducted. At the time of preparing this PCSI, no regulated sites or sites notified to the NSW EPA were identified within the study area or within one kilometre of the study area.

4.3 Environmental protection license premises

A review of NSW EPA Public Register under section 308 of the *Protection of the Environment Operations Act 1997* (POEO Act) identified 11 premises located within the study area boundary or within approximately one kilometre of the study area which were either currently licensed or had historically been licensed by the NSW EPA.

Of the 11 premises, one was listed as current and within the study area boundary and six were listed as former licenced activities and present within the study area boundary.

The sole current licenced premises is part of the Sydney Metro Rail Network (ie Norwest Metro Line), which intersects the eastern extent of the study area and is part of the Sydney Trains subway network. The Metro line travels underneath the study area in an easterly direction.

Of the six former licenced premises, two were listed as ‘railway system activities’ in the eastern and northern extents, one was listed as ‘miscellaneous licenced discharge to waters’ in the central portion of the study area and three activities, which covered the entire study area were listed as ‘other activities’ and associated with the application of herbicides as part of weed maintenance across various waterways.

Details of the licenced activities, including those which occur outside the study area boundary (within one kilometre of the study area) are presented in **Table 4.2**. A map showing the POEO licensed premises is provided in the Lotsearch (November 2019) report in **Appendix A**.

Table 4.2: Environmental Protection Licensed Premises

POEO No.	License Holder	Activity Type	Address	Status	Relative Location
21247	Metro Trains Sydney Pty Ltd	Railway systems activities	Sydney Metro Rail Network – Rouse Hill NSW 2155	Current	Within study area
10553	Lendlease Engineering Pty Limited	Miscellaneous licensed discharge to waters (at any time)	Rouse Hill Development Area, Stage 2, Kellyville, NSW 2155	Surrendered	Within study area
20198	Lendlease Engineering	Railway systems activities	North West Rail Link Early Works Project,	Surrendered	Within study area

POEO No.					
	Pty Limited		between Tallawong Road Maintenance Facility and Epping Station, Epping		
20319	Thiess Pty Ltd	Railway systems activities	North West Rail Link Tunnels and Station Civil Works, between Balmoral Road Bella Vista and Epping Railway Station, Castle Hill	Surrendered	Within study area
4653	Luhrmann Environment Management Pty Ltd	Other Activities / Non Scheduled Activity - Application of Herbicides	Waterways Throughout NSW	Surrendered	Within study area
4838	Robert Orchard	Other Activities / Non Scheduled Activity - Application of Herbicides	Various Waterways Throughout New South Wales - Sydney NSW 2000	Surrendered	Within study area
6630	Sydney Weed & Pest Management Pty Ltd	Other Activities / Non Scheduled Activity - Application of Herbicides	Waterways Throughout NSW - Prospect, NSW, 2148	Surrendered	Within study area
2178	Mulpha Fkp Pty Limited	Crushing, grinding or separating; Other Land-Based Extraction	Old Windsor Road, Baulkham Hills, NSW 2153	Surrendered	223m south
11875	Lendlease Engineering Pty Limited	Crushing, grinding or separating, Road construction, Concrete works; Freeway or Tollway Construction	From Connection with M5 At Camden Valley Way to Connection with M2 At Baulkham Hills, Blacktown, NSW 2148	Surrendered	763m south west
12154	John Holland Pty Ltd	Crushing, grinding or separating	Kellyville 2155	Surrendered	927m north east
12154	John Holland Pty Ltd	Sewage treatment processing by small plants	Kellyville 2155	Surrendered	927m north east

4.4 National Waste Management Database

No waste sites were reported within the study area, or within one kilometre of the study area.

4.5 PFAS investigation sites

No Per- and poly-fluoroalkyl substances (PFAS) investigation sites, either listed under the EPA PFAS Investigation Program or the Defence PFAS Investigation and Management Program were identified in the study area or within one kilometre of the study area.

4.6 Historical business directories

The Lotsearch (November 2019) report detailed a search of records from historical business directories from 1948 to 1993. The search results indicated there were three businesses present within 150 metres of the study area but outside of the study area boundary that may be associated with potential contaminating activities. A summary of the businesses of interest is provided in **Table 4.4**.

When historic street numbers from historical business directories cannot be reconciled with current street numbering, the business is mapped to a road and not to a specific premise. Subsequently, the three businesses do not have street addresses and therefore their specific location is unknown. However, all three businesses appear to be located at the same location and to the south east of Old Windsor Road.

Table 4.4: Summary of historical business of interest within 500 metres of the study area

Year of Record	Business Activity	Premise	Road Business is Mapped to	Distance to Property Boundary or Road Intersection
1950 & 1960	Concrete Contractors - Constructional	Royal, S. P. Meurants Lane, Parklea	Meurants Lane, Parklea	102 metres south east
1950	Fencing Contractors	Royal, S. P, Corner of Meurants Lane and Burns Road, Parklea	Meurants Lane, Parklea	102 metres south east
1950	Drainlayers	Royal, S. P. Meurants Lane, Parklea	Meurants Lane, Parklea	102 metres south east

5. Site inspection

A site inspection was undertaken by a Jacobs Environmental Scientist on 1 November 2019. The site inspection identified that the study area was comprised of public roads (Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive) bordered by predominately commercial premises immediately north of Norwest Boulevard; north, east and west of Lexington Drive and west (ie the ResMed Innovation Centre) and south of Elizabeth Macarthur Drive. Located to the east of Elizabeth Macarthur Drive and south of Norwest Boulevard is Bella Vista Farm Park, a historic and heritage listed farm complex that is now utilised as a public open space recreational area with walking tracks, barbecue and picnic facilities and toilets. Residential areas were also observed to the north, south and east of Norwest Boulevard towards the eastern extent of the study area. Surrounding land use within one kilometre of the study area but not immediately adjacent was generally comprised of residential areas with some open space recreational use as well as commercial precincts in the north east.

A site inspection of the land on the outer edges of the study area identified no current potentially contaminating activities. However, fill material containing wastes such as concrete and cement rubble, brick and plastic was observed in two areas of the study area that are identified on **Figure 1** as 'Potential construction compound location' options. The first of these areas, located in the north west corner of Bella Vista Farm Park and to the south east of the intersection which connects Elizabeth Macarthur Drive to Norwest Boulevard (location 2A), consisted of a grassed open space that was elevated above the road reserves to its west and north. Concrete in at least one location (Photo 1 in **Appendix B**) was observed to be protruding through the surface. However, with the exception of minor amounts of brick and concrete on the surface no other evidence of potential contamination was observed.

The second 'Potential construction compound location' option which was observed to contain evidence of fill material containing wastes, was located in the north east corner of the ResMed Innovation Centre to the immediate south west of the intersection that connects Elizabeth Macarthur Drive to Norwest Boulevard (location 1). The area which largely consisted of cleared grassed open space sloping south towards a constructed unnamed creek flowing in a south west direction, was observed to contain concrete, bitumen, brick and plastic on the surface and protruding from the surface in its southern portion. A small pile of brick, bitumen and concrete / cement was also present adjacent to the fence line nearby (Photo 2 in **Appendix B**). In addition to these waste materials, one fragment of potential asbestos containing material (ACM) was observed (Photo 3 in **Appendix B**) on the surface. The potential ACM which was sampled and submitted to a National Association of Testing Authorities (NATA) accredited laboratory (Eurofins) for analysis and was confirmed to contain chrysotile, amosite and crocidolite forms of asbestos. Laboratory documentation and results are presented in **Appendix C**.

In addition to the two options for potential construction compound locations discussed above, two other options, one located on Bella Vista Farm Park, toward the eastern extent of the alignment just south of Norwest Boulevard (location 2B) and the other located approximately 100 metres east of the eastern extent of the Norwest alignment and adjacent to a residential estate on Westwood Way (location 3), were also inspected. While inspection of both options, which were comprised of grassed open space, found no evidence of waste or potential contamination, a stormwater drain, heading in a north east direction (Photo 4 and 5 in **Appendix B**) and a groundwater monitoring well (Photo 6 in **Appendix B**) were observed at the potential construction compound location 3. Approximately 90 metres to the north east and upgradient from this option was the Parklea Reservoir and Water Pumping Station (Westwood Way).

In addition to the formal stormwater drainage network running along Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive and associated with commercial and residential precincts, two stormwater drains /

constructed creek / drainage line systems were also observed to be intersecting the study area. One of these systems located on the ResMed Innovation Centre, was observed to be flowing in a south west direction and appeared to be fed by a formalised stormwater system coming from a north east direction under Elizabeth Macarthur Drive (Photo 7 and 8 in **Appendix B**). The unnamed creek which flows through the ResMed site, widening at various locations, eventually flows under Old Windsor Road and continues in a south west direction. In addition to the creek, an erosional drainage line grading down to a creek to the north-north east was also observed (Photo 9 in **Appendix B**).

The second of these unnamed creek / stormwater systems, which becomes Elizabeth Macarthur Creek (north of Norwest Boulevard) and connects to Waterfall Crescent Reserve, at the time of the inspection was dry at its southern end (adjacent to Norwest Boulevard). This system, which divides the business park (located east of Lexington Drive) to the west and low density residential to the east appears to flow in a northerly direction. This system appears to be fed by stormwater drainage lines that during rainfall direct overland flows down the easement from Norwest Boulevard (Photo 10 in **Appendix B**) into the creek / drainage line system. South of Norwest Boulevard and just upgradient from the creek / stormwater system, located on Bella Vista Farm Park, a stormwater drainage line and culvert were also observed. The stormwater drain appears to flow in a northerly direction towards Norwest Boulevard (Photos 11,12, and 13 in **Appendix B**). Two stormwater pits, parallel to each other, in line with the direction of the drain and on either side of Norwest Boulevard (north and south) were also observed.

A construction site, located north of Norwest Boulevard and west of the McDonald’s Restaurant on Lexington Drive was observed during the site inspection. There was no activity at the time of the inspection. However, the area which was fenced off had been cleared and levelled (Photo 13 and 14 in **Appendix B**).

A photo log including coordinates has been prepared and presented in **Appendix B**.

6. Identification of areas of environmental interest

Based on the information from the desktop review and observations from the site inspection, Areas of Environmental Interest (AEI) were identified and assigned a qualitative risk ranking based on the potential contamination risk posed to construction and operation of the project without mitigation measures.

In developing the risk ranking, the following has been assumed:

- Any proposed construction works are sufficiently close to AEIs and deep enough that contaminated soils and groundwater are likely to be encountered and / or disturbed and / or created

- Sensitive receptors are present (or the formation of pathways to sensitive receptors will be created).

Risk could thus be related to harm to human health (construction workers and wider public), environmental impacts and impacts on building materials' durability. Construction related risks may also arise relating to the management of surplus spoil. Excavation works associated with the intersection upgrade are likely to be limited to 1.0 – 5.0 metres below ground level (bgl). Considering information relating to groundwater depths for groundwater bores identified within one kilometre of the study area was unavailable at the time of the desktop assessment, the likelihood of encountering groundwater during construction activities could not be determined

Based on the information presented in Section 4 and Section 5, AEIs have been identified and are presented below and those identified with a medium or high risk ranking have been presented in **Figure 2**.

AEI 1: Potential herbicide application in waterways and/or drainage lines – low risk

- A few waterways (drainage lines, Elizabeth Macarthur Creek, unnamed creeks/systems and Strangers Lake) transect, run adjacent or in proximity to the study area where herbicides were likely to have been used. In consideration of the following, a low risk has been applied to the AEI:

    - Licensed application of herbicides on waterways and drainage lines in the proposal area ceased in 2000.

    - Herbicides, if present, are likely to be bound to the sediments of waterways and therefore confined unless sediments are disturbed.

    - Based on the concept design detailed in **Figure 1**, only one waterway (located on the ResMed study area) is likely to be impacted by construction activities. However, the creek/stormwater systems, which is feed by a stormwater drain flowing underneath Elizabeth Macarthur Drive, was constructed post 2000 when licensed application of herbicides ceases.

AEI 2: Subway / Railway corridor – low risk

- Subway rail line – the North West Metro Line runs underneath the study area on the eastern extent of Norwest Boulevard and runs in a north and east direction. Rail corridors including subways are frequently associated with a range of contaminants, including metals, lubricants / fuel and asbestos. Considering it runs underneath the study area and only emerges to an above ground rail line approximately 700 metres to the north at Bella Vista station, construction of the upgrade is not expected to encounter the subway or rail line and associated potential contamination.

AEI 3: Imported fill and discarded waste – high risk

- Previous development of the study area and surrounding areas suggests fill materials may have been widely used in the construction of the roads, intersections and developments within and surrounding the study area. The presence of wastes that were observed at two of the 'potential construction compound location' options is an indication of the potential for fill to have been used in at least some portions of the study area, which could be disturbed as part of the proposed upgrade. An ACM fragment was observed on the surface of one of these locations (the ResMed site) and given the observation of other waste (eg concrete, bitumen and brick) on the surface and protruding from the surface, it is possible that more ACM or other contaminants may be present in fill materials at these locations and potentially other locations in the study area. Based on the presence of ACM at one location and observation of other wastes, the AEI has been assigned a high risk ranking as these materials could be disturbed as part of construction activities.

AEI 4: Agricultural activities – low risk

- A review of historical areas of the study area indicated that Bella Vista Farm Park, now a recreational open space, prior to the late 1990's to 2000s was used for agricultural purposes. Herbicides, pesticides and fertilisers are commonly used in agricultural practices. Further contaminant sources associated with agricultural activities could include chemical storage (pesticides, herbicides, fuel, oil), chemical use (widespread spraying, dip sites, fertilizer use) and waste disposal. Contamination would be typically localised around structures (chemical storage areas), waste disposal and dip sites. No information indicating these localised sources are present at or near to the study area has been obtained. More widespread diffuse contamination may be associated with the use of chemicals during spraying activities on and / or adjacent to the respective properties. Given that much of the area has previously been developed and likely subject to filling and that the proposed upgrade is only expected to include the northern and western edges of Bella Vista Farm Park (where it has already been subject to developments and filling), the risk of encountering soils impacted by the historical agricultural activities in this area is unlikely and therefore a low risk ranking has been applied to this AEI.

AEI 5: Contaminated groundwater – low risk

- Excavation works associated with intersection upgrade are likely to be limited to 1.0 – 5.0 metres bgl. Considering information relating to groundwater depths for groundwater bores identified within one kilometre of the study area was unavailable at the time of the desktop assessment and based on the geological profile underlying the study area suggesting a potential for a perched groundwater layer to be present there is a potential that groundwater may be encountered during excavations. However, based on the lack of potentially groundwater contaminating activities located within a 500 metre radius of the study area, the potential for groundwater being contaminated and that groundwater may pose a risk to site workers, site users and site visitors is low. Furthermore, the likelihood of excavation activities contributing to the mobilisation of contaminated groundwater is also considered low.

- ▭ Cadastre
- — Concept Design (20191022)
- ▨ Potential construction compound location - Options
- ▭ Study area
- ● ACM location
- ▨ High risk AEI

0 125 250 m

1:5,000 at A4

Data sources

RMS 2019
Metromap Imagery May 2019

GDA94 MGA56

Figure 2 High risk Areas of Environmental Interest (AEIs)

7. Conclusions

Based on the information reviewed and observation from the study area inspection, potential AEI have been identified. These include one high risk AEI comprising two locations (as shown in Figure 2 above) where evidence of fill containing waste material was observed. Of these two locations, ACM was identified on the ‘Potential construction compound location’ option on the ResMed site (location 1 on Figure 1). The ACM and other waste identified are likely to have been associated with historical development of these areas where fill of unknown quality was used to raise parts of the study area.

In the event that the two areas containing observed waste material and ACM are to be disturbed by construction activities, it is recommended that further investigation is undertaken to assess whether contamination is present in the areas identified that could present a risk to or from the proposed intersection upgrade works. This should include appropriate consideration of the risk to construction workers and future intrusive maintenance workers that may be exposed to contamination. The investigation should also seek to provide information for appropriate classification and management of waste materials from the proposed construction activities. Due to the presence of ACM, any further investigations should consider the requirements of the NEPM (2013) and the Western Australia Department of Health (May 2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.*

In consideration of the construction activities to be undertaken across the study area, the adoption of an ‘unexpected finds’ protocol within construction documents (such as Construction Environmental Management Plan or similar) should be implemented to provide measures to manage other contamination (if present) which may be encountered as part of construction activities. In addition, if groundwater is encountered during excavations and dewatering is undertaken, water should be tested and disposed of at an appropriately licensed facility. These measures can be managed under a CEMP.

References

Bannerman SM and Hazelton PA (1990) *Soil Landscapes of the Penrith 1:100,000 Sheet Map and Report,* Soil Conservation Service of NSW, Sydney.

Lotsearch Enviro Professional (2019) *Environmental Risk and Planning Report* (Lotsearch, November 2019). LS009470 EP.

National Environment Protection (Assessment of Site Contamination) Measure 1999, as revised

NSW EPA (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*

RMS (2013) *Guideline for the Management of Contamination*

Western Australia Department of Health (May 2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*

Office of Environment and Heritage, eSPADE database, https://www.environment.nsw.gov.au/eSpade2Webapp (accessed 13 November 2019).

Appendix A. Lotsearch Reports

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 08 Nov 2019 09:40:43

Reference: LS009470 EP

Address: Norwest Boulevard, Bella Vista, NSW 2153

Disclaimer:
The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features.
You should obtain independent advice before you make any decision based on the information within the report.
The detailed terms applicable to use of this report are set out at the end of this report.

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Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise match	Georeferenced to the site location / premise or part of site
General area or suburb match	Georeferenced with the confidence of the general/approximate area
Road match	Georeferenced to the road or rail
Road intersection	Georeferenced to the road intersection
Feature is a buffered point	Feature is a buffered point
Land adjacent to geocoded site	Land adjacent to Georeferenced Site
Network of features	Georeferenced to a network of features

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	NSW Department of Finance, Services & Innovation	08/11/2019	08/11/2019	Daily	-	-	-	-
Topographic Data	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	15/10/2019	15/10/2019	Monthly	1000	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	14/10/2019	14/10/2019	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	04/11/2019	11/10/2017	Monthly	1000	0	0	0
National Waste Management Facilities Database	Geoscience Australia	05/11/2019	07/03/2017	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	04/11/2019	04/11/2019	Monthly	2000	0	0	0
Defence PFAS Investigation & Management Program	Department of Defence	04/11/2019	04/11/2019	Monthly	2000	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	04/11/2019	04/11/2019	Monthly	2000	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	04/11/2019	04/11/2019	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	13/12/2018	13/12/2018	Annually	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	25/10/2019	25/10/2019	Monthly	1000	1	1	1
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	25/10/2019	25/10/2019	Monthly	1000	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	25/10/2019	25/10/2019	Monthly	1000	6	6	10
UPSS Environmentally Sensitive Zones	Environment Protection Authority	14/04/2015	12/01/2010	As required	1000	0	0	1
UBD Business to Business Directory 1991 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business to Business Directory 1991 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business to Business Directory 1986 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business to Business Directory 1986 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1982 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1982 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1978 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1978 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1975 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1975 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1970 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1970 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1965 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1965 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1961 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
UBD Business Directory 1961 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	1
UBD Business Directory 1950 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1950 (Road & Area Matches)	Hardie Grant			Not required	150	-	1	4
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500	0	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500	-	0	0
Points of Interest	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	Quarterly	1000	1	1	21
Tanks (Areas)	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	Quarterly	1000	0	0	1
Tanks (Points)	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	Quarterly	1000	0	0	1
Major Easements	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	Quarterly	1000	0	0	15
State Forest	NSW Department of Finance, Services & Innovation	18/01/2018	18/01/2018	As required	1000	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	16/01/2019	14/11/2018	Annually	1000	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000	1	1	1
Botany Groundwater Management Zones	NSW Department of Primary Industries	15/03/2018	01/10/2005	As required	1000	0	0	0
Groundwater Boreholes	NSW Dept. of Primary Industries - Water NSW; Commonwealth of Australia (Bureau of Meteorology)	24/07/2018	23/07/2018	Annually	2000	0	0	15
Geological Units 1:100,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	3	-	3
Geological Structures 1:100,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	0	-	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Soil Landscapes	NSW Office of Environment & Heritage	12/08/2014		None planned	1000	2	-	2
Atlas of Australian Soils	ABARES	19/05/2017	17/02/2011	As required	1000	1	1	1
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning and Environment	04/11/2019	11/10/2019	Weekly	500	0	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000	1	1	1
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	0	0	0
Dryland Salinity Potential of Western Sydney	NSW Office of Environment & Heritage	12/05/2017	01/01/2002	None planned	1000	1	1	3
Mining Subsidence Districts	NSW Department of Finance, Services & Innovation	11/04/2019	11/04/2019	Quarterly	1000	0	0	0
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning and Environment	04/11/2019	07/12/2018	Weekly	1000	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning and Environment	04/11/2019	25/10/2019	Weekly	1000	4	9	60
Commonwealth Heritage List	Australian Government Department of the Environment and Energy - Heritage Branch	16/01/2019	31/07/2018	Unknown	1000	0	0	0
National Heritage List	Australian Government Department of the Environment and Energy - Heritage Branch	16/01/2019	28/09/2018	Unknown	1000	0	0	0
State Heritage Register - Curtilages	NSW Office of Environment & Heritage	14/10/2019	09/11/2018	Quarterly	1000	0	0	0
Environmental Planning Instrument Heritage	NSW Department of Planning and Environment	04/11/2019	11/10/2019	Weekly	1000	2	2	7
Bush Fire Prone Land	NSW Rural Fire Service	28/08/2019	03/06/2019	Quarterly	1000	0	0	0

Dataset Name	**Custodian**	**Supply Date**	**Currency Date**	**Update Frequency**	**Dataset Buffer (m)**	**No. Features Onsite**	**No. Features within 100m**	**No. Features within Buffer**
Remnant Vegetation of the Cumberland Plain	NSW Office of Environment & Heritage	07/10/2014	04/08/2011	Unknown	1000	1	3	9
Ramsar Wetlands of Australia	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	0	0	2
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	0	0	2
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	07/11/2019	07/11/2019	Weekly	10000	-	-	-

Site Diagram

Norwest Boulevard, Bella Vista, NSW 2153

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 92092m^2

Total Perimeter: 2920m

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

Parcels that make up less than 2.0% of the total site area have not been labelled for increased legibility.

Scale:

0 25 50 100 150 200
Meters

Data Sources: Aerial Imagery: © Aerometrex Pty Ltd

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Contaminated Land & Waste Management Facilities

Norwest Boulevard, Bella Vista, NSW 2153

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist (m)	Direction
N/A	No records in buffer								

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
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 Environmental Planning and Assessment Act 1979 (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 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 of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA’s regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (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 Protection of the Environment Operations Act 1997 (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 Environmental Planning and Assessment Act 1979 (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 of Notices.
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 Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
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 Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land & Waste Management Facilities

Norwest Boulevard, Bella Vista, NSW 2153

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit
http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist (m)	Direction
N/A	No records in buffer											

Waste Management Facilities Data Source: Geoscience Australia

PFAS Investigation Sites

Norwest Boulevard, Bella Vista, NSW 2153

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Id	Site	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation & Management Program

Sites being investigated or managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Investigation & Management Program Data Custodian: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Loc Conf	Dist	Dir
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

Norwest Boulevard, Bella Vista, NSW 2153

Defence 3 Year Regional Contamination Investigation Program

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

EPA Other Sites with Contamination Issues

Norwest Boulevard, Bella Vista, NSW 2153

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill
- Pasminco Lead Abatement Strategy Area

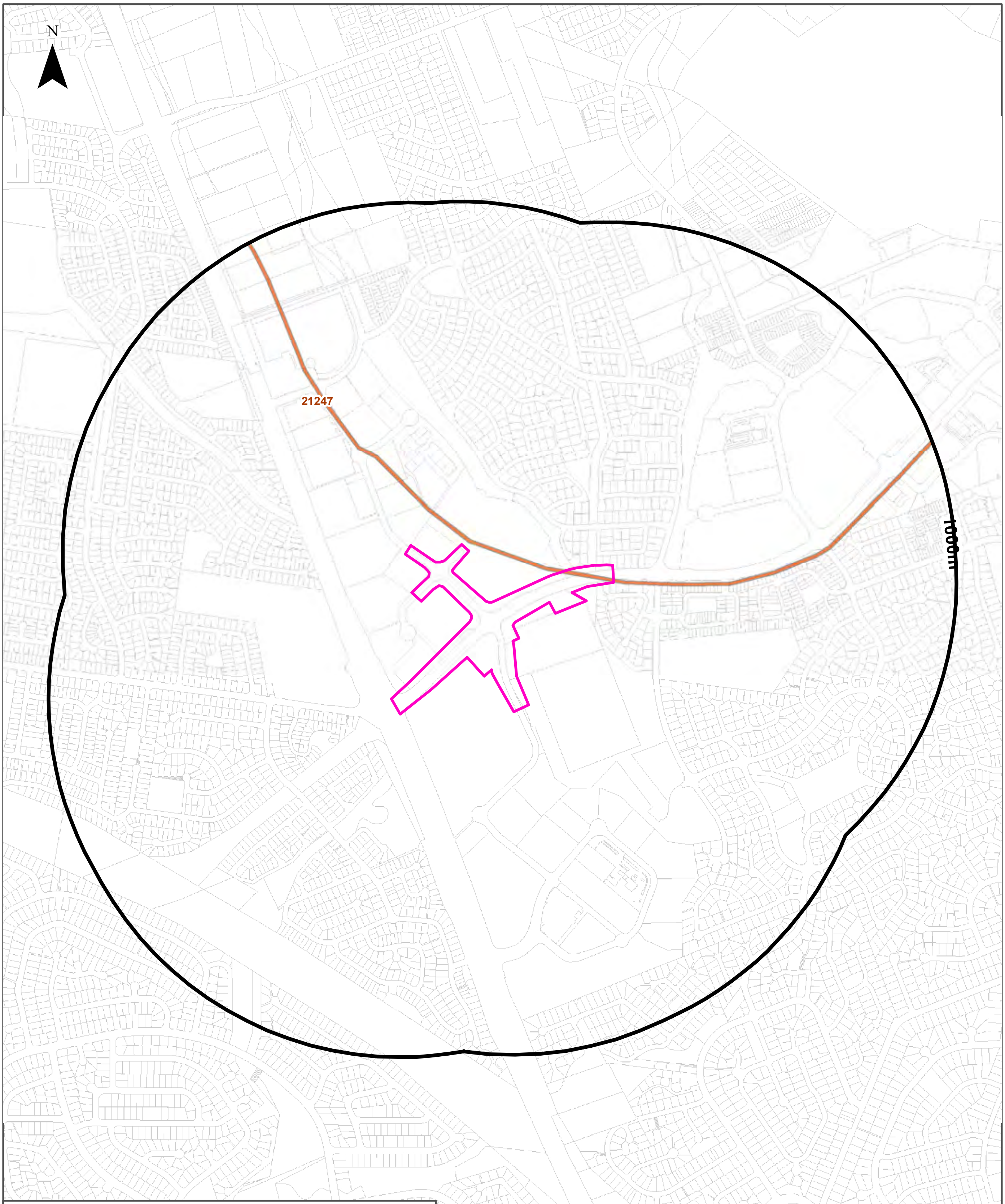
Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority

Current EPA Licensed Activities

Norwest Boulevard, Bella Vista, NSW 2153



Legend

🟪	Site Boundary	🟧	Current Licensed Activities under POEO Act
⬛	Report Buffer	▨	Current Licences related to Other Activities incl. Application of Herbicides to Waterways
☐	Property Boundary	▨	Current Licences related to Irrigated Agriculture

Scale:

0 100 200 400 600 800
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

EPA Activities

Norwest Boulevard, Bella Vista, NSW 2153

Licensed Activities under the POEO Act 1997

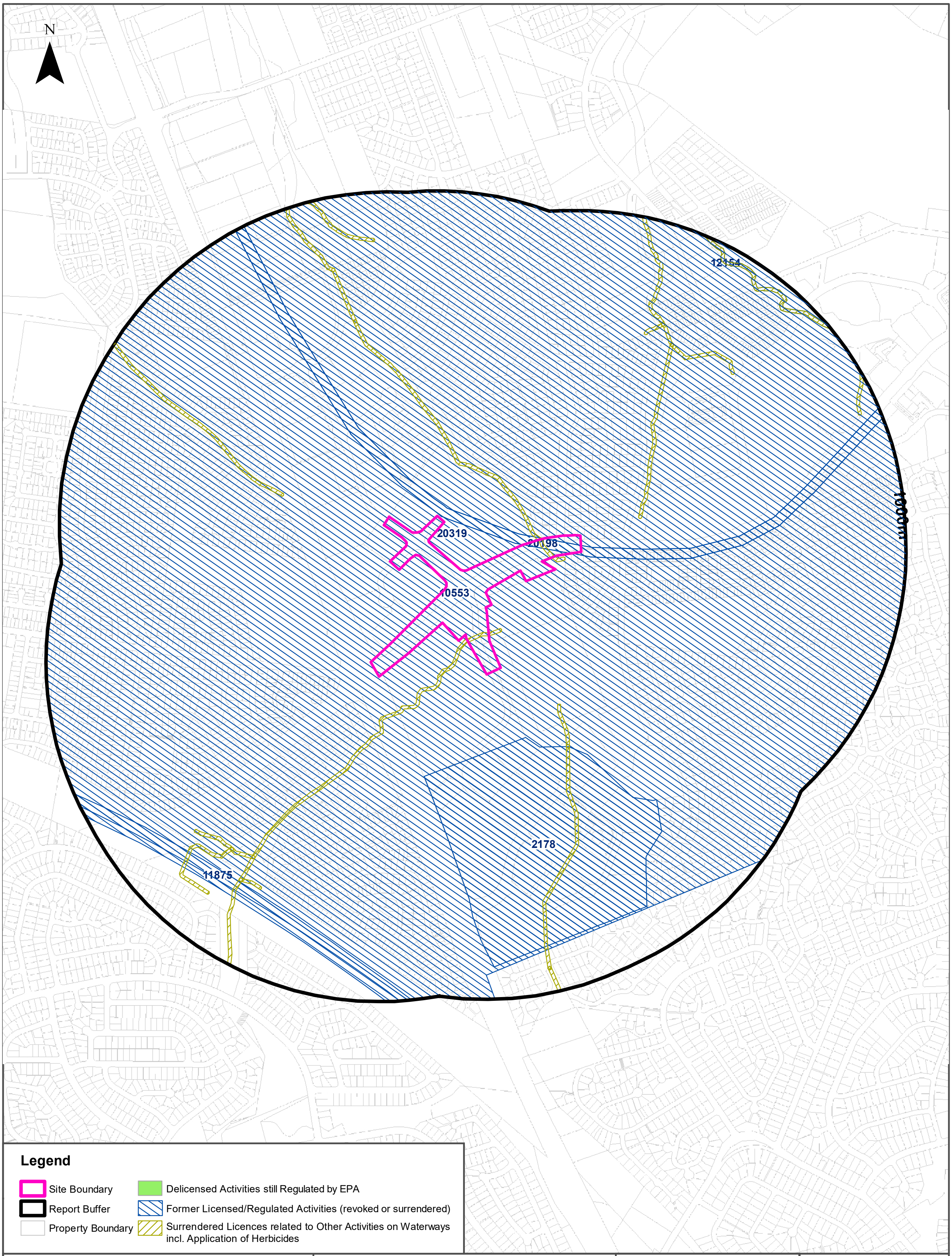
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
21247	Metro Trains Sydney Pty Ltd		Sydney Metro Rail Network - as defined by premise maps. , ROUSE HILL, NSW 2155		Railway systems activities	Network of Features	0m	Onsite

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Norwest Boulevard, Bella Vista, NSW 2153



Scale:
0 100 200 400 600 800
Meters

Property Boundary Data Source:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

EPA Activities

Norwest Boulevard, Bella Vista, NSW 2153

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

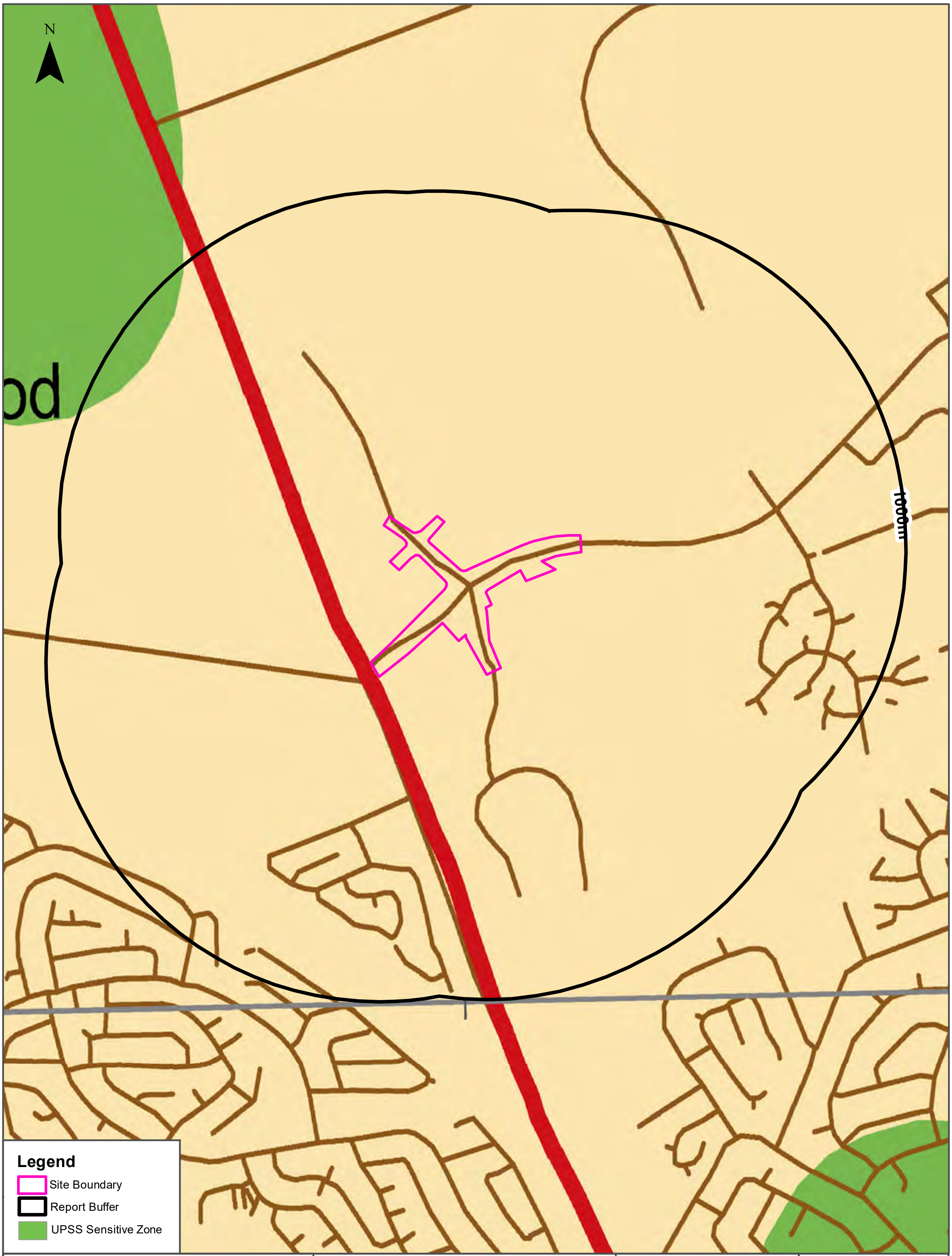
Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
10553	LENDLEASE ENGINEERING PTY LIMITED	ROUSE HILL DEVELOPMENT AREA, STAGE 2, KELLYVILLE, NSW 2155	Surrendered	27/11/2000	Miscellaneous licensed discharge to waters (at any time)	General Area/ Suburb Match	0m	Onsite
20198	LENDLEASE ENGINEERING PTY LIMITED	North West Rail Link Early Works Project, Between Tallawong Road Maintenance Facility and Epping Station, EPPING	Surrendered	08/03/2013	Railway systems activities	Network of Features	0m	Onsite
20319	THIESS PTY LTD	North West Rail Link Tunnels and Station Civil Works, Between Balmoral Road Bella Vista and Epping Railway Station, CASTLE HILL	Surrendered	30/09/2013	Railway systems activities	Network of Features	0m	Onsite
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
2178	MULPHA FKP PTY LIMITED	OLD WINDSOR ROAD, BAULKHAM HILLS, NSW 2153	Surrendered	13/09/1999	Crushing, grinding or separating; Other Land-Based Extraction	Premise Match	223m	South
11875	LENDLEASE ENGINEERING PTY LIMITED	FROM CONNECTION WITH M5 AT CAMDEN VALLEY WAY TO CONNECTION WITH M2 AT BAULKHAM HILLS, BLACKTOWN, NSW 2148	Surrendered	10/04/2003	Crushing, grinding or separating, Road construction, Concrete works; Freeway or Tollway Construction	Road Match	763m	South West

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
12154	JOHN HOLLAND PTY LTD	-, KELLYVILLE, NSW 2155	Surrendered	16/08/2004	Crushing, grinding or separating	Premise Match	927m	North East
12154	JOHN HOLLAND PTY LTD	-, KELLYVILLE, NSW 2155	Surrendered	16/08/2004	Sewage treatment processing by small plants	Premise Match	927m	North East

Former Licensed Activities Data Source: Environment Protection Authority

UPSS Sensitive Zones

Norwest Boulevard, Bella Vista, NSW 2153



Scale:

UPSS Data Source: Environment Protection Authority
© Dept of Environment, Climate Change & Water (NSW)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1991 Business to Business Directory Records Premise or Road Intersection Matches

Records from the 1991 UBD Business to Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1991 Business to Business Directory Records Road or Area Matches

Records from the 1991 UBD Business to Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1986 Business to Business Directory Records
Premise or Road Intersection Matches

Records from the 1986 UBD Business to Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1986 Business to Business Directory Records
Road or Area Matches

Records from the 1986 UBD Business to Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1982 Business Directory Records Premise or Road Intersection Matches

Records from the 1982 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1982 Business Directory Records Road or Area Matches

Records from the 1982 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1978 Business Directory Records
Premise or Road Intersection Matches

Records from the 1978 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1978 Business Directory Records
Road or Area Matches

Records from the 1978 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1975 Business Directory Records Premise or Road Intersection Matches

Records from the 1975 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1975 Business Directory Records Road or Area Matches

Records from the 1975 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1970 Business Directory Records
Premise or Road Intersection Matches

Records from the 1970 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1970 Business Directory Records
Road or Area Matches

Records from the 1970 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1965 Business Directory Records Premise or Road Intersection Matches

Records from the 1965 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1965 Business Directory Records Road or Area Matches

Records from the 1965 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
	No records in buffer				

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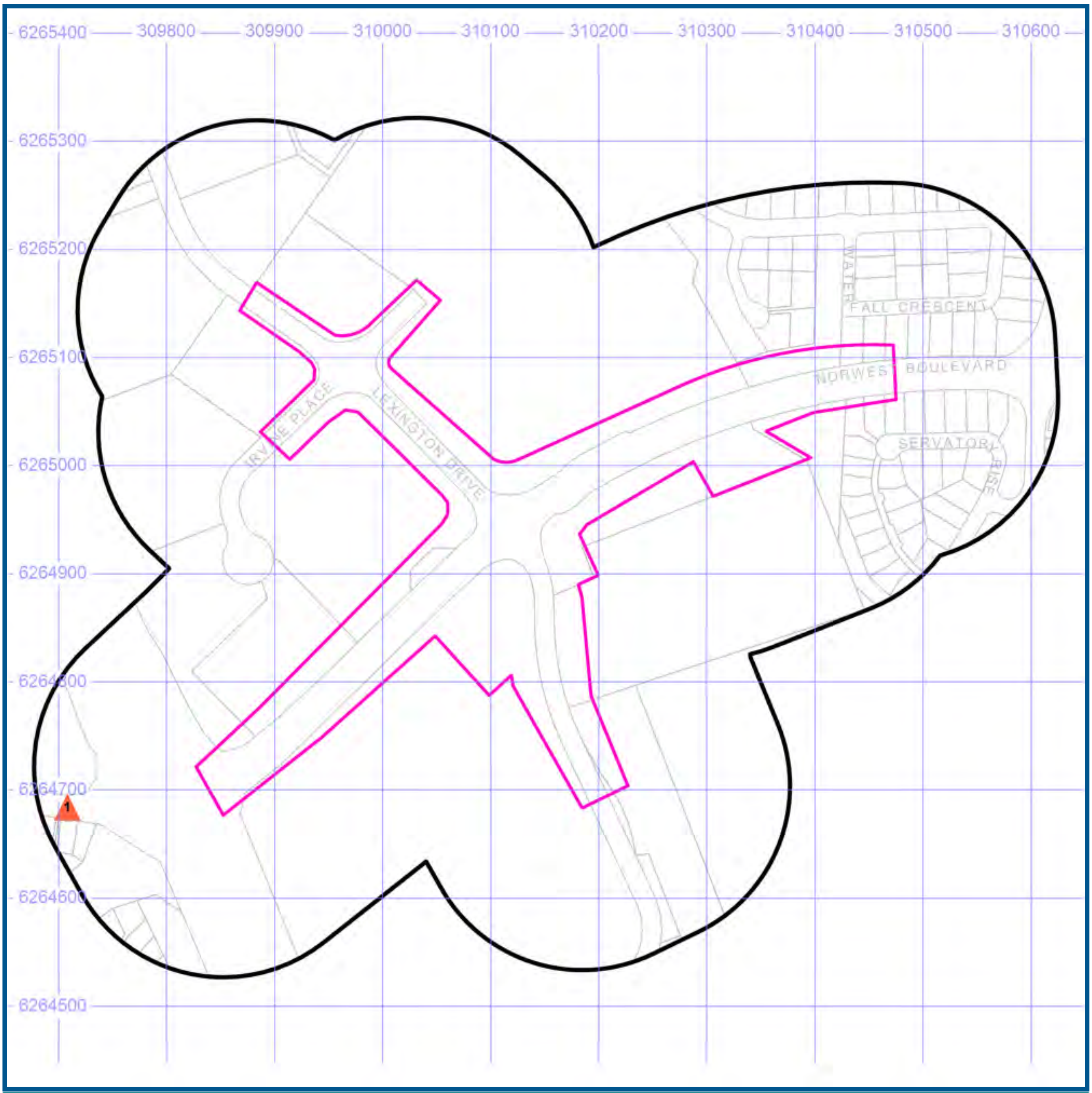
Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1961 Business Directory Records



🟥	Site Boundary	●	Business directory records mapped to a specific premise
⬛	Buffer 150m	🟩	Business directory records mapped to a road intersection
☐	Property Boundaries	▲	Business directory records mapped to a road corridor
		▨	Business directory records mapped to a general area

N

Projected Coordinate System:
GDA94 MGA Zone 56

Data Sources: Reproduced with permission of UBD and Hardie Grant Media Pty Ltd DD 01/08/2018
Property Boundaries © NSW Department Finance, Services & Innovation 2019

Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1961 Business Directory Records Premise or Road Intersection Matches

Records from the 1961 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1961 Business Directory Records Road or Area Matches

Records from the 1961 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
1	CONCRETE CONTRACTORS-CONSTRUCTIONAL	Royal, S. P. Meurants Lane, Parklea	292279	Road Match	102m

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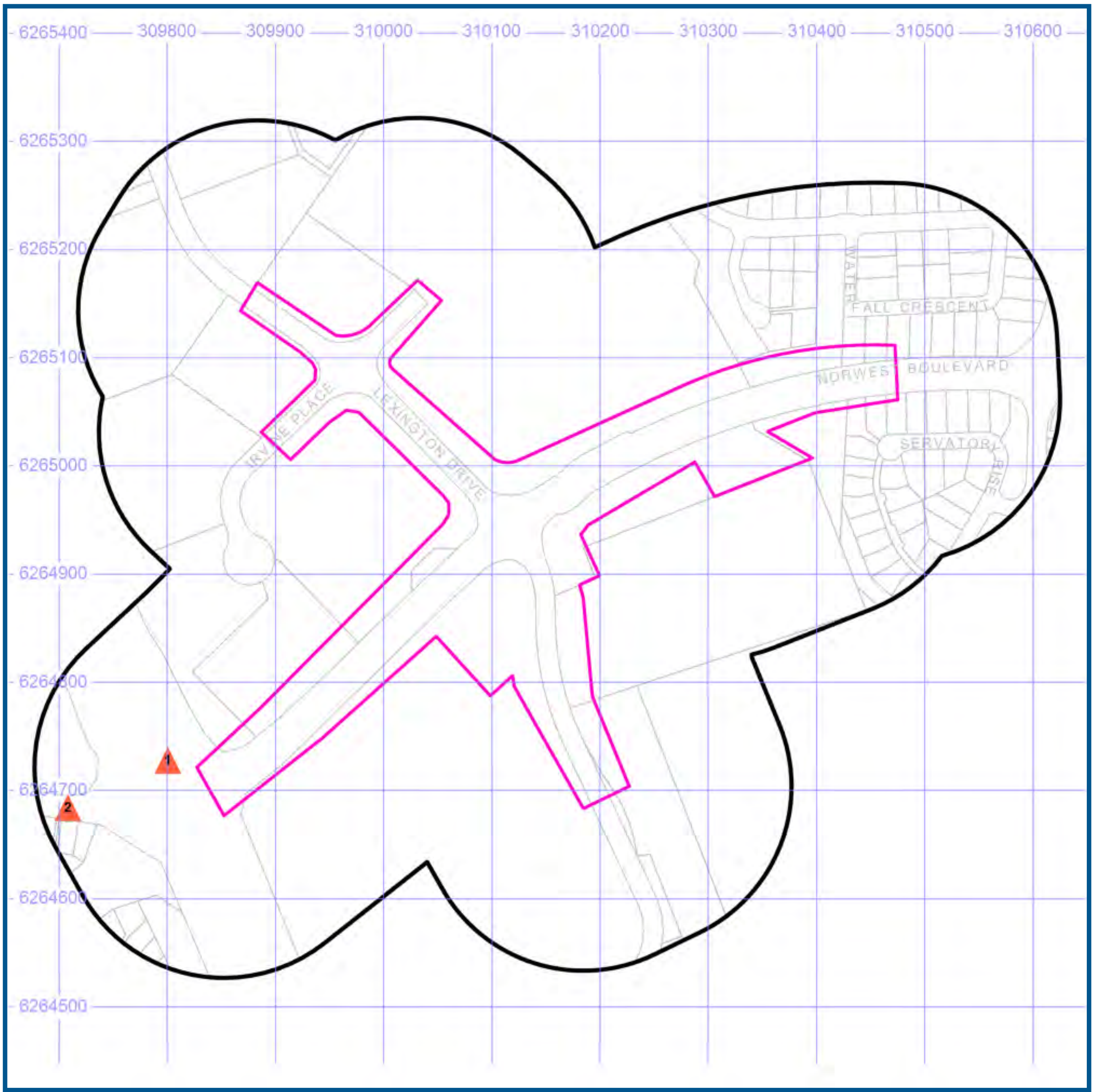
Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1950 Business Directory Records



▭	Site Boundary	●	Business directory records mapped to a specific premise
▭	Buffer 150m	■	Business directory records mapped to a road intersection
▭	Property Boundaries	▲	Business directory records mapped to a road corridor
		▨	Business directory records mapped to a general area

N

Projected Coordinate System:
GDA94 MGA Zone 56

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Property Boundaries © NSW Department Finance, Services & Innovation 2019

Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

1950 Business Directory Records Premise or Road Intersection Matches

Records from the 1950 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer					

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1950 Business Directory Records Road or Area Matches

Records from the 1950 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Map Id	Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
1	MILK VENDORS	Peel, J., Old Windsor Rd., Parklea	77892	Road Match	3m
2	FENCING CONTRACTORS	Royal, S. P., Cnr. Meurants Lane and Burns Rd., Parklea	43727	Road Match	102m
	DRAINLAYERS	Royal, S. P., Meurants Lane, Parklea	33417	Road Match	102m
	CONCRETE CONTRACTORS-CONSTRUCTIONAL	Royal, S. P., Meurants Lane, Parklea	28319	Road Match	102m

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Historical Business Directories

Norwest Boulevard, Bella Vista, NSW 2153

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches (1948-1993)

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer.

Note: The Universal Business Directories were published between 1948 and 1993. Dry Cleaners, Motor Garages & Service Stations have been extracted from all of these directories except the following years 1951, 1955, 1957, 1960, 1963, 1973, 1974, 1977, 1987.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer						

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Dry Cleaners, Motor Garages & Service Stations Road or Area Matches (1948-1993)

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Note: The Universal Business Directories were published between 1948 and 1993. Dry Cleaners, Motor Garages & Service Stations have been extracted from all of these directories except the following years 1951, 1955, 1957, 1960, 1963, 1973, 1974, 1977, 1987.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
	No records in buffer					

Aerial Imagery 2019

Norwest Boulevard, Bella Vista, NSW 2153

Scale:

0 60 120 180 240
Meters

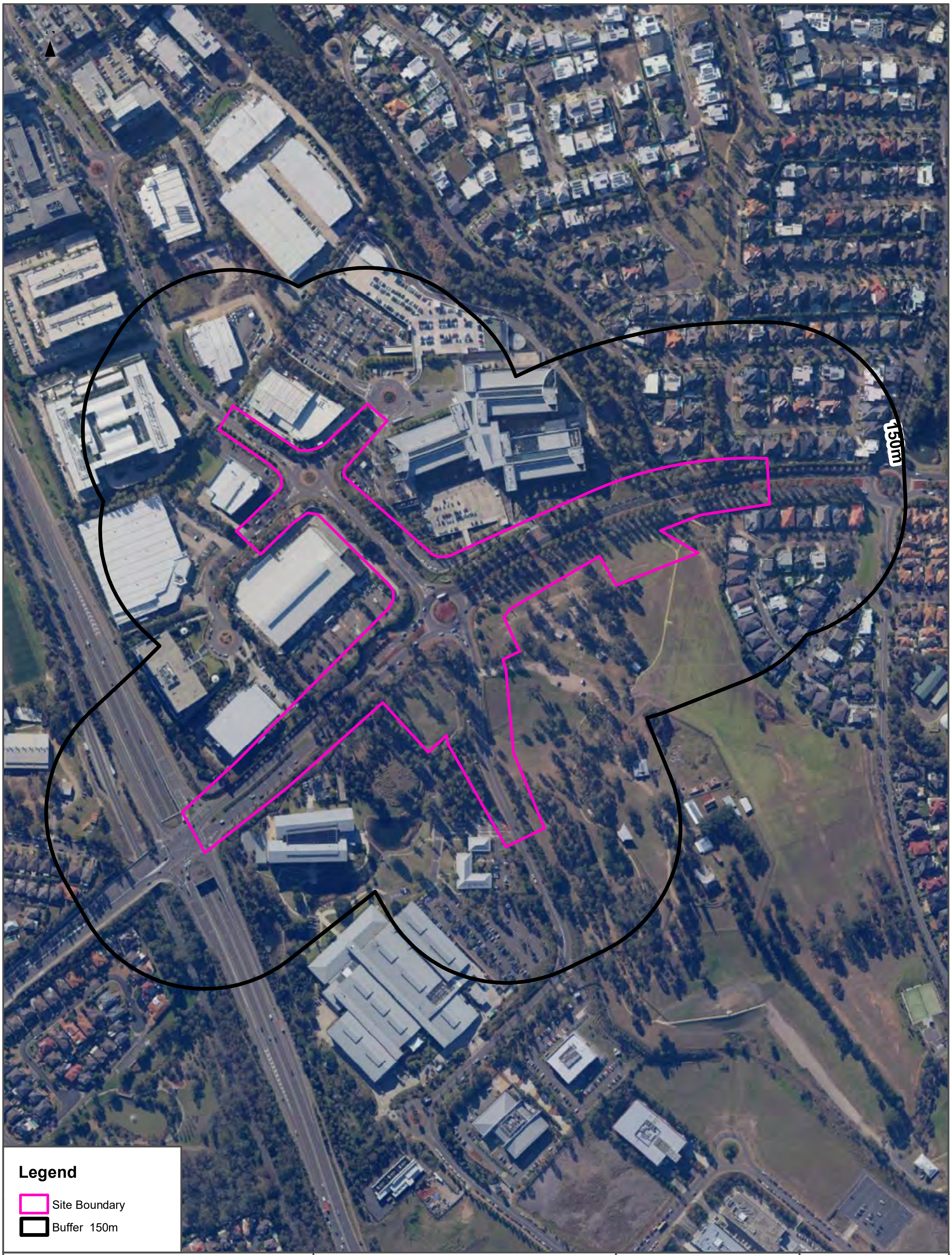
Data Sources: Aerial Imagery © Aerometrex Pty Ltd

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Aerial Imagery 2018

Norwest Boulevard, Bella Vista, NSW 2153



Scale:
0 25 50 100
Meters

Data Sources: Aerial Imagery © Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

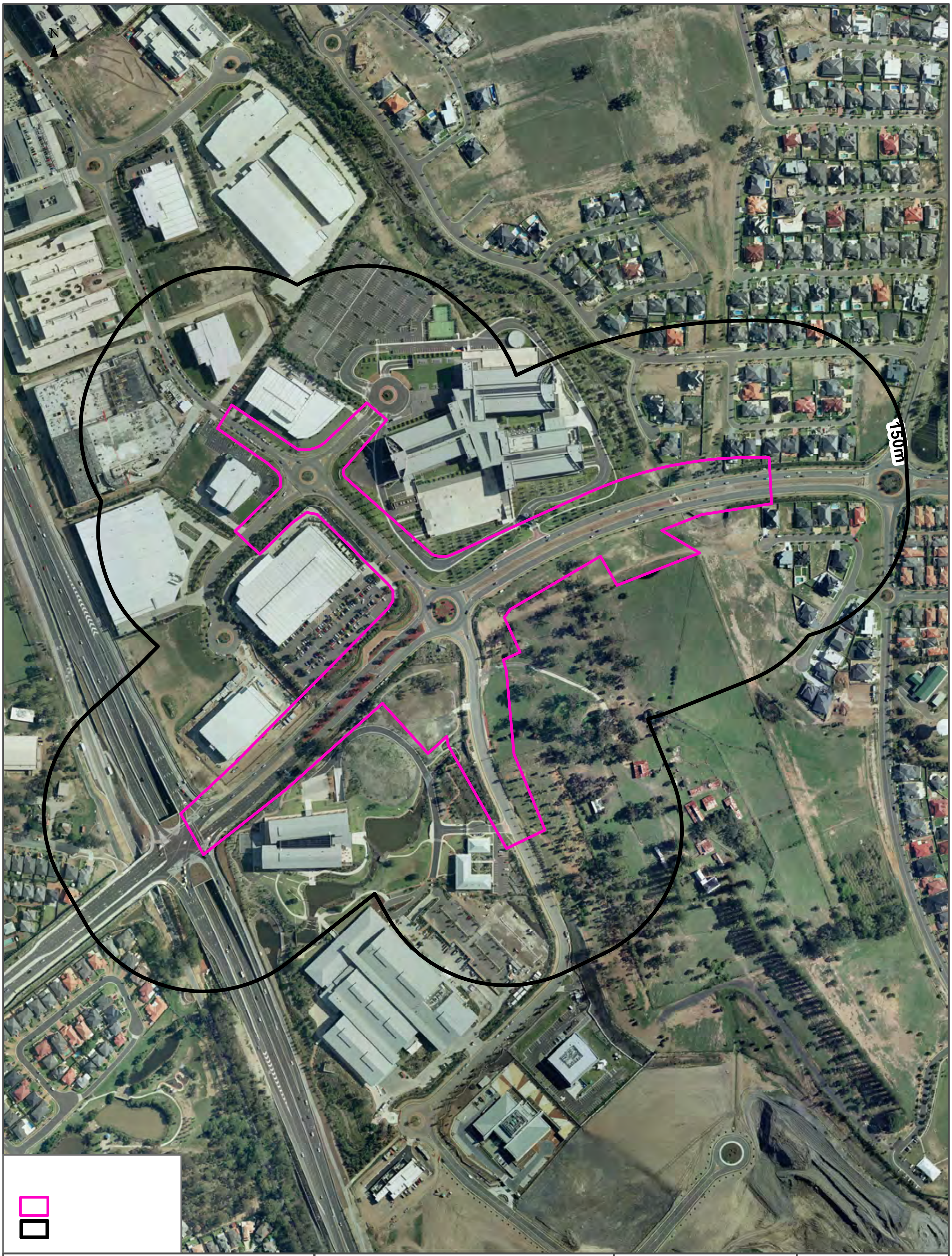
Aerial Imagery 2014

Norwest Boulevard, Bella Vista, NSW 2153

Scale: 0 60 120 180 240 Meters	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

Aerial Imagery 2007

Norwest Boulevard, Bella Vista, NSW 2153



Scale: 0 60 120 180 240 Meters	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

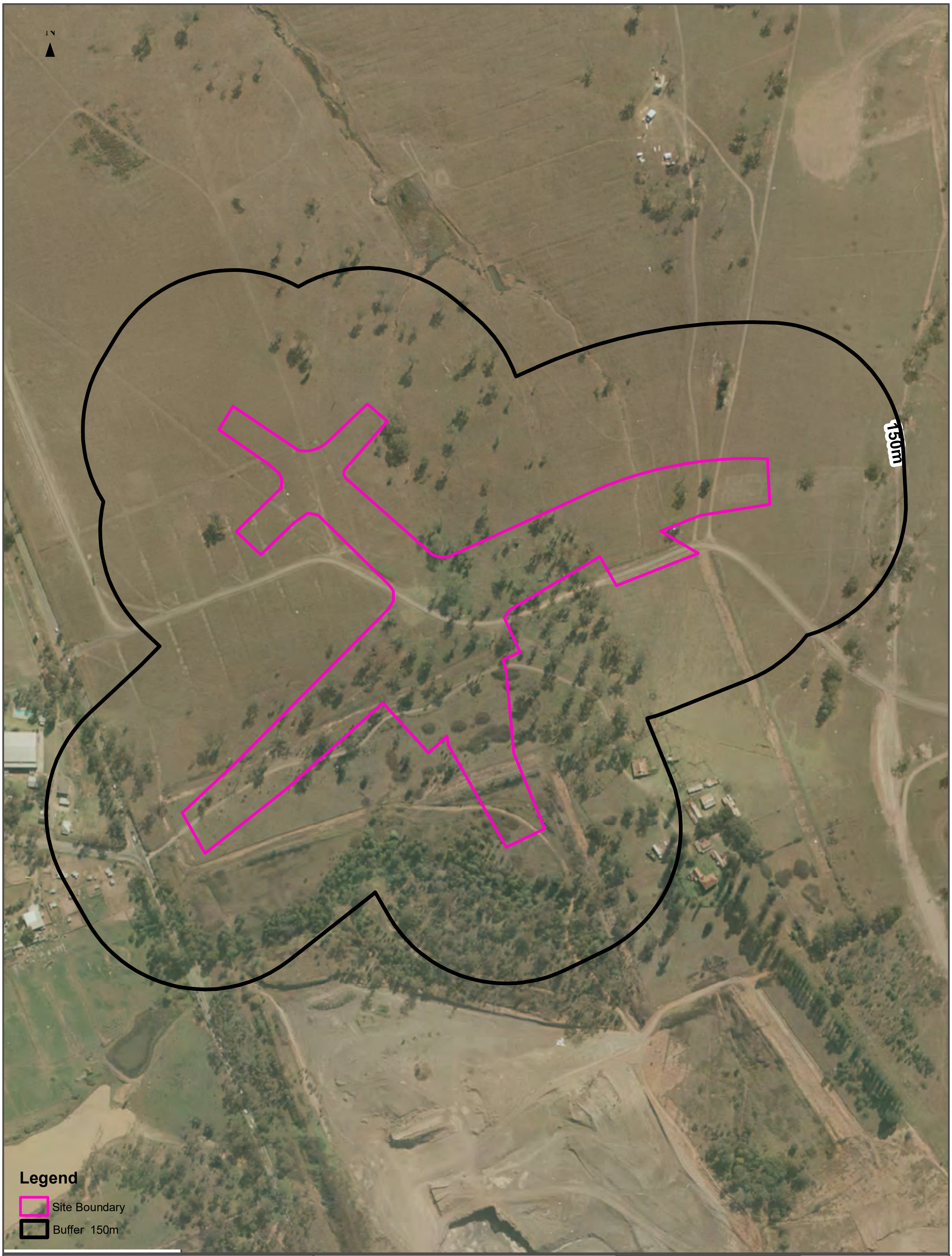
Aerial Imagery 2000

Norwest Boulevard, Bella Vista, NSW 2153

Scale: 0 60 120 180 240 Meters	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

Aerial Imagery 1991

Norwest Boulevard, Bella Vista, NSW 2153



Data Sources: Aerial Imagery © Department of Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Aerial Imagery 1982

Norwest Boulevard, Bella Vista, NSW 2153

Legend

- 🟪 Site Boundary
- ⬛ Buffer 150m

Scale:

Data Sources: Aerial Imagery © Department of Finance, Services & Innovation

Coordinate System: GDA 1994 MGA Zone 56

Date: 07 November 2019

Aerial Imagery 1970

Norwest Boulevard, Bella Vista, NSW 2153

Legend

🟪 Site Boundary

⬛ Buffer 150m

Scale:

Data Sources: Aerial Imagery © Department of Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Aerial Imagery 1965

Norwest Boulevard, Bella Vista, NSW 2153

Legend

🟪 Site Boundary

⬛ Buffer150m

Scale: 0 60 120 180 240 Meters	Data Source Aerial Imagery: © NSW Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 06 November 2019

Aerial Imagery 1961

Norwest Boulevard, Bella Vista, NSW 2153

Scale:

Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 06 November 2019

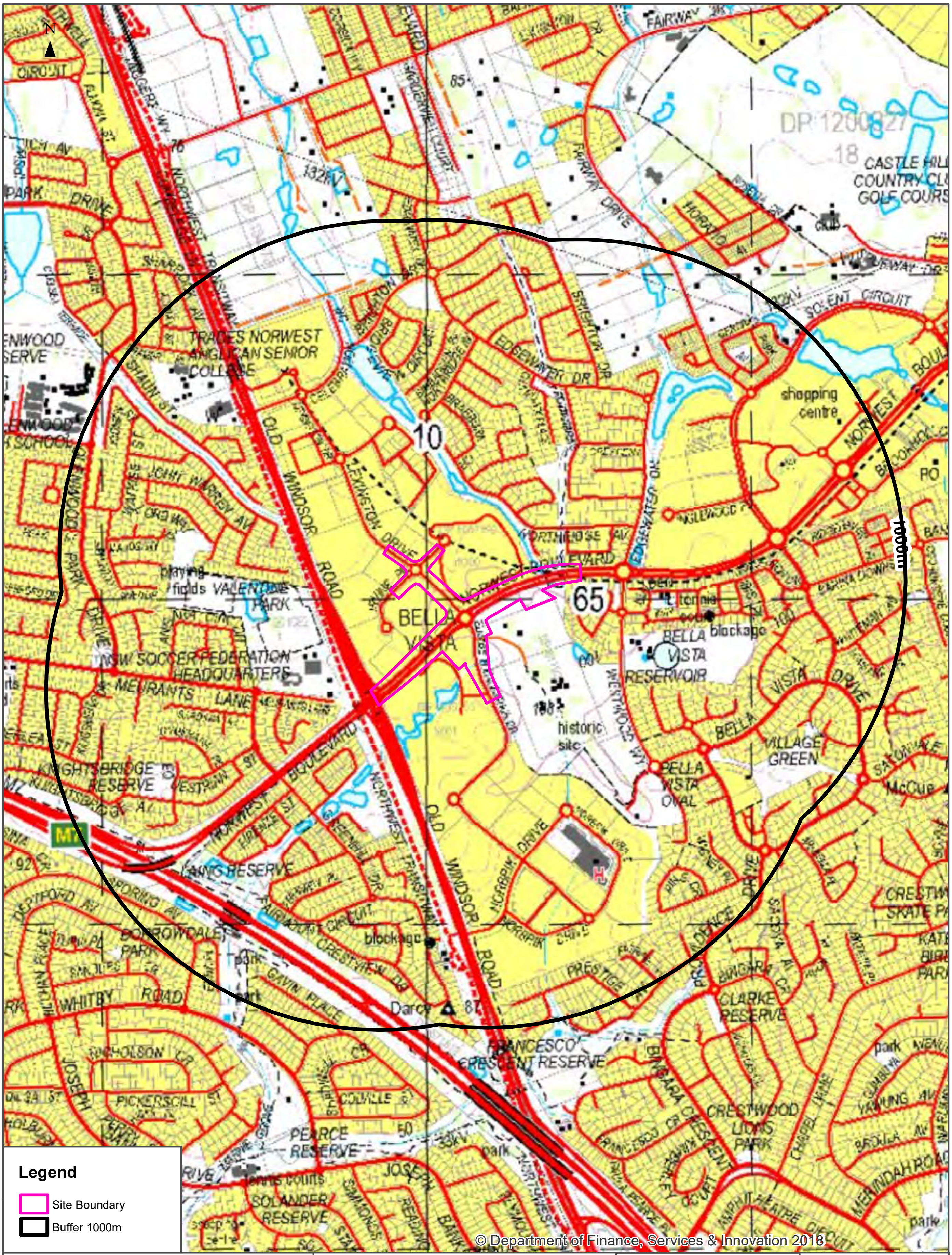
Aerial Imagery 1956

Norwest Boulevard, Bella Vista, NSW 2153

Scale: 0 60 120 180 240 Meters	Data Source Aerial Imagery: © NSW Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 06 November 2019

Topographic Map 2015

Norwest Boulevard, Bella Vista, NSW 2153



© Department of Finance, Services & Innovation 2018

Legend

▭ Site Boundary

▭ Buffer 1000m

Scale:

0 100 200 400 600 800
Meters

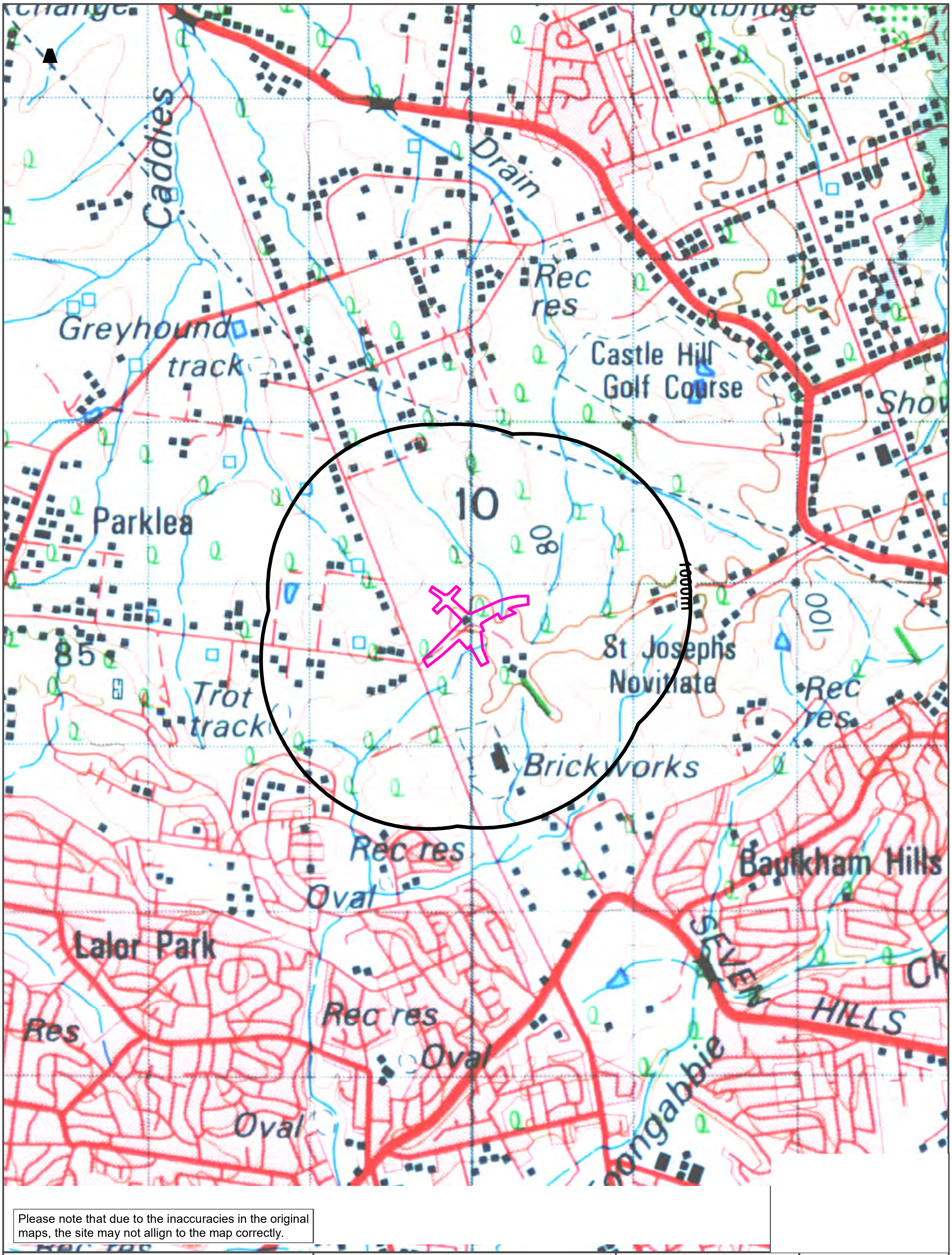
Data Sources: Topographic Map Data
© NSW Land and Property Information

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Historical Map 1975

Norwest Boulevard, Bella Vista, NSW 2153

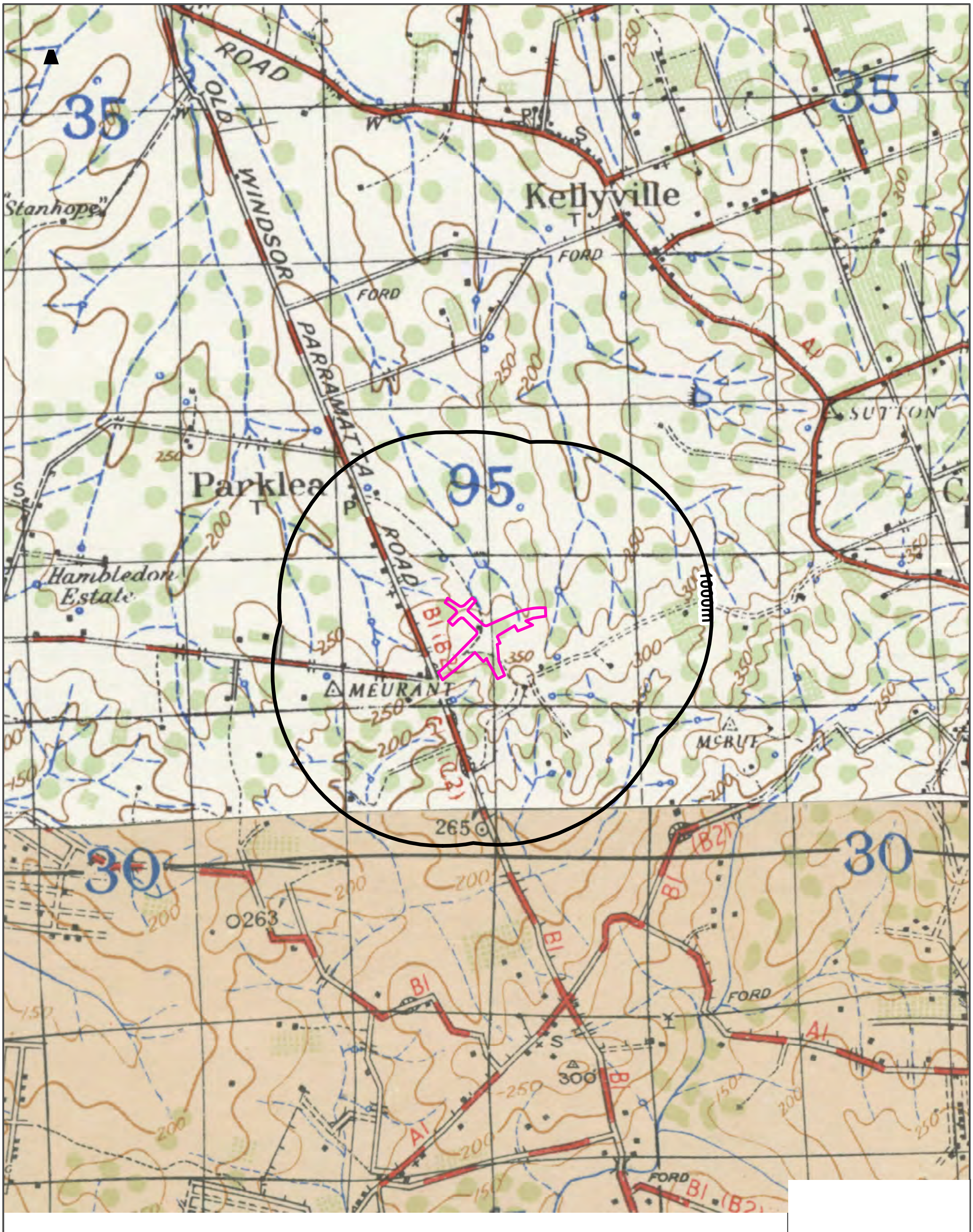


Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale: 0 150 300 600 900 1,200 1,500 Meters	Data Sources: NATMAP 1:100,000 Topographic Maps Geoscience Australia	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

Historical Map c.1942 - 1942

Norwest Boulevard, Bella Vista, NSW 2153



Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale:

0 150 300 600 900 1,200 1,500

Meters

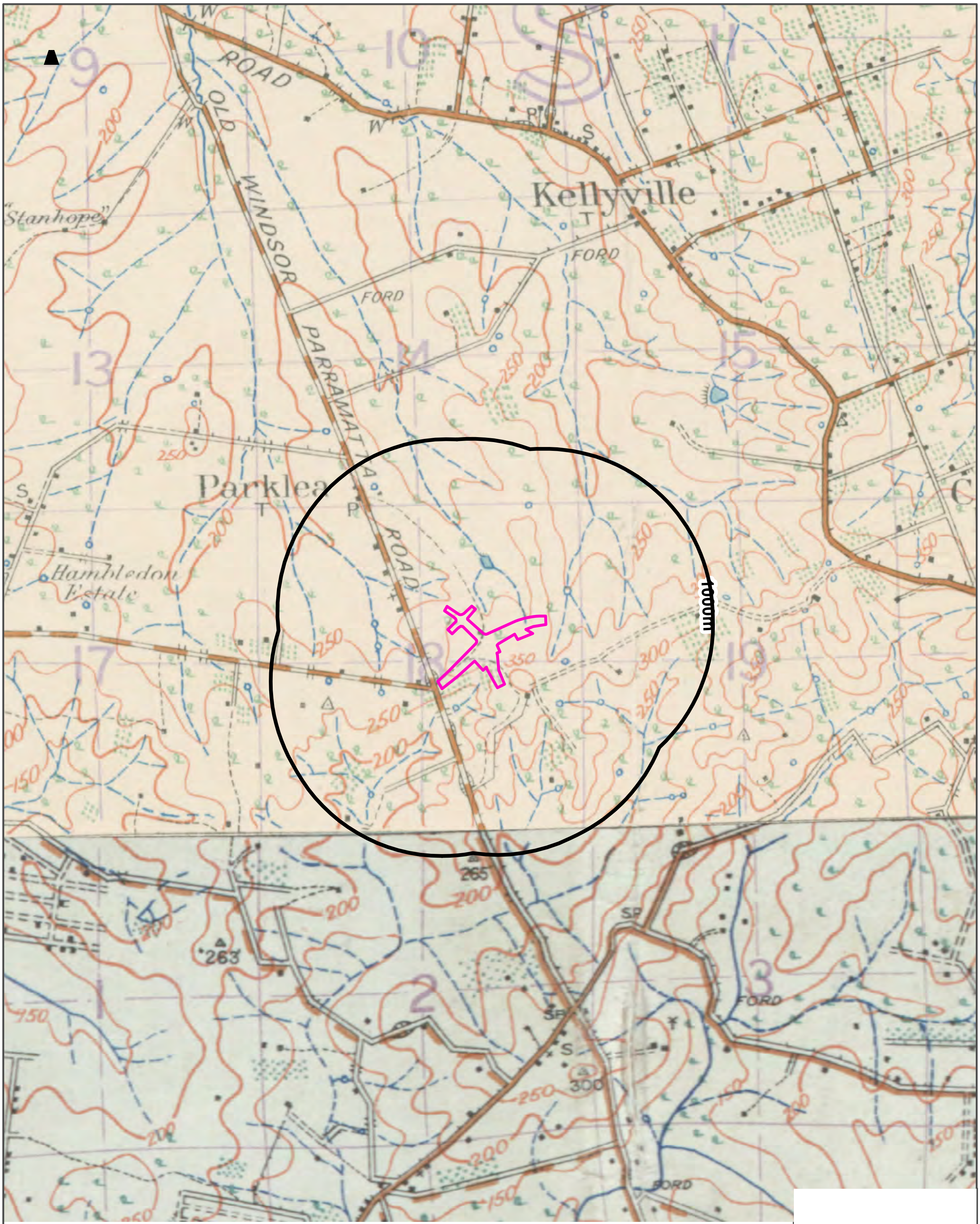
Data Sources: Australia 1:63360,
Produced by Australian Section Imperial General Staff

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Historical Map c.1929 - 1929

Norwest Boulevard, Bella Vista, NSW 2153

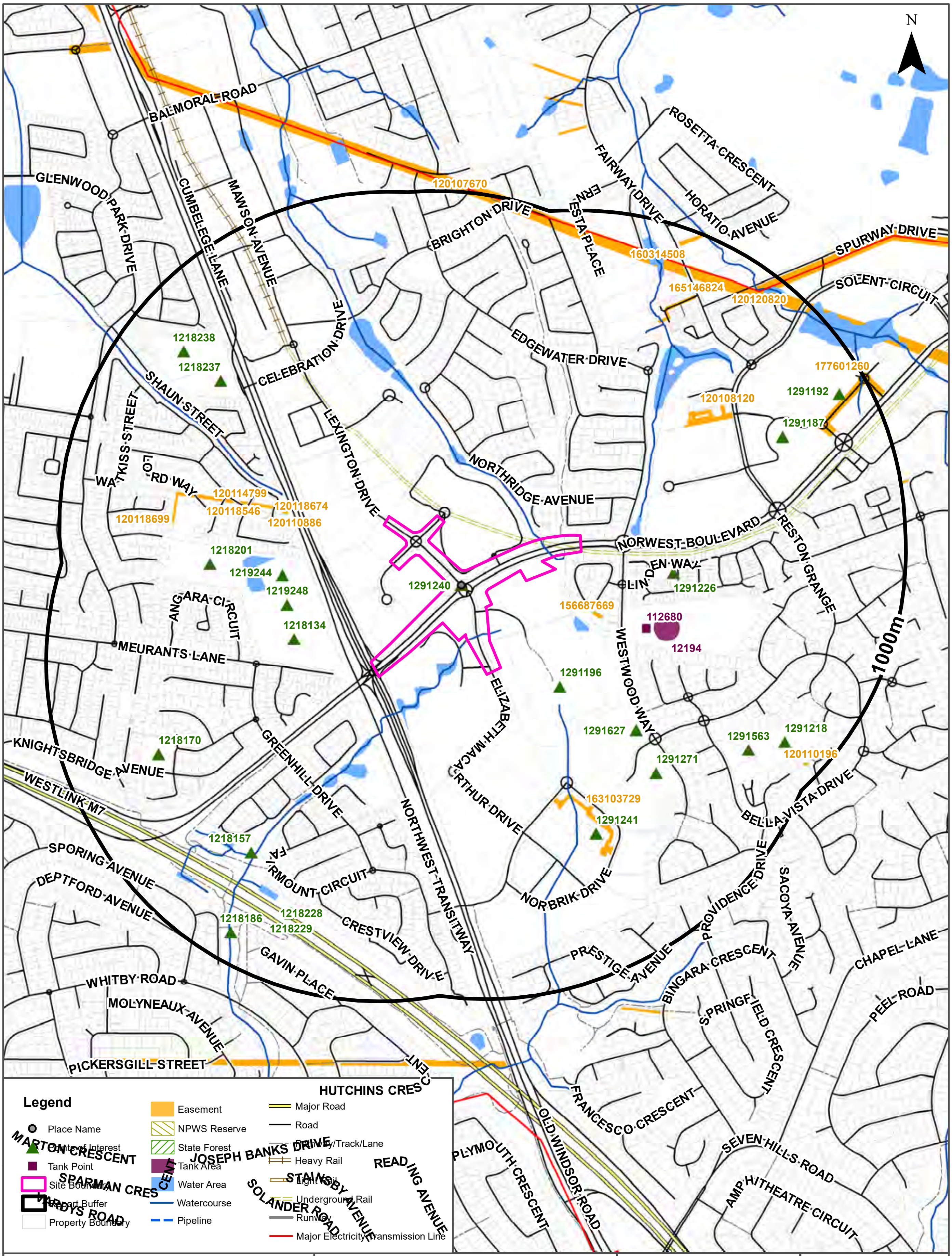


Please note that due to the inaccuracies in the original maps, the site may not allign to the map correctly.

Scale: 0 150 300 600 900 1,200 1,500 Meters	Data Sources: Australia 1:63360, Produced by Australian Section Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

Topographic Features

Norwest Boulevard, Bella Vista, NSW 2153



Scale:

0 100 200 400 600 800
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Topographic Features

Norwest Boulevard, Bella Vista, NSW 2153

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
1291240	Suburb	BELLA VISTA	0m	Onsite
1291196	Historic Site	BELLA VISTA	191m	South East
1218134	Sports Centre	NSW SOCCER FEDERATION HEADQUARTERS	247m	West
1291226	Sports Court	TENNIS COURT	291m	East
1219248	Sports Field	PLAYING FIELDS	312m	West
1219244	Park	VALENTINE PARK	335m	West
1291627	Sports Court	TENNIS COURTS	459m	South East
1218201	Sports Field	PLAYING FIELDS	549m	West
1291271	Park	BELLA VISTA OVAL	579m	South East
1291241	General Hospital	NORWEST PRIVATE HOSPITAL	590m	South East
1218237	Place Of Worship	BAPTIST CHURCH	665m	North West
1218157	Park	LAING RESERVE	670m	South West
1291187	Place Of Worship	ASSEMBLIES OF GOD CHURCH	693m	North East
1218170	Park	KNIGHTSBRIDGE RESERVE	713m	South West
1218229	Roadside Emergency Telephone	METS76N1	778m	South West
1291563	Community Facility	VILLAGE GREEN COMMUNITY CENTRE	799m	South East
1218238	High School	TRADES NORWEST ANGLICAN SENIOR COLLEGE	811m	North West
1218228	Roadside Emergency Telephone	METS76S1	831m	South West
1291218	Park	VILLAGE GREEN	859m	South East
1291192	Shopping Centre	NORWEST MARKETOWN	908m	North East
1218186	Park	Park	911m	South West

Topographic Data Source: © Land and Property Information (2015)

Topographic Features

Norwest Boulevard, Bella Vista, NSW 2153

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
12194	Undefined	Operational	BELLA VISTA RESERVOIR	04/08/2018	312m	East

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
112680	Water	Operational		04/08/2018	310m	East

Tanks Data Source: © Land and Property Information (2015)
Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

Major Easements

What Major Easements exist within the dataset buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
156687669	Primary	Right of way	Var	176m	East
120110886	Primary	Undefined		299m	North West
120118674	Primary	Undefined		348m	North West
120114799	Primary	Undefined		427m	West
163103729	Primary	Right of way	Variable	438m	South East
120108120	Primary	Undefined		465m	North East
120118546	Primary	Undefined		469m	West
120118712	Primary	Undefined		506m	West
120118699	Primary	Undefined		592m	West
165146824	Primary	Right of way	4m & Var.	700m	North East
177601260	Primary	Right of way	Var.	806m	North East
120107670	Primary	Undefined		861m	East
160314508	Primary	Right of way	Variable	943m	North East

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120120820	Primary	Undefined		943m	North East
120110196	Primary	Undefined		947m	South East

Easements Data Source: © Land and Property Information (2015)

Topographic Features

Norwest Boulevard, Bella Vista, NSW 2153

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

State Forest Data Source: © NSW Department of Finance, Services & Innovation (2018)
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National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

NPWS Data Source: © NSW Department of Finance, Services & Innovation (2018)
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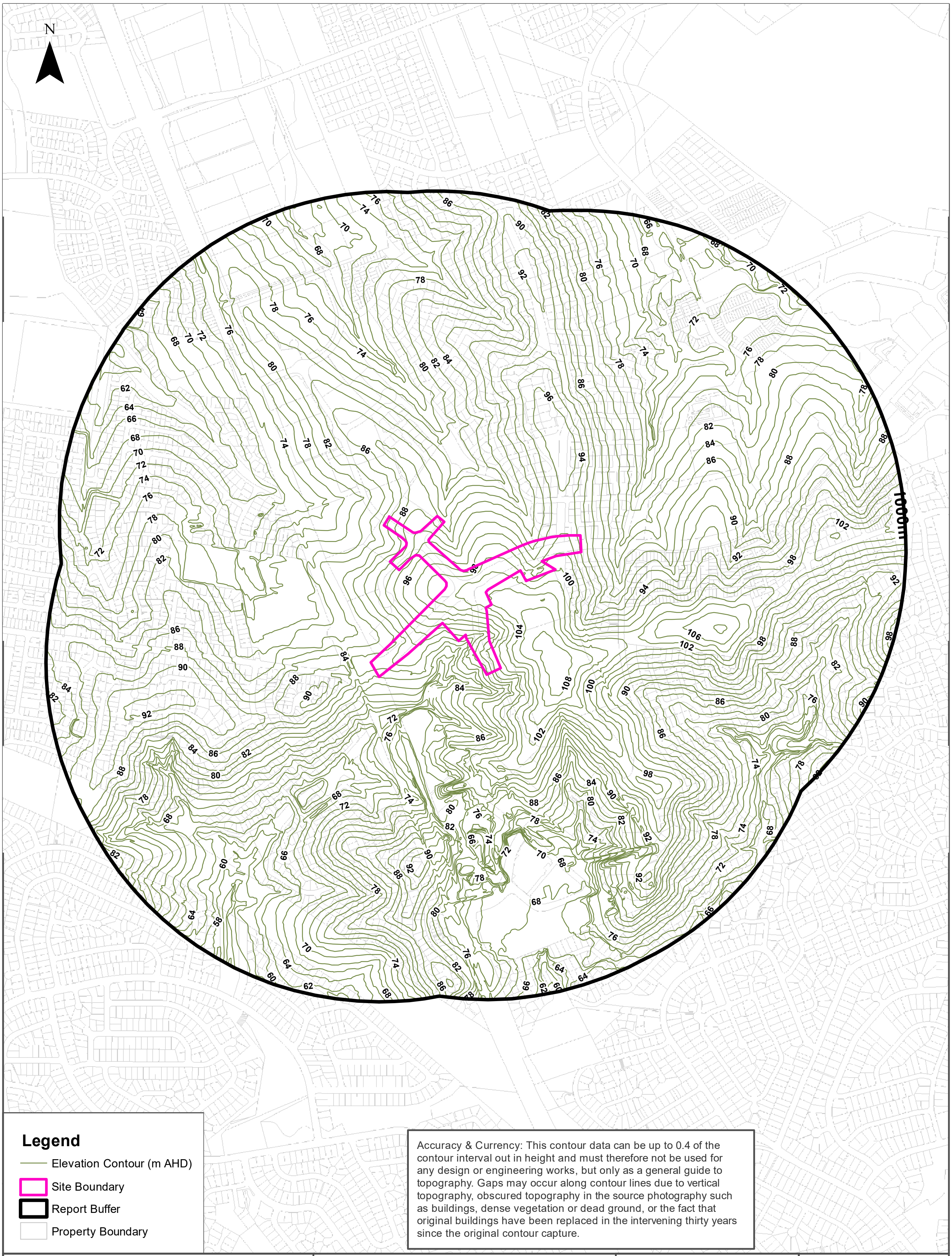
Elevation Contours (m AHD)

Norwest Boulevard, Bella Vista, NSW 2153



Legend

- Elevation Contour (m AHD)
- Site Boundary
- Report Buffer
- Property Boundary

Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2019	Coordinate System: GDA 1994 MGA Zone 56	Date: 07 November 2019

Hydrogeology & Groundwater

Norwest Boulevard, Bella Vista, NSW 2153

Hydrogeology

Description of aquifers on-site:

Description
Porous, extensive aquifers of low to moderate productivity

Description of aquifers within the dataset buffer:

Description
Porous, extensive aquifers of low to moderate productivity

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Botany Groundwater Management Zones

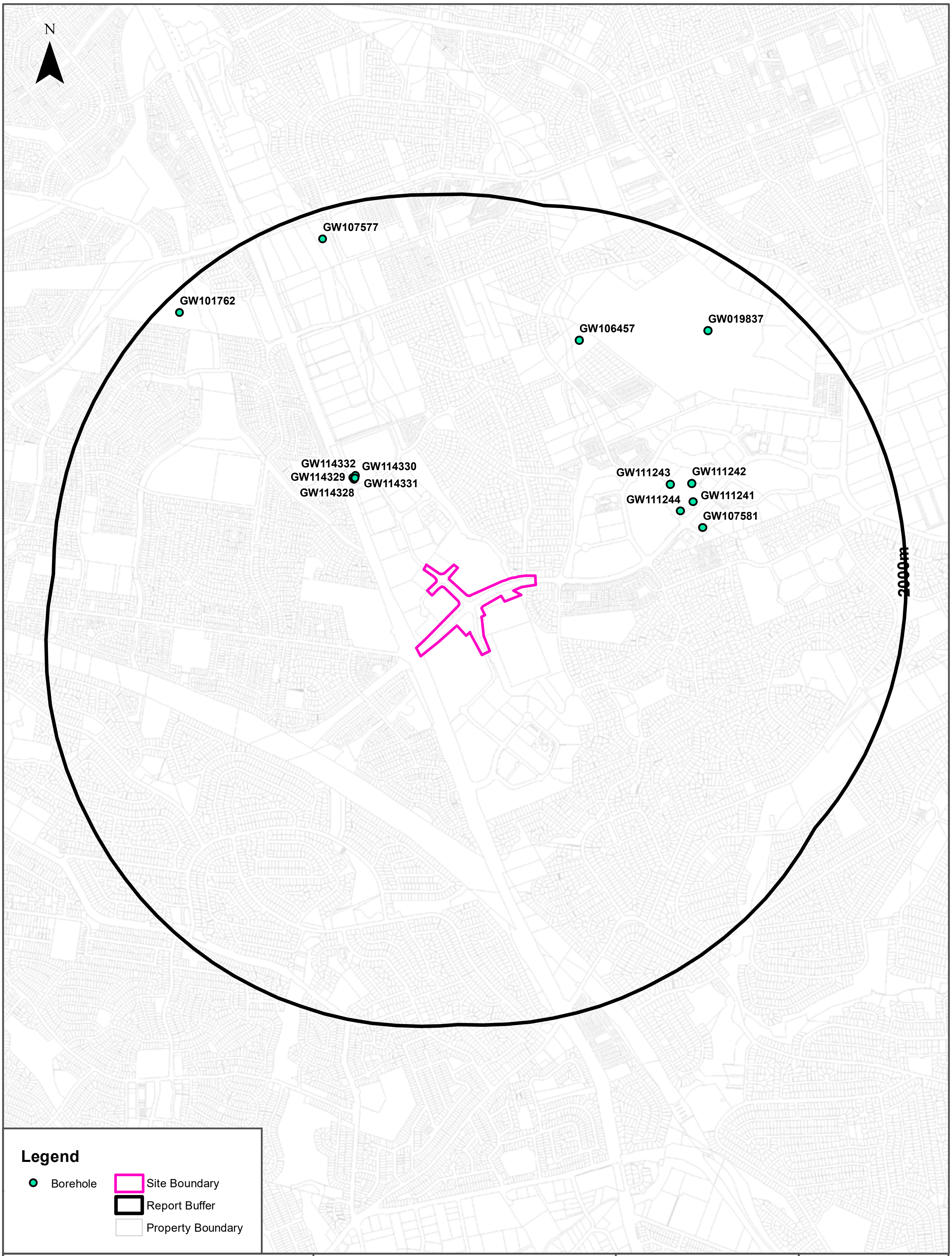
Groundwater management zones relating to the Botany Sand Beds aquifer within the dataset buffer:

Management Zone No.	Restriction	Distance	Direction
N/A	No records in buffer		

Botany Groundwater Management Zones Data Source : NSW Department of Primary Industries

Groundwater Boreholes

Norwest Boulevard, Bella Vista, NSW 2153



Scale:

0 100 200 400 600 800 1,000 1,200 1,400
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Hydrogeology & Groundwater

Norwest Boulevard, Bella Vista, NSW 2153

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW114328	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.90	4.90					602m	North West
GW114327	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.90	4.90					604m	North West
GW114329	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.90	4.90					613m	North West
GW114330	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.00	4.00					614m	North West
GW114332	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.00	4.00					614m	North West
GW114331	10BL604700	Bore	Private	Monitoring Bore	Monitoring Bore	BP - Norwest	23/06/2011	4.00	4.00					614m	North West
GW111244	10BL601846	Bore	Private	Monitoring Bore	Monitoring Bore		16/04/2007	8.10	8.10					858m	North East
GW111243	10BL601846	Bore	Private	Monitoring Bore	Monitoring Bore		16/04/2007	8.40	8.40					881m	North East
GW111241	10BL601846	Bore	Private	Monitoring Bore	Monitoring Bore		17/04/2007	8.00	8.00					941m	North East
GW107581	10BL161358	Bore		Monitoring Bore	Monitoring Bore		23/10/2002	27.48	27.48					942m	East
GW111242	10BL601846	Bore	Private	Monitoring Bore	Monitoring Bore		17/04/2007	8.30	8.30					981m	North East
GW106457	10BL162218, 10WA108584	Bore	Private	Domestic, Stock	Domestic, Stock		07/01/2004	87.00	87.00	Brackish	1.60	11.100		1293m	North
GW019837	10BL013154	Bore open thru rock	Private	Irrigation	Irrigation		01/10/1962	48.70	48.80	V.Salty				1619m	North East
GW107577	10BL160931	Bore		Monitoring Bore	Monitoring Bore		21/10/2002	20.40	20.40					1847m	North
GW101762	10BL157341, 10WA108368	Bore		Domestic, Stock	Domestic		04/12/1995	83.00	83.00	Good	8.92	0.858		1904m	North West

Borehole Data Source : NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation for all bores prefixed with GW. All other bores © Commonwealth of Australia (Bureau of Meteorology) 2015. Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

Hydrogeology & Groundwater

Norwest Boulevard, Bella Vista, NSW 2153

Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW111244	0.00m-0.20m CONCRETE 0.20m-1.50m GRAVELLY CLAYEY SAND,VERYLOOSE,GREY BLACK 1.50m-2.50m CLAYEY GRAVELLY SHALE,BROWN /GREY/RED/ORANGE 2.50m-3.40m GRAVELLY CLAYEY,M/STIFF,CLAY AND IRONSTONE 3.40m-3.90m CLAY,STIFF,MOIST,LITTLE SHALE 3.90m-4.70m SHALE WEATHERED,STIFF,DRY,GREY ORANGE MOTTLED 4.70m-5.50m CLAY,VERY STIFF,DRY,H/PLASTICITY,SHALE/IRONSTONE 5.50m-8.10m SHALE,V/SOFT,DRY,L/PLASTICITY,GREY,SHALE STONE	858m	North East
GW111243	0.00m-0.20m CONCRETE 0.20m-1.20m CLAY,FILL,SLIGHTLY MOIST,CONTAINS SAND 1.20m-1.80m CLAY,MEDIUIM STIFF,BROWN/RED,CONTAINS SHALE 1.80m-2.40m CLAY VERY STIFF,MOIST,SOME SHALE 2.40m-6.50m CLAY VERY STIFF,DRY,HIGH PLASTICITY,SOME IRONSTONE 6.50m-8.40m SHALE,DRY,SLIGHTLY MOIST,DARK GREY	881m	North East
GW111241	0.00m-0.30m FILL,GRASS AND GARDEN 0.30m-0.40m SANDY GRAVEL,FILL,VERY LOOSE,DRY 0.40m-1.10m GRAVEL,SANDY,SILTY,VERY LOOSE,IRONSTONE,SHALE 1.10m-2.90m SHALE,CLAYEY GRAVELLY,SLIGHTLY MOIST 2.90m-6.30m SHALE WEATHERED,LOOSE,DRY,LOW PLASTICITY 6.30m-8.00m SHALE,MOIST,L/PLASTICITY,BROWN/GREY	941m	North East
GW107581	0.00m-3.90m SILTY SANDY CLAY 3.90m-18.34m SHALE 18.34m-27.48m SANDSTONE	942m	East
GW111242	0.00m-0.30m CONCRETE 0.30m-1.40m GRAVEL,SILTY,SANDY,BLUE METAL PEBBLES 1.40m-2.60m CLAY GRAVELLY,STIFF,CONTAINS SHALE 2.60m-3.50m CLAY GRAVELLY,VERY STIFF,DRY,CONTAINS SHALE 3.50m-6.20m SHALE,WEATHERED SHALE,DRY,LOW PLASTICITY 6.20m-8.30m SHALE,SLIGHTLY MOIST,DARK BROWN,GREY/BLACK	981m	North East
GW106457	0.00m-1.00m topsoil 1.00m-3.00m clay 3.00m-6.00m shale, weathered 6.00m-7.00m shale, brown 7.00m-46.00m sandstone, with bands of shale 46.00m-87.00m sandstone	1293m	North
GW019837	0.00m-0.91m Topsoil 0.91m-4.57m Clay 4.57m-5.48m Clay Grey 5.48m-7.01m Shale 7.01m-20.11m Sandstone 20.11m-20.72m Shale 20.72m-30.78m Sandstone 30.78m-32.30m Clay 32.30m-39.01m Sandstone 39.01m-39.92m Clay 39.92m-43.28m Sandstone 43.28m-44.50m Clay Ironstone Gravel 44.50m-48.76m Sandstone	1619m	North East
GW107577	0.00m-3.00m SANDY CLAY 3.00m-4.31m CLAYEY SILT 4.31m-20.40m SHALE	1847m	North
GW101762	0.00m-2.50m Red and Black Clay 2.50m-6.00m Soft Shale 6.00m-38.00m Blue Shale 38.00m-83.00m White Sandstone	1904m	North West

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp

Geology 1:100,000

Norwest Boulevard, Bella Vista, NSW 2153

Legend

- Site Boundary
- Report Buffer
- Property Boundary

Structure

- Fault
- Dyke
- Fold
- Structure
- Lineament

Scale:

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Geology

Norwest Boulevard, Bella Vista, NSW 2153

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rwa	Dark-grey to black claystone-siltstone and fine sandstone -siltstone laminate	Ashfield Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000
Rwb	Shale, carbonaceous claystone,claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff	Bringelly Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000
Rwm	Fine to medium-grained quartz-lithic sandstone	Minchinbury Sandstone	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rwa	Dark-grey to black claystone-siltstone and fine sandstone -siltstone laminate	Ashfield Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000
Rwb	Shale, carbonaceous claystone,claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff	Bringelly Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000
Rwm	Fine to medium-grained quartz-lithic sandstone	Minchinbury Sandstone	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Norwest Boulevard, Bella Vista, NSW 2153

Naturally Occurring Asbestos Potential

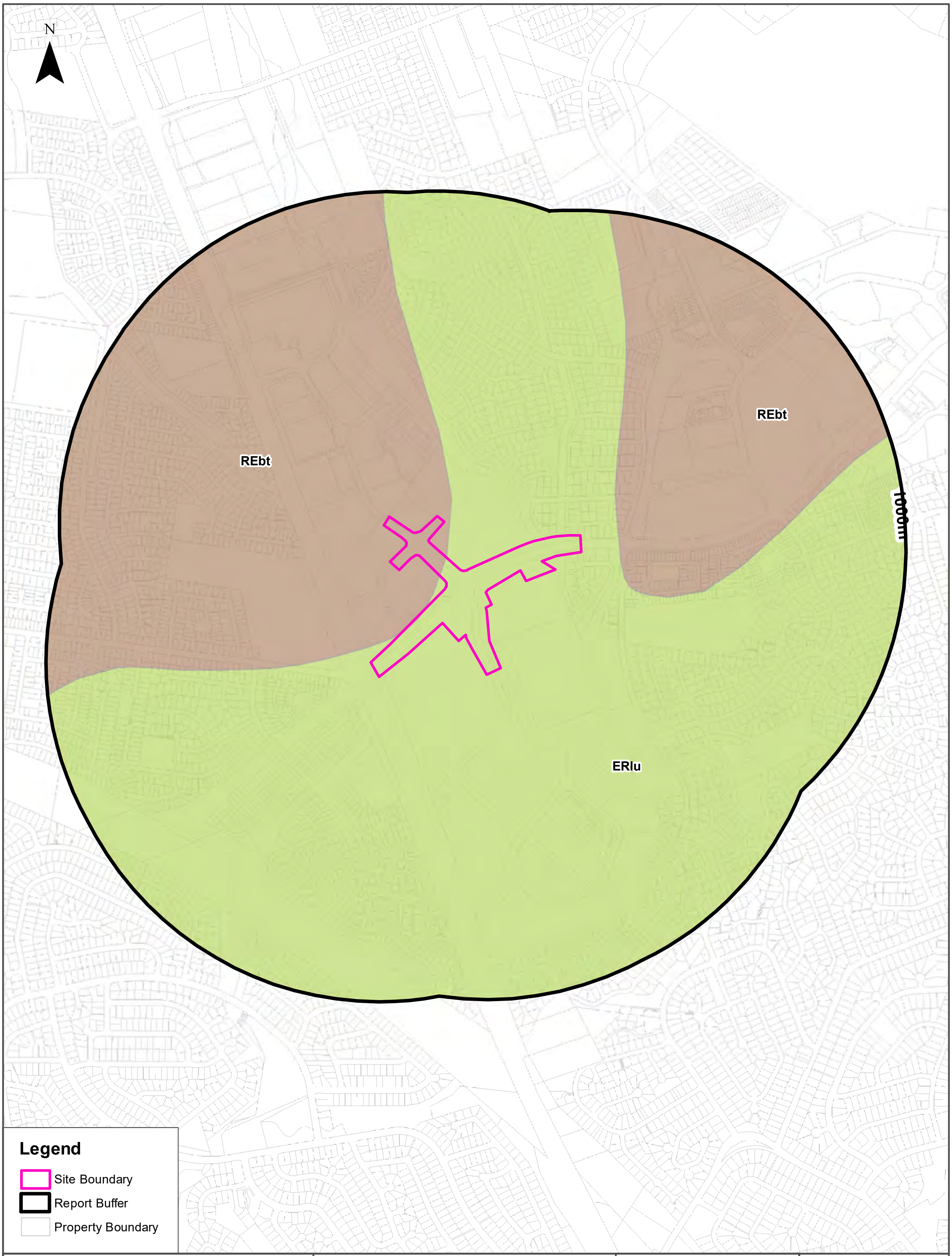
Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Mining Subsidence District Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Soil Landscapes

Norwest Boulevard, Bella Vista, NSW 2153



Scale:

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Soils

Norwest Boulevard, Bella Vista, NSW 2153

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
ERlu	LUDDENHAM		EROSIONAL	Penrith	1:100,000
REbt	BLACKTOWN		RESIDUAL	Penrith	1:100,000

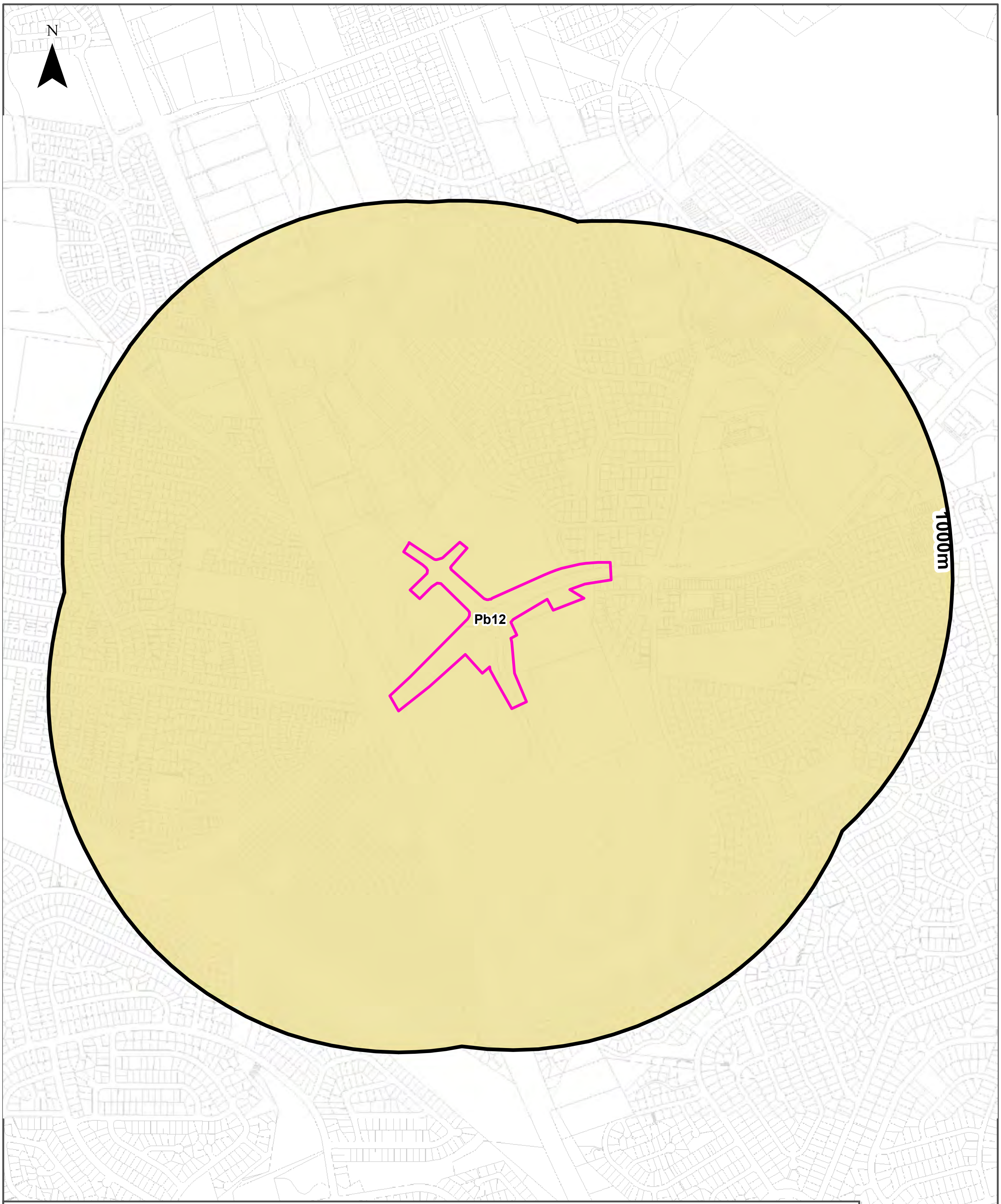
What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
ERlu	LUDDENHAM		EROSIONAL	Penrith	1:100,000
REbt	BLACKTOWN		RESIDUAL	Penrith	1:100,000

Soils Landscapes Data Source : NSW Office of Environment and Heritage

Atlas of Australian Soils

Norwest Boulevard, Bella Vista, NSW 2153



Legend

- □ Site Boundary
- ■ Report Buffer
- □ Property Boundary

Australian Soil Classification Orders

- ■ Anthroposol
- ■ Calcarosol
- ■ Chromosol
- ■ Dermosol
- ■ Ferrosol
- ■ Hydrosol
- ■ Kandosol
- ■ Kurosol
- ■ Organosol
- ■ Podosol
- ■ Rudosol
- ■ Sodosol
- ■ Tenosol
- ■ Vertosol
- ■ Lake
- □ No Data

Scale: 0 100 200 400 600 800 Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Soils

Norwest Boulevard, Bella Vista, NSW 2153

Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance
Pb12	Kurosol	Gently rolling to rounded hilly country with some steep slopes and broad valleys: chief soils are hard acidic red soils (Dr2.21) with hard neutral and acidic yellow mottled soils (Dy3.42 and Dy3.41) on lower slopes and in valleys. Associated are small areas of various soils including (Gn3.54) on some ridges, (Dr3.31) on some slopes; (Dr2.23) in saddles and some mid-slope positions, and some low- lying swampy areas of (Uf6) soils and (Uc1.2) soils with peaty surfaces. Small areas of other soils such as (Db1.2) are likely throughout.	0m

Atlas of Australian Soils Data Source: CSIRO

Acid Sulfate Soils

Norwest Boulevard, Bella Vista, NSW 2153

Environmental Planning Instrument - Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

Soil Class	Description	EPI Name
N/A		

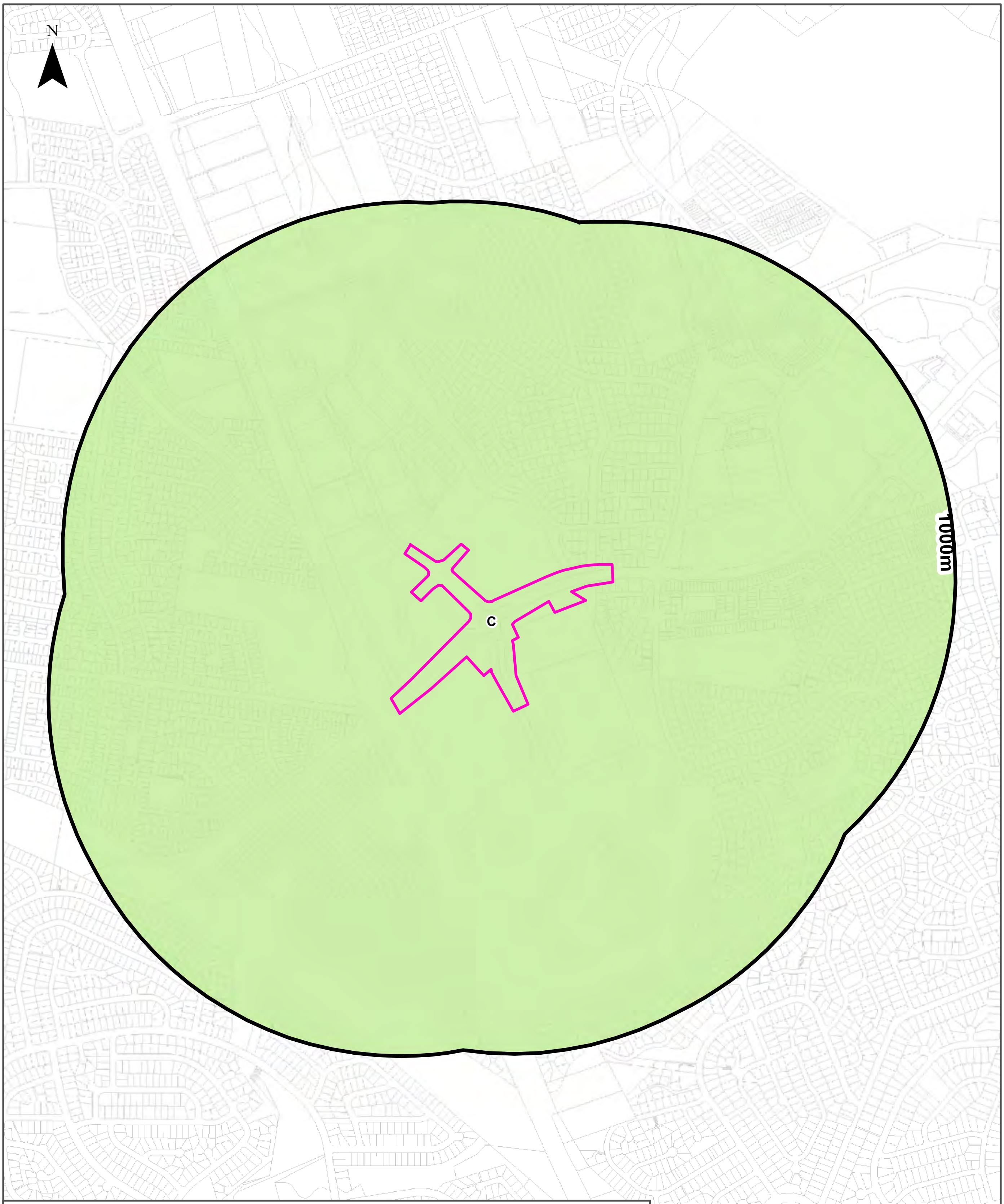
If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Acid Sulfate Data Source Accessed 23/10/2018: NSW Crown Copyright - Planning and Environment

Atlas of Australian Acid Sulfate Soils

Norwest Boulevard, Bella Vista, NSW 2153



Legend

Site Boundary

Report Buffer

Property Boundary

Probability of occurrence of Acid Sulfate Soils

🟥 A. High (>70%)	🟩 C. Extremely Low (1-5%)	☐ No Data
🟨 B. Low (6-70%)	⬜ D. No Chance (0%)	

Scale: 0 100 200 400 600 800 Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07November 2019

Acid Sulfate Soils

Norwest Boulevard, Bella Vista, NSW 2153

Atlas of Australian Acid Sulfate Soils

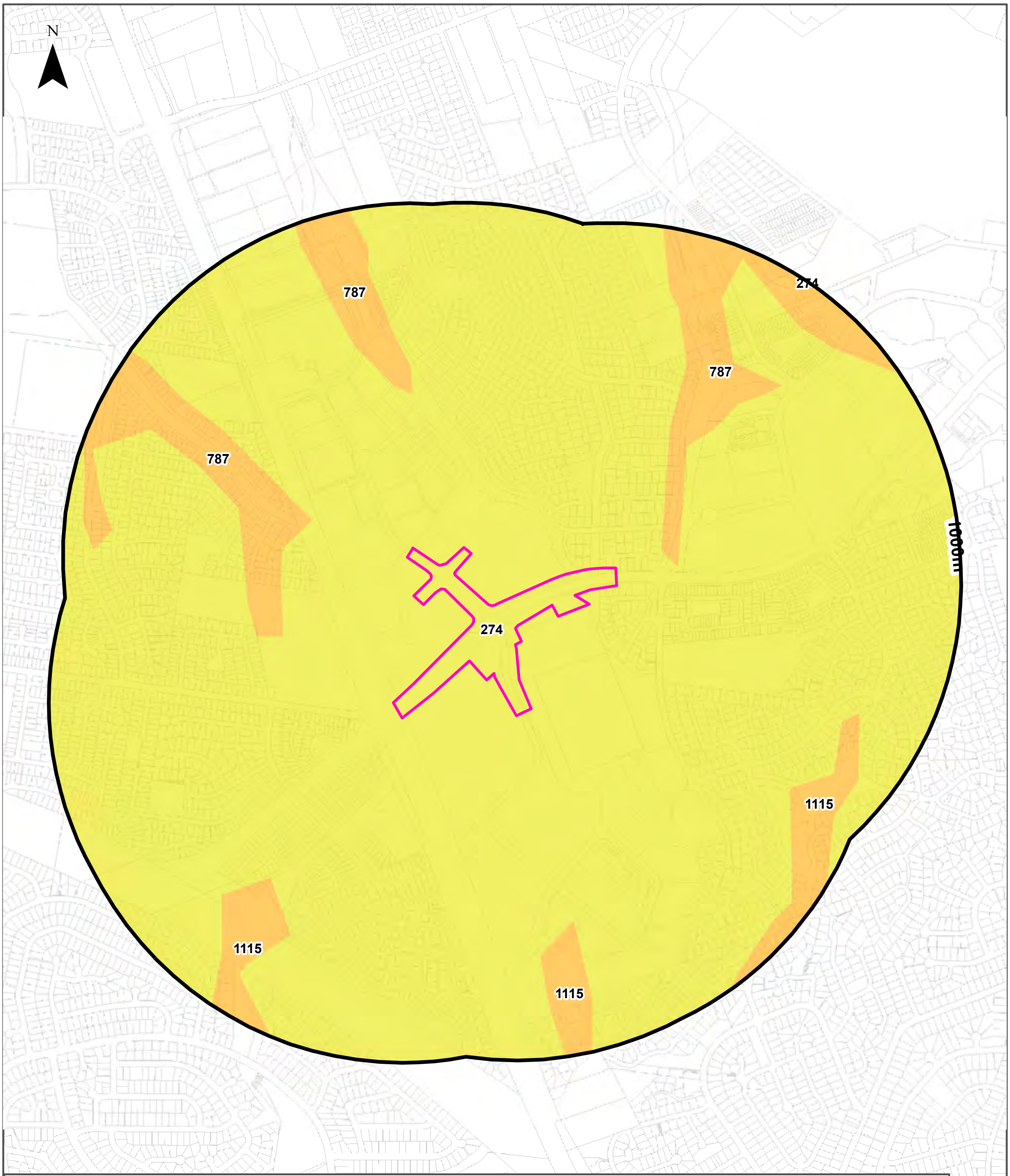
Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

Dryland Salinity

Norwest Boulevard, Bella Vista, NSW 2153



Legend

- ▭ Site Boundary
- ▭ Report Buffer
- ▭ Property Boundary

Dryland Salinity - National Assessment

- ⊠ Delineated risk area but no high hazard or risk rating for either 2000, 2020, 2050
- ▦ High hazard or risk in 2050 only
- ▨ High hazard or risk defined for 2050, but no assessment made for 2000 or 2020
- ▦ High hazard or risk in 2020 and 2050
- ▨ High hazard or risk in 2000 and 2050. 2020 not defined as high hazard
- ⊠ High hazard or risk defined for all years: 2000, 2020, 2050

Salinity Potential of Western Sydney

- 🟥 Area of Known Salinity
- 🟧 Area of High Salinity Potential
- 🟨 Area of Moderate Salinity Potential
- 🟩 Area of Very Low Salinity Potential
- 🟦 Area of Water

Scale:

0 100 200 400 600 800
Meters

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Dryland Salinity

Norwest Boulevard, Bella Vista, NSW 2153

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
274	MODERATE	Area of Moderate Salinity Potential	0m	Onsite
787	HIGH	Area of High Salinity Potential	142m	North West
1115	HIGH	Area of High Salinity Potential	599m	South

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

Mining Subsidence Districts

Norwest Boulevard, Bella Vista, NSW 2153

Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

Mining Subsidence District Data Source: © Land and Property Information (2016)

State Environmental Planning Policy

Norwest Boulevard, Bella Vista, NSW 2153

State Significant Precincts

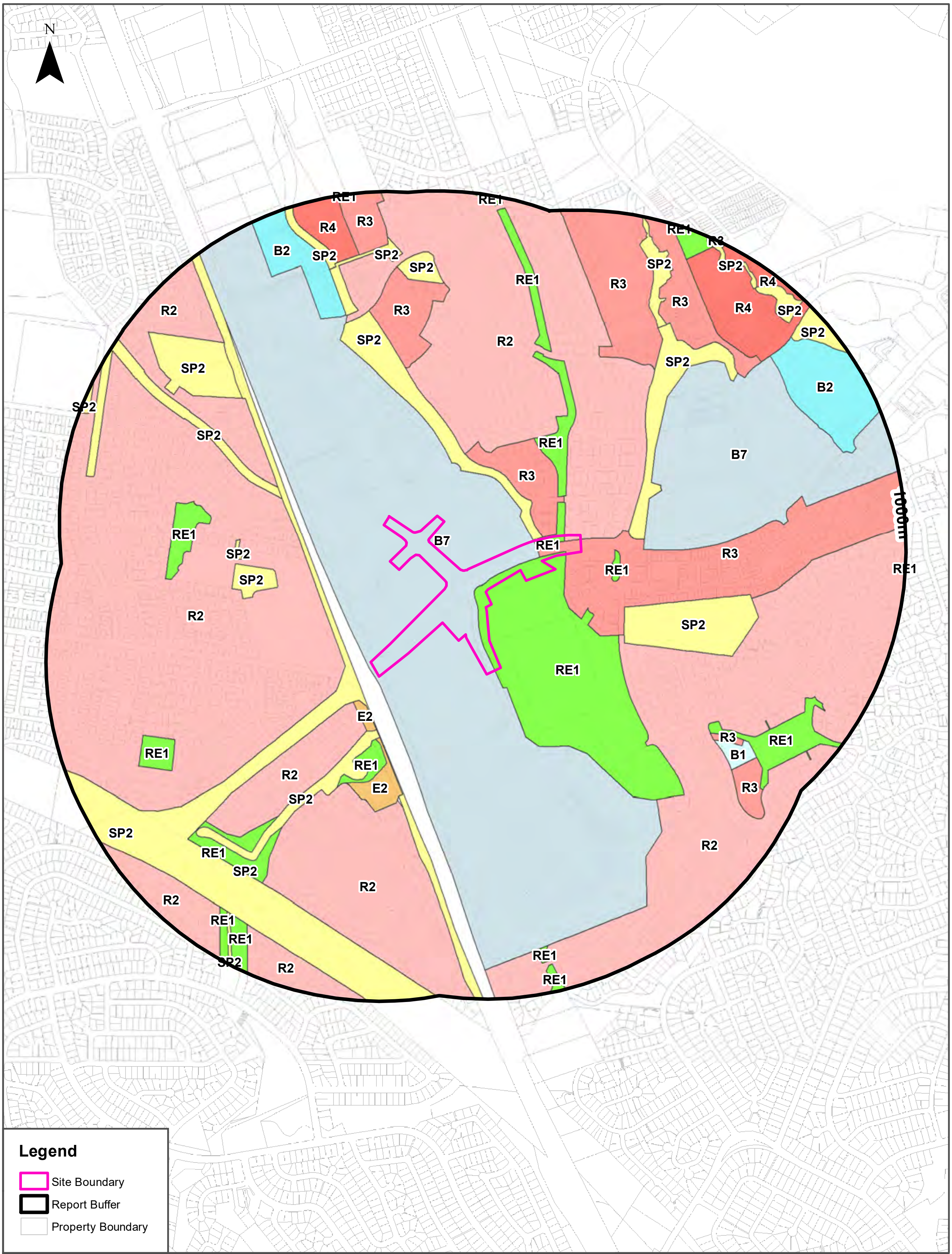
What SEPP State Significant Precincts exist within the dataset buffer?

Map Id	Precinct	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
N/A	No Records in Buffer							

State Environment Planning Policy Data Source: NSW Crown Copyright - Planning & Environment

EPI Planning Zones

Norwest Boulevard, Bella Vista, NSW 2153



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Data Sources: Property Boundaries & Topographic Data:
© Department Finance, Services & Innovation 2019
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Environmental Planning Instrument

Norwest Boulevard, Bella Vista, NSW 2153

Land Zoning

What EPI Land Zones exist within the dataset buffer?

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
B7	Business Park		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	0m	Onsite
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		0m	Onsite
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		0m	Onsite
R2	Low Density Residential		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	0m	Onsite
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		2m	North
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		4m	North East
SP2	Infrastructure	Classified Road	Blacktown Local Environmental Plan 2015	10/08/2018	10/08/2018	28/02/2019	Amendment No 7	58m	West
R2	Low Density Residential		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		80m	West
E2	Environmental Conservation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		96m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		102m	East
R2	Low Density Residential		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		112m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		120m	North East
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		150m	North East
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		163m	South West
E2	Environmental Conservation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		188m	South West
B7	Business Park		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		192m	North East
RE1	Public Recreation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		194m	South West
SP2	Infrastructure	Water Storage Facility	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		217m	East
R2	Low Density Residential		The Hills Local Environmental Plan 2012	15/12/2017	15/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Showground Station Precinct) 2017	280m	South East

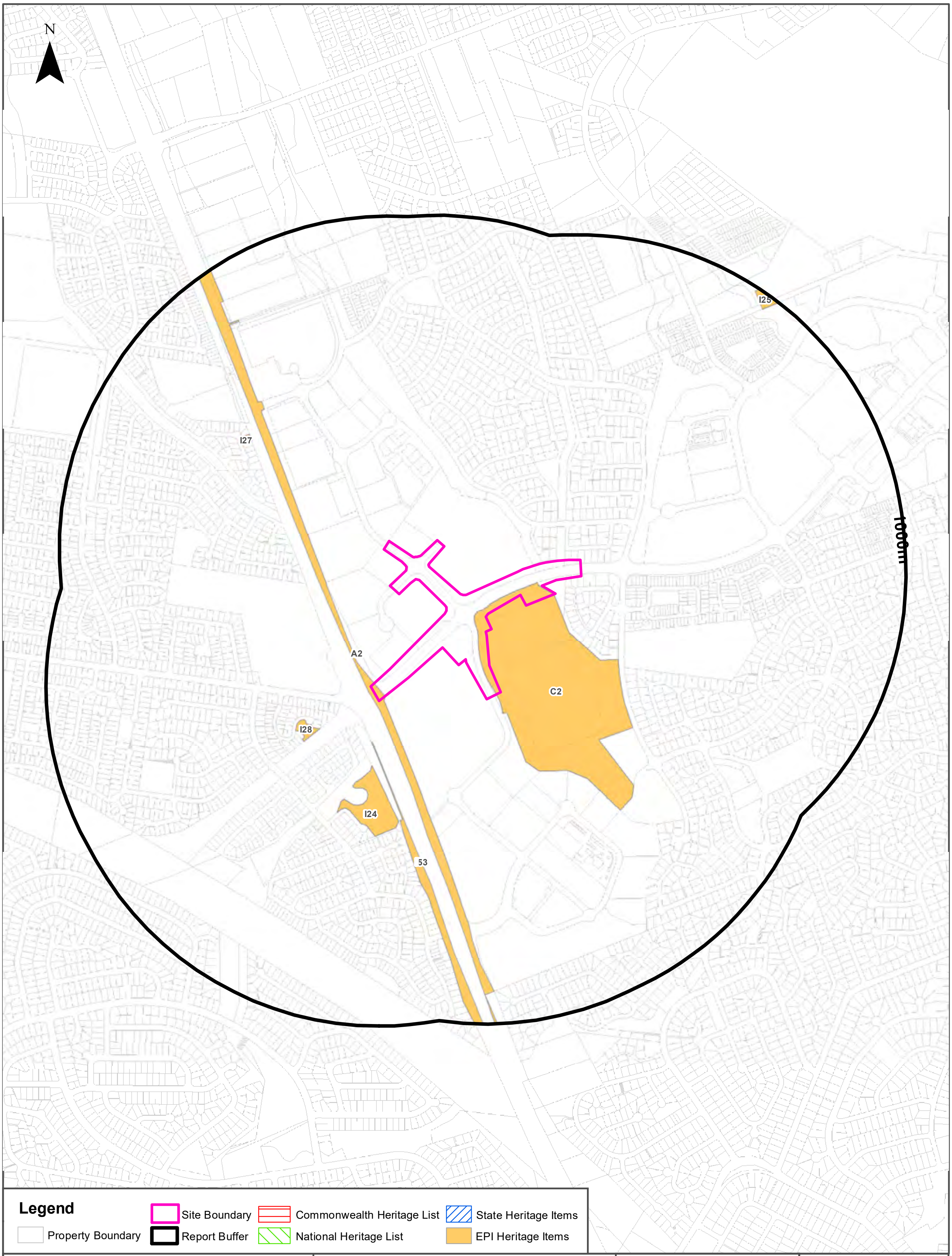
Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		323m	North West
R2	Low Density Residential		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		345m	South
R2	Low Density Residential		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		346m	North West
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		354m	West
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		441m	West
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		460m	North
RE1	Public Recreation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		531m	South West
RE1	Public Recreation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		532m	West
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	552m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		566m	North
SP2	Infrastructure	Educational Establishment & Place of Worship	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		579m	North West
B2	Local Centre		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	632m	North West
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		632m	North
RE1	Public Recreation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		650m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		661m	South East
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		669m	North East
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		677m	South East
SP2	Infrastructure	Stormwater Management	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		681m	North East
B1	Neighbourhood Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		694m	South East
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		711m	South West
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		716m	North
R4	High Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		746m	North East
B2	Local Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		774m	North East
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		778m	South East

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Stormwater Management	The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	783m	North
R4	High Density Residential		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	796m	North
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	809m	North
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		855m	South
RE1	Public Recreation		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		861m	South West
SP2	Infrastructure	Drainage	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		861m	South West
R2	Low Density Residential		Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		862m	South West
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		890m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		908m	North East
SP2	Infrastructure	Drainage	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		911m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		915m	South
SP2	Infrastructure	Stormwater Management	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		927m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		972m	North
SP2	Infrastructure	Educational Establishment	Blacktown Local Environmental Plan 2015	26/05/2015	07/07/2015	28/02/2019		972m	North West
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		985m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	01/12/2017	01/12/2017	21/12/2018	State Environmental Planning Policy Amendment (Bella Vista and Kellyville Station Precincts) 2017	987m	North
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/12/2018		995m	East

Environmental Planning Instrument Data Source: NSW Crown Copyright - Planning & Environment

Heritage Items

Norwest Boulevard, Bella Vista, NSW 2153



Data Sources: Property Boundaries & Topographic Data:
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Heritage - NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 07 November 2019

Heritage

Norwest Boulevard, Bella Vista, NSW 2153

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch

State Heritage Register - Curtilages

What are the State Heritage Register Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: NSW Crown Copyright - Office of Environment & Heritage

Environmental Planning Instrument - Heritage

What are the EPI Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
C2	Bella Vista Farm Homestead Complex	Conservation Area - General	State	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	0m	Onsite
A2	Original section of road and culvert	Item - Archaeological	Local	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	0m	Onsite
I53	Road	Item - General	Local	Blacktown Local Environmental Plan 2015	07/07/2015	07/07/2015	07/07/2015	127m	South

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I28	House	Item - General	Local	Blacktown Local Environmental Plan 2015	07/07/2015	07/07/2015	07/07/2015	200m	South West
I24	Sandstone Culvert	Item - General	Local	Blacktown Local Environmental Plan 2015	07/07/2015	07/07/2015	07/07/2015	200m	South West
I27	House	Item - General	Local	Blacktown Local Environmental Plan 2015	07/07/2015	07/07/2015	07/07/2015	523m	North West
I25	Avenue of Trees	Item - General	Local	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	954m	North East

Heritage Data Source: NSW Crown Copyright - Planning & Environment

Natural Hazards

Norwest Boulevard, Bella Vista, NSW 2153

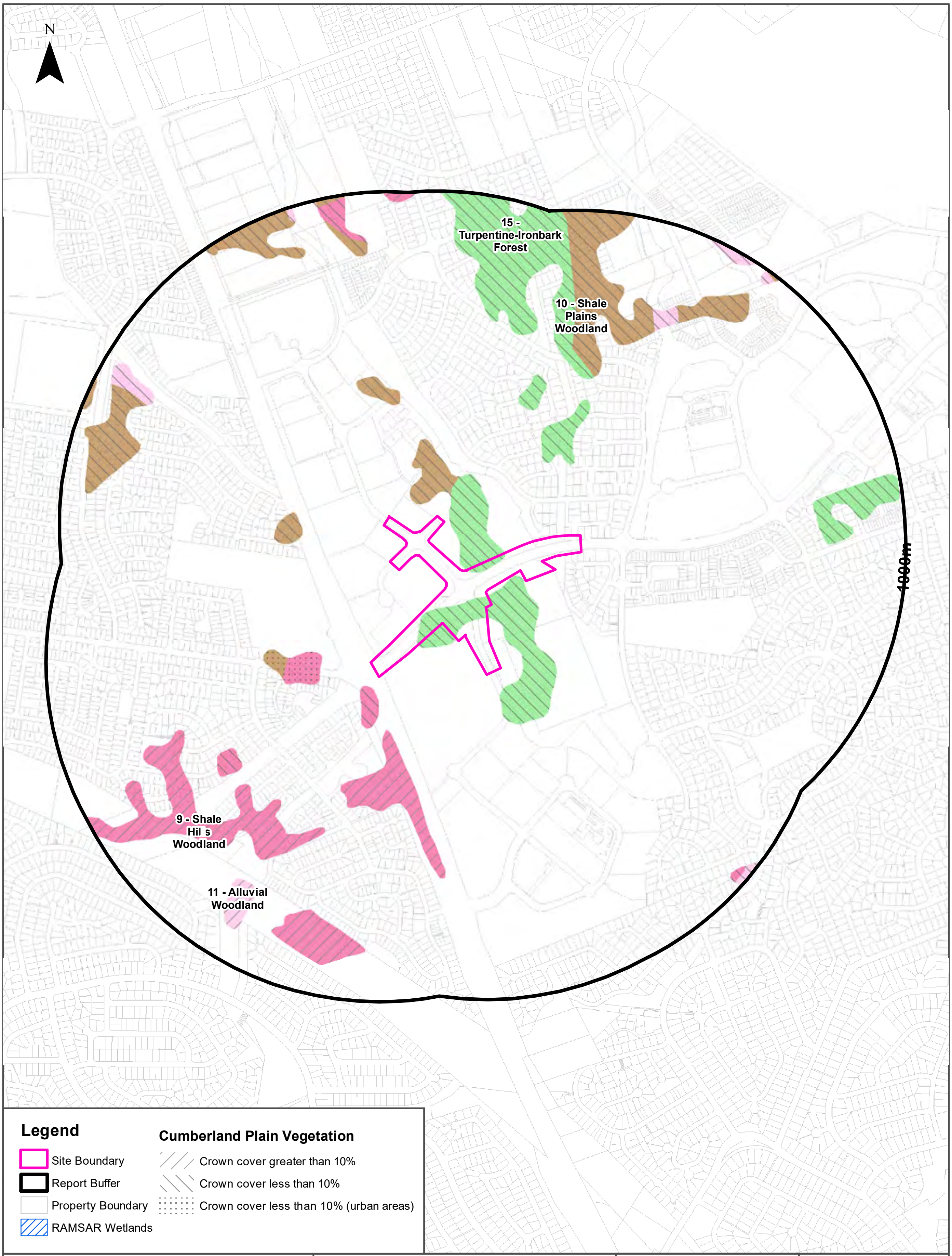
Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
No records within buffer		

Ecological Constraints - Remnant Vegetation of the Cumberland Plain

Norwest Boulevard, Bella Vista, NSW 2153



Scale:
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Meters

Data Sources: Property Boundaries & Topographic Data:
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Date: 07 November 2019

Ecological Constraints

Norwest Boulevard, Bella Vista, NSW 2153

Remnant Vegetation of the Cumberland Plain

What remnant vegetation of the Cumberland Plain exists within the dataset buffer?

Description	Crown Cover	Distance	Direction
15 - Turpentine-Ironbark Forest	Crown cover less than 10%	0m	Onsite
9 - Shale Hills Woodland	Crown cover less than 10%	40m	South West
10 - Shale Plains Woodland	Crown cover less than 10%	50m	North
9 - Shale Hills Woodland	Crown cover less than 10% (urban areas)	150m	South West
9 - Shale Hills Woodland	Crown cover greater than 10%	165m	South
10 - Shale Plains Woodland	Crown cover less than 10% (urban areas)	255m	West
11 - Alluvial Woodland	Crown cover less than 10%	666m	North East
11 - Alluvial Woodland	Crown cover greater than 10%	747m	South West
10 - Shale Plains Woodland	Crown cover greater than 10%	974m	North West

Remnant Vegetation of the Cumberland Plain : NSW Office of Environment and Heritage

Ramsar Wetlands

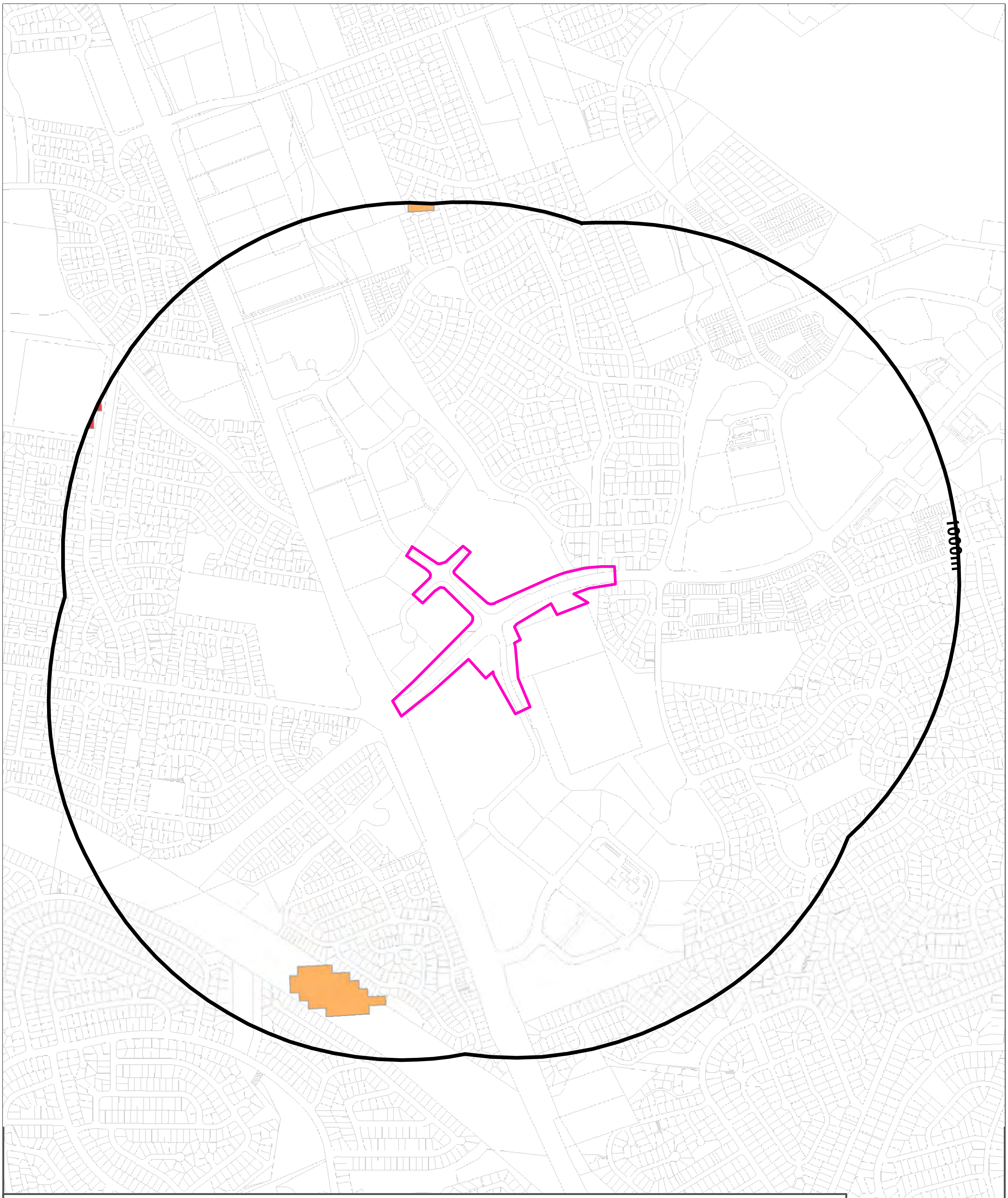
What Ramsar Wetland areas exist within the dataset buffer?

Map Id	Ramsar Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

Ramsar Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

Norwest Boulevard, Bella Vista, NSW 2153



Legend

- ▭ Site Boundary
- ▭ Report Buffer
- ▭ Property Boundaries
- 🟥 High potential GDE - from national assessment
- ▨ High potential GDE - from regional studies
- 🟧 Moderate potential GDE - from national assessment
- ▨ Moderate potential GDE - from regional studies
- 🟦 Low potential GDE - from national assessment
- ▨ Low potential GDE - from regional studies
- ▨ Known GDE - from regional studies
- 🟪 Unclassified potential GDE - from national assessment
- ▨ Unclassified potential GDE - from regional studies

Scale:
0 100 200 400 600 800
Meters

Data Sources: Property Boundaries & Topographic Data:
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Coordinate System:
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Date: 07 November 2019

Ecological Constraints

Norwest Boulevard, Bella Vista, NSW 2153

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	Moderate potential GDE - from national assessment	Deeply dissected sandstone plateaus.	Vegetation	Consolidated sedimentary	749m
Terrestrial	High potential GDE - from national assessment	Deeply dissected sandstone plateaus.	Vegetation	Consolidated sedimentary	980m

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

Norwest Boulevard, Bella Vista, NSW 2153

Scale:

Data Sources: Property Boundaries & Topographic Data:
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Coordinate System:
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Date: 07 November 2019

Ecological Constraints

Norwest Boulevard, Bella Vista, NSW 2153

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	6	Deeply dissected sandstone plateaus.	Vegetation	Consolidated sedimentary	749m
Terrestrial	8	Deeply dissected sandstone plateaus.	Vegetation	Consolidated sedimentary	980m

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

Norwest Boulevard, Bella Vista, NSW 2153

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Amphibia	Litoria aurea	Green and Golden Bell Frog	Endangered	Not Sensitive	Vulnerable	
Animalia	Amphibia	Pseudophryne australis	Red-crowned Toadlet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Ardea ibis	Cattle Egret	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Ardenna pacificus	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Ardenna tenuirostris	Short-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris ruficollis	Red-necked Stint	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered Population, Vulnerable	Category 3	Not Listed	
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Charadrius hiaticula	Ringed Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus fuliginosus	Sooty Oystercatcher	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Category 3	Critically Endangered	
Animalia	Aves	Lophochroa leadbeateri	Major Mitchell's Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Merops ornatus	Rainbow Bee-eater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Neophema pulchella	Turquoise Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica phoenicea	Flame Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica rodinogaster	Pink Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Phaethon lepturus	White-tailed Tropicbird	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Plegadis falcinellus	Glossy Ibis	Not Listed	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Pluvialis squatarola	Grey Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	Poephila cincta cincta	Black-throated Finch (southern subspecies)	Presumed Extinct	Not Sensitive	Endangered	
Animalia	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable	Category 3	Vulnerable	
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto tenebricosa	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Gastropoda	Meridolum corneovirens	Cumberland Plain Land Snail	Endangered	Not Sensitive	Not Listed	
Animalia	Gastropoda	Pommerhelix duralensis	Dural Land Snail	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petaurus australis	Yellow-bellied Glider	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pseudomys australis	Plains Rat	Presumed Extinct	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Antaresia stimsoni	Stimson's Python	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Aspidites ramsayi	Woma	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Caretta caretta	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Pseudonaja modesta	Ringed Brown Snake	Endangered	Not Sensitive	Not Listed	
Animalia	Reptilia	Tiliqua occipitalis	Western Blue-tongued Lizard	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Acacia bynoeana	Bynoe's Wattle	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Acacia pubescens	Downy Wattle	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Argyrotegium nitidulum	Shining Cudweed	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Callistemon linearifolius	Netted Bottle Brush	Vulnerable	Category 3	Not Listed	
Plantae	Flora	Darwinia biflora		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Dillwynia tenuifolia		Endangered Population, Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Dillwynia tenuifolia		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Doryanthes palmeri	Giant Spear Lily	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Epacris purpurascens var. purpurascens		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus nicholii	Narrow-leaved Black Peppermint	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus scoparia	Wallangarra White Gum	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus sp. Cattai		Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Hibbertia superans		Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Isotoma fluviatilis subsp. fluviatilis		Not Listed	Not Sensitive	Extinct	
Plantae	Flora	Lasiopetalum joyceae		Vulnerable	Not Sensitive	Vulnerable	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Leucopogon fletcheri subsp. fletcheri		Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Melaleuca deanei	Deane's Paperbark	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Persoonia hirsuta	Hairy Geebung	Endangered	Category 3	Endangered	
Plantae	Flora	Persoonia mollis subsp. maxima		Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pilularia novae-hollandiae	Austral Pillwort	Endangered	Category 3	Not Listed	
Plantae	Flora	Pimelea curviflora var. curviflora		Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Pimelea spicata	Spiked Rice-flower	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pomaderris brunnea	Brown Pomaderris	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Pomaderris prunifolia	Plum-leaf Pomaderris	Endangered Population	Not Sensitive	Not Listed	
Plantae	Flora	Pterostylis gibbosa	Illawarra Greenhood	Endangered	Category 2	Endangered	
Plantae	Flora	Pterostylis saxicola	Sydney Plains Greenhood	Endangered	Category 2	Endangered	
Plantae	Flora	Pultenaea parviflora		Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Senecio behrianus		Presumed Extinct	Not Sensitive	Endangered	
Plantae	Flora	Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Tetratheca glandulosa		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Triplarina imbricata	Creek Triplarina	Endangered	Not Sensitive	Endangered	

Data does not include NSW category 1 sensitive species.
NSW BioNet: © State of NSW and Office of Environment and Heritage
Data obtained 08/11/2019

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7. End User acknowledges and agrees that Lotsearch and Third Party Content Suppliers retain ownership of all copyright, patent, design right (registered or unregistered), trade marks (registered or unregistered), database right or other data right, moral right or know how or any other intellectual property right in any Report or any other item, information or data included in or provided as part of a Report.
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10. Lotsearch acknowledges that if, under applicable State, Territory or Commonwealth law, End User is a consumer certain rights may be conferred on End User which cannot be excluded, restricted or modified. If so, and if that law applies to Lotsearch, then, Lotsearch's liability is limited to the greater of an amount equal to the cost of resupplying the Report and the maximum extent permitted under applicable laws.
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    (b) any loss of profit, loss of revenue, loss of interest, loss of data, loss of goodwill or loss of business opportunities, business interruption arising directly or indirectly out of or in relation to the Report or these Terms,

    irrespective of how that liability arises including in contract or tort, liability under indemnity or for any other common law, equitable or statutory cause of action or otherwise.
12. These Terms are subject to New South Wales law.

Appendix B. Study area Photographs

Photograph 1: View of concrete on the surface/protruding from the Surface in fill material in the Bella Vista Farm Park construction compound option.	**Photograph 2:** Small pile of waste comprised on brick, concrete/cement and bitumen adjacent to the eastern fence line of the ResMed site on Elizabeth Macarthur Drive (Eastings – 310134; Northings – 6264814)
	
Photograph 3: ACM, brick, concrete and gravels on the surface of fill material in the ResMed site construction compound option.	**Photograph 4:** Stormwater drain located on the construction compound option on Westwood Way (Eastings – 310173; Northings – 6264907)
	

Photograph 5: View from the stormwater drain on the construction compound on Westwood Way showing its north east direction (Eastings – 319134; 6264814)	**Photograph 6:** Groundwater monitoring well located on the construction compound option on Westwood Way (Eastings 310588; Northings – 6264999)
	
Photograph 7: Stormwater drain and stormwater flowing on the ResMed site looking north west towards Elizabeth Macarthur Drive (Eastings: (Eastings 310588; Northings – 6264999)	**Photograph 8:** Constructed creek/open stormwater drain flowing in a south east direction on the ResMed site (Eastings: 377966; Northings – 6368807)
	

Photograph 9: Erosional drainage line heading a south to south west direction towards the creek on the ResMed site (Eastings: 310131; Northings – 6264821)	**Photograph 10:** Drainage line to direct overland stormwater flows during rainfall into drainage line/creek that connects to Elizabeth Macarthur Creek
	
Photograph 11: View from the storm water drain culvert, looking south, that starts at the northern boundary of Bella Vista Farm Park (Eastings – 310127; Northings – 6264793)	**Photograph 12:** View of open stormwater drain culvert on the northern boundary that flows north towards Norwest Boulevard at the eastern extent of the proposed upgrades (Eastings – 310127; Northings – 6264793)
	

Photograph 13: View of open stormwater drain on the northern boundary that flows north towards Norwest Boulevard at the eastern extent of the proposed upgrades (Eastings – 310127; Northings – 6264793)	**Photograph 14:** Photo of existing construction site adjacent to the Lexington Drive McDonald's looking north from Norwest Boulevard (Eastings – 310330; Northings - 6265032)
	

Appendix C. Laboratory Certificates

CHAIN OF CUSTODY RECORD

Eurofins | mgt ABN 50 005 085 521

☑ **Sydney Laboratory**
Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory**
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory**
Unit 2 91 Leach Highway Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory**
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	JACOBS
Address	Level 7, 177 Pacific Hwy, Nth Sydney
Contact Name	Kyle Mclean
Phone №	0402536796
Special Directions	—
Purchase Order	—
Quote ID №	—
Project №	IA0227900
Project Name	Nth Wst Boulevard
Project Manager	Michael. Stacey
EDD Format ESdat, EQuIS etc	Esdat.
Sampler(s)	Kyle Mclean
Handed over by	Kyle Mclean
Email for Invoice	kyle.mclean@jacobs.com
Email for Results	" "

Analyses
Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers
Change container type & size if necessary.

Required Turnaround Time
Default will be 5 days if not ticked.

◆Surcharge will apply

☐ Overnight (reporting by 9am)◆
☐ Same day◆ ☐ 1 day◆
☐ 2 days◆ ☐ 3 days◆
☑ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Asbestos P/A	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	500mL PFAS PET	Jar (Glass or HDPE)	Sample Comments / Dangerous Goods Hazard Warning
1	PACM-01-190101	1/11/19	ACM	X								
2												
3												
4												
5												
6												
7												
8												
9												
10												
			Total Counts									

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name		Signature		Date		Time	
Eurofins | mgt Laboratory Use Only	Received By	Cayanne Kool	[✓ SYD] | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	5/11/19	Time	1:28PM	Temperature	
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	686411

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

eurofins Environment Testing

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Jacobs Group (Australia) P/L NSW**
Contact name:	Kyle McLean
Project name:	NTH WEST BOULEVARD
Project ID:	IA0227900
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 5, 2019 1:28 PM
Eurofins reference:	**686411**

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.

N/A 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.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Kyle McLean - kyle.mclean@jacobs.com.

Sample Receipt Advice

Company name:	**Jacobs Group (Australia) P/L NSW**
Contact name:	Kyle McLean
Project name:	NTH WEST BOULEVARD
Project ID:	IA0227900
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Nov 5, 2019 1:28 PM
Eurofins reference:	**686411**

Sample information

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Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Kyle McLean - kyle.mclean@jacobs.com.

Company Name: Jacobs Group (Australia) P/L NSW
Address: Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Project Name: NTH WEST BOULEVARD
Project ID: IA0227900

Order No.:
Report #: 686411
Phone: 02 9928 2100
Fax: 02 9928 2504

Received: Nov 5, 2019 1:28 PM
Due: Nov 12, 2019
Priority: 5 Day
Contact Name: Kyle McLean

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos Absence /Presence
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	PACM-01-191101	Nov 01, 2019		Building Materials	S19-No06245	X
Test Counts						1

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Jacobs Group (Australia) P/L NSW
Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Attention:	Kyle McLean
Report	686411-AID
Project Name	NTH WEST BOULEVARD
Project ID	IA0227900
Received Date	Nov 05, 2019
Date Reported	Nov 13, 2019

Methodology:

Asbestos Fibre Identification	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. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter 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) is employed. *NOTE: 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.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name NTH WEST BOULEVARD
Project ID IA0227900
Date Sampled Nov 01, 2019
Report 686411-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
PACM-01-191101	19-No06245	Nov 01, 2019	Approximate Sample 6g / 40x25x4mm Sample consisted of: Grey compressed fibre cement fragment	Chrysotile, amosite and crocidolite asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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
Asbestos - LTM-ASB-8020	Sydney	Nov 05, 2019	Indefinite

Company Name: Jacobs Group (Australia) P/L NSW
Address: Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Order No.:
Report #: 686411
Phone: 02 9928 2100
Fax: 02 9928 2504

Received: Nov 5, 2019 1:28 PM
Due: Nov 12, 2019
Priority: 5 Day
Contact Name: Kyle McLean

Project Name: NTH WEST BOULEVARD
Project ID: IA0227900

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos Absence /Presence
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	PACM-01-191101	Nov 01, 2019		Building Materials	S19-No06245	X
Test Counts						1

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. 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 Sample Receipt Advice.

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.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	N/A
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
N/A	Not applicable

Asbestos Counter/Identifier:

Sayeed Abu	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (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.

Appendix B. Geotechnical logs

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH04
FILE / JOB NO : G5168
SHEET : 1 OF 3

PROJECT : NORWEST BOULEVARD
LOCATION : BELLA VISTA FARM

POSITION : E: 310161.683, N: 6264937.427 (56 MGA94)
SURFACE ELEVATION : 103.336 (AHD)
ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hanjin
MOUNTING : Track
CONTRACTOR : ROCKWELL
DRILLER : P. SHEEHY

DATE STARTED : 13/12/19
DATE COMPLETED : 13/12/19
DATE LOGGED : 13/12/19
LOGGED BY : BA
CHECKED BY : OP

DRILLING						MATERIAL					
PROGRESS											
DRILLING & CASING	WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T NW Casing	N/A	E-F	Not Encountered	0.50m	0.0			GRAVELLY SILTY SAND WITH CLAY: brown, fine to medium grained sand, low plasticity silt, fine to medium gravel, with low to medium plasticity clay 0.50m	D		FILL
		F		SPT 10, 7, 10 N*=17 0.95m			CH	SILTY CLAY: orange-brown and brown, high plasticity 1.00m	D - M	H	RESIDUAL SOIL 0.50: SPT Recovery: 0.44 m 0.70: HP Samp >400 kPa 0.95: SPT Recovery: 0.4 m
				SPT 8, 14, 19 N*=33 1.40m 2.00m SPT 12/100mm HB N=R 2.10m	1.0 2.0			SILTY SANDSTONE: orange-brown, cream and red-brown patches, fine to medium grained 2.10m			BEDROCK 1.00: EW bedrock 2.00: SPT Recovery: 0 m
					3.0 4.0 5.0 6.0 7.0 8.0			Continued as Cored Drill Hole			

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

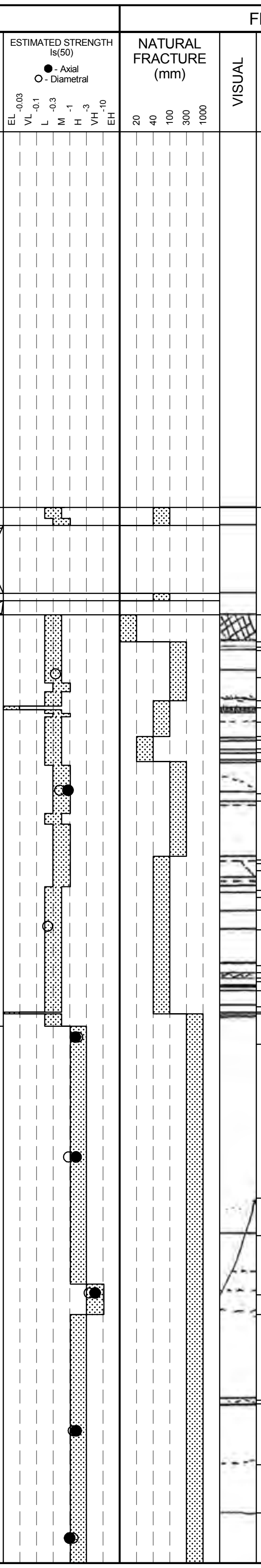
CORED DRILL HOLE LOG

HOLE NO : BH04
FILE / JOB NO : G5168
SHEET : 2 OF 3

PROJECT : NORWEST BOULEVARD
LOCATION : BELLA VISTA FARM

POSITION : E: 310161.683, N: 6264937.427 (56 MGA94) SURFACE ELEVATION : 103.336 (AHD) ANGLE FROM HORIZONTAL : 90°
RIG TYPE : Hanjin MOUNTING : Track CONTRACTOR : ROCKWELL DRILLER : P. SHEEHY
DATE STARTED : 13/12/19 DATE COMPLETED : 13/12/19 DATE LOGGED : 13/12/19 LOGGED BY : BA CHECKED BY : OP
CASING DIAMETER : NW BARREL (Length) : 3.00 m BIT : STEP FACE BIT CONDITION : GOOD

DRILLING				DEPTH (m)	MATERIAL			FRACTURES
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) DRILL DEPTH	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG (depth)	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
				0.0				
				1.0				
				2.0	2.10m	START CORING AT 2.10m		
NMLC	0% Polymer LOSS (NW casing at 2.00m)	79% LOSS			2.20m	SILTY SANDSTONE: refer to 2.70m	MW	
						CORE LOSS 0.38m (2.20-2.58) Probable location		
		2.58			2.58m			
		10% LOSS			2.62m	SILTY SANDSTONE: refer to 2.70m	MW	
					2.70m	CORE LOSS 0.08m (2.62-2.70)		FZ 150 mm
						SILTY SANDSTONE: brown, pale brown, pale grey and grey, fine grained, colours in layers and laminations, bedding predominantly at 0-5°, with laminations of Sandy Siltstone and Siltstone.	MW	BP 2° Fe PR RF BP 0° Clay PR 1 mm
			Is(50) d=0.36 MPa	3.0				BP 0° Fe PR S BP 3 - 7° Fe IR RF fracturing along BP
		3.35						SM 0° EW clayey HB, BP 2° CN PR S BP 0 - 5° Fe CN PR RF BP 0 - 5° Fe CN PR RF BP 0 - 5° Fe CN PR RF BP 0 - 5° Fe CN PR RF
		0% LOSS	Is(50) d=0.48 a=0.85 MPa					BPs 2° Clay VNR PR BP 0 - 5° Fe CN PR RF BP 0 - 5° Fe CN PR RF
				4.0				BP 0 - 5° Fe CN PR RF DB, JT 70° Fe DIS S BP 2° PR <1 mm clayey sealed
		4.28						
		0% LOSS	Is(50) d=0.21 a>0.28 MPa					BP 0 - 5° Fe CN PR RF DL BP 0 - 5° Fe CN PR RF BP 0 - 5° Fe CN PR RF BP 0 - 3° Clay IR 2-3mm FZ 30 mm BP 0° Clay PR 4 mm BP 0 - 5° Fe CN PR RF
				5.0	5.00m	SILTY SANDSTONE: pale grey, fine grained, bedding predominantly at 0-5°, with occasional patchy cross bedding.	F	BP 0 - 5° Fe CN PR RF SM 0° 10 mm EW clayey DL
		5.10						
		0% LOSS	Is(50) d=1.66 a=1.41 MPa					
			Is(50) d=0.88 a=1.48 MPa					
				6.0				BP 5° CN PR RF JT 70° CN PR RF
		6.61	Is(50) d=3.63 a=5.5 MPa					DL
		0% LOSS						
				7.0				BP 0 - 5° CN IR RF fracturing between BPs
			Is(50) d=1.22 a=1.5 MPa					DB, JT 2 - 10° CN IR RF
								BP 2 - 5° CN IR S
			Is(50) d=1.2 a=0.95 MPa	8.0				



See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

CORED DRILL HOLE LOG

HOLE NO : BH04
FILE / JOB NO : G5168
SHEET : 3 OF 3

PROJECT : NORWEST BOULEVARD
LOCATION : BELLA VISTA FARM

POSITION : E: 310161.683, N: 6264937.427 (56 MGA94)
SURFACE ELEVATION : 103.336 (AHD)
ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Hanjin
MOUNTING : Track
CONTRACTOR : ROCKWELL
DRILLER : P. SHEEHY

DATE STARTED : 13/12/19
DATE COMPLETED : 13/12/19
DATE LOGGED : 13/12/19
LOGGED BY : BA
CHECKED BY : OP

CASING DIAMETER : NW
BARREL (Length) : 3.00 m
BIT : STEP FACE
BIT CONDITION : GOOD

DRILLING					MATERIAL				FRACTURES		
PROGRESS											
DRILLING & CASING	WATER	(CORE LOSS RUN %) DRILL DEPTH	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
NMLC	↓	0% LOSS 8.20		8.0	⁘	8.20m	F	▨	▨		DB, BP 2 - 5° CN IR S
						BOREHOLE BH04 TERMINATED AT 8.20 m Target depth					
				9.0							
				10.0							
				11.0							
				12.0							
				13.0							
				14.0							
				15.0							
				16.0							

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP05
FILE / JOB NO : G5168
SHEET : 1 OF 1

PROJECT : NORWEST BOULEVARD
LOCATION : BELLA VISTA FARM

POSITION : E: 310162.677, N: 6264912.371 (56 MGA94)
SURFACE ELEVATION : 102.933 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 13/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 1.50 m LONG 0.30 m WIDE

DRILLING					MATERIAL							
PENETRATION VE E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm 5 10 15 20 25	STRUCTURE & Other Observations
	Nil	Not Encountered		0.0 – 0.10m			CLAYEY SANDY SILT: dark brown, low plasticity, fine grained sand, organic roots and weeds.					TOPSOIL / FILL
			0.20m D-D1 0.40m	0.10m – 0.50m			CLAYEY SANDY GRAVEL: brown, sub-angular to angular, fine grained sand, low plasticity clay, with up to 80mm cobbles				23 24 23 21	FILL
			0.60m B-B1 0.90m	0.50m – 1.10m		CI-CH	CLAY: red, medium to high plasticity, trace sub-angular gravel	D	H	×	13 14 15 16 15 23	RESIDUAL SOIL 0.70: HP Samp >450 kPa
				1.10m – 1.40m			SILTY SANDSTONE: brown, red, yellow, extremely to highly weathered, very low strength.				20 24 25/80mm = R	WEATHERED ROCK
				1.40m – 1.50m			SILTY SANDSTONE: grey, red, orange, fine to medium grained, highly weathered, very low to low strength (assessed from ripped pieces).					BEDROCK
				1.5			EXCAVATION TP05 TERMINATED AT 1.50 m Refusal					
				2.0								
				2.5								
				3.0								
				3.5								

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
▶ water inflow
◀ water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

NSW GOVERNMENT Transport Roads & Maritime Services

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EXCAVATION - GEOLOGICAL LOG

PIT NO : TP06
FILE / JOB NO : G5168
SHEET : 1 OF 1

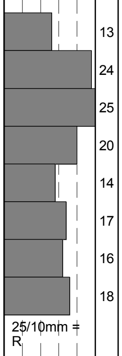
PROJECT : NORWEST BOULEVARD
LOCATION : BELLA VISTA FARM

POSITION : E: 310207.038, N: 6264970.477 (56 MGA94)
SURFACE ELEVATION : 103.170 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 13/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 1.50 m LONG 0.30 m WIDE

DRILLING | MATERIAL

PENETRATION (VE E F H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa	STRUCTURE & Other Observations
	Nil	Not Encountered		0.0 – 1.70m		MIXTURE OF SAND, SILT & BOULDERS: brown, fine to medium grained sand, low plasticity silt, angular boulders up to 160mm, concrete pieces, asbestos pieces found.	D			FILL
				1.70m – 1.90m		SILTY SANDSTONE: grey, fine to medium grained, slightly weathered, medium strength (assessed from tactile pieces).				BEDROCK
				1.90m		EXCAVATION TP06 TERMINATED AT 1.90 m Refusal Note: no samples taken due to possible asbestos				

DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm



PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
- N Natural Exposure
- E Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U50 - Undisturbed Sample 50 mm diameter
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

NSW GOVERNMENT Transport Roads & Maritime Services

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP101
FILE / JOB NO : G5168
SHEET : 1 OF 1

PROJECT : NORWEST BOULEVARD
LOCATION : RESMED SITE GARDEN

POSITION : E: 310104.325, N: 6264895.072 (56 MGA94)
SURFACE ELEVATION : 100.989 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 9/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 2.00 m LONG 0.30 m WIDE

DRILLING				MATERIAL						
PENETRATION VE E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
	Nil	Not Encountered		0.0		SILTY SANDY CLAY: dark brown, low plasticity, organics.				TOPSOIL / FILL
			0.15m D-D1	0.15m		CLAYEY SILT: brown, pale brown, high plasticity	D			FILL
			0.75m B-B1	0.75m	CH	CLAY: red, high plasticity, with silt		H	×	RESIDUAL SOIL 0.85: HP Samp >450 kPa
			1.50m	1.50m		SILTY SANDSTONE: red-brown, yellow, extremely to highly weathered, extremely low to low strength.				BEDROCK
				1.75m		EXCAVATION TP101 TERMINATED AT 1.75 m Refusal				

DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm

0.2	7
0.3	8
0.4	14
0.5	24
0.6	17
0.7	11
0.8	11
0.9	13
1.0	12
1.1	16
1.2	13
1.3	14
1.4	10
1.5	20
1.6	25
1.7	25
1.8	25

25/20mm = R

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH
No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50 - Undisturbed Sample 50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

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EXCAVATION - GEOLOGICAL LOG

PIT NO : TP102
FILE / JOB NO : G5168
SHEET : 1 OF 1

PROJECT : NORWEST BOULEVARD
LOCATION : ELIZABETH McCARTHUR DRIVE - RESERVED ROAD

POSITION : E: 310136.916, N: 6264871.398 (56 MGA94)
SURFACE ELEVATION : 99.159 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 9/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 2.00 m LONG 0.30 m WIDE

DRILLING					MATERIAL						
SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa (100 200 300 400)	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm (5 10 15 20 25)	STRUCTURE & Other Observations
Nil	Not Encountered	D-D1 0.20m	0.0		GRAVELLY SILTY CLAY: yellow-brown, medium plasticity, fine sub-angular gravel, roots and organic material.	D				FILL
		D-D2 0.35m	0.20m		SILTY GRAVELLY SAND: brown, pale grey, fine to medium grained sand, fine gravel				7 6	
			0.35m		SILTY SAND: pale grey, fine to medium grained sand				25/30mm = R	
		0.45m D-D3 1.05m	0.45m	CH	CLAY: red-brown mottled yellow, high plasticity		H	X	20 25 25/60mm = R	RESIDUAL SOIL 1.00: HP Samp >500 kPa
			1.05m		SILTY SANDSTONE: yellow, brown, fine grained, extremely weathered, extremely low to low strength.					BEDROCK
			1.10m		EXCAVATION TP102 TERMINATED AT 1.10 m Refusal					

Depth scale: 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

PENETRATION: VE E F H

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD

N	Natural Exposure
E	Existing Excavation
BH	Backhoe Bucket
B	Bulldozer Blade
R	Ripper

SUPPORT

T	Timbering

PENETRATION

VE E F H VH
No Resistance

WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50	-	Undisturbed Sample 50 mm diameter
D	-	Disturbed Sample
B	-	Bulk Disturbed Sample
MC	-	Moisture Content
HP	-	Hand Penetrometer (UCS kPa)
VS	-	Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT	-	Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE

D	-	Dry
M	-	Moist
W	-	Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

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EXCAVATION - GEOLOGICAL LOG

PIT NO : TP103
FILE / JOB NO : G5168
SHEET : 1 OF 1

PROJECT : NORWEST BOULEVARD
LOCATION : WOOLWORTHS - LEXINGTON DRIVE

POSITION : E: 310075.402, N: 6265002.092 (56 MGA94)
SURFACE ELEVATION : 98.242 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 10/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 1.50 m LONG 0.30 m WIDE

DRILLING				MATERIAL								
PENETRATION VE E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	HAND PENETRO-METER kPa 100 200 300 400	DCP TEST (AS 1289.6.3.2-1997) Blows/100 mm 5 10 15 20 25	STRUCTURE & Other Observations
	Nil	Not Encountered	D-D1 0.25m	0.0			GRAVELLY CLAYEY SILT: brown, low plasticity, fine to medium sub-angular gravel, roots and organics. 0.25m				4	TOPSOIL / FILL
			B-B1 0.55m	0.5		CH	CLAY: red, high plasticity 0.55m	D	H		6 10 8	RESIDUAL SOIL 0.40: HP Samp >500 kPa
							SANDY SILTSTONE AND SANDSTONE: brown, red, yellow, highly weathered, low strength. 0.90m				12 16 16 25/30mm = R	BEDROCK
				1.0 1.5 2.0 2.5 3.0 3.5			EXCAVATION TP103 TERMINATED AT 0.90 m Refusal					

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD

N	Natural Exposure
E	Existing Excavation
BH	Backhoe Bucket
B	Bulldozer Blade
R	Ripper

SUPPORT

T	Timbering

PENETRATION

VE E F H VH
No Resistance

WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U50	-	Undisturbed Sample 50 mm diameter
D	-	Disturbed Sample
B	-	Bulk Disturbed Sample
MC	-	Moisture Content
HP	-	Hand Penetrometer (UCS kPa)
VS	-	Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT	-	Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION

Based on Unified Classification System

MOISTURE

D	-	Dry
M	-	Moist
W	-	Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

NSW GOVERNMENT Transport Roads & Maritime Services

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP104
FILE / JOB NO : G5168
SHEET : 1 OF 1

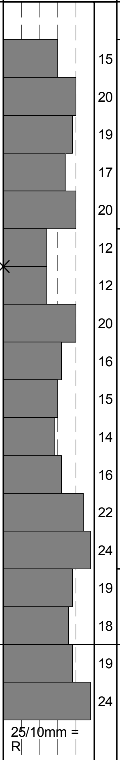
PROJECT : NORWEST BOULEVARD
LOCATION : WOOLWORTHS - NORWEST BOULEVARD
POSITION : E: 310142.157, N: 6264991.767 (56 MGA94)
SURFACE ELEVATION : 99.982 (AHD)
EQUIPMENT TYPE : 5t Excavator
METHOD : EXCAVATION
DATE EXCAVATED : 10/12/19
LOGGED BY : RN
CHECKED BY : OP
EXCAVATION DIMENSIONS : 1.80 m LONG 0.30 m WIDE

DRILLING

PENETRATION (VE E F H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS
	Nil	Not Encountered	0.10m D-D1 0.40m
			0.40m D-D2 0.60m
			0.70m D-D3 0.90m
			1.50m D-D4 1.70m

MATERIAL

DEPTH (m)	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
0.10m		CLAYEY SILT: brown, low plasticity, trace sand, trace gravel, organics.			TOPSOIL / FILL
0.40m		CLAYEY SAND: brown, fine to medium grained sand, low plasticity clay, with fine angular gravel			FILL
0.60m		GRAVELLY CLAY: red, pale red, medium to high plasticity, fine to medium, rounded to angular gravel			
1.50m	CH	CLAY: red, high plasticity	D	H	RESIDUAL SOIL 0.70: HP Samp >500 kPa
1.70m	CH	CLAY: red mottled grey and orange, high plasticity, with angular gravel, likely weathered bedrock.			RESIDUAL SOIL becoming BEDROCK
		EXCAVATION TP104 TERMINATED AT 1.70 m Refusal			



Blows/100 mm	15	20	19	17	20	12	12	20	16	15	14	16	22	24	19	18	19	24

25/10mm = R

HAND PENETRO-METER kPa: 100 200 300 400

DEPTH (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5

PHOTOGRAPHS NOTES ☒ YES ☐ NO

METHOD
N Natural Exposure
E Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH
No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U50 - Undisturbed Sample 50 mm diameter
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND MARITIME SERVICES, NSW

NSW GOVERNMENT Transport Roads & Maritime Services

RMS 41.2 LIB.GLB Log RTA EXCAVATION NORWEST BOULEVARD.GPJ <<DrawingFile>> 25/Feb/2020 13:00 10.0.000 Datgel Tools

JACOBS

177 Pacific Highway
North Sydney

Environmental Test Pit Log

Bore No. TP201

Client: **RMS**

Project No: IA227900 **Project Name:** Norwest Boulevard

Site: Norwest Boulevard

Page 1 of 1

Date: 30-Jan-20
Project Manager: David Harris
Logged By: CY
Checked By: DH

Drilling Contractor: RMS
Drill Rig: 5t excavator
Drill Method:
Final Depth: 0.40 mbgl

Depth (mbgl)	PID	Sample Number	Graphic Log	Material Description	Comments/ Observations
	No PID Recorded		▨	***Fill*** TOPSOIL. Mulch, consisting of bark and organic matter, with some silty sand.	No visual contamination or odour detected.
		TP201_0.1	▨	**SANDY CLAY**, red/brown, dry, with trace rocks and gravel present. Fine-grained sand, low plasticity.	No visual contamination or odour detected.
0.2			▨		
0.4					

Refusal on hard clay. Further excavation restricted by presence of irrigation/services.
End of Borehole at 0.40m

Ground Surface Elevation (mAHD):
Easting:
Northing:
Coordinate System: MGA Zone 56

JACOBS

177 Pacific Highway
North Sydney

Environmental Test Pit Log

Bore No. TP202

Client: **RMS**

Project No: IA227900 **Project Name:** Norwest Boulevard

Site: Norwest Boulevard

Page 1 of 1

Date: 30-Jan-20

Project Manager: David Harris

Logged By: CY

Checked By: DH

Drilling Contractor: RMS

Drill Rig: 5t excavator

Drill Method:

Final Depth: 0.70 mbgl

Depth (mbgl)	PID	Sample Number	Graphic Log	Material Description	Comments/ Observations
	No PID Recorded		▨	***Fill*** Sandy SILT, fine-grained sand, brown, loose, dry.	No visual contamination or odour detected.
		TP202_0.1	▨		
0.2			▨		
0.4			▨	***Fill*** SAND with Silt, brown, fine-grained, low plasticity, with rock fragments throughout. Moderately dense, dry.	No visual contamination or odour detected.
		TP202_0.5	▨		
0.6			▨		

Refusal on natural clays. Further excavation impeded by presence of adjacent services.
End of Borehole at 0.70m

Ground Surface Elevation (mAHD):
Easting:
Northing:
Coordinate System: MGA Zone 56

Environmental Test Pit Log

Bore No. TP203

JACOBS
177 Pacific Highway
North Sydney

Client: **RMS**
Project No: IA227900 **Project Name:** Norwest Boulevard
Site: Norwest Boulevard

Page 1 of 1

Date: 30-Jan-20
Project Manager: David Harris
Logged By: CY
Checked By: DH

Drilling Contractor: RMS
Drill Rig: 5t excavator
Drill Method:
Final Depth: 0.80 mbgl

Depth (mbgl)	PID	Sample Number	Graphic Log	Material Description	Comments/ Observations
	No PID Recorded		▨	**TOPSOIL**. Wood chips and organic matter, with silty sand interspersed.	No visual contamination or odour detected.
		TP203_0.1	▨	**SILTY CLAY**, brown/orange, highly plastic. Shale and sandstone fragments	Rocks and brick fragments within soil matrix. No odour detected.
0.2			▨		
0.4			▨		
0.6			▨		
		TP203_0.7	▨	**SILTY CLAY,** as above with weathered shale component increasing.	
0.8				Refusal on weathered shale. End of Borehole at 0.80m	

Ground Surface Elevation (mAHD):
Easting:
Northing:
Coordinate System: MGA Zone 56

ZDO NOT USE - ES AUS - ENV. LOG ALT NORWEST_ADDTIONAL SAMPLES.GPJ CH2M ES AUS DATA TEMPLATE 2015.GDT 3-10-20

Appendix C. Summary laboratory analytical testing results

Field ID	Date	Metals																Exchangeable Metals	Exchangeable Cations			Soil
		Arsenic		Cadmium		Chromium (III+VI)		Copper		Lead		Mercury		Nickel		Zinc		Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Calcium	Exchangeable Sodium	Moisture
		mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	meq/100g	meq/100g	meq/100g	meq/100g	%
EQL		2	1	0.4	0.1	1	1	1	1	1	1	0.1	0.05	1	1	1	1	0.1	0.1	0.1	0.1	0.1
NEPM 2013 Table 7 Asbestos HSLs																						
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																						
NEPM 2013 Table 1A(1) HIL D Soil		**3,000**		**900**				**240,000**		**1,500**		**730**		**6,000**		**400,000**						
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																						
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)		80						180		440				190		460						
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)		160						280		1,800				460		920						
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial																						
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial																						
NSW 2014 General Solid Waste CT1		100		20						100		4		40								
NSW 2014 General Solid Waste SCC1		500		100						1,500		50		1,050								
Field ID	**Date**																					
BH04_0.0	**13/12/2019**	**5**	-	<0.4	-	**10**	-	**21**	-	**11**	-	**0.1**	-	**9**	-	**68**	-	-	-	-	-	**5.8**
BH04_0.5	**13/12/2019**	**8**	-	<0.4	-	**19**	-	**13**	-	**12**	-	<0.1	-	**4**	-	**22**	-	-	-	-	-	**14**
QC101	**30/01/2020**	**6**	-	<0.4	-	**16**	-	**22**	-	**19**	-	<0.1	-	**15**	-	**33**	-	-	-	-	-	**17**
QC101_101219	**10/12/2019**	**8**	-	<0.4	-	**11**	-	**19**	-	**19**	-	<0.1	-	**6**	-	**42**	-	-	-	-	-	**8.8**
QC102_101219	**10/12/2019**	**14**	-	<0.4	-	**21**	-	**28**	-	**36**	-	<0.1	-	**11**	-	**61**	-	-	-	-	-	-
QC201	**30/01/2020**	**6.1**	-	<0.4	-	**12**	-	**25**	-	**18**	-	<0.1	-	**19**	-	**60**	-	-	-	-	-	-
R01_131219	**13/12/2019**	-	<1	-	<0.1	-	<1	-	<1	-	<1	-	<0.05	-	<1	-	**1**	-	-	-	-	-
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	**10**	-	<0.4	-	**11**	-	**19**	-	**15**	-	<0.1	-	**2**	-	**18**	-	-	-	-	-	**13**
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	**9**	-	<0.4	-	**18**	-	**22**	-	**13**	-	<0.1	-	**4**	-	**27**	-	-	-	-	-	**15**
TP06_0.0	**13/12/2019**	**9**	-	<0.4	-	**17**	-	**8**	-	**16**	-	<0.1	-	**6**	-	**24**	-	-	-	-	-	**4.6**
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	**9**	-	<0.4	-	**7**	-	**17**	-	**12**	-	<0.1	-	**4**	-	**25**	-	-	-	-	-	**7.2**
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	**9**	-	<0.4	-	**13**	-	**18**	-	**20**	-	<0.1	-	**8**	-	**38**	-	-	-	-	-	**13**
		<4	-	<0.4	-	**4**	-	**13**	-	**11**	-	<0.1	-	<1	-	**5**	-	**2.5**	**0.2**	<0.1	**0.69**	**11**
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	**6**	-	<0.4	-	**12**	-	**19**	-	**19**	-	<0.1	-	**8**	-	**36**	-	-	-	-	-	**4.4**
		10	-	<0.4	-	**14**	-	**20**	-	**13**	-	<0.1	-	**4**	-	**24**	-	-	-	-	-	**14**
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	**7**	-	<0.4	-	**16**	-	**12**	-	**15**	-	<0.1	-	**5**	-	**21**	-	-	-	-	-	**5.6**
		9	-	<0.4	-	**14**	-	**13**	-	**10**	-	<0.1	-	**4**	-	**39**	-	-	-	-	-	**11**
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	**11**	-	<0.4	-	**13**	-	**17**	-	**10**	-	<0.1	-	**6**	-	**60**	-	-	-	-	-	-
TP104	**10/12/2019**	**6**	-	<0.4	-	**15**	-	**16**	-	**17**	-	<0.1	-	**7**	-	**44**	-	-	-	-	-	**10**
		8	-	<0.4	-	**13**	-	**17**	-	**11**	-	<0.1	-	**2**	-	**18**	-	-	-	-	-	**14**
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	<4	-	<0.4	-	**13**	-	**23**	-	**15**	-	<0.1	-	**19**	-	**38**	-	-	-	-	-	**16**
TP202_0.1	**30/01/2020**	**7**	-	<0.4	-	**12**	-	**14**	-	**14**	-	<0.1	-	**7**	-	**27**	-	-	-	-	-	**11**
TP202_0.5	**30/01/2020**	**8**	-	<0.4	-	**10**	-	**13**	-	**11**	-	<0.1	-	**4**	-	**24**	-	-	-	-	-	**9.6**
TP203_0.7	**30/01/2020**	**11**	-	<0.4	-	**15**	-	**32**	-	**18**	-	<0.1	-	**20**	-	**46**	-	-	-	-	-	**18**
TP2023_0.1	**30/01/2020**	**17**	-	<0.4	-	**13**	-	**24**	-	**14**	-	<0.1	-	**14**	-	**43**	-	-	-	-	-	**15**
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

		Properties	Particle Sizing	Inorganics	Physiochemical parameters	TRH - NEPM 2013 Fractions													TPH - N			
		Moisture Content (dried @ 103°C)	Clay in soils <2um	Cation exchange capacity	pH 1:5 soil:water	TRH >C6 - C10		TRH >C10 - C16		TRH >C16 - C34		TRH >C34 - C40		TRH >C10 - C40 (Sum of total)	TRH >C6 - C10 less BTEX (F1)		TRH >C10 - C16 less Naphthalene (F2)		TPH C6 - C9		TPH C10 - C14	
		%	%	meq/100g	pH Units	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL		1		1		20	10	50	50	100	100	100	100	50	20	10	50	50	20	10	20	50
NEPM 2013 Table 7 Asbestos HSLs																						
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.						26,000		20,000		27,000		38,000										
NEPM 2013 Table 1A(1) HIL D Soil																						
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion															260 | 370 | 630 |							
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																						
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																						
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial										1,700		3,300			215		170					
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial										2,500		6,600			215		170					
NSW 2014 General Solid Waste CT1																						
NSW 2014 General Solid Waste SCC1																			650			
Field ID	**Date**																					
BH04_0.0	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
BH04_0.5	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
QC101	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
QC101_101219	**10/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
QC102_101219	**10/12/2019**	**10**	-	-	-	<20	-	<50	-	<100	-	<100	-	<100	<20	-	<50	-	<20	-	<20	-
QC201	**30/01/2020**	**15**	-	-	-	<20	-	<50	-	<100	-	<100	-	<100	<20	-	<50	-	<20	-	<20	-
R01_131219	**13/12/2019**	-	-	-	-	-	<10	-	**120**	-	<100	-	<100	-	-	<10	-	**120**	-	<10	-	<50
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP06_0.0	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	**50**	**3.4**	**5.3**	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP202_0.1	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP202_0.5	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP203_0.7	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TP2023_0.1	**30/01/2020**	-	-	-	-	<25	-	<50	-	<100	-	<100	-	<50	<25	-	<50	-	<25	-	<50	-
TRIP BLANK	**30/01/2020**	-	-	-	-	<25	-	-	-	-	-	-	-	-	<25	-	-	-	<25	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
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NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

		EPM 1999 Fractions					BTEXN															
		TPH C15 - C28		TPH C29-C36		TPH C10 - C36 (Sum of total)	Benzene		Ethylbenzene		Naphthalene		Toluene		Xylene (m & p)		Xylene (o)		Xylene Total	Benzo[b+j]fluoranthene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)
		mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	mg/kg	mg/kg
EQL		50	100	50	100	50	0.1	1	0.1	1	0.1	1	0.1	1	0.2	2	0.1	1	0.3	0.5	0.5	0.5
NEPM 2013 Table 7 Asbestos HSLs																						
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.							430		27,000		11,000		99,000						81,000			
NEPM 2013 Table 1A(1) HIL D Soil																						
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion							3 | 3 | 3 | 3												230 | | |			
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)											370											
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)											370											
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial							75		165				135						180			
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial							95		185				135						95			
NSW 2014 General Solid Waste CT1							10		600				288						1,000			
NSW 2014 General Solid Waste SCC1						10,000	18		1,080				518						1,800			
Field ID	**Date**																					
BH04_0.0	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
BH04_0.5	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
QC101	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
QC101_101219	**10/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
QC102_101219	**10/12/2019**	<50	-	<50	-	<50	<0.1	-	<0.1	-	<0.5	-	<0.1	-	<0.2	-	<0.1	-	<0.3	<0.5	<0.5	**0.6**
QC201	**30/01/2020**	<50	-	**65**	-	**65**	<0.1	-	<0.1	-	<0.5	-	<0.1	-	<0.2	-	<0.1	-	<0.3	<0.5	<0.5	**0.6**
R01_131219	**13/12/2019**	-	**130**	-	<100	-	-	<1	-	<1	-	<1	-	<1	-	<2	-	<1	-	-	-	-
TB_09/12/19	**9/12/2019**	-	-	-	-	-	<0.2	-	<1	-	-	-	<0.5	-	<2	-	<1	-	<3	-	-	-
TP05_0.0	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP06_0.0	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP202_0.1	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP202_0.5	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP203_0.7	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TP2023_0.1	**30/01/2020**	<100	-	<100	-	-	<0.2	-	<1	-	<0.1	-	<0.5	-	<2	-	<1	-	<3	-	<0.5	<0.5
TRIP BLANK	**30/01/2020**	-	-	-	-	-	<0.2	-	<1	-	<1	-	<0.5	-	<2	-	<1	-	<3	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	**970,000**	-	**1,180,000**	-	-	-	**1,090,000**	-	**1,170,000**	-	**1,130,000**	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

		PAHs																							
		Benzo(a)pyrene TEQ calc(PQL)	Acenaphthene		Acenaphthylene		Anthracene		Benz(a)anthracene		Benzo(a) pyrene		Benzo(a)pyrene TEQ	Benzo(b+j) & Benzo(k)fluoranthene		Benzo(g,h,i)perylene		Benzo(k)fluoranthene	Chrysene		Dibenz(a,h)anthracene		Fluoranthene		Fluorene
		mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg
EQL		0.5	0.1	1	0.1	1	0.1	1	0.1	1	0.05	1	5	0.2	2	0.1	1	0.5	0.1	1	0.1	1	0.1	1	0.1
NEPM 2013 Table 7 Asbestos HSLs																									
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																									
NEPM 2013 Table 1A(1) HIL D Soil																									
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																									
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial											1.4														
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial											0.7														
NSW 2014 General Solid Waste CT1											0.8														
NSW 2014 General Solid Waste SCC1											10														
Field ID	**Date**																								
BH04_0.0	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
BH04_0.5	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
QC101	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
QC101_101219	**10/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
QC102_101219	**10/12/2019**	**1.2**	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5
QC201	**30/01/2020**	**1.2**	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5
R01_131219	**13/12/2019**	-	-	<1	-	<1	-	<1	-	<1	-	<1	<5	-	<2	-	<1	-	-	<1	-	<1	-	<1	-
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP06_0.0	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP202_0.1	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP202_0.5	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP203_0.7	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TP2023_0.1	**30/01/2020**	<0.5	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	-	<0.2	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

												Polychlorinated Biphenyls													
			Indeno(1,2,3-c,d)pyrene		Phenanthrene		Pyrene		PAHs (Sum of total)	Total +ve PAHs		Arochlor 1016		Arochlor 1221		Arochlor 1232		Arochlor 1242		Arochlor 1248		Arochlor 1254		Arochlor 1260	
		µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL		1	0.1	1	0.1	1	0.1	1	0.5	0.05	1	0.1	2	0.1	2	0.1	2	0.1	2	0.1	2	0.1	2	0.1	2
NEPM 2013 Table 7 Asbestos HSLs																									
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																									
NEPM 2013 Table 1A(1) HIL D Soil									**4,000**																
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																									
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial																									
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial																									
NSW 2014 General Solid Waste CT1																									
NSW 2014 General Solid Waste SCC1																									
Field ID	**Date**																								
BH04_0.0	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
BH04_0.5	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
QC101	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
QC101_101219	**10/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
QC102_101219	**10/12/2019**	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC201	**30/01/2020**	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	-	<0.5	-	<0.1	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-
R01_131219	**13/12/2019**	<1	-	<1	-	<1	-	<1	-	-	**0**	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP06_0.0	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP202_0.1	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP202_0.5	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP203_0.7	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TP2023_0.1	**30/01/2020**	-	<0.1	-	<0.1	-	<0.1	-	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

			Organochlorine Pesticides (OCPs)																						
		PCBs (Sum of total)	4,4-DDE		a-BHC		Aldrin		Aldrin + Dieldrin	b-BHC		Chlordane	Chlordane (cis)		Chlordane (trans)		d-BHC		DDD		DDT		DDT+DDE+DDD	Dieldrin	
		mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L
EQL		0.1	0.05	0.2	0.05	0.2	0.05	0.2	0.05	0.05	0.2	0.1	0.1	0.2	0.1	0.2	0.05	0.2	0.05	0.2	0.05	0.2	0.05	0.05	0.2
NEPM 2013 Table 7 Asbestos HSLs																									
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																									
NEPM 2013 Table 1A(1) HIL D Soil		**7**							**45**			**530**											**3,600**		
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																					640				
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																					640				
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial																									
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial																									
NSW 2014 General Solid Waste CT1																									
NSW 2014 General Solid Waste SCC1		50																							
Field ID	**Date**																								
BH04_0.0	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
BH04_0.5	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
QC101	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
QC101_101219	**10/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
QC102_101219	**10/12/2019**	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.1	-	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-
QC201	**30/01/2020**	<0.5	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.1	-	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-
R01_131219	**13/12/2019**	-	-	<0.2	-	<0.2	-	<0.2	-	-	<0.2	-	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	-	<0.2
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP06_0.0	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP202_0.1	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP202_0.5	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP203_0.7	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TP2023_0.1	**30/01/2020**	<0.1	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

																						Halogenated Benzenes			
		Endosulfan I		Endosulfan II		Endosulfan sulphate		Endrin		Endrin aldehyde		Endrin ketone	g-BHC (Lindane)		Heptachlor		Heptachlor epoxide		Methoxychlor		Toxaphene	Hexachlorobenzene		ACM in >7mm Sample	
		mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/kg	µg/L	%(w/w)	g
EQL		0.05	0.2	0.05	0.2	0.05	0.2	0.05	0.2	0.05	0.2	0.05	0.05	0.2	0.05	0.2	0.05	0.2	0.1	0.2	1	50	0.2		
NEPM 2013 Table 7 Asbestos HSLs																									
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																									
NEPM 2013 Table 1A(1) HIL D Soil								**100**							**50**				**2,500**		**160**	**80,000**			
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																									
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																									
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial																									
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial																									
NSW 2014 General Solid Waste CT1																									
NSW 2014 General Solid Waste SCC1																									
Field ID	**Date**																								
BH04_0.0	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
BH04_0.5	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
QC101	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
QC101_101219	**10/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
QC102_101219	**10/12/2019**	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	-	<1	<50	-	-	-
QC201	**30/01/2020**	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	-	<0.2	-	<1	<50	-	-	-
R01_131219	**13/12/2019**	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	-	<0.2	-	-
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP05_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP05_0.5	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP06_0.0	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP06_0.0-0.3	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP06_1.0-1.9	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP06_1.9	**13/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP102	**9/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP103	**10/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	**0**
TP201_0.1	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP202_0.1	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP202_0.5	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP203_0.7	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TP2023_0.1	**30/01/2020**	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<100	-	-	-
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs

CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.

NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil

NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion

NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)

NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)

NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial

NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial

NSW EPA, NSW 2014 General Solid Waste CT1

NSW EPA, NSW 2014 General Solid Waste SCC1

		Asbestos																			
		AF/FA in <2mm Sample	Asbestos Detected	Asbestos Reported Result	Asbestos (FA) - Comment	Approximate Sample Mass	ACM - Comment	Asbestos fibres		Asbestos from ACM in Soil	Asbestos from FA & AF in Soil	Asbestos Fines (AF) - Comment	Organic Fibres - Comment	Respirable Fibres - Comment	Synthetic Fibres - Comment	ACM (Mass)	Asbestos (AF) - Mass	Asbestos in AF (Mass)	Asbestos in FA & AF (Mass)	Asbestos (FA) - Mass	Asbestos in ACM (Mass)
		%(w/w)	g/kg	Comment	Comment	g	Comment	g/kg	-	%w/w	%w/w	Comment	Comment	Comment	Comment	g	g	g	g	g	g
EQL			0.1																		
NEPM 2013 Table 7 Asbestos HSLs								1													
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.																					
NEPM 2013 Table 1A(1) HIL D Soil																					
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion																					
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)																					
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)																					
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial																					
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial																					
NSW 2014 General Solid Waste CT1																					
NSW 2014 General Solid Waste SCC1																					
Field ID	**Date**																				
BH04_0.0	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04_0.5	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
QC101	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
QC101_101219	**10/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
QC102_101219	**10/12/2019**	-	-	**1**	**1**	**63**	**1**	-	-	**0**	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
QC201	**30/01/2020**	-	-	**1**	**1**	**62**	**1**	-	-	**0.0000**	**0.0000**	**1**	**1**	**0**	**1**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**
R01_131219	**13/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TB_09/12/19	**9/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.0-0.3	**13/12/2019**	<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP05_0.5	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_0.0	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_0.0-0.3	**13/12/2019**	<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.0-1.9	**13/12/2019**	<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_1.9	**13/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP06_PACM-01	**13/12/2019**	-	-	-	-	-	-	-	**1**	-	-	-	-	-	-	-	-	-	-	-	-
TP101	**10/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP102	**9/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103	**10/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP104	**10/12/2019**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
		<0.001	<0.1	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP201_0.1	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP202_0.1	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP202_0.5	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP203_0.7	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TP2023_0.1	**30/01/2020**	-	-	-	-	-	-	**0**	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP BLANK	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

		EPA 621 Classification of Wastes	
	Asbestos in FA (Mass)	Vic EPA IWRG 621 Organochlorine pesticides (Total)*	Vic EPA IWRG 621 Other organochlorine pesticides (Total)*
	g	mg/kg	mg/kg
EQL		0.1	0.1
NEPM 2013 Table 7 Asbestos HSLs			
CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.			
NEPM 2013 Table 1A(1) HIL D Soil			
NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion			
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)			
NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)			
NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial			
NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial			
NSW 2014 General Solid Waste CT1			
NSW 2014 General Solid Waste SCC1			

Field ID	Date			
BH04_0.0	**13/12/2019**	-	-	-
BH04_0.5	**13/12/2019**	-	-	-
QC101	**30/01/2020**	-	-	-
QC101_101219	**10/12/2019**	-	-	-
QC102_101219	**10/12/2019**	**0**	<0.2	<0.2
QC201	**30/01/2020**	**0.0000**	<0.2	<0.2
R01_131219	**13/12/2019**	-	-	-
TB_09/12/19	**9/12/2019**	-	-	-
TP05_0.0	**13/12/2019**	-	-	-
TP05_0.0-0.3	**13/12/2019**	-	-	-
TP05_0.5	**13/12/2019**	-	-	-
TP06_0.0	**13/12/2019**	-	-	-
TP06_0.0-0.3	**13/12/2019**	-	-	-
TP06_1.0-1.9	**13/12/2019**	-	-	-
TP06_1.9	**13/12/2019**	-	-	-
TP06_PACM-01	**13/12/2019**	-	-	-
TP101	**10/12/2019**	-	-	-
		-	-	-
		-	-	-
TP102	**9/12/2019**	-	-	-
		-	-	-
		-	-	-
TP103	**10/12/2019**	-	-	-
		-	-	-
		-	-	-
TP103 - [TRIPLICATE]	**10/12/2019**	-	-	-
TP104	**10/12/2019**	-	-	-
		-	-	-
		-	-	-
TP201_0.1	**30/01/2020**	-	-	-
TP202_0.1	**30/01/2020**	-	-	-
TP202_0.5	**30/01/2020**	-	-	-
TP203_0.7	**30/01/2020**	-	-	-
TP2023_0.1	**30/01/2020**	-	-	-
TRIP BLANK	**30/01/2020**	-	-	-
TRIP SPIKE	**30/01/2020**	-	-	-

Environmental Standards

NEPM, April 2013, NEPM 2013 Table 7 Asbestos HSLs
CRCCARE, CRCCARE No. 10 Table 4 HSL-D (direct contact) Comm./Ind.
NEPM, April 2013, NEPM 2013 Table 1A(1) HIL D Soil
NEPM, April 2013, NEPM 2013 Table 1A(3) HSL D Sand for Vapour Intrusion
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Fresh)
NEPM, April 2013, NEPM 2013 Table 1B(1-5) EIL Comm Ind Default (Aged)
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Coarse Soil, Commercial/Industrial
NEPM, April 2013, NEPM 2013 Table 1B(6) ESL, Fine Soil, Commercial/Industrial
NSW EPA, NSW 2014 General Solid Waste CT1
NSW EPA, NSW 2014 General Solid Waste SCC1

Field Duplicates (Soil)
Filter: ALL

			SDG	ENVIROLAB 2019-12-11T00:00:00	ENVIROLAB 2019-12-11T00:00:00		ENVIROLAB 2019-12-11T00:00:00	12-Dec-19	
			Field ID	TP101	QC101_101219	**RPD**	TP101	QC102_101219	**RPD**
			Sampled Date/Time	10/12/2019	10/12/2019		10/12/2019	10/12/2019	
Method_Type	**ChemName**	**Units**	**EQL**						
Acid Extractable metals in soil	Arsenic	mg/kg	4 : 2 (Interlab)	9	8	12	9	14	43
	Cadmium	mg/kg	0.4	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium (III+VI)	mg/kg	1 : 5 (Interlab)	13	11	17	13	21	47
	Copper	mg/kg	1 : 5 (Interlab)	18	19	5	18	28	43
	Lead	mg/kg	1 : 5 (Interlab)	20	19	5	**20**	**36**	**57**
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	1 : 5 (Interlab)	8	6	29	8	11	32
	Zinc	mg/kg	1 : 5 (Interlab)	38	42	10	**38**	**61**	**46**
Moisture	Moisture	%	0.1	**13**	**8.8**	**39**	13		
svTRH (C10-C40) in Soil	TRH >C10 - C16	mg/kg	50	<50	<50	0	<50	<50	0
	TRH >C16 - C34	mg/kg	100	<100	<100	0	<100	<100	0
	TRH >C34 - C40	mg/kg	100	<100	<100	0	<100	<100	0
	TRH >C10 - C40 (Sum of total)	mg/kg	50 : 100 (Interlab)	<50	<50	0	<50	<100	0
	TRH >C10 - C16 less Naphthalene (F2)	mg/kg	50	<50	<50	0	<50	<50	0
vTRH(C6-C10)/BTEXN in Soil	TRH >C6 - C10	mg/kg	25 : 20 (Interlab)	<25	<25	0	<25	<20	0
	TRH >C6 - C10 less BTEX (F1)	mg/kg	25 : 20 (Interlab)	<25	<25	0	<25	<20	0
svTRH (C10-C40) in Soil	TPH C10 - C14	mg/kg	50 : 20 (Interlab)	<50	<50	0	<50	<20	0
	TPH C15 - C28	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	TPH C29-C36	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
vTRH(C6-C10)/BTEXN in Soil	TPH C6 - C9	mg/kg	25 : 20 (Interlab)	<25	<25	0	<25	<20	0
PAHs in Soil	Naphthalene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
vTRH(C6-C10)/BTEXN in Soil	Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0
	Ethylbenzene	mg/kg	1 : 0.1 (Interlab)	<1	<1	0	<1	<0.1	0
	Naphthalene	mg/kg	1 : 0.5 (Interlab)	<1	<1	0	<1	<0.5	0
	Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0
	Xylene (m & p)	mg/kg	2 : 0.2 (Interlab)	<2	<2	0	<2	<0.2	0
	Xylene (o)	mg/kg	1 : 0.1 (Interlab)	<1	<1	0	<1	<0.1	0
	Xylene Total	mg/kg	3 : 0.3 (Interlab)	<3	<3	0	<3	<0.3	0
PAHs in Soil	Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5	<0.5	<0.5	0	<0.5	0.6	18
	Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	<0.5	<0.5	0	**<0.5**	**1.2**	**82**
	Acenaphthene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Acenaphthylene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Anthracene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Benz(a)anthracene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Benzo(a) pyrene	mg/kg	0.05 : 0.5 (Interlab)	<0.05	<0.05	0	<0.05	<0.5	0
	Benzo(b+j) & Benzo(k)fluoranthene	mg/kg	0.2	<0.2	<0.2	0	<0.2		
	Benzo(g,h,i)perylene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Chrysene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Fluoranthene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Fluorene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Phenanthrene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Pyrene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0
	Total +ve PAHs	mg/kg	0.05	<0.05	<0.05	0	<0.05		
PCBs in Soil	Arochlor 1016	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1221	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1232	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1242	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1248	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1254	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Arochlor 1260	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	PCBs (Sum of total)	mg/kg	0.1	<0.1	<0.1	0	<0.1		
Organochlorine Pesticides in soil	4,4-DDE	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	a-BHC	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Aldrin	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	b-BHC	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Chlordane (cis)	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	Chlordane (trans)	mg/kg	0.1	<0.1	<0.1	0	<0.1		
	d-BHC	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	DDD	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	DDT	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	DDT+DDE+DDD	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Dieldrin	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Endosulfan I	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Endosulfan II	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Endosulfan sulphate	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Endrin	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Endrin aldehyde	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	g-BHC (Lindane)	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Heptachlor	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Heptachlor epoxide	mg/kg	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.05	0
	Methoxychlor	mg/kg	0.1 : 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.2	0
	Hexachlorobenzene	µg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
Asbestos ID - soils	Asbestos fibres	g/kg		0.0E0	0.0E0	0	0.0E0		

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix D. Laboratory testing certificates and documentation

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200   fax 02 9910 6201
customerservice@envirolab.com.au
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CERTIFICATE OF ANALYSIS 232914

Client Details

Client	Jacobs Group (Australia) Pty Ltd
Attention	Kyle Mclean
Address	Level 7, 177 Pacific Highway, North Sydney, NSW, 2060

Sample Details

Your Reference	IA227900
Number of Samples	20 Soil
Date samples received	11/12/2019
Date completed instructions received	11/12/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	18/12/2019
Date of Issue	18/12/2019

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Senior Asbestos Analyst
Nick Sarlamis, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	111	110	103	110	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		232914-11	232914-12	232914-13	232914-15	232914-16
Your Reference	UNITS	TB_09/12/19	TS_09/12/19	TP103	TP103	TP104
Depth		-	-	0.0	0.5	0.0
Date Sampled		09/12/2019	09/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
TRH C_6 - C_9	mg/kg	[NA]	[NA]	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	[NA]	[NA]	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	[NA]	<25	<25	<25
Benzene	mg/kg	<0.2	95%	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	94%	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	98%	<1	<1	<1
m+p-xylene	mg/kg	<2	98%	<2	<2	<2
o-Xylene	mg/kg	<1	91%	<1	<1	<1
naphthalene	mg/kg	[NA]	[NA]	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	[NA]	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	120	98	111	104	114

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		232914-19
Your Reference	UNITS	TP104
Depth		1.0
Date Sampled		10/12/2019
Type of sample		Soil
Date extracted	-	13/12/2019
Date analysed	-	16/12/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	105

svTRH (C10-C40) in Soil						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	76	78	75	77	79

svTRH (C10-C40) in Soil					
Our Reference		232914-13	232914-15	232914-16	232914-19
Your Reference	UNITS	TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	14/12/2019	14/12/2019	14/12/2019	14/12/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	74	76	76	96

PAHs in Soil						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	95	101	100	100	100

PAHs in Soil					
Our Reference	UNITS	232914-13	232914-15	232914-16	232914-19
Your Reference		TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	102	99	98	103

Organochlorine Pesticides in soil						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	109	107	108	108

Organochlorine Pesticides in soil					
Our Reference		232914-13	232914-15	232914-16	232914-19
Your Reference	UNITS	TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	105	104	112

PCBs in Soil

Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	109	107	108	108

PCBs in Soil

Our Reference		232914-13	232914-15	232914-16	232914-19
Your Reference	UNITS	TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	105	104	112

Acid Extractable metals in soil						
Our Reference		232914-13	232914-15	232914-16	232914-19	232914-21
Your Reference	UNITS	TP103	TP103	TP104	TP104	TP103 - [TRIPLICATE]
Depth		0.0	0.5	0.0	1.0	0.5
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Arsenic	mg/kg	7	9	6	8	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	14	15	13	13
Copper	mg/kg	12	13	16	17	17
Lead	mg/kg	15	10	17	11	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	4	7	2	6

Moisture						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Moisture	%	13	11	4.4	14	8.8

Moisture					
Our Reference		232914-13	232914-15	232914-16	232914-19
Your Reference	UNITS	TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Moisture	%	5.6	11	10	14

Asbestos ID - soils NEPM - ASB-001					
Our Reference		232914-2	232914-7	232914-14	232914-17
Your Reference	UNITS	TP101	TP102	TP103	TP104
Depth		0.0-0.3	0.0-0.3	0-0.3	0.0-0.3
Date Sampled		10/12/2019	09/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Sample mass tested	g	1,138.44	943.39	862.85	1,066.32
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–
FA and AF Estimation*	g	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils						
Our Reference		232914-1	232914-5	232914-6	232914-8	232914-10
Your Reference	UNITS	TP101	TP101	TP102	TP102	QC101_101219
Depth		0.0	1.7	0.0	0.5	-
Date Sampled		10/12/2019	10/12/2019	09/12/2019	09/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Sample mass tested	g	Approx. 45g	Approx. 40g	Approx. 50g	Approx. 35g	Approx. 50g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils					
Our Reference		232914-13	232914-15	232914-16	232914-19
Your Reference	UNITS	TP103	TP103	TP104	TP104
Depth		0.0	0.5	0.0	1.0
Date Sampled		10/12/2019	10/12/2019	10/12/2019	10/12/2019
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Sample mass tested	g	Approx. 45g	Approx. 30g	Approx. 65g	Approx. 50g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil		
Our Reference		232914-5
Your Reference	UNITS	TP101
Depth		1.7
Date Sampled		10/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	16/12/2019
pH 1:5 soil:water	pH Units	5.3

CEC		
Our Reference		232914-5
Your Reference	UNITS	TP101
Depth		1.7
Date Sampled		10/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	16/12/2019
Exchangeable Ca	meq/100g	<0.1
Exchangeable K	meq/100g	0.2
Exchangeable Mg	meq/100g	2.5
Exchangeable Na	meq/100g	0.69
Cation Exchange Capacity	meq/100g	3.4

Clay 50-120g		
Our Reference		232914-5
Your Reference	UNITS	TP101
Depth		1.7
Date Sampled		10/12/2019
Type of sample		Soil
Date prepared	-	18/12/2019
Date analysed	-	18/12/2019
Clay in soils <2μm	% (w/w)	50

Method ID	Methodology Summary
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2µm reported.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.

Method ID	Methodology Summary
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date extracted	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	98	100
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	98	100
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	106	108
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	93	92
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	92	95
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	99	102
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	107
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	96	1	111	114	3	119	106

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	16/12/2019	16/12/2019		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	15	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	15	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	15	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	15	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	15	104	110	6	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date extracted	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	87	78
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	86	77
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	80
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	87	78
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	86	77
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	80
Surrogate o-Terphenyl	%		Org-003	79	1	76	78	3	90	86

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	14/12/2019	14/12/2019		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	15	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	15	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	15	76	78	3	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date extracted	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	98	94
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	96	96
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	100	92
Anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	96	94
Pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	94
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	76	78
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	1	<0.05	<0.05	0	104	104
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	101	1	95	102	7	106	98

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	15	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	15	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	15	99	101	2	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate					Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date extracted	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	124	120
HCB	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	120	116
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	122	108
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	138	130
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	134	128
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	133	132
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	122	110
Endrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	116	114
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	120	112
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	108	100
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	111	1	102	109	7	111	106

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	[NT]	15	105	109	4	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date extracted	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	88	85
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	111	1	102	109	7	111	106

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	[NT]	15	105	109	4	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	232914-5
Date prepared	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Date analysed	-			13/12/2019	1	13/12/2019	13/12/2019		13/12/2019	13/12/2019
Arsenic	mg/kg	4	Metals-020	<4	1	9	6	40	107	106
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	96
Chromium	mg/kg	1	Metals-020	<1	1	13	15	14	113	105
Copper	mg/kg	1	Metals-020	<1	1	18	17	6	108	114
Lead	mg/kg	1	Metals-020	<1	1	20	19	5	109	101
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	100	85
Nickel	mg/kg	1	Metals-020	<1	1	8	7	13	105	100
Zinc	mg/kg	1	Metals-020	<1	1	38	39	3	110	103

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	13/12/2019	13/12/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	15	9	8	12	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	15	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	15	14	13	7	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	15	13	11	17	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	15	10	10	0	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	15	4	3	29	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	15	39	23	52	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

Client Reference: IA227900

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

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

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Asbestos-ID Australian Standard: Excessive sample volumes were provided for asbestos analysis.
A portion of the supplied samples were sub-sampled according to Envirolab procedures.
We cannot guarantee that these sub-samples are indicative of the entire sample.
Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.
Note: Samples 232914-1,5,6,8,13,15,16,18 were sub-sampled from bags provided by the client.

Asbestos-ID Australian Standard: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample.
Envirolab recommends supplying 40-50g of sample in its own container.
Note: Sample 232914-10 was sub-sampled from a jar provided by the client.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 232914-15 for Zn. Therefore a triplicate result has been issued as laboratory sample number 232914-21.

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SAMPLE RECEIPT ADVICE

Client Details

Client	Jacobs Group (Australia) Pty Ltd
Attention	Kyle Mclean

Sample Login Details

Your reference	IA227900
Envirolab Reference	232914
Date Sample Received	11/12/2019
Date Instructions Received	11/12/2019
Date Results Expected to be Reported	18/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	20 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	2.7
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	Asbestos ID - soils	Misc Inorg - Soil	CEC	Clay 50-120g	On Hold
TP101-0.0	✓	✓	✓	✓	✓	✓		✓				
TP101-0.0-0.3							✓					
TP101-0.5												✓
TP101-1.0												✓
TP101-1.7	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
TP102-0.0	✓	✓	✓	✓	✓	✓		✓				
TP102-0.0-0.3							✓					
TP102-0.5	✓	✓	✓	✓	✓	✓		✓				
TP102-1.0												✓
QC101_101219	✓	✓	✓	✓	✓	✓		✓				
TB_09/12/19	✓											
TS_09/12/19	✓											
TP103-0.0	✓	✓	✓	✓	✓	✓		✓				
TP103-0-0.3							✓					
TP103-0.5	✓	✓	✓	✓	✓	✓		✓				
TP104-0.0	✓	✓	✓	✓	✓	✓		✓				
TP104-0.0-0.3							✓					
TP104-0.5												✓
TP104-1.0	✓	✓	✓	✓	✓	✓		✓				
TP104-1.5-1.7												✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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CERTIFICATE OF ANALYSIS 233129

Client Details

Client	Jacobs Group (Australia) Pty Ltd
Attention	Kyle Mclean
Address	Level 7, 177 Pacific Highway, North Sydney, NSW, 2060

Sample Details

Your Reference	**IA227900**
Number of Samples	14 Soil, 1 Material, 1 Water
Date samples received	13/12/2019
Date completed instructions received	13/12/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	20/12/2019
Date of Issue	20/12/2019

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Asbestos Approved By

Analysed by Asbestos Approved Identifier: Lucy Zhu, Panika Wongchanda
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By

Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Senior Asbestos Analyst

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference	UNITS	233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference		BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	125	124	129	128	122

vTRH(C6-C10)/BTEXN in Soil		
Our Reference	UNITS	233129-13
Your Reference		TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	129

svTRH (C10-C40) in Soil						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	104	104	69	103	102

svTRH (C10-C40) in Soil		
Our Reference		233129-13
Your Reference	UNITS	TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	100

PAHs in Soil						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	101	98	101	96	98

PAHs in Soil		
Our Reference		233129-13
Your Reference	UNITS	TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5

Organochlorine Pesticides in soil						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	99	98	98	98

Organochlorine Pesticides in soil		
Our Reference	UNITS	233129-13
Your Reference		TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1

PCBs in Soil						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	99	98	98	98

PCBs in Soil		
Our Reference		233129-13
Your Reference	UNITS	TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	97

Acid Extractable metals in soil						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Arsenic	mg/kg	5	8	10	9	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	10	19	11	18	17
Copper	mg/kg	21	13	19	22	8
Lead	mg/kg	11	12	15	13	16
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	4	2	4	6
Zinc	mg/kg	68	22	18	27	24

Acid Extractable metals in soil		
Our Reference		233129-13
Your Reference	UNITS	TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	16/12/2019
Arsenic	mg/kg	9
Cadmium	mg/kg	<0.4
Chromium	mg/kg	7
Copper	mg/kg	17
Lead	mg/kg	12
Mercury	mg/kg	<0.1
Nickel	mg/kg	4
Zinc	mg/kg	25

Moisture						
Our Reference	UNITS	233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference		BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Moisture	%	5.8	14	13	15	4.6

Moisture		
Our Reference	UNITS	233129-13
Your Reference		TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	17/12/2019
Moisture	%	7.2

Asbestos ID - soils						
Our Reference		233129-1	233129-2	233129-5	233129-7	233129-9
Your Reference	UNITS	BH04_0.0	BH04_0.5	TP05_0.0	TP05_0.5	TP06_0.0
Date Sampled		13/12/2019	13/12/2019	13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	18/12/2019	18/12/2019	18/12/2019	18/12/2019	18/12/2019
Sample mass tested	g	Approx. 30g	Approx. 55g	Approx. 60g	Approx. 45g	Approx. 45g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Red clayey soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils		
Our Reference		233129-13
Your Reference	UNITS	TP06_1.9
Date Sampled		13/12/2019
Type of sample		Soil
Date analysed	-	18/12/2019
Sample mass tested	g	Approx. 45g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Asbestos ID - soils NEPM - ASB-001				
Our Reference		233129-6	233129-10	233129-15
Your Reference	UNITS	TP05_0.0-0.3	TP06_0.0-0.3	TP06_1.0-1.9
Date Sampled		13/12/2019	13/12/2019	13/12/2019
Type of sample		Soil	Soil	Soil
Date analysed	-	16/12/2019	16/12/2019	16/12/2019
Sample mass tested	g	1,072.67	817.97	1,053.17
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–
FA and AF Estimation*	g	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001

Asbestos ID - materials		
Our Reference		233129-11
Your Reference	UNITS	TP06_PACM-01
Date Sampled		13/12/2019
Type of sample		Material
Date analysed	-	17/12/2019
Mass / Dimension of Sample	-	75x45x5mm
Sample Description	-	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected
Trace Analysis	-	Not tested

vTRH(C6-C10)/BTEXN in Water		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date extracted	-	17/12/2019
Date analysed	-	18/12/2019
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	105
Surrogate toluene-d8	%	100
Surrogate 4-BFB	%	100

svTRH (C10-C40) in Water		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date extracted	-	17/12/2019
Date analysed	-	18/12/2019
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	130
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	120
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	120
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	116

PAHs in Water		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date extracted	-	17/12/2019
Date analysed	-	17/12/2019
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE

Organochlorine Pesticides in Water		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date extracted	-	17/12/2019
Date analysed	-	17/12/2019
alpha-BHC	µg/L	<0.2
HCB	µg/L	<0.2
beta-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
Endosulfan II	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
pp-DDT	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
		116

PCBs in Water		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date extracted	-	17/12/2019
Date analysed	-	17/12/2019
Aroclor 1016	µg/L	<2
Aroclor 1221	µg/L	<2
Aroclor 1232	µg/L	<2
Aroclor 1242	µg/L	<2
Aroclor 1248	µg/L	<2
Aroclor 1254	µg/L	<2
Aroclor 1260	µg/L	<2
Surrogate TCMX	%	116

HM in water - total		
Our Reference		233129-14
Your Reference	UNITS	R01_131219
Date Sampled		13/12/2019
Type of sample		Water
Date prepared	-	16/12/2019
Date analysed	-	16/12/2019
Arsenic-Total	µg/L	<1
Cadmium-Total	µg/L	<0.1
Chromium-Total	µg/L	<1
Copper-Total	µg/L	<1
Lead-Total	µg/L	<1
Mercury-Total	µg/L	<0.05
Nickel-Total	µg/L	<1
Zinc-Total	µg/L	1

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** [#1] Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** [#2] The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.

Method ID	Methodology Summary
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Client Reference: IA227900

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	97	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	94	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	94	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	125	[NT]	[NT]	[NT]	[NT]	129	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	77	[NT]
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	77	[NT]
Surrogate o-Terphenyl	%		Org-003	100	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate					Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	70	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	88	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	94	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	136	[NT]
HCB	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	128	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	122	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
Endrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	99	[NT]	[NT]	[NT]	[NT]	98	[NT]

Client Reference: IA227900

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-006	99	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	106	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Date analysed	-			18/12/2019	[NT]	[NT]	[NT]	[NT]	18/12/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	112	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	102	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-016	98	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-016	100	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	99	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	99	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate o-Terphenyl	%		Org-003	114	[NT]	[NT]	[NT]	[NT]	104	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Naphthalene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Acenaphthylene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Phenanthrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Benzo(a)anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012/017	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	84	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: Organochlorine Pesticides in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
alpha-BHC	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	84	[NT]
HCB	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	84	[NT]
gamma-BHC	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	84	[NT]
delta-BHC	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	88	[NT]
gamma-Chlordane	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	90	[NT]
Dieldrin	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
Endrin	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	112	[NT]
Endosulfan II	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	98	[NT]
Endrin Aldehyde	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	88	[NT]
Methoxychlor	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	79	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: PCBs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Date analysed	-			17/12/2019	[NT]	[NT]	[NT]	[NT]	17/12/2019	[NT]
Aroclor 1016	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Aroclor 1260	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-006	79	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Lead-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

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

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Sample 233129-13 was sub-sampled from a jar provided by the client.

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SAMPLE RECEIPT ADVICE

Client Details

Client	Jacobs Group (Australia) Pty Ltd
Attention	Kyle Mclean

Sample Login Details

Your reference	IA227900
Envirolab Reference	233129
Date Sample Received	13/12/2019
Date Instructions Received	13/12/2019
Date Results Expected to be Reported	20/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	14 Soil, 1 Material, 1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	9.7
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Extra bag received: TP06_0.5

Please direct any queries to:

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

Analysis Underway, details on the following page:

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Asbestos ID - soils NEPM - ASB-001	Asbestos ID - materials	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	Organochlorine Pesticides in Water	PCBs in Water	HM in water - total	On Hold
BH04_0.0	✓	✓	✓	✓	✓	✓	✓									
BH04_0.5	✓	✓	✓	✓	✓	✓	✓									
BH04_1.0																✓
BH04_2.0																✓
TP05_0.0	✓	✓	✓	✓	✓	✓	✓									
TP05_0.0-0.3								✓								
TP05_0.5	✓	✓	✓	✓	✓	✓	✓									
TP05_1.0																✓
TP06_0.0	✓	✓	✓	✓	✓	✓	✓									
TP06_0.0-0.3								✓								
TP06_PACM-01									✓							
TP06_0.5-1.0																✓
TP06_1.9	✓	✓	✓	✓	✓	✓	✓									
R01_131219										✓	✓	✓	✓	✓	✓	
TP06_1.0-1.9								✓								
TP06_0.5																✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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CERTIFICATE OF ANALYSIS 235751

Client Details

Client	Jacobs Group (Australia) Pty Ltd
Attention	Campbell Young
Address	Level 7, 177 Pacific Highway, North Sydney, NSW, 2060

Sample Details

Your Reference	**IA227900**
Number of Samples	9 Soil
Date samples received	31/01/2020
Date completed instructions received	04/02/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	11/02/2020
Date of Issue	11/02/2020

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Aida Marner
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Asbestos Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	85	85	83	66	79

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		235751-7	235751-8	235751-9
Your Reference	UNITS	TP201_0.1	TRIP SPIKE	TRIP BLANK
Depth		0.1	-	-
Date Sampled		30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	06/02/2020	06/02/2020	06/02/2020
TRH C_6 - C_9	mg/kg	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]	<25
Benzene	mg/kg	<0.2	97%	<0.2
Toluene	mg/kg	<0.5	109%	<0.5
Ethylbenzene	mg/kg	<1	118%	<1
m+p-xylene	mg/kg	<2	117%	<2
o-Xylene	mg/kg	<1	113%	<1
naphthalene	mg/kg	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<3	[NA]	<3
Surrogate aaa-Trifluorotoluene	%	80	77	86

svTRH (C10-C40) in Soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	07/02/2020	07/02/2020	07/02/2020	07/02/2020	07/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	97	94	97	97	98

svTRH (C10-C40) in Soil		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date extracted	-	05/02/2020
Date analysed	-	07/02/2020
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	97

PAHs in Soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	07/02/2020	07/02/2020	07/02/2020	07/02/2020	07/02/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	118	118	120	124	121

PAHs in Soil		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date extracted	-	05/02/2020
Date analysed	-	07/02/2020
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5

Organochlorine Pesticides in soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	07/02/2020	07/02/2020	07/02/2020	07/02/2020	07/02/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	121	119	106	118	105

Organochlorine Pesticides in soil		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date extracted	-	05/02/2020
Date analysed	-	07/02/2020
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1

PCBs in Soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	07/02/2020	07/02/2020	07/02/2020	07/02/2020	07/02/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	121	119	106	118	105

PCBs in Soil		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date extracted	-	05/02/2020
Date analysed	-	07/02/2020
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	110

Acid Extractable metals in soil						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Arsenic	mg/kg	17	6	11	7	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	16	15	12	10
Copper	mg/kg	24	22	32	14	13
Lead	mg/kg	14	19	18	14	11
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	15	20	7	4
Zinc	mg/kg	43	33	46	27	24

Acid Extractable metals in soil		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date prepared	-	05/02/2020
Date analysed	-	05/02/2020
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	13
Copper	mg/kg	23
Lead	mg/kg	15
Mercury	mg/kg	<0.1
Nickel	mg/kg	19
Zinc	mg/kg	38

Moisture						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Date analysed	-	06/02/2020	06/02/2020	06/02/2020	06/02/2020	06/02/2020
Moisture	%	15	17	18	11	9.6

Moisture		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date prepared	-	05/02/2020
Date analysed	-	06/02/2020
Moisture	%	16

Asbestos ID - soils						
Our Reference		235751-1	235751-2	235751-4	235751-5	235751-6
Your Reference	UNITS	TP2023_0.1	QC101	TP203_0.7	TP202_0.1	TP202_0.5
Depth		0.1	0.1	0.7	0.1	0.5
Date Sampled		30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/02/2020	10/02/2020	10/02/2020	10/02/2020	10/02/2020
Sample mass tested	g	Approx. 55g	Approx. 30g	Approx. 35g	Approx. 55g	Approx. 60g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils		
Our Reference		235751-7
Your Reference	UNITS	TP201_0.1
Depth		0.1
Date Sampled		30/01/2020
Type of sample		Soil
Date analysed	-	10/02/2020
Sample mass tested	g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date extracted	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			06/02/2020	[NT]	[NT]	[NT]	[NT]	06/02/2020	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	87	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	91	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	97	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	[NT]	[NT]	[NT]	[NT]	82	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date extracted	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			07/02/2020	[NT]	[NT]	[NT]	[NT]	07/02/2020	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	99	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			07/02/2020	[NT]	[NT]	[NT]	[NT]	07/02/2020	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	122	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	118	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	126	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			07/02/2020	[NT]	[NT]	[NT]	[NT]	07/02/2020	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
HCB	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	122	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Endrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	112	[NT]	[NT]	[NT]	[NT]	109	[NT]

Client Reference: IA227900

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			07/02/2020	[NT]	[NT]	[NT]	[NT]	07/02/2020	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-006	112	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date prepared	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Date analysed	-			05/02/2020	[NT]	[NT]	[NT]	[NT]	05/02/2020	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	100	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Samples received in good order: No

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.
Note: Samples 235751-1, 2, 4, 5, 6, 7 were sub-sampled from bags provided by the client.

Sample Receipt Advice

Company name:	**Jacobs Group (Australia) P/L NSW**
Contact name:	Michael Stacey
Project name:	IA227900
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Dec 12, 2019 4:50 PM
Eurofins reference:	**693410**

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.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Michael Stacey - michael.stacey@jacobs.com.

Company Name: Jacobs Group (Australia) P/L NSW
Address: Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Project Name: IA227900

Order No.:
Report #: 693410
Phone: 02 9928 2100
Fax: 02 9928 2504

Received: Dec 12, 2019 4:50 PM
Due: Dec 19, 2019
Priority: 5 Day
Contact Name: Michael Stacey

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	Moisture Set	Eurofins | mgt Suite B9
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC102_101219	Dec 10, 2019		Soil	S19-De18661	X	X	X
Test Counts						1	1	1

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Jacobs Group (Australia) P/L NSW
Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Attention:	Michael Stacey
Report	693410-AID
Project Name	IA227900
Received Date	Dec 12, 2019
Date Reported	Dec 19, 2019

Methodology:

Asbestos Fibre Identification	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. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter 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) is employed. *NOTE: 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.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name	IA227900
Project ID	
Date Sampled	Dec 10, 2019
Report	693410-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
QC102_101219	19-De18661	Dec 10, 2019	Approximate Sample 63g Sample consisted of: Brown coarse-grained clayey soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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
Asbestos - LTM-ASB-8020	Sydney	Dec 12, 2019	Indefinite

Company Name: Jacobs Group (Australia) P/L NSW
Address: Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Project Name: IA227900

Order No.:
Report #: 693410
Phone: 02 9928 2100
Fax: 02 9928 2504

Received: Dec 12, 2019 4:50 PM
Due: Dec 19, 2019
Priority: 5 Day
Contact Name: Michael Stacey

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	Moisture Set	Eurofins | mgt Suite B9
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC102_101219	Dec 10, 2019		Soil	S19-De18661	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. 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 Sample Receipt Advice.

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.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

The sample received was not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-sample to be analysed accurately represented the sample received.

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
N/A	Not applicable

Asbestos Counter/Identifier:

Chamath JHM Annakkage	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (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.

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Jacobs Group (Australia) P/L NSW
Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Attention: **Michael Stacey**

Report **693410-S**
Project name IA227900
Received Date Dec 12, 2019

Client Sample ID			**QC102_101219**
Sample Matrix			**Soil**
Eurofins Sample No.			**S19-De18661**
Date Sampled			**Dec 10, 2019**
Test/Reference	LOR	Unit	
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	%	70
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
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
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)^{N01}	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
Total Recoverable Hydrocarbons			
TRH C6-C9	20	mg/kg	< 20
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene^{N07}	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5

Client Sample ID			**QC102_101219**
Sample Matrix			**Soil**
Eurofins Sample No.			**S19-De18661**
Date Sampled			**Dec 10, 2019**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	84
p-Terphenyl-d14 (surr.)	1	%	91
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
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
d-BHC	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
g-BHC (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	0.2	mg/kg	< 0.2
Toxaphene	1	mg/kg	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2
Dibutylchlorendate (surr.)	1	%	83
Tetrachloro-m-xylene (surr.)	1	%	93
Heavy Metals			
Arsenic	2	mg/kg	14
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	21
Copper	5	mg/kg	28
Lead	5	mg/kg	36
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	11
Zinc	5	mg/kg	61
% Moisture	1	%	10

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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
Eurofins | mgt Suite B9			
BTEX	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Dec 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Sydney	Dec 17, 2019	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Metals M8	Sydney	Dec 17, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Dec 12, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

Company Name: Jacobs Group (Australia) P/L NSW
Address: Level 7, 177 Pacific Highway
North Sydney
NSW 2065

Project Name: IA227900

Order No.:
Report #: 693410
Phone: 02 9928 2100
Fax: 02 9928 2504

Received: Dec 12, 2019 4:50 PM
Due: Dec 19, 2019
Priority: 5 Day
Contact Name: Michael Stacey

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	Moisture Set	Eurofins | mgt Suite B9
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC102_101219	Dec 10, 2019		Soil	S19-De18661	X	X	X
Test Counts						1	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							
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							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
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							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	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-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
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	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	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	
LCS - % Recovery							
BTEX							
Benzene	%	111			70-130	Pass	
Toluene	%	108			70-130	Pass	
Ethylbenzene	%	109			70-130	Pass	
m&p-Xylenes	%	111			70-130	Pass	
o-Xylene	%	101			70-130	Pass	
Xylenes - Total	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	94			70-130	Pass	
TRH C6-C10	%	126			70-130	Pass	
TRH >C10-C16	%	82			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	127			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	89			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	75			70-130	Pass	
Acenaphthylene	%	80			70-130	Pass	
Anthracene	%	78			70-130	Pass	
Benz(a)anthracene	%	101			70-130	Pass	
Benzo(a)pyrene	%	98			70-130	Pass	
Benzo(b&j)fluoranthene	%	83			70-130	Pass	
Benzo(g.h.i)perylene	%	84			70-130	Pass	
Benzo(k)fluoranthene	%	82			70-130	Pass	
Chrysene	%	85			70-130	Pass	
Dibenz(a.h)anthracene	%	95			70-130	Pass	
Fluoranthene	%	80			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fluorene			%	79			70-130	Pass	
Indeno(1.2.3-cd)pyrene			%	97			70-130	Pass	
Naphthalene			%	82			70-130	Pass	
Phenanthrene			%	81			70-130	Pass	
Pyrene			%	79			70-130	Pass	
LCS - % Recovery									
Organochlorine Pesticides									
Chlordanes - Total			%	99			70-130	Pass	
4.4'-DDD			%	102			70-130	Pass	
4.4'-DDE			%	97			70-130	Pass	
4.4'-DDT			%	95			70-130	Pass	
a-BHC			%	101			70-130	Pass	
Aldrin			%	99			70-130	Pass	
b-BHC			%	97			70-130	Pass	
d-BHC			%	101			70-130	Pass	
Dieldrin			%	99			70-130	Pass	
Endosulfan I			%	98			70-130	Pass	
Endosulfan II			%	100			70-130	Pass	
Endosulfan sulphate			%	99			70-130	Pass	
Endrin			%	102			70-130	Pass	
Endrin aldehyde			%	97			70-130	Pass	
Endrin ketone			%	97			70-130	Pass	
g-BHC (Lindane)			%	100			70-130	Pass	
Heptachlor			%	100			70-130	Pass	
Heptachlor epoxide			%	105			70-130	Pass	
Hexachlorobenzene			%	100			70-130	Pass	
Methoxychlor			%	100			70-130	Pass	
Toxaphene			%	89			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	101			70-130	Pass	
Cadmium			%	106			70-130	Pass	
Chromium			%	108			70-130	Pass	
Copper			%	111			70-130	Pass	
Lead			%	112			70-130	Pass	
Mercury			%	103			70-130	Pass	
Nickel			%	112			70-130	Pass	
Zinc			%	110			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-De23130	NCP	%	83			70-130	Pass	
Toluene	S19-De23130	NCP	%	80			70-130	Pass	
Ethylbenzene	S19-De23130	NCP	%	82			70-130	Pass	
m&p-Xylenes	S19-De23130	NCP	%	83			70-130	Pass	
o-Xylene	S19-De23130	NCP	%	75			70-130	Pass	
Xylenes - Total	S19-De23130	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-De23130	NCP	%	76			70-130	Pass	
TRH C6-C10	S19-De23130	NCP	%	92			70-130	Pass	
TRH >C10-C16	S19-De24127	NCP	%	72			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C9	S19-De23130	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S19-De24127	NCP	%	78			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S19-De23130	NCP	%	79			70-130	Pass	
Acenaphthylene	S19-De23130	NCP	%	86			70-130	Pass	
Anthracene	S19-De23130	NCP	%	86			70-130	Pass	
Benz(a)anthracene	S19-De23130	NCP	%	120			70-130	Pass	
Benzo(a)pyrene	S19-De23130	NCP	%	111			70-130	Pass	
Benzo(b&j)fluoranthene	S19-De23130	NCP	%	116			70-130	Pass	
Benzo(g.h.i)perylene	S19-De23130	NCP	%	105			70-130	Pass	
Benzo(k)fluoranthene	S19-De23130	NCP	%	106			70-130	Pass	
Chrysene	S19-De23130	NCP	%	88			70-130	Pass	
Dibenz(a.h)anthracene	S19-De23130	NCP	%	115			70-130	Pass	
Fluoranthene	S19-De23130	NCP	%	87			70-130	Pass	
Fluorene	S19-De23130	NCP	%	85			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S19-De23130	NCP	%	115			70-130	Pass	
Naphthalene	S19-De23130	NCP	%	89			70-130	Pass	
Phenanthrene	S19-De23130	NCP	%	79			70-130	Pass	
Pyrene	S19-De23130	NCP	%	86			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S19-De23131	NCP	%	91			70-130	Pass	
4.4'-DDD	S19-De23131	NCP	%	124			70-130	Pass	
4.4'-DDE	S19-De23131	NCP	%	70			70-130	Pass	
4.4'-DDT	S19-De23218	NCP	%	78			70-130	Pass	
a-BHC	S19-De23131	NCP	%	94			70-130	Pass	
Aldrin	S19-De23131	NCP	%	91			70-130	Pass	
b-BHC	S19-De23131	NCP	%	89			70-130	Pass	
d-BHC	S19-De23131	NCP	%	93			70-130	Pass	
Dieldrin	S19-De23131	NCP	%	83			70-130	Pass	
Endosulfan I	S19-De23131	NCP	%	92			70-130	Pass	
Endosulfan II	S19-De23131	NCP	%	91			70-130	Pass	
Endosulfan sulphate	S19-De23131	NCP	%	87			70-130	Pass	
Endrin	S19-De23131	NCP	%	93			70-130	Pass	
Endrin aldehyde	S19-De23131	NCP	%	88			70-130	Pass	
Endrin ketone	S19-De23131	NCP	%	74			70-130	Pass	
g-BHC (Lindane)	S19-De23131	NCP	%	89			70-130	Pass	
Heptachlor	S19-De23131	NCP	%	82			70-130	Pass	
Heptachlor epoxide	S19-De23131	NCP	%	96			70-130	Pass	
Hexachlorobenzene	S19-De23131	NCP	%	94			70-130	Pass	
Methoxychlor	S19-De23218	NCP	%	80			70-130	Pass	
Toxaphene	S19-De23218	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-De24103	NCP	%	140			70-130	Fail	Q08
Cadmium	S19-De24103	NCP	%	139			70-130	Fail	Q08
Chromium	S19-De24103	NCP	%	147			70-130	Fail	Q08
Copper	S19-De24103	NCP	%	151			70-130	Fail	Q08
Lead	S19-De24103	NCP	%	154			70-130	Fail	Q08
Mercury	S19-De24103	NCP	%	156			70-130	Fail	Q08
Nickel	S19-De24103	NCP	%	152			70-130	Fail	Q08
Zinc	S19-De24103	NCP	%	142			70-130	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-De23129	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-De23129	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-De23129	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S19-De23129	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-De23129	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S19-De23129	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S19-De23129	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S19-De23129	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-De23129	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S19-De23129	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S19-De23129	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S19-De23129	NCP	mg/kg	0.15	0.16	9.0	30%	Pass	
4.4'-DDT	S19-De23129	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
a-BHC	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S19-De23129	NCP	mg/kg	0.08	0.09	9.0	30%	Pass	
Endosulfan I	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endosulfan sulphate	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S19-De23129	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S19-De23129	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S19-De23129	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-De22720	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S19-De22720	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-De22720	NCP	mg/kg	6.5	7.9	19	30%	Pass	
Copper	S19-De22720	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	S19-De22720	NCP	mg/kg	57	53	8.0	30%	Pass	
Mercury	S19-De22720	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S19-De22720	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S19-De22720	NCP	mg/kg	110	60	59	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-De18663	NCP	%	< 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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
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

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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.