TAFE NSW

# TAFE NSW Bega - Stage 2 Development Due Diligence Preliminary Site Investigation for Contamination and Geotechnical

September 2019

# Executive summary

GHD Pty Ltd (GHD) was commissioned by TAFE NSW to undertake a Preliminary Site Investigation (PSI) for Contamination and Geotechnical. The site is located at No. 1 McKee Drive, Bega, NSW (the site).

TAFE NSW required this investigation as part of due diligence and to support the development application (DA) process for the proposed development of the site. TAFE NSW intend to redevelop the site into a tertiary educational facility, which will comprise building(s), pavements, footpaths and other associated structures. The planned development site layout is currently unavailable as the project is in pre-concept design stage

The objectives of the geotechnical investigation were to inform the concept design of the proposed development with geotechnical parameters of encountered materials, including assessment of subsurface conditions, and prepare a report that includes advice / recommendations in relation to these parameters.

The objectives of the PSI for contamination were to assess the likelihood for contamination to exist on the site from past or present activities; provide recommendations for further investigation and/or options management (if applicable) with respect to the proposed development based on the findings of the assessment.

The scope of work developed to meet these objectives included a desktop study of site history and review of previous hazardous building materials reports, site walkover, soil sampling from five boreholes and six surface samples, laboratory analysis of selected soil samples for contaminants of potential concern (COPC) and geotechnical parameters, interpretation of results and make conclusions and recommendations in relation to the above objectives.

The site formed part of the Bega District Hospital, which was constructed circa 1946. A small segment of the Community Health Centre building is situated within the north-western portion of the site. The remaining parts of the site remained undeveloped until circa 1979 where a residential dwelling was constructed to provide temporary accommodation for nurses and visiting doctors.

Based on site history and site observation results, potential for contamination was identified in four areas of environmental concern (AECs) which included:

- AEC 1: Imported fill of unknown quality and origin within the northern, southern and eastern parts of the site. Fill may exist in other areas of the site including below the internal access road.
- AEC 2: Ash material in the southern part of the site and at the surface in the remaining areas of the site.
- AEC 3: Potential impacts to soil from the weathering of hazardous building materials and application of pesticides adjacent to existing site structures.
- AEC 4: Onsite migration of potential contamination via stormwater drain which collects surface water runoff from McKee Drive and directs it onto the site. The source of contamination is associated with incidental spills of fuel/oil and other general road grime.

Field and laboratory results did not identify contamination with respect to human health in the AECs. Therefore, the likelihood of contamination being present and posing a potential constraint to redevelopment is assessed as low.

However, concentrations of, zinc, TRH and PAH exceeded ecological assessment criteria at three locations (BH01, SS04. SS06) in near surface soils. No vegetation was present at locations BH01 and SS06, and exposed patches of soil were present near SS04. Based on the current site configuration the exposure pathway to ecological receptors is potentially complete. However, following redevelopment of the site the exposure pathways are likely to change and should be reassessed at that time.

Ash fill is present at the site and appears to be a thicker deposit in the southern parts of the site. Ash may pose an aesthetic issue for the current residential land use however unlikely to be a concern for the future development as there will have minimal access to soils for the majority of site users.

Based upon the findings of this targeted preliminary investigation, as outlined above, the following recommendations are made in order to further assess or mitigate contamination risks associated with the site.

- Preparation of an Unexpected Finds Protocol (UFP) to manage occurrences of contamination that may be encountered during construction. These occurrences may include ACM, staining, odours or ground conditions that differ significantly to what has been encountered during this investigation.
- Assessment of the western portion of the site following removal of the internal access road. This assessment would target potential fill material that may exist below the road and adjacent to the Community Health Care building.
- Assess the building footprints for potential asbestos and lead impacts following removal of site structures in preparation for redevelopment. The residential dwelling contains asbestos and it is possible that the section of building in the western portion of the site may also contain hazardous building materials due to its age. There is a potential for soil contamination following demolition of structures containing hazardous building materials. Soils should be assessed for potential contamination following demolition of structures and prior to commencing earthworks / construction activities.
- Reassess exposure pathways for ecological receptors once the new site layout has been finalised.

Geotechnical advice and recommendations are discussed in Section 12.1.

*This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the Report.*

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# 1. Introduction

## 1.1 General

GHD Pty Ltd (GHD) was commissioned by TAFE NSW to undertake a Preliminary Site Investigation (PSI) for Contamination and Geotechnical. The site is located at No. 1 McKee Drive, Bega, NSW (the site). The site is shown in Figure 1, Appendix B.

TAFE NSW required this investigation as part of due diligence and to support the development application (DA) process for the proposed development of the site. TAFE NSW intend to redevelop the site into a tertiary educational facility, which will comprise building(s), pavements, footpaths and other associated structures. The planned development site layout is currently unavailable as the project is in pre-concept design stage.

This preliminary Contamination and Geotechnical Investigation has been carried out in general accordance with GHD's email proposal, dated 20 May 2019 and subsequent variations approved by TAFE NSW.

## 1.2 Objectives

### 1.2.1 Geotechnical

The objectives of the geotechnical investigation were to:

- Inform the concept design of the proposed development with geotechnical parameters of encountered materials, including assessment of subsurface conditions, and prepare a report including advice / recommendations in relation to:
  - Excavation and groundwater conditions (if encountered);
  - Bearing capacity of the soil and rock;
  - Suitable footing types for likely buildings;
  - Preliminary site classification to AS 2870, Residential Slabs and Footings;
  - Site preparation and earthworks.
- Provide a preliminary slope stability assessment for the project area to assess potential for slope instability on site.

### 1.2.2 Contamination

The purpose of this report is to document the findings of the PSI for contamination at this site for NSW TAFE. In order to achieve this, the PSI has the following objectives:

- Assess the potential for contamination to exist on the site from past or present activities; and
- Provide recommendations for further investigation and/or options management in relation to the proposed development (if applicable).

## 1.3 Scope of work

To meet the project objectives, the following scope of work was carried out:

- Review of published information (e.g. topographic, geological, soil landscape maps).
- Specific information reviewed for assessing the potential for contamination to exist at the site included: historical title records, aerial photographs and Council planning records; holding interviews with persons familiar with the history of the site; search of WaterNSW groundwater bore database and NSW Environment Protection Authority (EPA) databases.
- A site walkover to visually assess potential sources of contamination, observe surrounding land uses, topography, drainage, nearby sensitive environments, and assess details of the site history and desk study to further assess potential areas of environmental concern (AEC) and contaminants of potential concern (COPC).
- Prepare a conceptual site model (CSM).
- Drilling of five boreholes (BH01 to BH05) a maximum depth of 6.7 m below ground level (bgl) using a Gemco 210 SD drilling rig. Soil samples were collected from each borehole for laboratory analysis. One borehole (BH02) was continued as a cored borehole using NMLC diamond coring techniques to a depth of 13.4 m bgl.
- Collection of six surface soil samples (SS01 to SS06) targeting the upper 0.1 m of the soil profile.
- Log subsurface conditions noting the extent of fill, groundwater inflows and evidence of contamination.
- Collection of soil samples in duplicate and screening for Volatile Organic Compounds (VOC) using a Photoionisation Detector (PID).
- Selected samples were analysed for a suite of COPCs including petroleum hydrocarbons, polychlorinated biphenyls, pesticides, heavy metals and asbestos.
- Geotechnical testing included:
  - Four soil samples tested for Atterberg limits including linear shrinkage and moisture content.
  - Three rock samples tested for point load index.
  - One soil sample tested for CBR 4 day soaked, at 100% standard compaction.
  - One soil sample and one rock sample were tested for aggressivity (pH, electrical conductivity (EC), chloride (Cl), resistivity, sulfate ($SO_4$)).
- Preparation of this report summarising results of site history, site walkover, fieldwork, presenting and interpreting analytical results and findings, comparing chemical concentrations to applicable assessment criteria and making conclusions and recommendations with respect to the objectives outlined in Section 1.2.

## 1.4 Basis of the PSI for contamination

The framework for the PSI for contamination herein, was developed in accordance with guidelines "made or approved", by the NSW EPA under the *Contaminated Land Management Act, 1997*. These guidelines include, but are not limited, to the following:

- NSW EPA (2011), "*Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*".
- NEPM (2013), "*National Environment Protection (Assessment of Site Contamination) Measure 1999*", National Environment Protection Council (NEPC).

## 1.5 Limitations

*This report: has been prepared by GHD for TAFE NSW and may only be used and relied on by TAFE NSW for the purpose agreed between GHD and the TAFE NSW as set out in Section 1.2 and proposal referenced in Section 1.2 of this report.*

*GHD otherwise disclaims responsibility to any person other than TAFE NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by TAFE NSW and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

*Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.*

*Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.*

*This report is to be read in conjunction with document titled "General Notes" (Ref: DS5.5.1 Issue 1.8 Date: 5/10/2012), which is located in Appendix A of this report.*

# 2. Site setting

## 2.1 Location and zoning

Site identification details and surrounding land uses are summarised in Table 2-1. The site layout and surrounding areas are shown on Figure 1 (Appendix B). The surveyed site boundary is shown on drawing no. 201533A titled “Plan of Detail, Levels & Contours”, dated 19/6/2019. The proposed property acquisition plan also shows the site boundary and area, which is designated as Lot 3. A copy of the survey plan and proposed acquisition plan are included in Appendix C.

**Table 2-1: Site identification details**

| | |
|---|---|
| Address: | No. 1 McKee Drive, Bega, NSW |
| Title identification: | Part Lot 2 DP1243054 (current title identification) |
| Zoning: | R2 low density residential under the Bega Valley Local Environmental Plan 2013 (LEP 2013) |
| Area (surveyed): | 2,888 $m^2$ |
| Local government area: | Bega |
| County: | Auckland |
| Parish: | Bega |
| Proposed land use: | Tertiary education |
| Current land owner and land use: | Southern NSW Local Health District. Residential dwelling. |
| Surrounding land use: | North: Connected Learning Centre<br>East: Auckland Street and residential housing<br>South: McKee Drive and residential housing<br>West: Bega Hospital |
| Site coordinates:<br>(Zone 56 H) | 753701 m E; 5936772 m N; elevation 34.4860 (m AHD) (measured from the northeast corner of the site boundary). Coordinates obtained from the site survey drawing included in Appendix C. |

## 2.2 Sensitive environments

Kisses Lagoon is located approximately 650 m northwest of the site and has been identified as being a low, moderate and high potential groundwater and inflow dependent ecosystem. As discussed in Section 2.3, an unnamed tributary is located approximately 85 m north and down gradient of the site and discharges into Kisses Lagoon.

## 2.3 Topography and drainage

The survey drawing in Appendix C indicates that the site is at an elevation between 34.50 m and 39.25 m above Australian Height Datum (AHD). The site is situated on the side of a broad ridge associated with a granodiorite intrusion. The highest point on the site occurs in the south-western corner and the lowest point occurs in the north-eastern corner. The ground surface over the site falls towards the north and north-west. The gradient is generally gentle to moderate (approximately 5% to 7%) with locally steeper sections along the southern boundary of greater than 10%.

An unnamed tributary is located approximately 85 m north of the site and appears to flow north-west into Kisses Lagoon. Kisses Lagoon is located approximately 650 m northwest of the site.

A stormwater drainage line flows through the site from south to north-west. The survey drawing in Appendix C indicates that stormwater from McKee Drive is directed into stormwater pits then flows into a concrete pipe below McKee Drive and the southern part of the site. The stormwater then discharges from this pipe onto the site. The stormwater continues as overland flow through the site and onto the neighbouring property adjacent to the northern boundary (Lot 1 DP 1243054). Based on the survey plan contours and site observations, onsite surface water runoff that is not absorbed into the ground, is likely to flow towards the drainage line.

It is likely that stormwater/surface water that has not been absorbed into the ground will continue to flow to the north-west and discharge into the unnamed tributary.

No significant wet areas were observed over the surface; however, drought conditions existed in the region at the time of our investigation. The lower north-western parts of the site have been filled with coarse gravels suggesting that during wet conditions this area of the site may retain some water.

## 2.4 Soil landscape

The Bega 1:100 000 Soil Landscape Series Sheet 8824 (Soil Conservation Service of NSW, 1998) indicates the site is situated within the Lower Brogo soil landscape. This soil landscape is described as:

- Transferral soil landscape:
  - Landscape – Rolling to undulating low hills on granodiorite. Local relief 30-110 m; slopes gently to moderately inclined (8-32%). Elevation 10-210 m. Minor bedrock outcrop. Cleared.
  - Soils – Moderately deep, moderately well drained and leached red earths and yellow earths on crests to mid-slopes. Moderately deep, poorly drained soils on the lower slopes and drainage lines.
  - Limitations – infertile, acid soils subject to seasonal waterlogging (lower slopes, springs) and water erosion hazard with bedrock outcrops (localised), groundwater pollution hazard.

## 2.5 Acid sulphate soils

With reference to the NSW Government Sharing and Enabling Environmental Data (SEED) website, there is no known occurrence of acid sulphate soils at or near the site.

## 2.6 Geology

Reference to the 1:250,000 Bega-Mallacoota Geological Series Sheet SJ/55-4 and part SJ/55-8 (Geological Survey of NSW 1985) indicates that the site is underlain by Brogo Granodiorite, an intrusive rock of early Devonian age. The 1:100,000 Bega Valley Area – Coastal Quaternary Geology indicates that the site is situated near a geological contact of Quaternary undifferentiated sediments described as valley fill of silts, clays, fluvial sand and gravel. Figure 2-1 shows the mapped geological units relative to the site. The green shading represents the Quaternary unit whilst the pink shading represents the granodiorite.

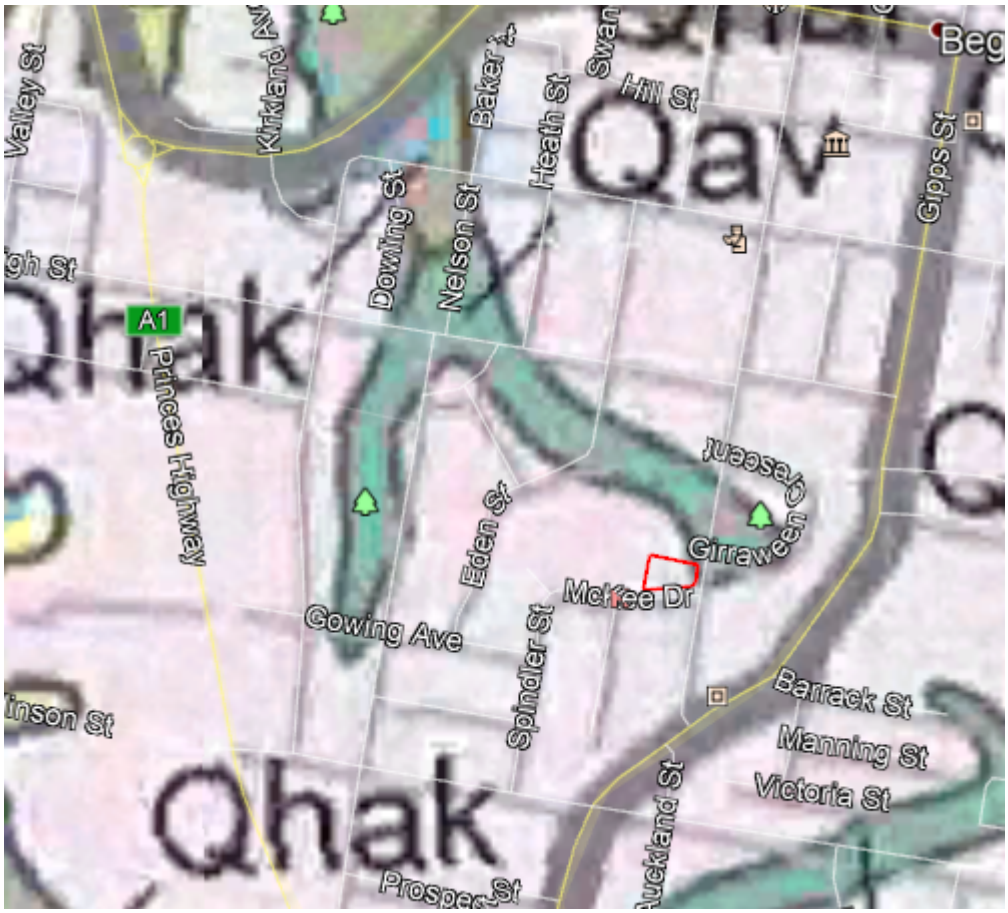


**Figure 2-1: Local geology relative to the site (red outline)**

## 2.7 Hydrogeology

The Lotsearch report (ref: LS006566 EP) in Appendix D, indicated that there is one groundwater bore registered within 500 m of the site (No. 21910102). No information was available on the type or intended purpose of this groundwater bore, except for elevation. An elevation of 51.36 m AHD was recorded for this bore, which is at a higher elevation than the site (i.e. 34.50 m to 39.25 m AHD). Therefore it is unlikely that groundwater from the site would influence this groundwater bore.

The remaining registered groundwater bores are located greater than 633 m from the site. Based on topography and distance, it is unlikely groundwater from the site would influence these groundwater monitoring well.

Groundwater is expected to occur within about 3 m of the ground surface and follow the regional topography, flowing towards the north and north-west.

# 3. Site history

Information on the site history was obtained from:

- Review of selected aerial photographs (1957 to 2018)
- Review of historical title search results.
- Interview with local engineer Ken Gordon and Ron Smith from RD Miller Pty Ltd.
- A search of NSW EPA register for listings of the site and nearby properties
- Historical business directly records between 1950 and 1982
- A review of Bega Valley Shire Council records and Section 10.7 planning certificate.

The site history information is presented in Appendices D and C. A summary is provided below. Relevant historical details are shown on Figure 2 (Appendix B).

## 3.1 Historical aerial photography

The review of aerial photography is summarised in Table 3-1. Aerial photographs are included in the Lotsearch report (ref: LS006566 EP, dated 3/6/2019) presented in Appendix D.

**Table 3-1: Historical aerial photography review**

| Date | Site | Surrounding Area |
|---|---|---|
| 1957 (black & white) | The area where the site is located appears generally undeveloped, except for an access road within the southern half of the site.<br>The Bega hospital building is evident where a small segment of the building is situated within the north western portion of the site. | Bega Hospital is located immediately west of the site. Adjacent to the north west corner of the site, a rectangular area is evident but does not appear to be a building. McKee Drive and Auckland Street are event. Possible residential housing occupies areas south and south east of the site. Remaining areas appear to be grassed and generally undeveloped. |
| 1967 (black & white) | The site appears similar to the previous aerial photograph. The onsite access road as changed configuration and appears to be originated adjacent to the southern and western boundaries. Some possible changes in vegetation. | Apart from some minor development and vegetation changes, the areas surrounding the site appear generally similar to the previous aerial photograph.<br>Immediately north of the site a relatively large tree is evident. |
| 1979 (black & white) | A relatively large rectangular structure occupies the eastern portion of the site. The structure resembles the dwelling that currently exists at the site.<br>Several trees are noted along the southern, eastern and western boundaries at various stages of maturity. A relatively large tree exists near the centre of the site. | Residential developments south and east of the site have continued to expand. Vegetation immediately north of the site appears larger and comprises additional trees.<br>Remaining areas appear relatively unchanged. |
| 1987 (black & white) | The site appears generally similar to the previous aerial photograph except for changes to existing vegetation and an access road within the western portion of the site. The vegetation appears to have maturity since 1979 with trees and shrubs | The hospital grounds appear to have a car parking area south of Building 2 (community health centre – Refer to Appendix F). The rectangular feature located immediately north west of the site boundary is no longer evident. |

| Date | Site | Surrounding Area |
|---|---|---|
| | appearing larger. The access road appears to occupy a similar location to the current access road in this area of the site. There also appears to be an object, possibly a car, located at the north-western corner of the residential house. | Remaining areas appear relatively unchanged from the previous aerial photograph. |
| 1994 (colour) | The site appears generally similar to the previous aerial photograph except for some minor changes in the existing vegetation. | Girraween Crescent located northeast of the site is now sealed.<br>Remaining areas appear relatively unchanged from the previous aerial photograph. |
| 2003 (colour) | The internal access road occupying the western portion of the site appears to have been sealed. Some vegetation has been removed from site including a large tree adjacent to the northern site boundary. A possible concrete driveway adjacent to the north-western corner of the residential dwelling is evident. Remaining parts of the site appear relatively unchanged since the previous aerial photograph. | A relatively large portion of vegetation has been removed from the area north of the site and is grass covered. Remaining areas appear relatively unchanged from the previous aerial photograph. |
| 2004 (colour) | Apart from changes in vegetation due to deciduous trees losing foliage. An area of ground disturbance noted in the north-eastern corner of the site<br>Remaining parts of the site appear relatively unchanged since the previous aerial photograph. | Areas surrounding the site appear relatively unchanged from the previous aerial photograph. |
| 2010 (colour) | The area of disturbance in the north-eastern portion of the site has expanded, and resembles a vehicle access track, which continues north of the site.<br>Several small white features are noted west and east of the residential dwelling and one in the north-eastern portion of the site. | Areas surrounding the site appear relatively unchanged from the previous aerial photograph. |
| 2013 (colour) | The western portion of the site appears to be used for car parking. Remaining areas of the site appear relatively unchanged from the previous aerial photograph. | Areas surrounding the site appear relatively unchanged from the previous aerial photograph. |
| 2018 (colour) | The area of disturbance associated with the access track noted in the western portion of the site has expanded. The access track appears to continue into the construction site located north of the site.<br>The grass area within the central portion of the site and immediately west of the residential dwelling has a slight brown coloration. | The Connected Learning Centre located immediately north of the site is under development.<br><br>The remaining areas surrounding the site appear similar to the previous aerial photograph. |

## 3.2 Historical title search

The historical title information indicates the registered proprietors were:

- 1946 to today: Bega District Hospital or Southern NSW Local Health District.
- 1875 to 1946: individuals with occupations of farmer and bootmaker.

The results of the historical title search area included in Appendix E.

## 3.3 NSW EPA registers

The results of that search are summarised in Table 3-2. Search results are included in the Lotsearch report presented in Appendix D.

**Table 3-2: Summary of NSW EPA search results**

| Search | Result |
|---|---|
| Contaminated Land Record of Notices | No record for site or within 500 m of the site |
| Notified Sites under the *Contaminated Land Management Act* 1997 | No record for site or within 500 m of the site |
| Environmental protection licenses under the *Protection of the Environment Operations Act* 1997 (POEO Act) | The site is no longer licenced but still regulated by the EPA for Hazardous, Industrial or Group A Waste Generation or Storage but is still regulated by the EPA. Licence number is 10921 and associated with the Bega Hospital.<br>A record for three surrendered / revoked licences were noted in the search, which pertained to the watercourse located approximately 54 m north of the site. The licences were for the application of herbicide. The watercourse is down gradient of the site therefore the associated herbicide application is unlikely to affect the site. |
| EPA PFAS Investigation Program | No record for site or within 500 m of the site |

## 3.4 Section 10.7 Planning Certificate

The Section 10.7 planning certificate pertaining to the site was reviewed and results summarised in Table 3-3 and included in Appendix F.

**Table 3-3: Summary of Section 10.7 regarding contamination matters**

| Search | Result |
|---|---|
| Part (5) Section 2 – Contaminated and Potentially Contaminated Land | Council has not provided comment on matters of potential contamination effecting the site. |
| Part (2) matters under section 59 (2) of the Contaminated Land Management Act 1997 | Council has no record of the land being significantly contaminated, or subject to a: management order; voluntary management proposal; ongoing maintenance order or site audit statement. |

## 3.5 Council records

Council records were reviewed on 18 July 2019 by a senior environmental scientist. Council records available for review were dated between 1987 and 2007. The records reviewed generally pertained to the hospital and extensions to the existing hospital infrastructure. Council files included two drawings which provided the layout for Lot 2 including building identification and functions. A copy of these drawings have been included in Appendix F. Council received several complaints from residents living adjacent to the hospital. The complaints related to hospital activities and were generally associated with aesthetic matters such as noise, car parking and the appearance of certain structures.

Apart from inclusion in two drawings, which are included in Appendix F, there were no other records specifically relating to the site.

The Section 10.7 (5) planning certificate indicates that 01/08/2018 - Development Application 2018/188 Educational Facility - TAFE Connected Learning Centre was approved within the last five years. This development pertains to the property immediately north of the site (Lot 1 DP1243054). Lot 1 previously formed part of Lot 2 but was subdivided as part of the TAFE NSW development.

## 3.6 Historical business directories

No business recorded for the site. However, a number of businesses were noted on Auckland Street. Some of these businesses included workshops, garages, petrol stations and battery service station. A review of the aerial photographs indicating the surrounding land use to be a hospital, residential and vacant land. Therefore, it is likely that these businesses were located further north, closer to town, and down gradient of the site.

## 3.7 Interviews

Mr Ken Gordon has knowledge about the site, which dates back approximately 50 years and was able to provide the following information concerning site activities and history:

- The house was used as a residence for visiting doctors to the hospital and nurses accommodation. The residential dwelling was built approximately 35 years ago.
- The hospital boiler (offsite), used for heating, hot water and laundry, generated waste ash which was placed in the northern and southern parts of the site. The coal used to fire the boiler was sourced from Port Kembla and transported by Spenco.
- There was possible filling of the southern and eastern parts of the site associated with the road construction.
- He was not aware of chemical application at the site (e.g. pesticides or herbicides).
- Hospital staff used the western part of the site for car parking.
- He was not aware of oil heaters used within the residential dwelling.

Mr Ron Smith was the supervisor for the recently constructed Connected Learning Centre located north of the site. During earthworks, ash material was encountered immediately north of the site's northern boundary. The ash material was excavated and placed behind a retaining wall that was constructed on the northern side of the new TAFE NSW connected learning centre.

## 3.8 Previous report

GHD was commissioned by TAFE NSW to carry out a Hazardous Building Materials (HBM) Pre Demolition assessment and compile a Hazardous Building Materials Register of the existing Auckland Street residence and its surrounding block of land (the site) (GHD 2019).

TAFE NSW plan to demolish the residence and develop the block of land and as such, TAFE NSW requires the Pre Demolition HBM assessment to be undertaken prior to any demolition or partial demolition commencing at the site.

The objective of the HBM Pre Demolition survey was to locate, assess and document a risk assessment for all suspected HBM within the residence, as far as reasonably practicable for the purpose of demolition of the nominated residence, which at the time of the assessment was still occupied.

For the purpose of the survey, HBM have been limited to:

- Asbestos Containing Materials (ACM);
- Lead based paint systems (Lead Paints);
- Synthetic Mineral Fibre (SMF);
- Polychlorinated Biphenyls (PCBs); and
- Ozone Depleting Substances (ODS).

A GHD consultant undertook this survey on 20 June 2019.

Non-friable asbestos (chrysotile) was identified in some external fixtures such as eaves, mastic around window frames, electrical bituminous backing board and packers, and packers beneath the building associated with piers (refer to Photo 30 in Section 4.3). The ACM was assessed as poor to fair condition but non-friable. No lead based paints were detected in a sample representing the external painted surfaces.

Non-friable asbestos (chrysotile) was identified inside the residence in the vinyl flooring, panel infill and fibre cement sheeting on the walls and falls. Suspected SMF was noted in the ceiling void, garage area and insulation associated with the hot water system. The air conditioning unit was suspected to contain ODS.

For the purposes of the risk assessment, due to the proposed demolition of the residence, all identified HBM have been assessed as “Very High” risk, requiring removal prior to general demolition works commencing.

## 3.9 Summary of site history

The site formed part of the Bega District Hospital, which was constructed circa 1946. A small segment of the Community Health Centre building is situated within the north-western portion of the site. The remaining parts of the site remained undeveloped until circa 1979 where a residential dwelling was constructed to provide temporary accommodation for nurses and visiting doctors.

Anecdotal information indicates that waste ash from the hospital boilers was placed within the southern and northern parts of the site. A layer of ash was encountered immediately north of the site during the construction of the connected learning centre. The ash was removed and placed behind a retaining wall that was constructed in the northern portion of the connected learning centre. The hospital boilers, located west of the site, provided heating, hot water and used in the laundry. The boilers were fired using coal from Port Kembla.

The western portion of the site was used for hospital staff for car parking and access to the property north of the site.

Anecdotal information indicates that the southern and eastern portions of the site may have been filled with surplus materials generated during the road construction.

No chemical application (e.g. pesticides or herbicides) or oil storage associate with heaters was known to have occurred at the site.

Non-friable asbestos (chrysotile) was identified in some external fixtures such as eaves, mastic around window frames, electrical bituminous backing board and packers, and packers beneath the building associated with piers. The ACM was assessed as poor to fair condition but non-friable. No lead based paints were detected in a sample representing the external painted surfaces. There are no Contaminated Land Record of Notices, Notified Sites under the Contaminated Land Management Act 1997 or environmental protection licences (EPL) associated with the site. However, the hospital did have an EPL for Hazardous, Industrial or Group A Waste Generation or Storage. The licence has been surrendered but still regulated by the EPA.

# 4. Site observations

## 4.1 General

The site walkover was carried out by a senior environmental scientist who visited the site on 16 and 17 July 2019. Photographs 1 to 9 show the typical surface conditions and structures over the investigation area. The location of key features are also shown on Figure 2 (Appendix B).

The site was located on a hillside, which slopes down towards the north and north-west. The site was situated in a mixed land use area, with residential dwellings to the west and south, education facilities to the north and former hospital to the west.

The site forms part of the former Bega Hospital property and was bounded by Auckland Street and McKee Drive to the east and south, respectively. North of the site was a newly constructed TAFE building and to the west was the former nurse's quarters / Community Health Centre building. The site was accessible via an access road adjoining the western site boundary. The site was not secured by fencing and was on occasions accessed by general members of the public.

The site was occupied by a residential dwelling, clothesline and a small fenced enclosure adjoining the western side of the dwelling (Photo 6). A relatively small concrete slab was adjoining the garage door on the western side of the residential dwelling. A stormwater discharge point was noted near the central part of the southern boundary and appeared to flow towards the north-western boundary, the lowest part of the site. Large mature trees occupied by the southern half of the site whilst the remaining areas were grass covered or exposed ground. Some of the trees are deciduous resulting in a relatively thick leaf cover within parts of the southern portion of the site, which obscured surface observations in these areas. A segment of the Community Health Centre building occupied a small portion of the central western site boundary.

The residential dwelling appeared to be of brick construction and tile roof with fibre cement eaves (containing asbestos (GHD 2019)) and painted timber gables. The guttering on the eastern side of the dwelling was partially detached and unlikely to capture rainwater from the roof.

The segment of the Community Health Centre building within the site appeared to be a garage constructed of brick (Photo 1). The roofing materials could not be directly observed from ground level.

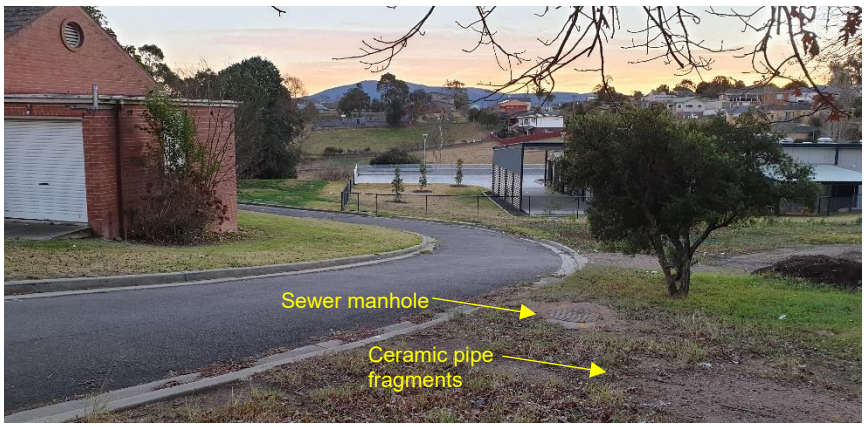


Photo 1: Looking north along the southern boundary, note the eastern garage wall falls within the site (16/7/2019).

Photo 2: Looking east towards the residential dwelling and mulch stockpile (16/7/2019).

Photo 3: Looking east along the northern boundary. Note ground disturbance and filling. Filling comprises basalt gravel and extremely weathered granodiorite (16/7/2019)

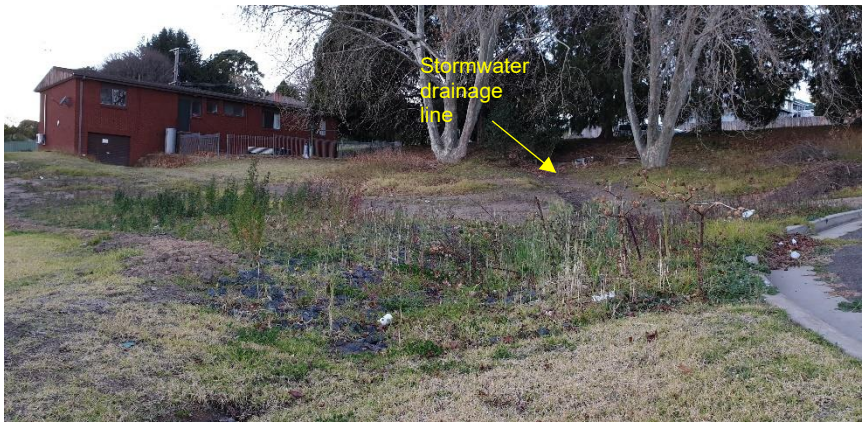


Photo 4: Looking southeast towards the stormwater drainage line (16/7/2019).

Photo 5: Looking south along the site's eastern boundary (16/7/2019).

Photo 6: Looking west along the northern boundary. Note ground disturbance and filling. Filling comprises basalt gravel and decomposed granodiorite (16/7/2019)

Photo 7: Looking southeast at the residential dwelling, clothesline and a small fenced enclosure adjoining the western side of the dwelling (16/7/2019).

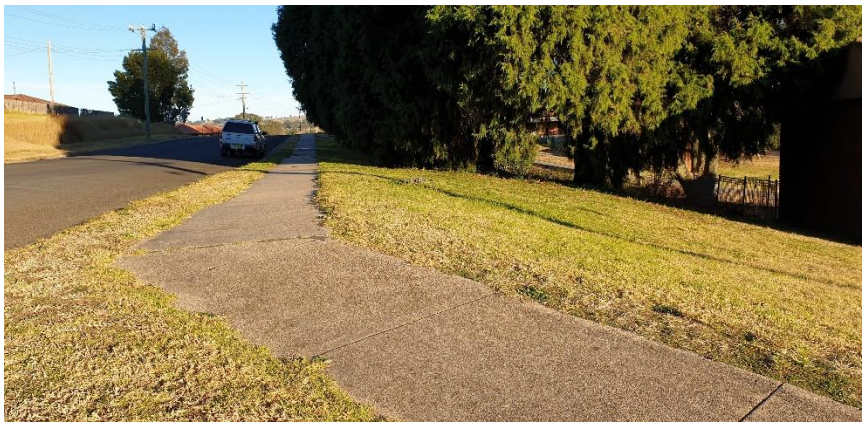

Photo 8: Looking west along the site's southern boundary (16/7/2019).

Photo 9: The headwall of the stormwater discharge pipe (16/7/2019).

## 4.2 Potential sources of contamination

The fibre cement eaves were indicated by a label (see Photo 10) to contain asbestos. The timber forming the gables appeared to be rotting in parts and potentially some flaking paint was noted. Fibre cement sheeting was used beneath a hot water system that was located immediately south of the garage door on the western side of the residential dwelling. GHD carried out a hazardous material survey and identified asbestos in eaves, mastic around windows, packers beneath the dwelling and behind the electrical cupboard and in the backing board of the electrical cupboard; however, no asbestos was identified in the fibre cement sheeting used below the hot water system (GHD 2019).

The segment of the Community Health Centre building within the site appeared to have some flaking paint from the guttering. GHD has not been provided with the HBM survey that has been carried out on that building.

Anecdotal information indicates parts of the site were filled from historical road construction and ash from the former hospital boiler. A fill profile of less than 0.5 m was observed in boreholes BH02, BH03 and BH04 (Refer to Section 11.1). Ash fill was purported to have been placed within the south and northern portions of the site; and beyond the northern boundary where the TAFE connected learning centre now exists. Surface fragments of ash were noted within the northern, central and western parts of the site. Larger / thicker deposits of ash were observed along the toe of southern embankment, near the south-western corner of the concrete driveway and within the central and south-western parts of the site where it appeared to have been used to form a hardstand area for car parking. Apart from surface ash fragments, no ash was encountered during drilling along the northern half of the site. This is further discussed in Section 11.1.

Broken fragments of ceramic pipe within the near surface and disturbed ground were along the sewer pipe alignment and may indicate potential repairs to a damage portion of the sewer pipe (Photo 15).

Area of fill and disturbance was evident along the northern site boundary, in particular, within the north-western portion of the site. The fill within the north-western portion of the site appeared slightly mounded relative to surrounding ground level and contained fragments of ballast and concrete and trace of amounts of ceramic fragments and fine grained basalt gravel. The soil matrix appeared to be a mixture of gravel and extremely weathered (decomposed) granodiorite. The area of fill and disturbance may have been associated with the recently constructed TAFE connected learning centre.

Concrete fragments were also observed the stormwater drainage line and adjacent to the headwall. The fragments adjacent to the headwall appear to be concrete washed out from a concrete truck or pump (Photo 19). The concrete fragments within the stormwater drainage line were on the surface or embedded into the near surface (Photo 12).

A small mulch stockpile, approximately 2 m by 4 m by 1 m high with an estimated volume of 2 $m^3$, was observed near the central western boundary.

No other apparent evidence of potential asbestos containing materials (ACM) or other contamination such as odours and oil staining.

Photos 10 to 21 below illustrate site observations made during fieldwork.

Photo 10: Residential dwelling eaves with an asbestos warning label (16/7/2019).

Photo 11: Western site of the residential dwelling within the fenced enclosure (16/7/2019).

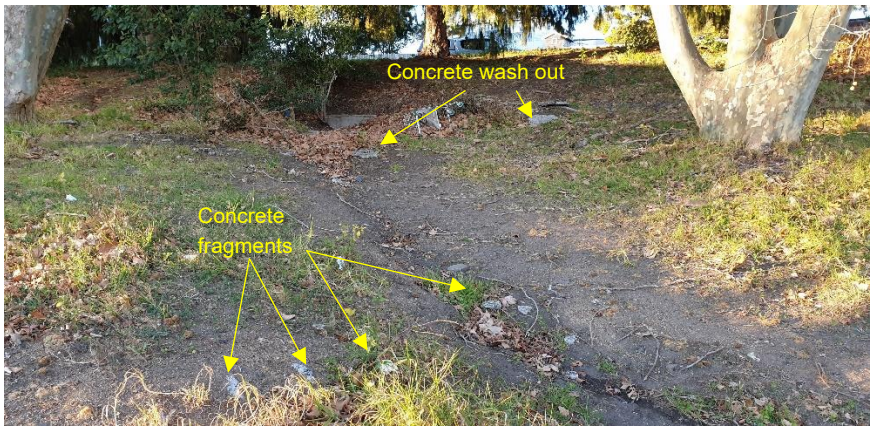


Photo 12: Looking south towards the stormwater drainage line (16/7/2019).

Photo 13: Example of asphalt and ash mixture within the former car parking areas (16/7/2019).

Photo 14: Example of extremely weathered (decomposed) granodiorite fill at the surface north of the residential dwelling (16/7/2019).

Photo 15: Ceramic pipe fragments at the surface near the sewer manhole in the western part of the site (16/7/2019).

Photo 16: Basalt gravel fill in the north-western portion of the site (16/7/2019).

Photo 17: Fill windrow along the northern boundary. Note concrete fragments and fine grained basalt gravels (16/7/2019).

Photo 18: Fibre cement sheeting used below hot water system. The hazardous materials survey did not identify asbestos in the sheeting (16/7/2019).

Photo 19: Concrete wash out near the stormwater outlet headwall (16/7/2019).

Photo 20: Ash fill encountered near the south-western corner of the concrete slab to the residential dwelling garage (17/7/2019).

Photo 21: Mulch stockpile located in the western portion of the site (16/7/2019).

## 4.3 Geotechnical

The gradient is generally gentle to moderate (approximately 5% to 7%) with locally steeper sections along the southern boundary of greater than 10%.

The residential dwelling is a single level structure at the southern end but two storey at the northern end. The end section of a strip footing was observed on the western side of the residential dwelling (Photo 27). The house is supported on besser block piers (Photos 29 and 30). ACM packers and thinner besser blocks appear to have been used suggesting that some settlement of footings may have occurred.

Stepped cracking along the mortar lines, cracking through some bricks, minor cracking of concrete pavements on or near the residential dwelling suggesting some settlement may have occurred.

Community Health Centre building appeared to be of similar construction as the residential dwelling and generally single level in the east and two storey as the building continues further west. The section of this building closest to the site is a single level garage. No apparent evidence of settlement, such as cracking, was observed on the section of the Community Health Centre building that was within and adjoining the western site boundary.

Some cracking of the wearing course on the internal access road was also observed.

Photos 22 to 30 below illustrate site observations made during fieldwork.

Photo 22: Cracking through brickwork on the eastern (front) steps of the residential dwelling (16/7/2019).

Photo 23: Stepped cracking along the mortar lines of the brickwork on the western (rear) steps of the residential dwelling (16/7/2019).

Photo 24: Stepped cracking along the mortar lines of the brickwork and cracking through brickwork on the south-western wall of the residential dwelling. See Photo 28 for detail (16/7/2019).

Photo 25: Minor cracking within the concrete pavement adjacent to the garage door on the western side of the residential dwelling (16/7/2019)

Photo 26: Minor defects in the asphalt pavement of the internal access road located in the western portion of the site (16/7/2019)

Photo 27: Possible strip footing located adjacent to the western wall of the residential dwelling (16/7/2019).

Photo 28: Close up of Photo 24 (16/7/2019)

Photo 29: Besser block piers supporting the residential dwelling (20/6/2019).

Photo 30: Besser block piers with ACM packers (20/6/2019).

# 5. Preliminary conceptual site model (CSM)

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM is developed using information obtained from previous investigations, site history, site observations, proposed land use and expected ground conditions. Once the contamination status is understood through the sampling and analysis process, the CSM then allows the assessor to evaluate the risk posed by the contamination to the identified receptor, and whether remediation is required to manage that risk.

## 5.1 Potential sources

Site history information and site observations indicate four potentially contaminating activities that have occurred at the site. The activities and potential sources of contamination include:

- On-site sources:
  - Imported fill of unknown quality and origin: Anecdotal information suggests surplus soil from the construction of McKee Drive and Auckland Street, may have been placed on the eastern and southern parts of the site. It is likely that the fill, if present onsite, is reworked natural soils/weathered rock. Other fill observed in the northern part of the site appears to be basalt gravel and reworked natural soil (extremely weathered granodiorite). The reworked natural soils were possibly generated during the recent construction of the neighbouring connected learning centre. Fill may exist in other areas of the site including below the internal access road. Therefore, the potential for contamination associated with this activity was assessed as low.
  - Ash fill: Anecdotal information suggests coal sourced from Port Kembla was burned in the hospital boiler and the waste ash was placed in the northern and southern parts of the site. Ash was observed at the toe of the southern embankment, west of the residential dwelling, used in asphalt mix in the western part of the site and scattered across the surface of the site. Ash can contain polycyclic aromatic hydrocarbons (PAH) and some heavy metals. Based on the amount of ash observed at the site, the potential for contamination was assessed as moderate to high.
  - Weathering of hazardous building materials: The site contains a residential dwelling and the eastern wall of the Community Health Centre. Based on the age of these structures potential weathering of hazardous building materials such as lead paint, ACM and galvanised iron may have occurred and impacted adjacent soils. A hazardous materials building survey (GHD 2019) was carried out on the residential dwelling. Non-friable asbestos (chrysotile) was identified in some external fixtures such as eaves, mastic around window frames, electrical bituminous backing board and packers, and packers beneath the building associated with piers (refer to Photo 30 in Section 4.3). The ACM was assessed as poor to fair condition but non-friable. No lead based paints were detected in a sample representing the external painted surfaces. Therefore, the potential contamination, in particular asbestos, in soils surrounding the dwelling was assessed as high. The portion of the Community Health Centre within the site was brick with painted guttering. The paint on the guttering was flaking. Therefore, the potential for contamination was assessed as low to moderate.

  - Pesticide application: Pesticide application near these structures may have occurred. Limited site history information was available on pesticide application. Quantities of pesticides, if used, are likely to be relatively small. Therefore, the potential for contamination was assessed as low to moderate.
  - Onsite migration of contamination: Stormwater is directed onsite from McKee Drive. Incidental fuel / oil spills and general road grime may have been transported onto site. The potential for contamination was assessed as low.
- Off-site sources:
  - None identified.

A broad suite of contaminants of potential concern (COPC) are potentially associated with the identified sources, including: total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyls (PCB), heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury, zinc) and asbestos.

## 5.2 Pathway

The primary pathways by which potential receptors could be exposed to the COPC outlined above, if present, are considered to be:

- Dermal contact with contaminated soils
- Incidental ingestion of contaminated soil or dust
- Inhalation of dust from contaminated soils
- Inhalation of vapours/gases generated by soil contaminated by volatiles and/or semi-volatiles

Based on the potential sources of contamination and currently available information on subsurface conditions, the potential for impacts to groundwater were considered low.

## 5.3 Receptor

This assessment focuses on the current and proposed land use of the site. Accordingly, the key receptors of interest include:

- Future workers: individuals involved in potential future construction and maintenance of the site and future facilities.
- Current and future site users: The current site users appear to be adults occupying the residential dwelling. At the time of the site visit, general members of the public periodically access the site generally using as a thoroughfare between the Community Health Centre and Auckland Street. The future site users will be students and staff associated with the TAFE. The proposed development layout is unknown but likely to comprise classrooms, study areas and offices within the building. External seating or study areas may be provided to attending students.
- Future intrusive maintenance workers: carrying out repairs or installation on subsurface utilities.
-

- Ecological receptors: the local environment including the groundwater, surface water, flora and fauna. The site is situated within an urban residential area of Bega. Surface water not absorbed into the ground will flow towards an unnamed tributary located approximately 85 m north of the site and appears to flow north-west into Kisses Lagoon. Kisses Lagoon is located approximately 650 m north-west of the site. Kisses Lagoon appears to be the nearest sensitive environment. It is considered unlikely that site contamination (if present) has the potential to affect this sensitive environment due to its distance from the site. The area appears to be connected to town water suggesting groundwater is not presently beneficially used in the area. The flora appears to be grass across most of the site with introduced tree and shrub species occupying the centre and southern parts. The trees and shrubs may attract birds however; fauna is likely to be feral animals or domestic pets given the site's urbanised setting and vegetation onsite. Magpies were observed picking at the ground surface, presumably for food, during fieldwork.

## 5.4 Source-pathway-receptor linkages

Based on the above and as identified in the CSM, Table 5-1 lists the potential Source-Pathway-Receptor (SPR) contaminant linkages that have been identified for the site.

**Table 5-1: Source-Pathway-Receptor Linkages**

| Sources (Primary and secondary) | Pathway | Receptor | Potentially Complete? |
|---|---|---|---|
| Contaminated fill impacted by asbestos | Dust inhalation | Current and future workers<br>Current and future site users<br>Intrusive maintenance workers | Unlikely – the fill is likely to be reworked natural soil and weathered which was excavated as part of construction of McKee Drive and Auckland Street. Other fill in the northern part of the site appears to be basalt gravel, which is likely to be quarry product and reworked natural soils possibly generated during the recent construction of the neighbouring connected learning centre. |
| Contaminated fill impacted by volatile /semi-volatile compounds (VOC / SVOC) | Direct contact (during material handling)<br>Burrow of transitory wildlife<br>Growing medium<br>Inhalation of vapours (outdoors or indoors) | Current and future workers | Unlikely – A source of VOCs or SVOCs has not been identified on or the nearby off-site. |
| | | Intrusive maintenance workers | |
| | | Ecological receptors | |
| Contaminated fill impacted by non-volatile compounds | Direct contact (including burrow of transitory wildlife and growing medium) | Current and future site users<br>Ecological receptors | Unlikely – the fill is likely to be reworked natural soil and weathered which was excavated as part of construction of McKee Drive and Auckland Street. |

| Sources (Primary and secondary) | Pathway | Receptor | Potentially Complete? |
|---|---|---|---|
| | Dust inhalation | Current and future workers<br>Current and future site users<br>Intrusive maintenance workers | |
| Ash fill | Leaching | Groundwater and surface water | Possible – PAHs and metals, if present, could be mobilised to surface water. However, it is less likely for groundwater as the subsurface conditions contain some clay reducing downward movement of contaminants and groundwater was measured between 2.2 m and 2.35 m bgl. |
| | Direct contact (including burrow of transitory wildlife and growing medium)<br>Dust inhalation | Current and future workers<br>Current and future site users<br>Intrusive maintenance workers | Possible – ash fill has been identified at the site and will be encountered and disturbed during earthworks associated with the proposed development. However, apparent from some surface ash fragments, the thicker ash deposits are covered by grass, thus reducing direct exposure pathway to current site users. |
| | Surface water runoff | Ecological receptors | Possible – PAHs and metals, if present, could be mobilised to surface water. However, the distance to the sensitive receptor means it is unlikely to cause an adverse impact. |
| Pesticide application | Direct contact (during material handling)<br>Burrow of transitory wildlife<br>Growing medium | Current and future workers<br>Intrusive maintenance workers<br>Ecological receptors | Possible – based on the site history small amounts of moderately persistent herbicides are periodically used at the site.<br>No available information on historical pesticide application. Older pesticides are typically more persistent and toxic than modern pesticides. The organic component of these historical pesticides may have attenuated, however heavy metal residues may remain. |
| | Leaching | Groundwater | Less likely for groundwater as the subsurface conditions contain some clay reducing downward movement of contaminants and groundwater was measured between 2.2 m and 2.35 m bgl. |

| Sources (Primary and secondary) | Pathway | Receptor | Potentially Complete? |
|---|---|---|---|
| Weathering of hazardous building materials | Direct contact (during material handling)<br>Burrow of transitory wildlife<br>Growing medium | Current and future workers | Possible – asbestos has been identified in external building materials used in the residential dwelling. In its undisturbed condition, the asbestos is unlikely to pose an unacceptable risk to current occupants. However, the risk will increase if disturbed (e.g. during demolition phase).<br>Lead has not been identified in the residential dwelling. There is a potential for lead to exist on Community Health Centre guttering and therefore potentially complete pathway may exist. |
| | | Intrusive maintenance workers | |
| | | Ecological receptors | |
| | Leaching of lead | Groundwater | Less likely for groundwater as the subsurface conditions contain some clay reducing downward movement of contaminants and groundwater was measured between 2.2 m and 2.35 m bgl. Lead has not been identified in the residential dwelling. There is a potential for lead to exist on Community Health Centre guttering and therefore potentially complete pathway may exist. |
| Onsite migration of contaminants via stormwater drain | Direct contact (during material handling)<br>Burrow of transitory wildlife<br>Growing medium | Current and future workers | Possible – In particular, on first flush from the road. Organic based contaminants are likely to attenuate overtime. |
| | | Intrusive maintenance workers | |
| | | Ecological receptors | |
| | Leaching | Groundwater | Less likely for groundwater as the subsurface conditions contain some clay reducing downward movement of contaminants and groundwater was measured between 2.2 m and 2.35 m bgl. |

## 5.5 CSM conclusions

Based on review of the potential SPR linkages, proposed development and future maintenance works may provide direct contact / inhalation (i.e. vapours, dust) exposure opportunities to contamination if present. Sampling and analysis will be required to assess the significance of these potential SPR linkages.

# 6. Data quality objectives

## 6.1 Overview

Data Quality Objectives (DQOs) have been established for this assessment to assist the design and implementation of data collection activities, to ensure the type, quantity and quality of data obtained are appropriate and address the project objectives. The DQO process described in Schedule B2, Appendix B, of the NEPM (2013) was adopted for this project. The DQO process involves seven steps:

- Step 1: State the problem
- Step 2: Identify the decision
- Step 3: Identify inputs to the decision
- Step 4: Define the study boundaries
- Step 5: Develop a decision rule
- Step 6: Specify limits on decision errors
- Step 7: Optimise the design for obtaining data

Description of each DQO step developed for this project is provided below.

## 6.2 Step 1: State the problem

The site history and site observations have identified potentially contaminating activities generally associated with placement of ash, filling of the southern and eastern part of the site and potential hazardous building materials adjacent to the residential dwelling. The nature and extent of potential contamination that may exist onsite needs to be assessed to inform its suitability to remain on-site or develop appropriate actions should it be considered to pose a potential risk to identified receptors.

## 6.3 Step 2: Identify the decisions

The decisions to be made are:

- What are the potential contaminating activities at the site?
- Has the extent of fill and ash been adequately assessed?
- Has the fill and ash been sufficiently characterised?
- Does the residential dwelling contain hazardous building materials on its external fixtures?
- Are there potentially unacceptable risks to human health or the environment?
- Is remediation and / or management required?

## 6.4 Step 3: Identify inputs to the decision

The information considered in the decision making process comprised:

- Site observations and site history
- Review of the hazardous building materials report (GHD 2019)
- The conceptual site model (CSM) developed for the site
- Subsurface conditions encountered during field investigations
- Soil analytical data obtained during the investigation, and comparison to applicable criteria for the proposed land use
- Applicable guidelines, made or approved by NSW EPA under Section 105 of the *Contaminated Land Management Act 1997* (CLM Act)

## 6.5 Step 4: Define the study boundaries

The lateral investigation extent is illustrated in Figures 1 and 2 and the survey drawing in Appendix B and C, respectively.

The likely vertical extent of the assessment will be governed by the depth to base of the fill unit. The test locations will extend up to 0.5 m past the base of the fill unit or observed contamination. The depth of the fill unit is expected to be between 1 m and 2 m bgl in the southern and eastern parts of the site. The depth of investigation did extend beyond these depths to information geotechnical objectives.

The temporal extent of the assessment was 20 June 2019 for the HBM survey and between 16 and 17 July 2019 for the PSI for contamination.

## 6.6 Step 5: Develop a decision rule

The decision rules adopted in this detailed site investigation were:

- The concentrations of COPC are to be assessed against adopted site investigation levels, which are sourced from NSW EPA made or approved guidelines with reference to site-specific exposure scenarios for the proposed land use.
- If concentrations of COPC in soils are below the adopted investigation levels, then contamination at the site will be considered unlikely to pose an unacceptable risk to identified receptors. In such case, no further investigation, remediation or management will be considered warranted.
- Conversely, when concentration(s) of contaminants of potential concern exceed the adopted site investigation levels, further assessment may be required to evaluate the need for additional investigation and / or remediation / management activities.

## 6.7 Step 6: Specify limits on decision errors

Two primary decision error-types may occur due to uncertainties or limitations in the project data set:

- A sample/area may be deemed to pass the nominated criteria, when in fact it does not. This may occur if contamination is ‘missed’ due to limitations in the sampling plan, or if the project analytical data set is unreliable.
- A sample/area may be deemed to fail the nominated criteria, when in fact it does not. This may occur if the project analytical data set is unreliable, due to inappropriate sampling, sample handling, or analytical procedures.

The following aspects were considered when establishing the acceptable limits on decision errors:

- The null hypothesis for the project is: the sample / investigation area is deemed to be contaminated. Sufficient weight of evidence, via the uses of statistical analysis (e.g. 95% upper confidence limit of the mean (UCL)) and/or gathering of multiple lines of evidence (e.g. desktop review and laboratory analytical data), would be required to reject / disapprove the null hypothesis.
- A quality assurance / quality control (QA/QC) assessment evaluating the reliability and useability of data, which are expressed as five data quality indicators (DQI) discussed in Section 6.7.1.

### 6.7.1 Data quality indicators (DQIs)

The DQIs for sampling techniques and laboratory analysis of collected samples identifies the acceptable level of error for this investigation. The DQIs adopted in this investigation comprise five components, being precision, accuracy, representativeness, comparability and completeness. Detailed discussion of each component is provided below:

- Precision – measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the primary sample
Cd = Analyte concentration of the duplicate sample

- GHD adopts a nominal acceptance criterion of < 50% RPD for field duplicates and splits for organics and an acceptance criterion of < 30% RPD for inorganics. However, it is noted that this will not always be achieved, particularly at low analyte concentrations and in heterogeneous media.
- Accuracy – measures the bias in a measurement system. Accuracy can be undermined by such factors as field contamination of samples, poor preservation of samples, poor sample preparation techniques and poor selection of analytical techniques by the analysing laboratory. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes, laboratory blanks and analyses against reference standards. The nominal “acceptance limits” on laboratory control samples are defined as follows:
  - Laboratory spikes – 75-125% recovery for metals / inorganics and 70-130% for organics.
  - Laboratory duplicates – Nominal RPD values of 30% or lower. Higher RPD values are generally considered acceptable when the result is close to the LOR.
  - Laboratory Surrogates (Organics only) – 20% - 130% recovery.
  - Laboratory blanks - <LOR.
- Representativeness – expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples in appropriate locations across the investigation area, and by using an adequate number of sample locations to characterise soil and groundwater at the investigation area. Consistent and repeatable sampling techniques and methods are utilised throughout the sampling.

- Completeness – defined as the percentage of measurements made which are judged valid measurements. The completeness goal is set at there being sufficient valid data generated during the study. If there is insufficient valid data, then additional data are required to be collected.
- Comparability – is a qualitative parameter expressing the confidence whether one data set can be compared with others. This is achieved through maintaining a level of consistency in techniques used to collect samples and ensuring analysing laboratories use consistent analysis techniques and reporting methods.

## 6.8 Step 7: Optimise the design for obtaining data

With due consideration given to the DQO steps described above, a SAQP was prepared to obtain information to address the decision questions set out in Section 6.3. The environmental monitoring plan is presented in Section 7.

# 7. Sampling and analytical quality plan (SAQP)

## 7.1 SAQP for contamination

### 7.1.1 Sampling plan

The survey drawing indicates the site has area 2,888 m$^2$. The NSW EPA (1995) *Sampling Design Guidelines* recommends a minimum of nine sampling locations to assess an area of this size with respect to contamination (subject to the results of the site history) for a detailed site investigation.

For this preliminary investigation, five boreholes (BH01 to BH05) and six surface samples (SS01 to SS06) were positioned to target identified areas of environmental concern (AEC). The boreholes were drilled to depths between 2.0 m and 13.4 m bgl. The depth was governed by the geotechnical objectives of this combined investigation. Surface samples targeted the upper 0.1 m of the soil profile.

Twenty-three samples were collected, representing fill and natural soils and are listed below:

- Fill/topsoil: 11 samples
- Possible reworked natural: three samples
- Natural: nine samples

Each sample was screened with the PID for potential VOCs.

One background soil sample was collected from a depth within the borehole that was unlikely to have been exposed to potentially contaminating activities. This sample was analysed for heavy metals and used to developing site specific ecological investigation levels.

The following soil sample, representing natural soils, was collected:

- Gravelly sand with a trace of clay at BH02/4.2-4.5 m, 3.7 m below fill material. No deep sources of contamination was identified onsite or within the immediate areas surrounding the site. The appropriateness of BH02/4.2-4.5 m as a background sample is further discussed in Section 8.3.

### 7.1.2 Analysis plan

Samples were selected for analysis based on geological origin type of the material, results of headspace screening and visual and olfactory observations so that samples appropriately represented materials requiring characterisation.

The laboratory analysis carried out on selected samples are listed in Table 7-1 below.

**Table 7-1: Analysis plan**

| Description | TRH / BTEX | PAH | OCP / OPP | Heavy Metals | Asbestos | PCB |
|---|---|---|---|---|---|---|
| Soil samples | 11 | 11 | 6 | 13 | 9 | 6 |
| Background sample | - | - | - | 1 | - | - |
| Total | 11 | 11 | 6 | 14 | 9 | 6 |

### 7.1.3 Quality assurance / quality control plan

The QA/QC plan is designed to achieve predetermined data quality indicators (DQIs) that will demonstrate accuracy, precision, comparability, representativeness and completeness of the data generated. Refer to Section 6.7.1.

Samples were transported to the following laboratories under chain of custody for analysis:

- Eurofins|mgt laboratory (Eurofins), Lane Cove, NSW – Primary soil samples and intra-laboratory duplicates.
- ALS Environmental Services Pty Ltd (ALS), Sydney, NSW – Inter-laboratory duplicates.

These laboratories are NATA accredited for the analyses to be undertaken.

## 7.2 Geotechnical sampling and testing plan

Thirteen soil samples were collected and couriered to GHD's NATA accredited geotechnical laboratory in Artarmon, of which five samples were selected for testing of moisture content, Atterberg limits (plastic limit and liquid limit) and linear shrinkage.

Four sub-samples of cored rock from borehole BH02 were also tested for point load strength index testing at the GHD geotechnical facility in Wollongong.

Laboratory testing of soils samples was completed in accordance with Australian Standards; AS 1289; Methods of testing soils for engineering purposes – Soil classification tests.

Laboratory testing of rock samples was completed in accordance with Australian Standards; AS 4133; Methods of testing rocks for engineering purposes.

The following sections of AS 1289 and AS 4133 were used for each of the completed tests:

- Moisture content – AS 1289.2.1.1-2016; Determination of the moisture content of a soil – Oven drying method (standard method)
- Liquid limit – AS 1289.3.1.1-2009; Determination of liquid limit of a soil – Four point Casagrande method
- Plastic limit – AS 1289.3.2.1-2009; Determination of the plastic limit of a soil – Standard method
- Linear shrinkage – AS 1289.3.4.1-2008; Determination of the linear shrinkage of a soil – Standard method
- CBR – AS 1289.6.1.1 - 2014 – Soil strength & consolidation test - Determination of the Californian Bearing Ratio of a soil - Standard laboratory method for a remoulded specimen.
- Point Load Strength Index – AS 4133.4.1-2007: Methods of testing rocks for engineering purposes – Rock strength tests – Determination of point load strength index

# 8. Assessment criteria

## 8.1 General

The assessment criteria proposed for this project was sourced from:

- NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1)* 2013 (NEPM).
- Friebel and Nadebaum (2011) *CRC Care Technical Report No. 10 – Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater*.

The NEPM (2013) presents health based investigation levels for different land uses (e.g. industrial / commercial, residential, recreational, etc.) as well as management limits and ecological investigation / screening levels.

Section 2.1.1 of NEPM Schedule B1 states management limits are 'relevant for operating sites where significant subsurface leakage of petroleum compounds has occurred and when decommissioning industrial and commercial sites'. Based on previous investigations, site observations and site history, it is unlikely petroleum hydrocarbons resulting from sub-surface leakage will be present onsite and therefore has not been adopted as an assessment criteria.

## 8.2 Human health

Based on information provided, the proposed development is a tertiary educational facility, which will comprise building, pavements, footpaths and other associated structures. The site land use (i.e. tertiary education facility) does not have a designated land use scenario however Section 3.2.4 of Schedule B7 (NEPM 2013) identifies educational facilities as a sensitive land use and recommends HIL A or HIL B values be considered when assessing the site. It is considered that land use associated tertiary education facility would be similar to Residential B where there is minimal access to soil and includes dwellings with fully and permanently paved yard space such as high rise building and apartments.

The following assessment criteria were adopted for soil assessment purposes:

- Health screening level (HSL) for hydrocarbons (TRH, BTEX and naphthalene) - vapour intrusion (Table 1A(3) of NEPM HSL A/B);
- Health investigation level (HIL) for remaining COPCs (Table 1A(1) of NEPM HIL B);
- Direct contact and intrusive maintenance workers screening values for petroleum hydrocarbons listed in Tables B3 and B4 (CRC 2011).

## 8.3 Ecological

The risk to ecological receptors is dependent on the exposure pathway. Based on the proposed development, a complete exposure pathway for ecological receptors would exist within areas outside pavements, roads and building footprints (assuming slab on ground). Given that the site is situated in an urban residential, feral transitory wildlife is expected to visit the site, however native birds feed at ground level (e.g. magpies).

The ESLs and EILs have been developed for assessing risk to terrestrial ecosystems and have been developed for a number of land use scenarios. They apply to the top two metres of soil, which corresponds to the root zone and habitation zone of many species.

Ecological investigation and screening levels based on values listed in Tables 1B(3), 1B(4), 1B(5) and 1B(6) of the NEPM. Where site specific information is available and applicable, EILs will be determined using ASC NEPM Toolbox.

The ESLs are associated with selected petroleum compounds and broadly apply to coarse and fine-grained soils. Fill and topsoil typically comprised clayey sands / sandy clays and clayey silts underlain by sandy gravelly / sandy clay / clayey sand natural soils. Therefore, for this site, the dominating soil type is coarse.

The EILs are associated with selected metals and organic compounds. These EILs depend on specific soil physiochemical properties. Site specific data including clay content, pH and cation exchange capacity (CEC) and ambient background concentration (ABC) were obtained to derive site specific EILs for zinc, copper, chromium and nickel.

For the past 50 years, the site and surrounding areas have been used for residential purposes. For this assessment, ABCs were taken to be represented by one on-site sample collected within natural soils 3.7 m below the fill unit. Because downward movement of contaminants cannot be precluded, concentrations of heavy metals in natural soils were compared to published background data (Ref: Olszowy H, Torr P and Imray P (1995) NSW soils for new suburbs in low traffic areas listed on page 17 (South Australian Health Commission (1995)). Heavy metal concentrations, except for copper and chromium were within the published ranges. The higher copper and chromium concentrations reported may be associated with the granodiorite and naturally occurring.

Added Contaminant Limits (ACL) for lead, arsenic, dichlorodiphenyltrichloroethane (DDT), naphthalene do not require soil physiochemical properties. Site specific data used to derive EILs are summarised in Table 8-1 and Table 8-2. The physiochemical properties listed in Table 8-1 are based on the Soil and Landscape Grid of Australia (TERN 2015). Where a range was listed for a given parameter, the lower value was used in EIL calculation.

**Table 8-1: Summary of Site Specific Soil Physiochemical Properties**

| TOC (%) | CEC (cmol/kg) | pH (pH units) | Clay Content (%) |
|---|---|---|---|
| 1.5-2.0 | 10-15 | 4.9-5.5 | < 10 |

**Table 8-2: Summary of Ambient Background Concentration (ABC) of metals (mg/kg) based on average concentration reported in samples representing natural soils**

| Sample ID | As | Cd | Cr | Cu | Pb | Hg | Ni | Zn |
|---|---|---|---|---|---|---|---|---|
| BH02/4.2-4.5 m | 2.4 | < 0.4 | 32 | 35 | < 5 | < 0.1 | 16 | 46 |
| Published background range* | 5 to 11 | 0.25 | 6 to 21 | 6 to 32 | 13 to 44 | 0.05 | 5 to 50 | 17 to 77 |

*NSW soils for new suburbs in low traffic areas listed on page 17 (Olszowy H, Torr P and Imray P (1995))

The NEPM (1999, amended 2013) provides the following methods for calculating site specific EILs:

- EIL = ACL + ABC
- EIL spreadsheet in the ASC NEPM Toolbox.

The ASC NEPM Toolbox was used to determine EILs for copper, chromium (III), nickel and zinc. ACL listed in Tables 1B(4) and 1B(5) were added to the ABC to derived site specific EILs for lead, arsenic, DDT, naphthalene. Site history information indicates contamination (if any) is likely to have been present for over two years; therefore ACL for aged contamination is considered appropriate for the site. Table 8-3 summarises derived EILs.

**Table 8-3: Site Specific EILs (mg/kg)**

| Land use Scenario | As | Cu | Cr (III) | Pb | Ni | Zn | DDT* | Naphthalene* |
|---|---|---|---|---|---|---|---|---|
| Urban Residential and Open public spaces | 100 | 110 | 430 | 1100 | 180 | 220 | 180 | 170 |

* Based on fresh contamination. Insufficient data available to calculate aged contamination values. It is noted that fresh contamination values are more conservative than aged as it has not broken down.

## 8.4 Aesthetics

Aesthetic issues generally relate to the presence of low-concern or non-hazardous inert foreign material (refuse) in soil or fill resulting from human activity. Ash deposits were identified within the southern part of the site and ash gravels at the surface in the north parts of the site.

Therefore, as part of this contamination assessment, aesthetic issues will be considered in accordance with Section 3.6 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013), Schedule B1.

Further assessment and/or management may be required where:

- Highly malodorous soils (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in soil, organosulfur compounds)
- Discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature
- Presence of refuse including but not limited to concrete, metal, bricks, pottery, glass, trivial amounts of bonded asbestos-containing-materials, bitumen, ash, green waste, rubber, plastics is close to or at the ground surface.

# 9. Fieldwork

## 9.1 Fieldwork activities

Field investigations were carried out between 16 and 17 July 2019 by a GHD senior environmental scientist.

Five boreholes, designated BH01 to BH05 were drilled to depths between 2.0 m and 6.7 m bgl, with borehole BH02 extended to 13.4 m as a cored borehole using diamond coring drilling methods. Six surface soil samples, designated SS01 to SS06, were collected from the upper 0.1 m of the soil profile.

Standard Penetration Tests (SPTs) was carried out in the boreholes at intervals between 1.0 m and 2.0 m within the soil profile to assess the in-situ material strength. Descriptions of material consistency were generally based on SPT N values and checked against field pocket penetrometer measurements where cohesive soils were encountered.

Rock core samples were photographed onsite prior transport to the GHD storage facility in Wollongong. A subsequent photograph was taken at the storage facility with a uniform background.

The sampling locations were measured using a handheld GPS unit and are shown on Figure 2.

The logging of boreholes was carried out according to Australian Standard AS1726-2017 and GHD's standard procedures. The engineering borehole logs are included in Appendix G. The results of soil headspace screening are also presented on the logs.

## 9.2 Sampling methodology

All soil samples were collected with a new pair of nitrile gloves.

During drilling, soil samples were generally collected directly off the augers within the upper 0.5 m thereafter with a Standard Penetration Test (SPT) tube sampler. Between sampling locations the augers were washed with a high pressure hose followed by brush scrubbing with a phosphate free detergent and finally rinsed with potable water. The SPT tube sampler was also washed with a phosphate free detergent, rinsed with potable water followed by rinsing with distilled water between sampling locations.

Surface samples were collected within the upper 0.1 m of the ground surface with the aid of a stainless steel trowel. The stainless steel trowel and hand auger was also washed with a phosphate free detergent, rinsed with potable water followed by rinsing with distilled water between sampling locations.

Representative soil samples were generally collected at the surface, in the fill or at major changes in stratigraphy or where evidence of odours or staining was noted (if observed). Clean 250 mL glass jars were filled with soil to the brim and immediately sealed with Teflon lined caps to lower the potential for loss of volatile contaminants. Samples were then labelled and placed directly into ice filled cooler boxes. Soil required for asbestos testing was placed in a plastic zip-lock bag. A minimum of 50 g of soil was collected for absence / presence asbestos testing

Representative disturbed samples off the auger and undisturbed samples from the SPT were placed in sealed plastic bags for geotechnical laboratory testing.

Soil samples for analysis were collected in duplicate into tightly sealed plastic bags where considered appropriate.  The headspace above each sample was measured using a ProCheck Tiger PID fitted with a 10.6 eV lamp and calibrated with isobutylene gas at a concentration of 100 ppm.  This instrument allows rapid, semi quantitative analysis of ionisable volatile organic compounds in the soil.

# 10. Quality assurance/quality control

GHD assessed the laboratory data against predetermined DQOs and DQIs for laboratory procedures and results (refer to Section 6). This assessment is presented below.

## 10.1 Field quality control review

The field quality control adopted for this assessment is outlined in Section 7.1.3. The following field quality control samples were collected and analysed as part of that program:

- GHD monitoring equipment was calibrated in accordance with manufacturer's instructions. A copy of the calibration certificate and field check results is included in Appendix H.
- Intra-laboratory duplicate and inter-laboratory duplicate samples were as follows:
  - QC2 (intra-laboratory duplicate) and corresponding primary sample was BH02/0.0-0.2 m.
  - QC3 (intra-laboratory duplicate) and QC3A (inter-laboratory duplicate) corresponding primary sample was BH04/0.0-0.2 m.
- Collection of one wash blank sample from the SPT tube sampler to check the effectiveness of equipment decontamination, and designated WB1.
- Laboratory prepared trip spike and trip blank samples (one of each) were carried into the field and despatched to the laboratory for analysis of volatile contaminants to check the potential for cross contamination or loss of volatile contaminants during transport and sample preparation at the laboratory. Results are presented in Table QAQC2 in Appendix K.
- Samples (as designated on the chain of custody form) were transported in ice-cooled chests to Eurofins | MGT Pty Ltd (Eurofins) and ALS Environmental Pty Ltd (ALS) for analysis. A copy of the chain of custody record is included in Appendix I.

## 10.2 Field and laboratory quality control sample results

GHD reviewed the laboratory reports and results of field quality control samples and makes the following comments on field and laboratory quality control:

### 10.2.1 Field

- Sample collection and handling: Satisfactory, as it was carried out in general accordance with GHD standard operating procedures and experienced sampling team, where consistency was maintained with field staff. Samples were also received in good condition at the laboratory.
- Sample preservation: Appropriate laboratory supplied sample containers were used. Some samples were received at the laboratory slightly above the recommended 6°C, despite ice present in the eskies upon receipt to the laboratory. However, this does not appear to have affected results, as reported concentrations of volatile and semi-volatile contaminants were consistent with field observations and considered representative of soil at the time of sampling. Additionally, trip spike and blank results were within control limits suggesting no unacceptable loss of volatile contaminants during sampling or transportation to the laboratory.
- Laboratory reporting limits (LOR): All LORs were below assessment.

- Field quality control sample results (Tables QAQC1 and QAQC2 in Appendix K):
  - Intra- and inter-laboratory duplicate: Higher RPD results were recorded for zinc in duplicate samples QC2, which correspond to primary samples BH02/0.0-0.2 m. It is likely that the variability observed in zinc concentrations is associated with sample heterogeneity. Therefore, variability in some heavy metal concentrations can be expected. The variability is unlikely to affect the conclusions and recommendations with respect to human health, as reported concentrations are orders of magnitude lower than the adopted assessment criteria. Zinc concentrations were either well above or below the zinc EIL and therefore the variability is not considered to affect concentrations and recommendations with respect to ecological receptors.
  - Trip blank: TRH and BTEX concentrations were reported below the laboratory detection limit.
  - Trip spike: BTEX recoveries were within acceptable control limits.
  - Rinsate: concentrations of contaminations analysed (TRH, BTEX, PAH and heavy metals) were below the laboratory reporting limit.

### 10.2.2 Laboratory

- Laboratory quality control samples:
  - Blanks: Satisfactory – all results were within laboratory acceptance criteria.
  - Duplicates: Satisfactory – all results were within laboratory acceptance criteria.
  - Laboratory control spikes: Satisfactory – all results were within adopted acceptance criteria.
  - Matrix spikes: a matrix spike for sample SS04/0.0-0.1 m recorded a recovery of 9.3%, which was outside the laboratory control limit range of 75% to 125% for zinc. The laboratory indicated that the low recovery was due to matrix interference. This result may indicate a lower concentration of zinc was recorded than what was actually present. The report zinc concentration for this sample exceeds the EILs but well below the HIL criterion, therefore, it is unlikely the lower recovery will affect the conclusions and recommendations of the report. The remaining matrix spike recoveries recorded were within laboratory acceptance criteria.
  - Surrogates: nine samples with surrogate spikes for BTEX, PAH, OCP, OPP and PCB recorded recoveries between 131% and 144%, which were outside the laboratory control limits of 20% and 130%. This result indicates that higher concentration of the containment may have been recorded than what was actually present. Three of the nine samples reported detectable concentrations but were below assessment criteria. Therefore, it is unlikely the higher recovery will affect the conclusions and recommendations of the report. The remaining surrogate spike recoveries recorded were within laboratory acceptance criteria.

## 10.3 Data useability

GHD concluded that the overall analytical results are representative of the characteristics of materials sampled and suitable for the purposes of this contamination assessment.

# 11. Results

## 11.1 Subsurface conditions

The generalised subsurface conditions encountered in the boreholes and surface samples are summarised below.

Groundwater inflows were encountered at 2.5 m (BH05), 5 m (BH01) and 7.5 m (BH02). The following standing water levels (SWL) were measured at least 30 minutes after drilling:

- BH01: 2.35 m bgl
- BH02: 5.6 m bgl
- BH05: 2.2 m bgl

Groundwater was not observed in remaining boreholes.

No apparent evidence of contamination such as odours, staining, potential ACM or foreign materials was observed in the field. Ceramic tile, concrete fragments and ash gravels were noted at the surface or near surface.

Natural materials encountered were generally consistent with published geological information and previous investigations.

**Table 11-1: Generalised subsurface conditions**

| Unit | Unit Description | Density / Consistency | Depth range to the top of unit (m) | Thickness of unit (m) | Location |
|---|---|---|---|---|---|
| Fill (Topsoil) | Clayey sand / sandy clay / gravelly or clayey silt: fine to medium grained sands, low plasticity, dark brown, with some silt, trace of fine grained gravel. Rootlets.<br>Natural wood fragments and pine needles noted at SS05. | Medium dense<br>Loose to firm<br>Friable | 0 | 0.4 to 1.0 | BH01, BH02, BH03, SS02 to SS05 |
| Fill (General) | Clayey gravel: fine to coarse grained gravel, low plasticity clays, brown. Some gravel appears to be of basalt origin. | Medium dense | 0 | 0.5 | BH05 |
| Fill (Ash) | Sandy gravel, fine to coarse grained gravels, fine to medium grained sands, grey. | Loose | 0 | Not assessed | SS01 |
| Residual | Clayey silt or sand / sandy clay: low plasticity, medium to coarse grained sand, brown with white mottling, dark brown | Medium dense<br>Very stiff<br>Friable | 0.4 to 0.5 | 0.5 to 1.0 | BH02 to BH05. |

| Unit | Unit Description | Density / Consistency | Depth range to the top of unit (m) | Thickness of unit (m) | Location |
|---|---|---|---|---|---|
| | (BH05), with some (BH04) to trace (BH03) fine grained gravel, trace rootlets (BH04). | | | | |
| Residual / XW Granodiorite | Sandy clay / clayey sand: medium to coarse grained sand, high plasticity clay (BH05), brown-orange with inconsistent white mottling, low plasticity, with some fine gravel. | Very stiff to hard<br>Medium dense to dense<br>Friable | 1.0 to 1.5 | 5.7 to 8.7 | All |
| HW to SWGranodiorite | Refusal on HW rock at 6.7 m (BH01) and 9.7 m (BH02). At BH02 XW / HW rock encountered to 11.4 m overlying slightly weathered to fresh rock. | N/A | 6.7 to 9.7 | Not assessed | BH01, BH02 |

Notes: XW = extremely weathered rock described as a soil; HW = highly weathered; SW = slightly weathered.

Photo 31: Example of XW Granodiorite at BH01, depth 2.0-2.45 m (16/7/2019).

Photo 32: Example of possible residual at BH04, depth 0.75-0.95 m (17/7/2019).

Photo 33: Example of possible residual at BH05, depth 0.8-0.95 m (17/7/2019)

## 11.1 Headspace screening results

Results of the soil vapour headspace measurements are presented on the borehole logs. All soil samples screened indicated readings between 0.3 and 2.7 ppm VOCs. This is considered very low and is generally consistent with field observations and the laboratory tested soil samples. This indicates that significant volatile ionisable contamination was unlikely to be present in the samples screened.

## 11.2 Laboratory results

### 11.2.1 Contamination

The laboratory analytical results for soil are summarised in Table LR1 contained within Appendix K. Laboratory reports are included in Appendix I.

No exceedances of adopted human health assessment criteria were reported in samples analysed.

Exceedances of ecological assessment criteria included:

- Sample SS04/0.0-0.1 m reported a zinc concentration of 1,200 mg/kg, which exceeds the EIL of 210 mg/kg.
- Sample SS06/0.0-0.1 m report a TRH >C16 - C34 Fraction (F3) concentration of 410 mg/kg, which exceeds adopted ESL of 300 mg/kg.
- Sample BH01/0.0-0.1 m reported a benzo(a)pyrene concentration of 0.8 mg/kg, which marginally exceeds the adopted ESL of 0.7 mg/kg.

No other exceedances of EILs/ESLs were reported in remaining samples analysed.

### 11.2.2 Geotechnical

#### *11.2.2.1 Point load test results*

Laboratory tests included Point Load Strength Index tests on suitable rock core samples from borehole BH02. Axial and diametral point load strength index test results are shown on the engineering logs in Appendix G.

The point load strength index test results gave a $I_{s(50)}$ corrected value of between 7.84 to 14.68 MPa at depths of 12.75 and 13.35 m where core samples were in the slightly weathered rock.

The point load strength index test provides an index of strength and not a direct strength value. Correlations between Point Load Strength Index and Unconfined Compressive Strength (UCS) are derived statistically for a particular rock type using a number of test results.

For the granodiorite tested a UCS conversion factor of 24 times the point load index $I_{s(50)}$ value was applied. An estimated UCS of between 188.06 and 352.22 MPa was calculated for the rock subsamples tested.

A summary of the laboratory point load index test results is presented in Table 11-2

**Table 11-2. Summary of Point Load Index and Unconfined Compressive Strength**

| Location ID | Depth (m) | Material | Core diameter (mm) | Failure Load (P) (kN) | Is (MPa) | Is(50) (MPa) | Estimated Unconfined Compressive Strength (MPa)[1] | Failure[2] |
|---|---|---|---|---|---|---|---|---|
| BH02 | 12.75 | Granodiorite | 50 | 36.69 | 14.68 | 14.68 | 352.22 | I (DIAM) |
| | 12.86 | Granodiorite | 50 | 22.56 | 10.12 | 9.87 | 236.78 | I (AXIAL) |
| | 12.91 | Granodiorite | 47.2 | 34.29 | 13.72 | 13.72 | 329.18 | I (DIAM) |
| | 13.30 | Granodiorite | 50 | 21.38 | 8.55 | 8.55 | 205.25 | I (DIAM) |
| | 13.35 | Granodiorite | 53.5 | 21.77 | 7.60 | 7.84 | 188.06 | I (DIAM) |

Note

1 Conversion factor of 24 applied to $I_{s50}$ for granite & diorite rock types, Brock & Franklin, 1972

2 *I (DIAM)* = failure through intact rock, diametral loading; *I (AXIAL)* = failure through intact rock, axial loading

#### *11.2.2.2 Moisture content, Atterberg limits and linear shrinkage test results*

Testing was carried out at a GHD NATA registered laboratory. The laboratory test reports are presented in Appendix J. A summary of the laboratory test results is presented in Table 11-3.

Four samples were collected and tested for Atterberg Limits and moisture content. Three of the four samples were also tested for linear shrinkage.

**Table 11-3. Summary of Atterberg Limits, linear shrinkage and moisture content test results**

| Location ID | Depth (m) | Material | Moisture Content (%) | Plastic Limit (%) | Liquid Limit (%) | Plasticity Index (%) | Linear Shrinkage (%) |
|---|---|---|---|---|---|---|---|
| BH01A | 0.0-0.2 | Fill: Sandy SILT | 9.4 | 35 | 43 | 8 | 8.5 |
| BH02 | 0.1-0.2 | Fill: Sandy SILT | 12.8 | 28 | 43 | 15 | - |
| BH03 | 1.1-1.45 | Residual: Silty SAND | 12.1 | 27 | 29 | 2 | 4.5 |
| BH05 | 1.7-1.95 | Residual/XW: CLAY | 21.2 | 30 | 67 | 37 | 12.5 |

Based on the above test results, estimated shrink/swell indices (Iss) range from about 0.9 to 2.5, indicating moderately reactive soils. Based on the soil profiles encountered in the boreholes, and the laboratory test results, characteristic free surface movement was calculated to be in the range of 20 mm to 40 mm. Note that the Iss values calculated from linear shrinkage test results are based on empirical relationships developed from limited material sources (ref: Fityus etal (2005). “The shrink swell test”, Geotechnical Testing Journal, Vol. 28, No. 1, pp 1-10) and as such should be used as a guide only.

#### *11.2.2.3 Soil and groundwater aggressivity*

Chemical testing to assess soil aggressivity including chlorides, conductivity, resistivity, sulphate and pH was undertaken on one rock and one soil sample collected from boreholes BH02 and BH03. The laboratory test report for aggressivity testing is presented in Appendix J. A summary of the aggressivity test results on rock samples submitted for analysis is presented in Table 11-4.

**Table 11-4. Summary of aggressivity test results on soil and weathered rock samples**

| Borehole location | Sample depth (m) | Sample type | Chloride (mg/kg) | Conductivity (uS/cm) | pH | Resistivity (ohm.cm) | Sulphate (as $SO_4$) (mg/kg) |
|---|---|---|---|---|---|---|---|
| BH02 | 11.85-12.0 | Rock | <10 | 32 | 5.8 | 160000 | <10 |
| BH03 | 0.5-0.7 | Soil | 20 | 17 | 7.4 | 58000 | <30 |

Aggressivity testing was not carried out on groundwater due to insufficient sample available to collect.

The laboratory test results indicate that the soil samples tested are non-aggressive to concrete (Table 6.4.2(c), Exposure Classification for Concrete Piles- Piles in Soil) and non-aggressive to steel (Table 6.5.2(c), Exposure Classification for Steel Piles-Piles in Soil), (Reference: AS 2159-2009).

# 12. Discussion and conclusions

## 12.1 Geotechnical

### 12.1.1 Site Classification

The exact location and configuration of new building(s) within the proposed subdivision was not known at the time of preparing this report. Future earthworks that will result in site regrading, placement of fill, and cuts may affect the site classification in accordance with Australian Standards AS2870-2011 Residential Slabs and Footings.

Based on our site observations and subsequent boreholes, fill material, thicker than 0.4 m, was encountered in the proposed residential area. The site classifications provided here are based on the current ground conditions observed and encountered at the time of this investigation. Therefore, a provisional site classification of P would apply due to the presence of uncontrolled fill thicker than 0.4 m.

Based on laboratory testing results, the sandy clay / clayey sand soils encountered beneath the topsoil / fill (based on visual tactile assessment during the fieldwork investigation and confirmed by laboratory testing) are expected to exhibit moderate soil reactivity with changes in moisture content. We expect that characteristic ground surface movements over the majority of the site, based on current soil profiles would not exceed 20 mm to 40 mm and therefore for footings terminated in the natural sandy clay / clayey sand soils may be designed to the requirements of a site classification of M.

Engineering assessment of footing excavations should be undertaken by the design engineer or geotechnical engineer at the time of construction to confirm that the ground conditions encountered are consistent with those encountered in the boreholes presented in this report.

This site classification assumes that building footprints fall within the guidelines for buildings included in AS2870-2011. Site classification is generally only applicable to residential and commercial buildings up to two levels, and therefore it is assumed that the site classifications provided here will only apply to single or two storey residential buildings. If larger building footprints are proposed, then the engineering implications will need to be assessed by the structural engineer (e.g. articulation, etc.). This site classification should be read in conjunction with the CSRIO information sheets in Appendix L concerning long term site maintenance issues.

### 12.1.2 Landslide risk assessment

Based on our observations of the site and the immediate surrounds, the slopes over the site are mainly gently to moderately sloping (about 5 to 10 degrees), with no evidence of irregular surface features such as slip scarps, slumping or undulations observed over the site.

The risk to property due to landslide for this property is assessed as **Very Low** in accordance with the risk assessment method described in Appendix C of the journal Australian Geomechanics, Vol. 42, No. 1 dated March 2007. A copy(2 pages) of Appendix C – Qualitative Terminology for use in Assessing Risk to Property, presented in Appendix M of this report.

### *Building footings*

The selection of the footing system will depend on the loads to be supported by the building frame and within the floor areas. In selecting the appropriate footing system, we recommend the following:-

- For the support of the heavier loads from building design elements including column loads, wall loads, concentrated or high floor loads, we recommend that footings be founded in the underlying weathered bedrock. Footings may be socketed into the weathered rock by means of closely spaced bored piles. Design parameters for bored piles are provided in Table 12-1 below.
- For lighter loads such as single storey structures and external low retaining walls or other minor structures, shallow footings may be designed for an allowable bearing capacity of 150 kPa provided all shallow footings extend through any topsoil, fill, root affected soils or disturbed soils to found uniformly in very stiff sandy clay or medium dense clayey sand.

To reduce the potential for differential settlement, we recommend that all footings for the building/s or associated structures be founded within the same geotechnical unit. Footings proportioned in accordance with the above recommendations should have load induced settlements of no greater than 1% of the footing width. Footing design will need to consider the presence of old or current site service trenches or other disturbed ground areas, e.g., where any trees have been removed or where other building development occurs on an adjacent site.

The recommended allowable bearing pressures provided above assume that the bearing surfaces are clean and free from spoil and other loose material, and free of water at the time of placement of concrete. We recommend that concrete for pad or strip footings be poured or a blinding layer of concrete be placed on any founding surfaces as soon as practical following excavations to limit disturbance to the surface and any likely degradation of the exposed materials.

A geotechnical engineer should be engaged to inspect footing excavations to assess whether the material exposed at the base of footings is consistent with the geotechnical model and assumed bearing pressures.

## 12.1.3 Pile design parameters

The parameters provided in Table 12-1 are the indicative ultimate state geotechnical design parameters that can be adopted for displacement/non-displacement pile design with pile spacing not less than 2.5 times pile diameter. For the design of piles, a limit state method must be adopted to comply with the piling code AS2159-2009.

**Table 12-1. Design Parameters for piled footings**

| Material description | $\gamma_b$ (N/m$^3$) | $f_b$ (kPa) | $f_s$ (kPa) | | $E_{sv}$ (MPa) | $E_{sh}$ (MPa) | $P_y$ (kPa) |
|---|---|---|---|---|---|---|---|
| Residual | 18 | 300 | 20 | | - | - | 150 |
| EW material | 19 | 750 | 50 | | 20 | 15 | 375 |
| HW material | 20 | 4000 | 150 | | 60 | 45 | 2000 |

Where:

γb – Bulk unit weight

fb - Ultimate end bearing capacity for the layer at the tip of the pile

fs - Ultimate skin friction

Esh - Young's modulus for lateral response

Esv - Young's modulus for axial response

Py - Ultimate lateral yield pressure

Serviceability (allowable) and ultimate bearing pressures have been recommended based on the Classification System presented in the 1998 Paper by Pells et al. If higher end bearing pressures are required, additional investigation would be required to assess the underlying less weathered rock at this site.

For limit state design a geotechnical reduction factor ($\phi_g$) is applied to the ultimate geotechnical pile capacity assessed using the ultimate shaft resistance and end bearing values shown in Table 12-1 to derive the design ultimate geotechnical pile capacity.

Where no pile load testing or other verification of soil geotechnical quality and condition is specified a geotechnical strength reduction factor of 0.45 should be adopted. If pile load testing or other soil quality and condition verification is undertaken, it may be possible to adopt a higher value of $\phi_g$ that leads to a more economical design. The final selection of $\phi_g$ should be reviewed by an appropriately experienced geotechnical engineer at the detailed design stage.

### 12.1.4 General site preparation and trafficability

No design drawings were available at the time of this report to inform extent of earthworks.

In order to avoid significant disturbance to the subgrade soils following removal of vegetation, topsoil and the root zone, allowance should be made for the placement of a working platform in construction vehicle access areas. The working platform may comprise a minimum of 200 mm of crushed rock or approved recycled non-plastic material such as crushed concrete or quarry product for general site traffic.

Small to medium size trees are located along the southern property boundary and in close proximity to the current site building. If the proposed development requires the removal of trees including root affected soils during site preparation works, this may result in disturbance to the soils and changes to in situ moisture regimes particularly if exposed to rain or surface runoff. This will need to be considered in the preparation of the building platform and design of high level footings and also subgrades for carparks and accessways.

Earthworks for the formation of roads and lots should be carried out in accordance with specific project specifications, or as a minimum in accordance with AS3798-2007 *Guidelines on Earthworks for Commercial and Residential Developments*.

### 12.1.5 Material re-use potential

It is anticipated that earthworks required for the site will typically be associated with site levelling, removing trees, preparation of building platforms, foundation excavations, pavements, service installation and landscaping. There is a potential that site collected materials may be re-used from cut to fill areas to minimise the costs associated with off-site disposal of materials and cost of sourcing imported materials. Topsoil should be stockpiled separately and may be reused for landscaping purposes subject to the waste classification and contamination status of such materials. The topsoil and upper sandy, clayey, silty fill soil materials may include rootlets and tree roots and screening of the soils to separate roots would provide a better material for landscaping purposes.

Excavated materials from the site that may be suitable for re-use as structural fill will include the residual soils, and extremely to highly weathered rock, provided the maximum particle size of the weathered rock is limited to 100 mm and rocky materials contain sufficient fines to allow compaction requirements to be readily achieved. Where coarser rock materials are excavated they may be re-used as structural fill provided the rock is processed by crushing to achieve a graded material with a maximum particle size of 100 mm.

Structural fill should be placed and compacted in 200 mm compacted thickness layers in accordance with AS 3798 to at least 98% of Standard Maximum Dry Density (SMDD) at a moisture content within +/- 2% of Standard Optimum Moisture Content. For the upper 300 mm of fill placement under building floor slabs or pavements, structural fill should be compacted to 100% of SMDD. If fill is to be placed and compacted close to existing structures or sensitive services, then vibrating rollers should not be used unless otherwise advised by the geotechnical engineer.

### 12.1.6 Excavation conditions and earthworks

No design drawings for the proposed development have been provided at this stage. For excavation depths in the order of 1.5 m to maximum 2.0 m below existing surface levels, excavations will likely be in fill materials, topsoil, residual soils or extremely weathered rock.

The fill, topsoil, residual soil and extremely weathered materials are expected to be readily excavated by backhoe or small excavator (>5 t), while the highly to moderately weathered rock is expected to be excavated with a 25 to 30 tonne excavator with a rock hammer or ripped with a D7 to D8 dozer.

### 12.1.7 Subsoil drainage and pavement maintenance

The development of this site may involve the construction of internal roads, accessways and carparking areas. Subsoil drainage should be provided along the outside edge of pavement shoulders and should be in good contact with the pavement subbase, and any granular select subgrade where required. The collected water must be drained to suitable outlets in the stormwater collection system.

The subsoil drains along access roads or around perimeters of carparks that are separate to stormwater drains should be 400 mm wide and extend at least 200 mm below the underside of the pavement or any granular select subgrade layer.

Design of drainage to address potential for dispersion and erosion should be considered, based on the existing surface drainage observed in the western portion of the site.

The subsoil drains should comprise a 100 mm slotted PVC pipe (Ag Pipe) surrounded by 20 mm clean aggregate and the entire drain should be wrapped in a geotextile fabric (for example Bidim A24 or equivalent). All subsoil drains should fall at a minimum 2% grade to dedicated drainage pits.

Based on our site observations, the site is covered mainly by small to medium sized trees with some large trees.  Consideration should be given to the possible adverse effects of roots from remaining trees on pavements should trees be located within one tree height from the pavement or new buildings.

Trees and other vegetation should be excluded from pavement verge areas or traffic islands if their roots are assessed as likely to enter subgrade areas beneath the road during the design life of the pavement.

## 12.2 Contamination

The site formed part of the Bega District Hospital, which was constructed circa 1946. A small segment of the Community Health Centre building is situated within the north-western portion of the site. The remaining parts of the site remained undeveloped until circa 1979 where a residential dwelling was constructed to provide temporary accommodation for nurses and visiting doctors.

Anecdotal information indicates that waste ash from the hospital boilers was placed within the southern and northern parts of the site. A layer of ash was encountered immediately north of the site during the construction of the connected learning centre. The ash was removed and placed behind a retaining wall that was constructed in the northern portion of the connected learning centre. The hospital boilers provided heating, hot water and used in the laundry. The boilers were fired using coal from Port Kembla.

The western portion of the site was used for hospital staff for car parking and access to the property north of the site.

Anecdotal information indicates that the southern and eastern portions of the site may have been filled with surplus materials generated during the road construction.

Based on site history and site observation results, potential for contamination was identified in four areas of environmental concern (AECs) which included:

- AEC 1: Imported fill of unknown quality and origin within the northern, southern and eastern parts of the site. Fill may exist in other areas of the site including below the internal access road.
- AEC 2: Ash material in the southern part of the site and at the surface in the remaining areas of the site.
- AEC 3: Potential impacts to soil from the weathering of hazardous building materials and application of pesticides adjacent to existing site structures.
- AEC 4: Onsite migration of potential contamination via stormwater drain which collects surface water runoff from McKee Drive and directs it onto the site. The source of contamination is associated with incidental spills of fuel/oil and other general road grime.

Nine sampling locations were used to target and assess the potential for contamination within the identified AECs. Soils adjacent to the Community Health Care building were not directly assessed as part of this preliminary investigation but based on observations and results of soils adjacent to the residential dwelling, the potential for contamination in this area, was assessed as low. GHD has not been provided with the HBM survey that has been carried out on Community Health Care building.

Field and laboratory results did not identify contamination with respect to human health in the AECs. Therefore, the likelihood of contamination being present and posing a potential constraint to redevelopment is assessed as low.

However, concentrations of, zinc, TRH and PAH exceeded ecological assessment criteria at three locations (BH01, SS04. SS06) in near surface soils. No vegetation was present at locations BH01 and SS06, and exposed patches of soil were present near SS04. Based on the current site configuration the exposure pathway to ecological receptors is potentially complete. However, following redevelopment of the site the exposure pathways are likely to change and should be reassessed at that time.

Ash fill is present at the site and appears to be a thicker deposit in the southern parts of the site. Ash may pose an aesthetic issue for the current residential land use however unlikely to be a concern for the future development as there will have minimal access to soils for the majority of site users.

Based upon the findings of this targeted preliminary investigation, as outlined above, the following recommendations are made in order to further assess or mitigate contamination risks associated with the site.

- Preparation of an Unexpected Finds Protocol (UFP) to manage occurrences of contamination that may be encountered during construction. These occurrences may include ACM, staining, odours or ground conditions that differ significantly to what has been encountered during this investigation.
- Assessment of the western portion of the site following removal of the internal access road. This assessment would target potential fill material that may exist below the road and adjacent to the Community Health Care building.
- Assess the building footprints for potential asbestos and lead impacts following removal of site structures in preparation for redevelopment. The residential dwelling contains asbestos and it is possible that the section of building in the western portion of the site may also contain hazardous building materials due to its age. There is a potential for soil contamination following demolition of structures containing hazardous building materials. Soils should be assessed for potential contamination following demolition of structures and prior to commencing earthworks / construction activities.
- Reassess exposure pathways for ecological receptors once the new site layout has been finalised.

# 13. References


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GHD Pty Ltd (2019) TAFE NSW Bega - Stage 2 Development Due Diligence Auckland St Residence Hazardous Materials Pre Demolition Assessment (Report Ref: 23-SO1-1488463794, dated 17/7/2019).

Lotsearch Pty Ltd (2019) Lotsearch Enviro Professional Report (Ref: LS006566 EP, dated 3 June 2019).

NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013, National Environment Protection Council.

NSW EPA (1995) Sampling Design Guidelines.

NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites.

Pells P.J.N., Mostyn G and Walker B. F. Foundations on Sandstone and Shale in the Sydney Region, Australian Geomechanics Society, December 1998.

Olszowy H, Torr P and Imray P (1995) Trace Element Concentrations in Soils from Rural and Urban Areas of Australia, Contaminated Sites Monograph Series No. 4, South Australian Health Commission.

Terrestrial Ecosystem Research Network (TERN) (2015) Soil and Landscape Grid of Australia.

# Appendices

# **Appendix A** – General Notes

# GENERAL NOTES

**GHD GEOTECHNICS**
Specialist Services in Geotechnical Engineering,
Geology, Field/Laboratory Testing and Hydrogeology
www.ghd.com

The report contains the results of a geotechnical investigation or study conducted for a specific purpose and client. The results may not be used or relied on by other parties, or used for other purposes, as they may contain neither adequate nor appropriate information. In particular, the investigation does not cover contamination issues unless specifically required to do so by the client.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the report are excluded unless they are expressly stated to apply in the report.

## TEST HOLE LOGGING

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information. Moreover, the location of test holes should be considered approximate, unless noted otherwise (refer report). Reference should also be made to the relevant standard sheets for the explanation of logging procedures (Soil and Rock Descriptions, Core Log Sheet Notes etc.).

## GROUNDWATER

Unless otherwise indicated, the water levels presented on the test hole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeabilities (i.e. depending on response time of the measuring instrument). Further, variations of this level could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities. Confirmation of groundwater levels, phreatic surfaces or piezometric pressures can only be made by appropriate instrumentation techniques and monitoring programmes.

## INTERPRETATION OF RESULTS

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data, often with only approximate locations (e.g. GPS). Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

## CHANGE IN CONDITIONS

Local variations or anomalies in ground conditions do occur in the natural environment, particularly between discrete test hole locations or available observation sites. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural processes.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to this firm for appropriate assessment and comment.

## GEOTECHNICAL VERIFICATION

Verification of the geotechnical assumptions and/or model is an integral part of the design process - investigation, construction verification, and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels, is required. There may be a requirement to extend foundation depths, to modify a foundation system and/or to conduct monitoring as a result of this natural variability. Allowance for verification by appropriate geotechnical personnel must be recognised and programmed for construction.

## FOUNDATIONS

Where referred to in the report, the soil or rock quality, or the recommended depth of any foundation (piles, caissons, footings etc.) is an engineering estimate. The estimate is influenced, and perhaps limited, by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The material quality and/or foundation depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications should provide for variations in the final depth, depending upon the ground conditions at each point of support, and allow for geotechnical verification.

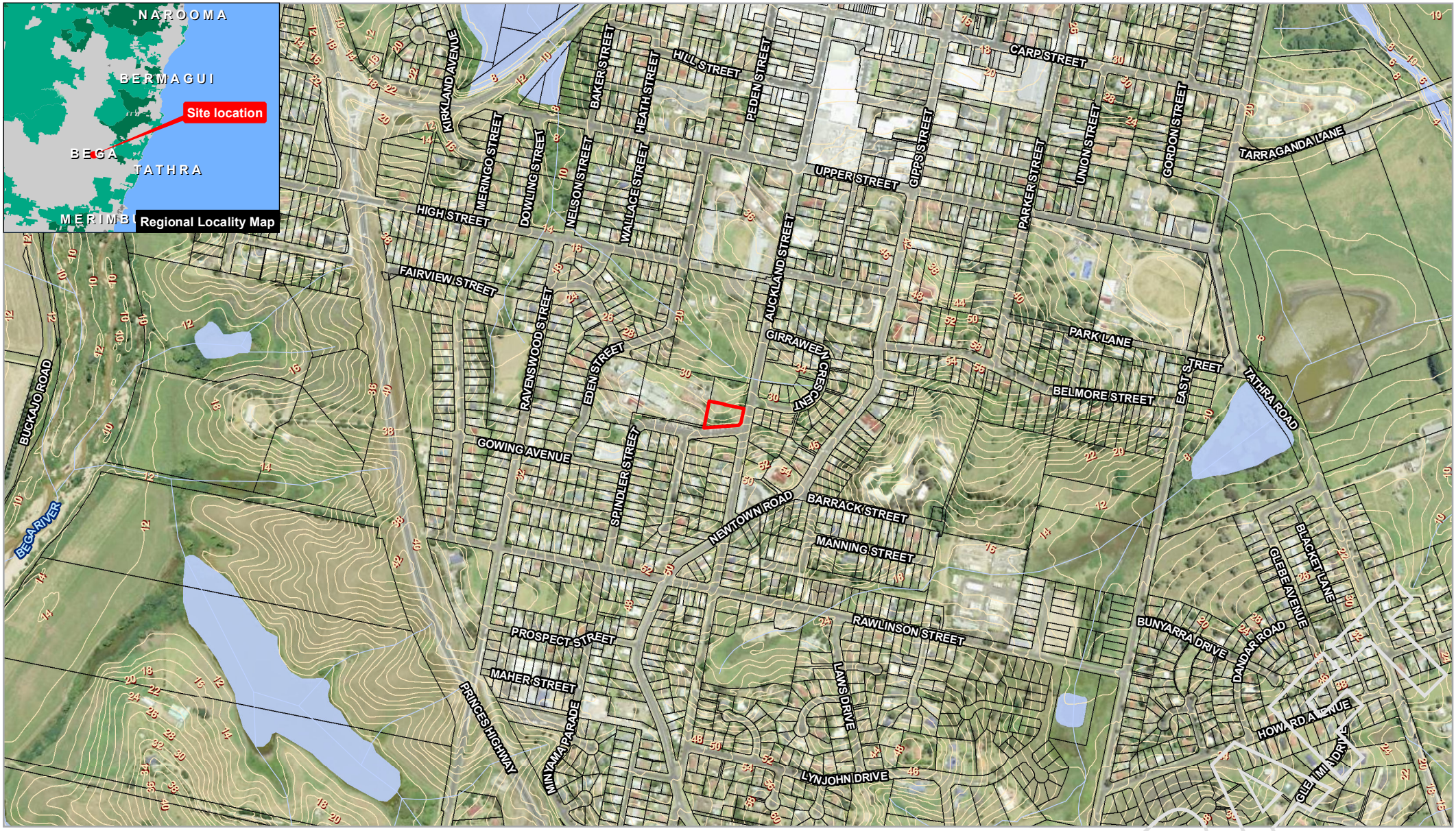
## REPRODUCTION OF REPORTS

Where it is desired to reproduce the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions must include at least all of the relevant test hole and test data, together with the appropriate Standard Description sheets and remarks made in the written report of a factual or descriptive nature.

Reports are the subject of copyright and shall not be reproduced either totally or in part without the prior written consent of GHD. GHD expressly disclaims responsibility to any person other than the client arising from or in connection with this report.

Ref: DS5.5.1 Issue 1.8 Date: 5/10/2012

# **Appendix B** – Figures




LEGEND

- Site and investigation area
- Cadastre
- Waterbody
- Waterway
- Contours (2m)

Paper Size ISO A4

0 200 400

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

GHD

TAFE NSW
TAFE NSW Bega - Stage 2 Development Due Diligence Preliminary Site Investigation for Contamination and Geotechnical

Site Locality Plan

Project No. 23-16678
Revision No. -
Date 02 Sep 2019

FIGURE 1

DRAFT

N:\AU\Wollongong\Projects\23\16678\GIS\Maps\Deliverables\23_16678_Z001_SiteLocation.mxd

Data source: Aerial Imagery - Sixmaps 2019 (); General Topo - NSW LPI DTDB 2015; Cadastre - NSW LPI DCDB 2019; Site Layout - Veris; Inset map - Geoscience Australia. Created by: jrprice

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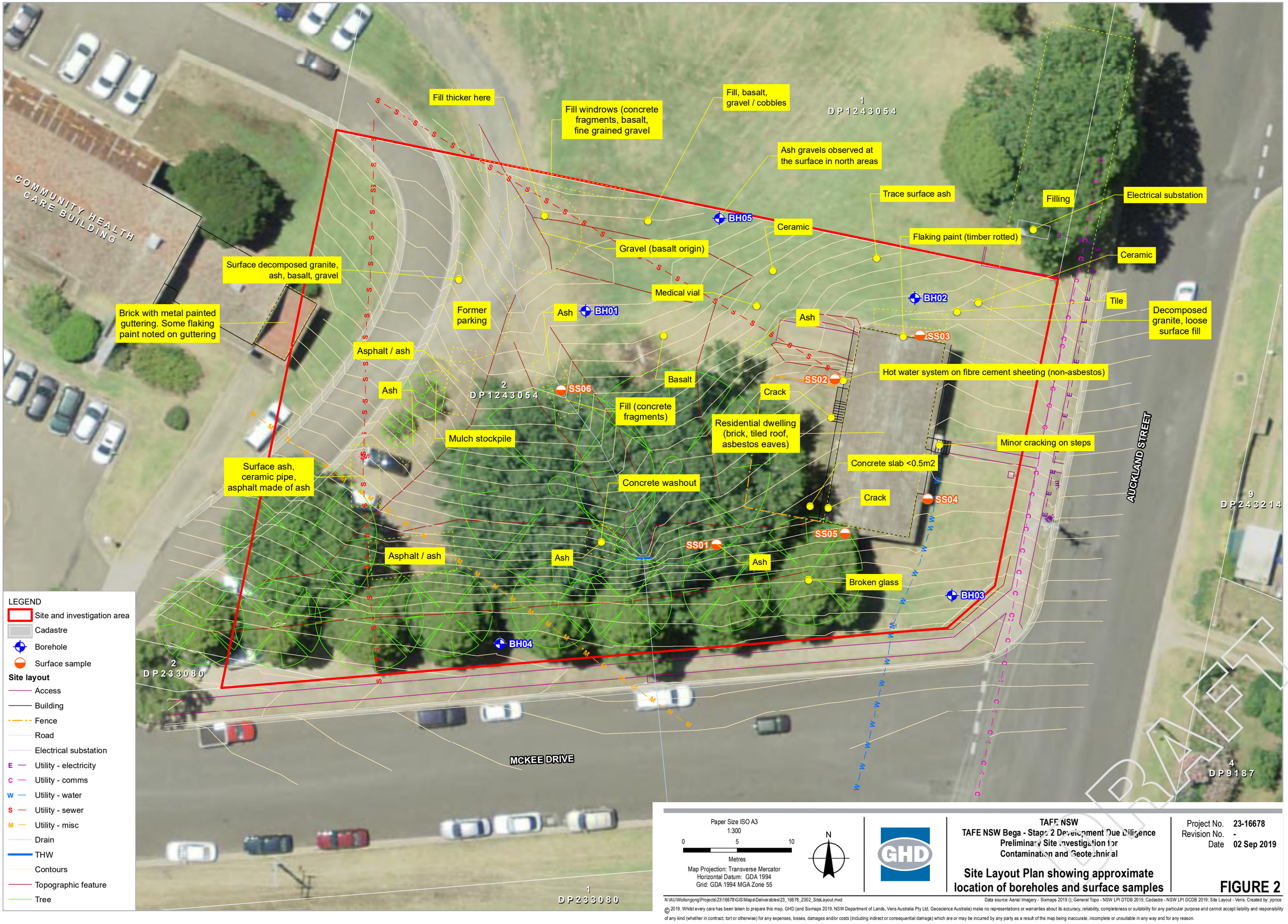


Paper Size ISO A3
1:300
0 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

**TAFE NSW**
**TAFE NSW Bega - Stage 2 Development Due Diligence Preliminary Site Investigation for Contamination and Geotechnical**

## Site Layout Plan showing approximate location of boreholes and surface samples

Project No. 23-16678
Revision No. -
Date 02 Sep 2019

**FIGURE 2**

N:\AU\Wollongong\Projects\23\16678\GIS\Maps\Deliverables\23_16678_Z002_SiteLayout.mxd

Data source: Aerial Imagery - Sixmaps 2019 (); General Topo - NSW LPI DTDB 2015; Cadastre - NSW LPI DCDB 2019; Site Layout - Veris. Created by: jprice

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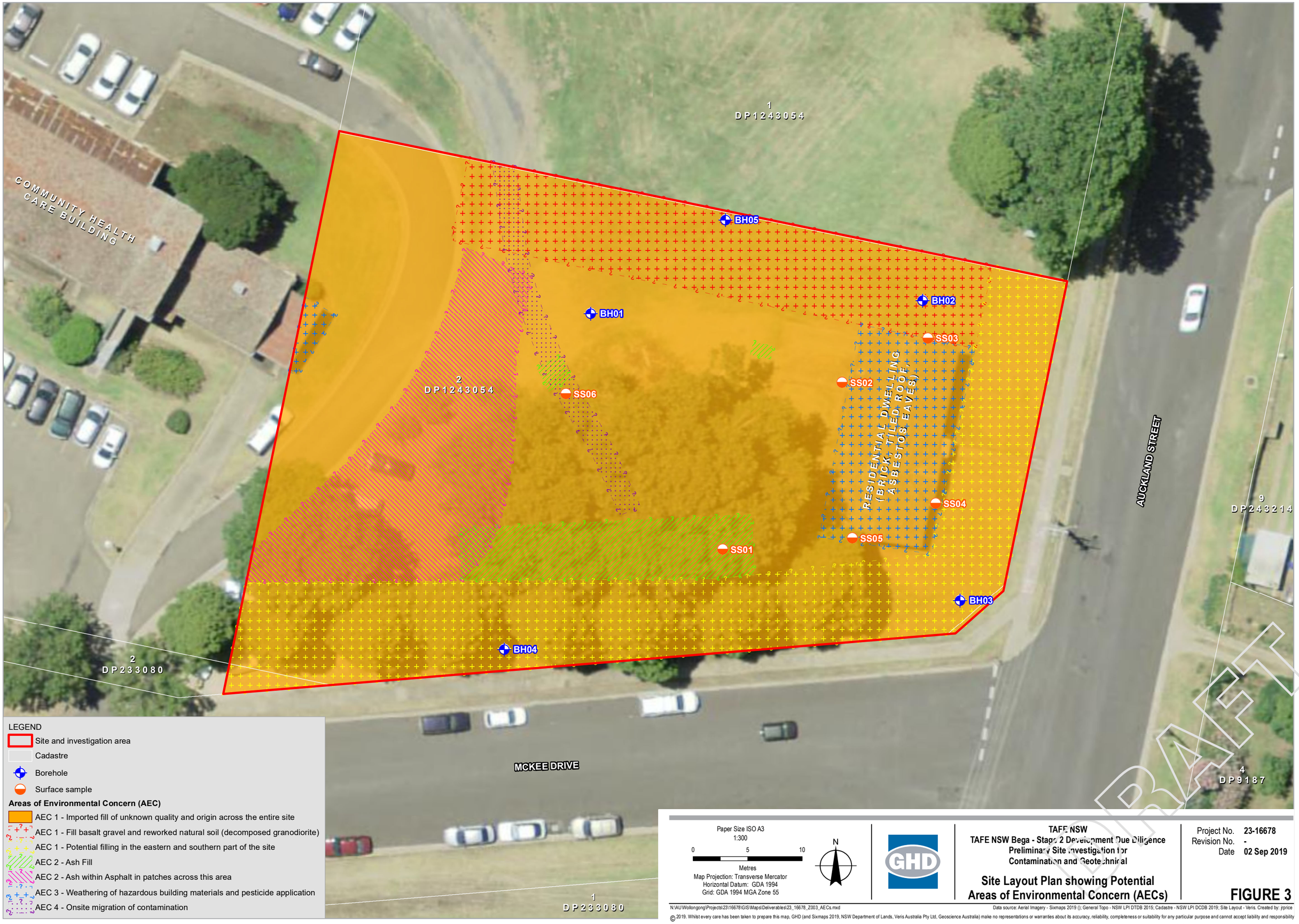


LEGEND

- Site and investigation area
- Cadastre
- Borehole
- Surface sample

**Areas of Environmental Concern (AEC)**

- AEC 1 - Imported fill of unknown quality and origin across the entire site
- AEC 1 - Fill basalt gravel and reworked natural soil (decomposed granodiorite)
- AEC 1 - Potential filling in the eastern and southern part of the site
- AEC 2 - Ash Fill
- AEC 2 - Ash within Asphalt in patches across this area
- AEC 3 - Weathering of hazardous building materials and pesticide application
- AEC 4 - Onsite migration of contamination

Paper Size ISO A3
1:300
0 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

**TAFE NSW**
**TAFE NSW Bega - Stage 2 Development Due Diligence Preliminary Site Investigation for Contamination and Geotechnical**

## Site Layout Plan showing Potential Areas of Environmental Concern (AECs)

Project No. 23-16678
Revision No. -
Date 02 Sep 2019

**FIGURE 3**

N:\AU\Wollongong\Projects\23\16678\GIS\Maps\Deliverables\23_16678_Z003_AECs.mxd

Data source: Aerial Imagery - Sixmaps 2019 (); General Topo - NSW LPI DTDB 2015; Cadastre - NSW LPI DCDB 2019; Site Layout - Veris. Created by: jprice

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# **Appendix C** – Survey plans

G N

MGA ZONE 55

# PROPOSED LOT 2 IN SUBDIVISION PROPOSAL PLAN BY PARKER SCANLON P/L

DP 1243054

LOW POINT

SINGLE STOREY

GARAGE

FFL 35.19

ACCESS

BITUMEN

OF

KERB

GUTTER

ROCK BEACHING

68

52.58

67.23

5.86

28.89

ELECTRICITY SUBSTATION

GARDEN EDGE

FOOTPATH

SEWER BDY TRAP

FFL/HSE 36.99

FFL/GAR 34.36

SINGLE STOREY BRICK RESIDENCE GARAGE UNDER

CONCRETE PATH

CONC

FENCE

WEIRDESH

CONC APRON

CONCRETE

HEADWALL TOP 35.89 INV 35.13

UNKNOWN & UNUSED UNDERGROUND SERVICE PROBABLY GAS

375dia RCP

KERB INLET PIT INV 36.18

KERB INLET PIT INV 36.69

CONCRETE

BACK

LIP

FOOTPATH

KERB

GUTTER

STREET

AUCKLAND

DRIVE

Mc KEE

## LEGEND

| LineStyle | Description |
|---|---|
| | UNDERGROUND STORMWATER |
| | INVERT OF GUTTER |
| | LIP OF GUTTER |
| | TOE OF BANK |
| | BACK OF KERB |
| | BUILDING |
| | FENCE |
| S | UNDERGROUND SEWER |
| W | UNDERGROUND WATER |
| T | UNDERGROUND TELECOM |
| E | UNDERGROUND ELECTRICITY |
| | TOP OF BANK |
| | WATER COURSE |
| | EAVE |

| Symbol | Description |
|---|---|
| | SPOT HEIGHT |
| | POWER POLE |
| | STAY POINT FOR POLE |
| S | SEWER MANHOLE |
| | SIGN POST |
| | TAP |
| | TREE |
| W | WATER METER |

NOTES

NO SURVEY HAS BEEN MADE OF THE BOUNDARIES.

AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY.

CONTOUR INTERVAL 0.25 METRE.

LEVELS TO AUSTRALIAN HEIGHT DATUM (AHD).

CONTOURS ARE INDICATIVE OF GROUNDFORM ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATION OF QUANTITIES.

TREE SPREAD PLOTTED AT SCALE

ELECTRONIC DATA SUPPLIED IS IN MGA CO-ORDINATES ZONE 55 WITH LOCALISED SCALE FACTOR OF 1.000424 APPLIED

PO BOX 639
35 FLINDERS STREET
EDEN NSW 2551
PHONE: (02) 6496 3418
E-MAIL: eden@veris.com.au

Veris Australia Pty Ltd
ABN: 53 615 735 727

DEVELOP WITH CONFIDENCE

veris

## PLAN OF DETAIL, LEVLES & CONTOURS

OVER PROPOSED LOT 3 IN PLAN BY PARKER SCANLON P/L

INTERSECTION OF AUCKLAND STREET & McKEE DRIVE, BEGA

For: GHD BEGA

| SCALE | DATE | DRN. | CHK. | SIZE |
|---|---|---|---|---|
| 1:200 | 19/06/2019 | SB | JW | A2 |

| REFERENCE/DRAWING NAME | REV. |
|---|---|
| 201533 A Sheet Number: 1 of 1 | 0 |

NOTE
ALL DIMENSIONS AND AREAS ARE SUBJECT TO FINAL SURVEY

| MGA CO-ORDINATES TABLE GDA2020 | | | | | | | |
|---|---|---|---|---|---|---|---|
| MARK | EAST | NORTH | ZONE | CLASS | ORDER | METHOD | STATE |
| PM 43729 | 753 598.999 | 5 936 737.445 | 56 | B | 3 | SCIMS | FOUND |
| SSM 35669 | 753 451.363 | 5 936 660.908 | 56 | B | 3 | SCIMS | FOUND |
| SSM 35671 | 753 702.790 | 5 936 698.906 | 56 | B | 3 | SCIMS | FOUND |

SOURCE: MGA COORDINATES ADOPTED FROM SCIMS 2nd AUGUST 2019
COMBINED SCALE FACTOR 1.000384

MGA ZONE 56

32 DP 20943
4 DP 224893
5 DP 227835
1 DP 782400
PT. A DP 351037
PT. B DP 351037
2 1.37ha
1 DP 1243054
3 2888m²
1 DP 233080
15 DP 234426
16 DP 234426
11 DP 2
12 3
13 4
14 4 2 6

RM GIP 189°42' 0.62 (DP 1243054)
RM DH&WNG 345°24' 8.93 (DP 1243054)
RM DH&WNG FD 304°04' 1.285 (DP 1243054)
RM DH&WNG FD 255°48' 4.4 (ORIGIN UNKNOWN)
PM43729 FD (ESTABLISHED)
RM C.BLK FD (EXPOSED) 188°36' 0.43 (DP 1074159)
RM C.BLK NOT FD (DP 233080)
SSM35671 FD (ESTABLISHED)
SSM35669 FD (ESTABLISHED)

101° 134.09 39' 05" 68 05" 49.96 39' 49.96 39' (3.66–12.8–3.66)
05" 38' 98.3 11° 281°41'05" 13.075 11°42'05" 5.13 2.825 84°35'05" 114.35 281°41'05"
36°10'34" 60.065 11° 52.56 28.93 5.86 228°28' 67.215 17' 4.115 265°
110°22'14" 110.672 (MGA GND) 42°36'10" 29.675 (DP233080) 281°43'40" 87.695 (DP233080)
11.46 05" 20.77 191° 73.293 358°40'33" 18.13 39' 190°
242°35'49" 166.232 (MGA GND)
281°39'05" 68

STREET
AUCKLAND
DRIVE (20.115 WIDE)
MCKEE (25.47 WIDE)
SPINDLER STREET
KOOLGARRA DRIVE

| | | | |
|---|---|---|---|
| Surveyor: COLIN ROBERT HUNTER<br>35 FLINDERS STREET, EDEN<br>Date of Survey:<br>Surveyor's Ref: 201533-B | PLAN OF ACQUISITION AND CONSOLIDATION OVER<br>LOT 2 IN DP 1243054 & LOT 2 IN DP 233080 | LGA: BEGA VALLEY<br>Locality: BEGA<br>Subdivision No:<br>Lengths are in metres. Reduction Ratio 1: 800 | Registered | DP |

10 20 30 40 50 Table of mm 90 100 110 120 130 140

# **Appendix D** – Lotsearch report

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

**Date: 03 Jun 2019 13:45:59**

**Reference: LS006566 EP**

**Address: 1 McKee Drive, Bega, NSW 2550**

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 | 03/06/2019 | 03/06/2019 | Daily | - | - | - | - |
| Topographic Data | NSW Department of Finance, Services & Innovation | 11/04/2019 | 10/04/2019 | As required | - | - | - | - |
| List of NSW contaminated sites notified to EPA | Environment Protection Authority | 20/05/2019 | 17/05/2019 | Monthly | 1000 | 0 | 0 | 4 |
| Contaminated Land Records of Notice | Environment Protection Authority | 10/05/2019 | 10/05/2019 | Monthly | 1000 | 0 | 0 | 2 |
| Former Gasworks | Environment Protection Authority | 31/05/2019 | 11/10/2017 | Monthly | 1000 | 0 | 0 | 1 |
| National Waste Management Facilities Database | Geoscience Australia | 07/05/2019 | 07/03/2017 | Quarterly | 1000 | 0 | 0 | 0 |
| EPA PFAS Investigation Program | Environment Protection Authority | 30/05/2019 | 30/05/2019 | Monthly | 2000 | 0 | 0 | 0 |
| Defence PFAS Investigation & Management Program | Department of Defence | 30/05/2019 | 30/05/2019 | Monthly | 2000 | 0 | 0 | 0 |
| Airservices Australia National PFAS Management Program | Airservices Australia | 30/05/2019 | 30/05/2019 | Monthly | 2000 | 0 | 0 | 0 |
| Defence 3 Year Regional Contamination Investigation Program | Department of Defence | 30/05/2019 | 30/05/2019 | 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 | 27/05/2019 | 27/05/2019 | Monthly | 1000 | 0 | 0 | 0 |
| Delicensed POEO Activities still regulated by the EPA | Environment Protection Authority | 27/05/2019 | 27/05/2019 | Monthly | 1000 | 1 | 1 | 1 |
| Former POEO Licensed Activities now revoked or surrendered | Environment Protection Authority | 27/05/2019 | 27/05/2019 | Monthly | 1000 | 0 | 3 | 3 |
| UPSS Environmentally Sensitive Zones | Environment Protection Authority | 14/04/2015 | 12/01/2010 | As required | 1000 | 1 | 1 | 1 |
| 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 | - | 10 | 10 |
| 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 | 1 |
| UBD Business Directory 1961 (Premise & Intersection Matches) | Hardie Grant | | | Not required | 150 | 0 | 0 | 0 |
| UBD Business Directory 1961 (Road & Area Matches) | Hardie Grant | | | Not required | 150 | - | 49 | 50 |
| 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 | - | 38 | 39 |
| 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 | - | 3 | 12 |
| Points of Interest | NSW Department of Finance, Services & Innovation | 11/04/2019 | 10/04/2019 | Quarterly | 1000 | 0 | 2 | 59 |
| Tanks (Areas) | NSW Department of Finance, Services & Innovation | 11/04/2019 | 11/04/2019 | Quarterly | 1000 | 0 | 0 | 0 |
| Tanks (Points) | NSW Department of Finance, Services & Innovation | 11/04/2019 | 10/04/2019 | Quarterly | 1000 | 0 | 0 | 1 |
| Major Easements | NSW Department of Finance, Services & Innovation | 11/04/2019 | 11/04/2019 | Quarterly | 1000 | 0 | 0 | 11 |

| Dataset Name | Custodian | Supply Date | Currency Date | Update Frequency | Dataset Buffer (m) | No. Features Onsite | No. Features within 100m | No. Features within Buffer |
|---|---|---|---|---|---|---|---|---|
| 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 | 2 |
| 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 | 50 |
| Geological Units 1:250,000 | NSW Dept. of Industry, Resources & Energy | 20/08/2014 | | None planned | 1000 | 1 | - | 2 |
| Geological Structures 1:250,000 | 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 | 1 | - | 5 |
| Atlas of Australian Soils | CSIRO | 19/05/2017 | 17/02/2011 | As required | 1000 | 1 | 1 | 1 |
| Environmental Planning Instrument Acid Sulfate Soils | NSW Department of Planning and Environment | 27/05/2019 | 28/02/2019 | 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 | - | - | - |
| 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 | 27/05/2019 | 07/12/2018 | Weekly | 1000 | 0 | 0 | 0 |
| Environmental Planning Instrument Land Zoning | NSW Department of Planning and Environment | 27/05/2019 | 10/05/2019 | Weekly | 1000 | 1 | 3 | 39 |
| 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 | 15/04/2019 | 09/11/2018 | Quarterly | 1000 | 0 | 0 | 0 |
| Environmental Planning Instrument Heritage | NSW Department of Planning and Environment | 27/05/2019 | 03/05/2019 | Weekly | 1000 | 0 | 1 | 132 |
| Bush Fire Prone Land | NSW Rural Fire Service | 28/05/2019 | 05/04/2019 | Quarterly | 1000 | 0 | 0 | 2 |
| 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 | 3 |
| Inflow Dependent Ecosystems Likelihood | Bureau of Meteorology | 14/08/2017 | 15/05/2017 | Unknown | 1000 | 0 | 0 | 8 |
| NSW BioNet Species Sightings | NSW Office of Environment & Heritage | 03/06/2019 | 03/06/2019 | Weekly | 10000 | - | - | - |

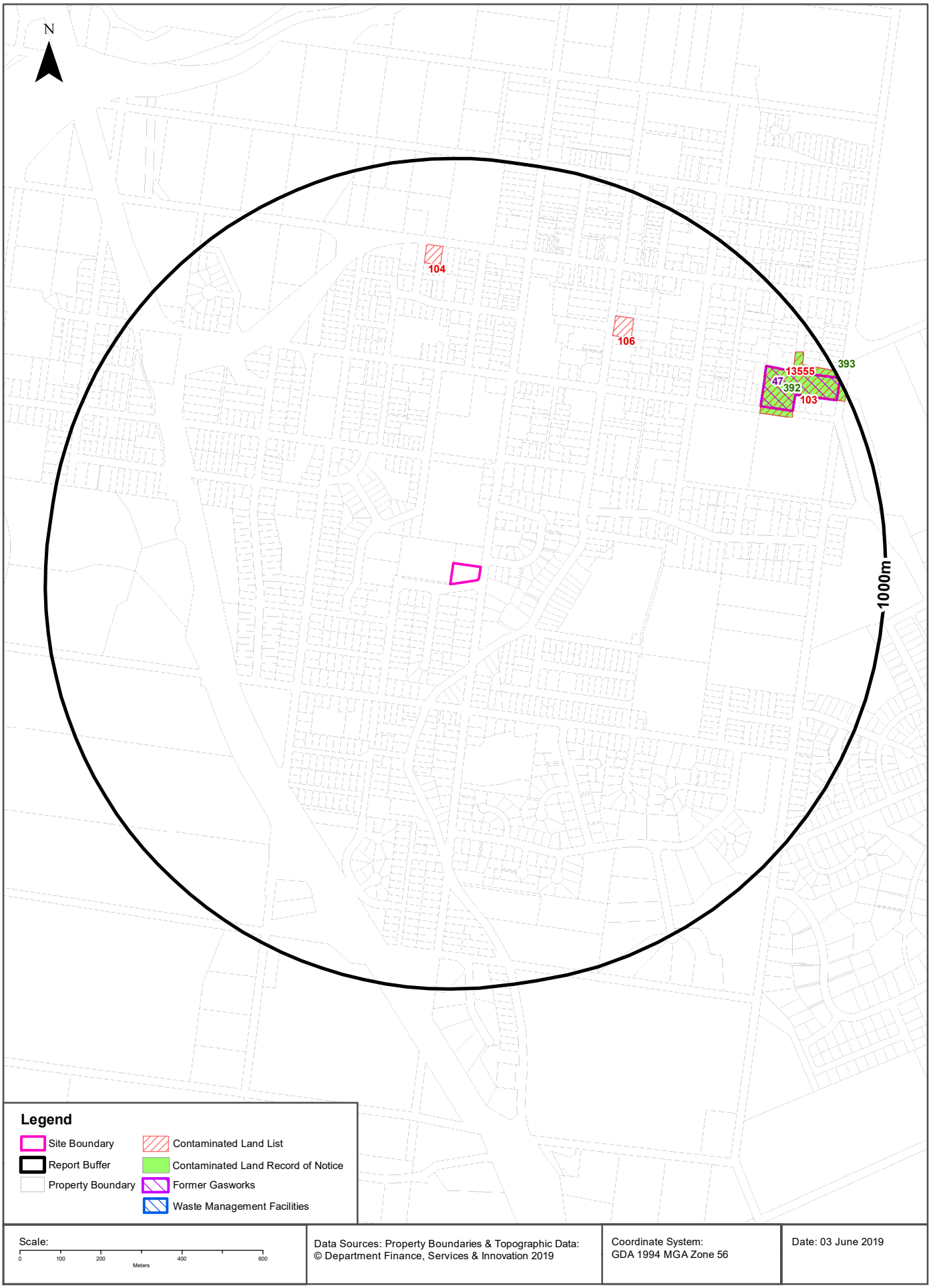
# Aerial Imagery 2018

**1 McKee Drive, Bega, NSW 2550**

| Scale: 0 25 50 100 Meters | Data Source Aerial Imagery: © 2019 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc. | Coordinate System: GDA 1994 MGA Zone 56 | Date: 30 May, 2019 |
|---|---|---|---|

# Contaminated Land & Waste Management Facilities

**1 McKee Drive, Bega, NSW 2550**



# Contaminated Land & Waste Management Facilities

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| 106 | Former BP Service Station | 100 - 102 Gipps Street | Bega | Service Station | Regulation under CLM Act not required | Current EPA List | Premise Match | 659m | North East |
| 104 | Coles Express (former Caltex) Service Station | 2-6 Swan (Corner Carp) STREET | Bega | Service Station | Regulation under CLM Act not required | Current EPA List | Premise Match | 738m | North |
| 13555 | Lands Adjoining the Former Bega Gasworks | Part of Upper, East, Gordon & Gloucester Street | BEGA | Gasworks | Under preliminary investigation order | Current EPA List | Premise Match | 787m | North East |
| 103 | Former Bega Gasworks | 19-29 Upper Street | Bega | Gasworks | Under preliminary investigation order | Current EPA List | Premise Match | 797m | North East |

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. |

| EPA site management class | Explanation |
|---|---|
| Under assessment | The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or 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
© State of New South Wales through the Environment Protection Authority

# Contaminated Land & Waste Management Facilities

**1 McKee Drive, Bega, NSW 2550**

## Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

| Map Id | Name | Address | Suburb | Notices | Area No | Location Confidence | Distance | Direction |
|---|---|---|---|---|---|---|---|---|
| 393 | Lands Adjoining the Former Bega Gasworks | Part of Upper, East, Gordon & Gloucester STREET | BEGA | 2 current | 3431 | Premise Match | 787m | North East |
| 392 | Former Bega Gasworks | 19-29 Upper STREET | BEGA | 2 current | 3430 | Premise Match | 797m | North East |

Contaminated Land Records of Notice Data Source: Environment Protection Authority
© State of New South Wales through the 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 |
|---|---|---|---|---|---|---|
| 47 | Upper Street, Bega | Bega Valley Shire Council | Contact council | Premise Match | 797m | North East |

Former Gasworks Data Source: Environment Protection Authority
© State of New South Wales through the 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
Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

# PFAS Investigation Sites

**1 McKee Drive, Bega, NSW 2550**

## 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
© State of New South Wales through the 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

**1 McKee Drive, Bega, NSW 2550**

## 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

**1 McKee Drive, Bega, NSW 2550**

## 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

© State of New South Wales through the Environment Protection Authority

# EPA Activities

**1 McKee Drive, Bega, NSW 2550**

## Licensed Activities under the POEO Act 1997

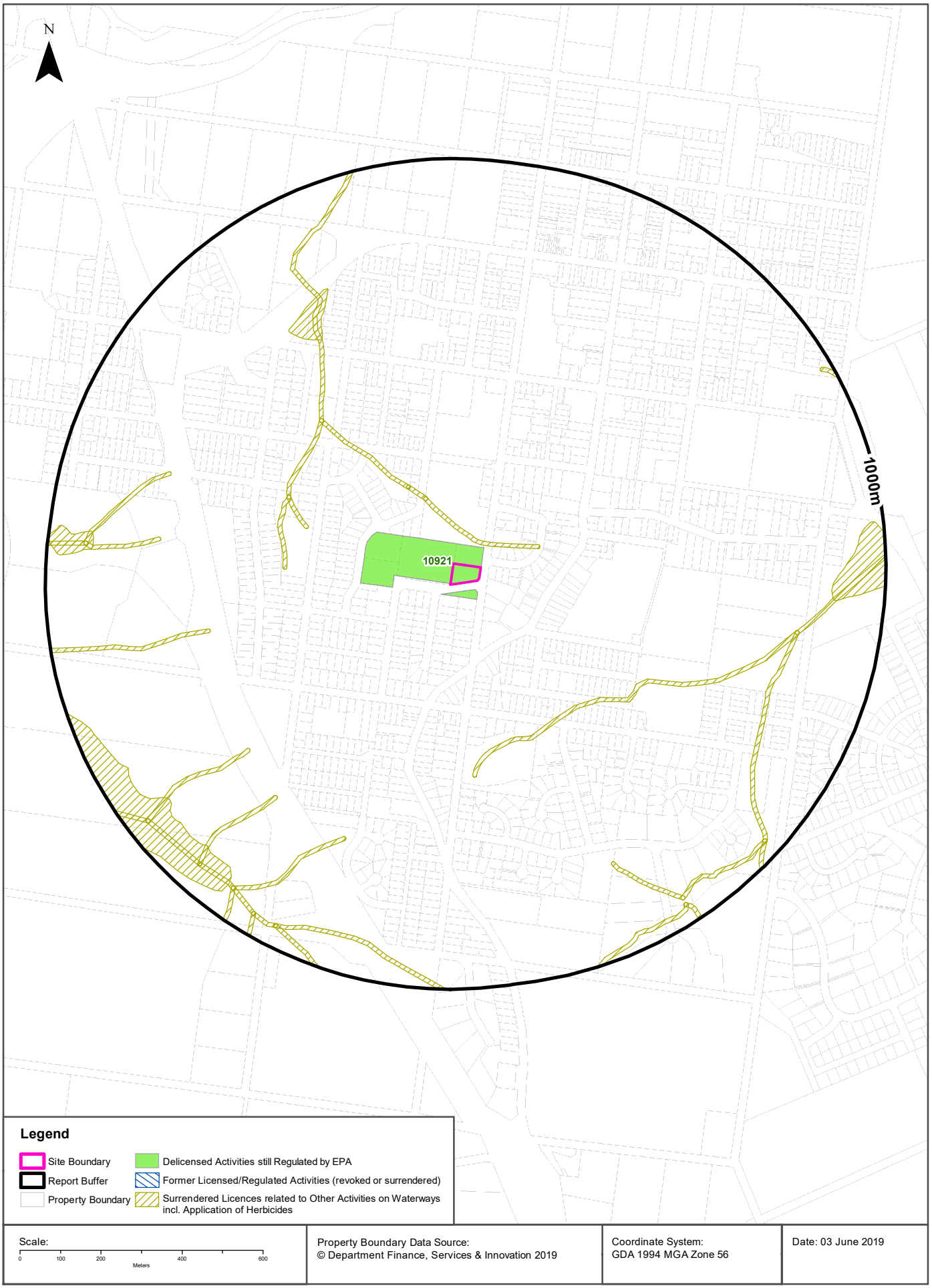
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

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

POEO Licence Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

# Delicensed & Former Licensed EPA Activities

**1 McKee Drive, Bega, NSW 2550**



# EPA Activities

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|---|---|---|---|
| 10921 | GREATER SOUTHERN AREA HEALTH SERVICE | BEGA DISTRICT HOSPITAL | McKEE STREET | BEGA | Hazardous, Industrial or Group A Waste Generation or Storage | Premise Match | 0m | Onsite |

Delicensed Activities Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

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

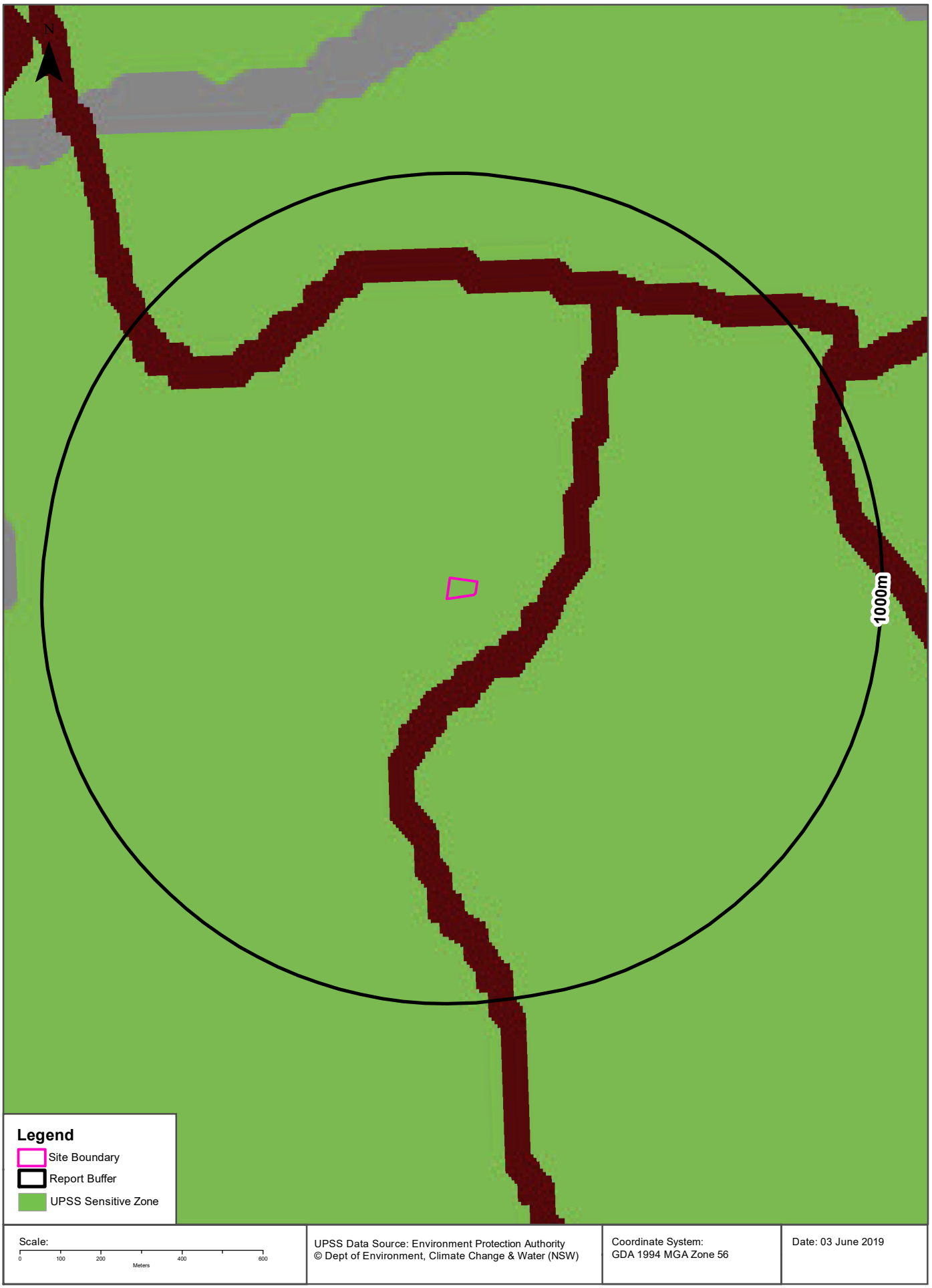
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

| Licence No | Organisation | Location | Status | Issued Date | Activity | Loc Conf | Distance | Direction |
|---|---|---|---|---|---|---|---|---|
| 4653 | LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD | WATERWAYS THROUGHOUT NSW | Surrendered | | Other Activities / Non Scheduled Activity - Application of Herbicides | Network of Features | 54m | - |
| 4838 | Robert Orchard | Various Waterways throughout New South Wales - SYDNEY NSW 2000 | Surrendered | | Other Activities / Non Scheduled Activity - Application of Herbicides | Network of Features | 54m | - |
| 6630 | SYDNEY WEED & PEST MANAGEMENT PTY LTD | WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148 | Surrendered | | Other Activities / Non Scheduled Activity - Application of Herbicides | Network of Features | 54m | - |

Former Licensed Activities Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

# UPSS Sensitive Zones

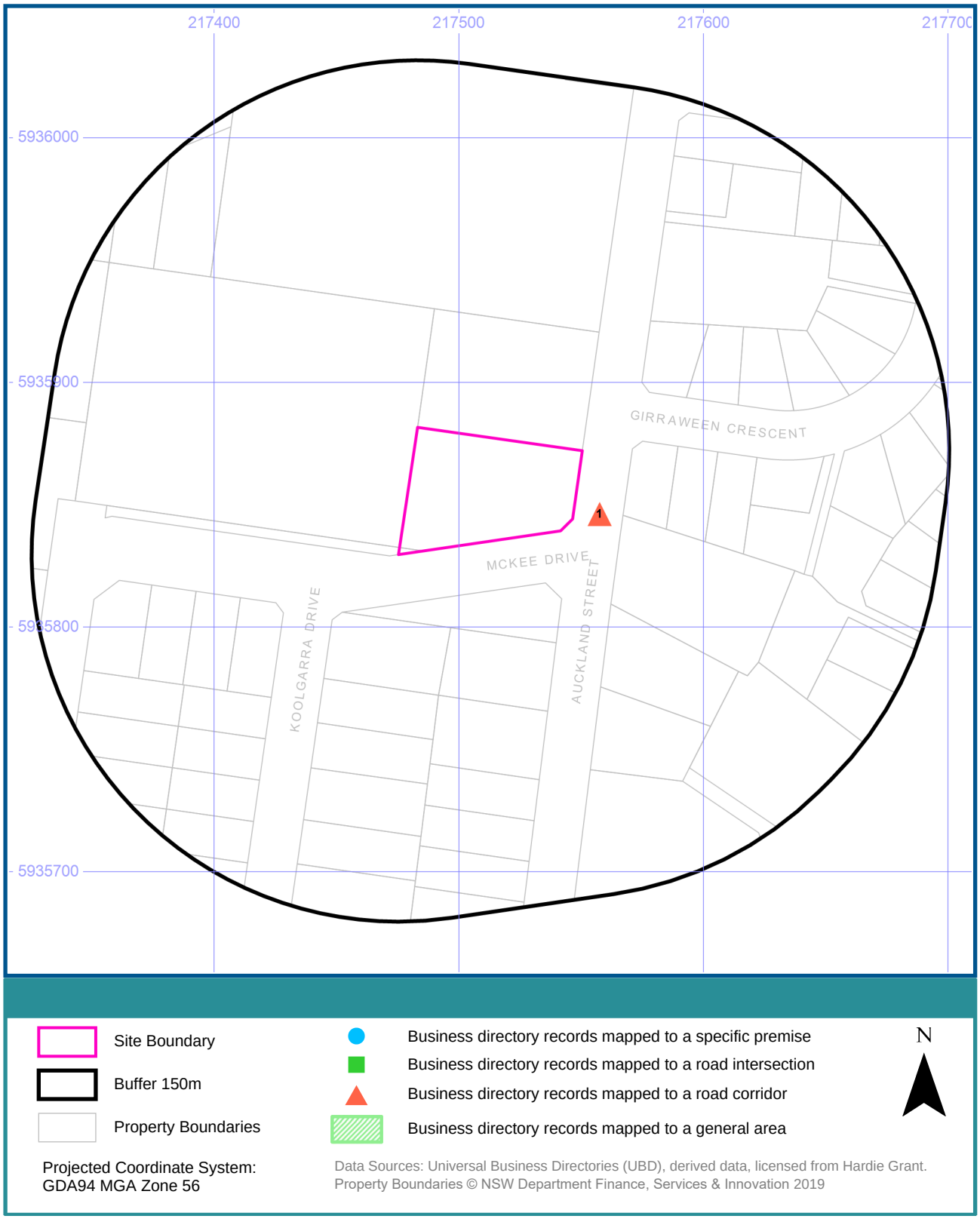
**1 McKee Drive, Bega, NSW 2550**



# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 1982 Business Directory Records



# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 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 | | | | | |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

## 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:

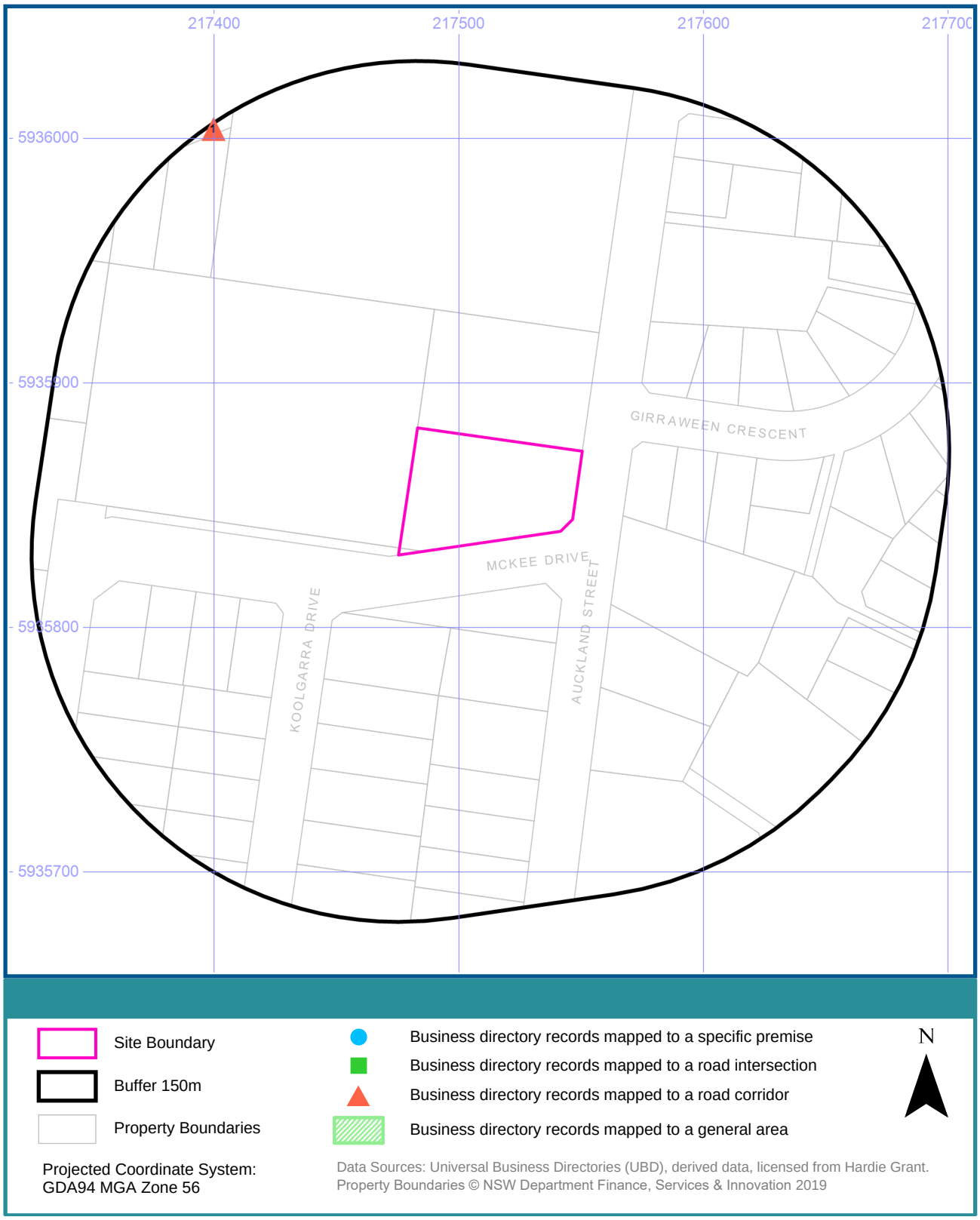
| Map Id | Business Activity | Premise | Ref No. | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|
| 1 | MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS | Balmain Bros., Auckland St., Bega | 146380 | Road Match | 0m |
| | ASSOCIATIONS, SOCIETIES, CLUBS &/OR SPORTING BODIES. | Bega Co-operative Society Ltd, The, Auckland St., Bega | 146148 | Road Match | 0m |
| | DEPARTMENTAL STORES | Bega Co-operative Society Ltd., Auckland St., Bega | 146235 | Road Match | 0m |
| | HOSPITALS &/ OR HEALTH CENTRES | Bega District Hospital, Auckland St., Bega | 146312 | Road Match | 0m |
| | SOLICITORS | Clark, A. J. & Earner, 104 Auckland St., Bega | 146457 | Road Match | 0m |
| | GOVERNMENT DEPARTMENTS | Commonwealth Employment Service, Auckland St., Bega | 146282 | Road Match | 0m |
| | SUPERMARKETS | Goodfellow Supermarket. Auckland St., Bega | 146468 | Road Match | 0m |
| | GIFT SHOPS | Howards Mitre 10 Hardware, Auckland St., Bega | 146277 | Road Match | 0m |
| | HARDWARE &/OR BUILDERS SUPPIIES | Howards Mitre 10 Hardware, Auckland St., Bega | 146307 | Road Match | 0m |
| | GOVERNMENT DEPARTMENTS | Main Roads Dept., Auckland St., Bega | 146285 | Road Match | 0m |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 1970 Business Directory Records



# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 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 | | | | | |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

## 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:

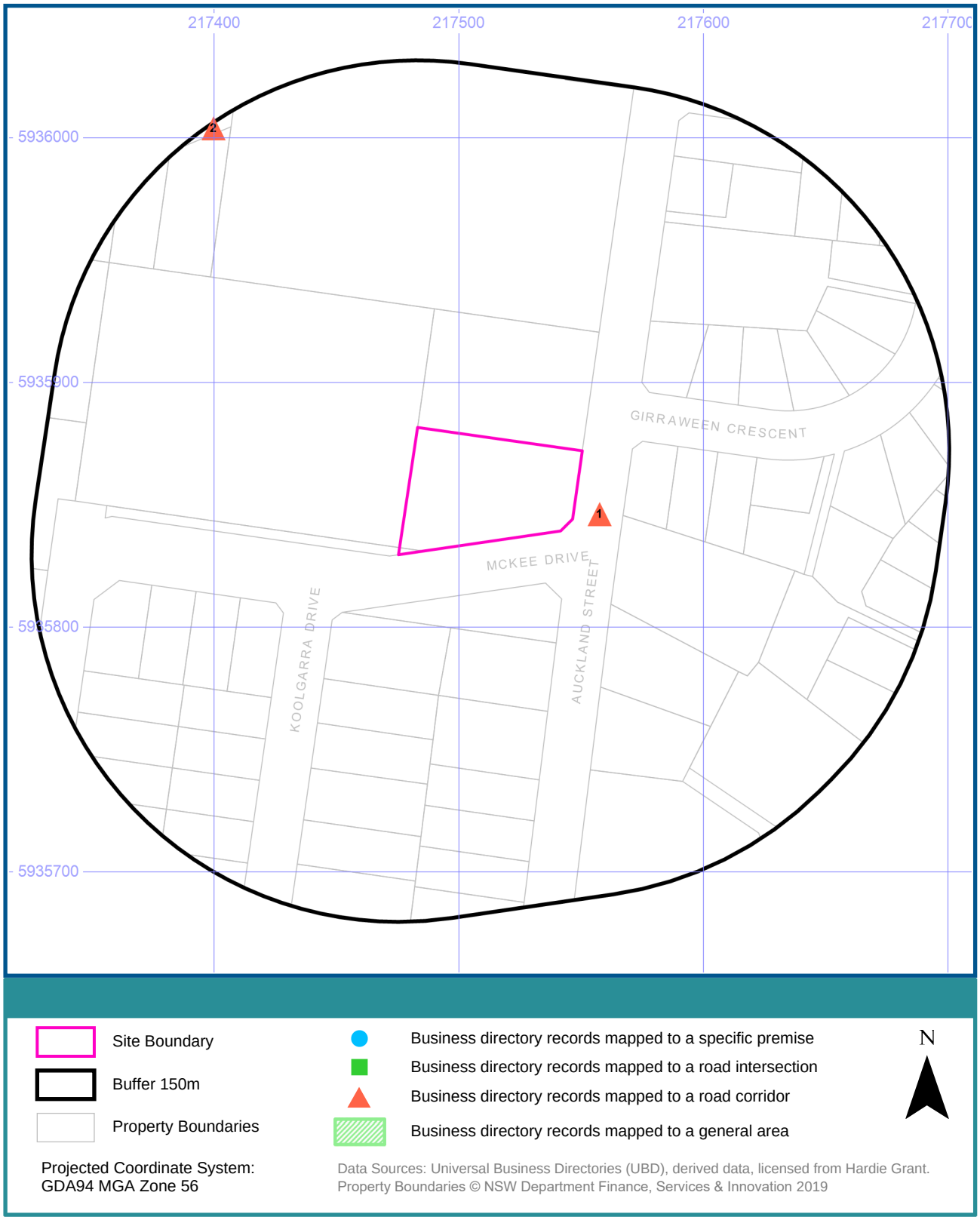
| Map Id | Business Activity | Premise | Ref No. | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|
| 1 | PLASTERERS-SOLID-& PLASTERING CONTRACTORS | Dickerson, W. E., Eden St. Bega | 571166 | Road Match | 145m |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 1961 Business Directory Records



# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 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 | | | | | |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

## 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 | ASSOCIATIONS & SOCIETIES | Bega Co-operative Society Ltd. (The), Auckland St., Bega | 186914 | Road Match | 0m |
| | BUILDERS' SUPPLIERS | Bega Co-operative Society Ltd., Auckland St, Bega | 186973 | Road Match | 0m |
| | BUTTER MANUFACTURERS & WHOLESALERS | Bega Co-operative Society Ltd., Auckland St, Bega | 186982 | Road Match | 0m |
| | BABY & CHILDREN'S WEAR-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 186930 | Road Match | 0m |
| | BATTERY DISTRIBUTORS | Bega Co-operative Society Ltd., Auckland St., Bega | 186944 | Road Match | 0m |
| | CHEESE MANUFACTURERS & DISTRIBUTORS | Bega Co-operative Society Ltd., Auckland St., Bega | 187009 | Road Match | 0m |
| | CYCLE DEALERS & ACCESSORIES | Bega Co-operative Society Ltd., Auckland St., Bega | 187030 | Road Match | 0m |
| | DEPARTMENTAL STORES | Bega Co-operative Society Ltd., Auckland St., Bega | 187038 | Road Match | 0m |
| | DRAPERS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187039 | Road Match | 0m |
| | ELECTRICAL SUPPLIES & APPLIANCES-RETAILERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187054 | Road Match | 0m |
| | FANCY GOODS & GIFT SHOPS | Bega Co-operative Society Ltd., Auckland St., Bega | 187065 | Road Match | 0m |
| | FISH MERCHANTS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187069 | Road Match | 0m |
| | FOOTWEAR RETAILERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187071 | Road Match | 0m |
| | FOUNDATION GARMENTS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187075 | Road Match | 0m |
| | FROCK & COAT SALONS | Bega Co-operative Society Ltd., Auckland St., Bega | 187077 | Road Match | 0m |
| | FRUITERERS & GREENGROCERS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187083 | Road Match | 0m |

| Map Id | Business Activity | Premise | Ref No. | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|
| 1 | FURNITURE & FURNISHINGS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187088 | Road Match | 0m |
| | GENERAL MERCHANTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187099 | Road Match | 0m |
| | GROCERS & GENERAL STOREKEEPERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187107 | Road Match | 0m |
| | GROCERS & GENERAL STOREKEEPERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187108 | Road Match | 0m |
| | HAND BAG & GLOVE SPECIALISTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187116 | Road Match | 0m |
| | HARDWARE DEALERS & IRONMONGERS , | Bega Co-operative Society Ltd., Auckland St., Bega | 187118 | Road Match | 0m |
| | ICE MANUFACTURERS & VENDORS | Bega Co-operative Society Ltd., Auckland St., Bega | 187137 | Road Match | 0m |
| | INSURANCE AGENTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187141 | Road Match | 0m |
| | LINGERIE & HOSIERY SPECIALISTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187170 | Road Match | 0m |
| | MERCERS & MEN'S & BOYS' OUTFITTERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187183 | Road Match | 0m |
| | MILK VENDORS | Bega Co-operative Society Ltd., Auckland St., Bega | 187188 | Road Match | 0m |
| | MILLINERY-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187189 | Road Match | 0m |
| | MOTOR OIL & SPIRIT DEPOTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187238 | Road Match | 0m |
| | OUTFITTERS-LADIES' & CHILDREN'S | Bega Co-operative Society Ltd., Auckland St., Bega | 187266 | Road Match | 0m |
| | PAINT, VARNISH, OIL & COLOUR MERCHANTS | Bega Co-operative Society Ltd., Auckland St., Bega | 187270 | Road Match | 0m |
| | PRODUCE MERCHANTS-GRAIN & SEED-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187286 | Road Match | 0m |
| | REFRIGERATOR DEALERS & SERVICEMEN | Bega Co-operative Society Ltd., Auckland St., Bega | 187290 | Road Match | 0m |
| | SPORTS & TRAVEL GOODS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187313 | Road Match | 0m |
| | TIMBER MERCHANTS & SAWMILLERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187333 | Road Match | 0m |
| | TOY DEALERS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187336 | Road Match | 0m |
| | TYRE DEALERS, RETREADERS & VULCANIZERS | Bega Co-operative Society Ltd., Auckland St., Bega | 187344 | Road Match | 0m |
| | WINE & SPIRIT MERCHANTS-RETAIL | Bega Co-operative Society Ltd., Auckland St., Bega | 187360 | Road Match | 0m |
| | HOSPITALS & HEALTH CENTRES . | Bega District Hospital, Auckland St., Bega | 187128 | Road Match | 0m |
| | NEWSPAPER PUBLISHERS & PRINTERS | Bega District News Pty. Ltd., Auckland St., Bega | 187263 | Road Match | 0m |
| | BUILDERS' SUPPLIERS | Bega Co-operative Society Ltd., Auckland St., Bega | 186972 | Road Match | 0m |
| | DEPARTMENTAL STORES | Bega Co-operative Society Ltd., Auckland St., Bega | 187037 | Road Match | 0m |
| | SCHOOLS & COLLEGES-PRIVATE & PUBLIC | Bega Primary School, Auckland St., Bega | 187302 | Road Match | 0m |
| | LOCAL BODIES | Bega Valley County Council, Auckland St., Bega | 187175 | Road Match | 0m |
| | ACCOUNTANTS & AUDITORS | Goldberg and Wheeler, Auckland St., Bega | 186893 | Road Match | 0m |
| | COOL STORES | Hayes & Kydd Pty. Ltd., Auckland St., Bega | 187029 | Road Match | 0m |
| | ICE MANUFACTURERS & VENDORS | Hayes & Kydd Pty. Ltd., Auckland St., Bega | 187138 | Road Match | 0m |
| | GOVERNMENT DEPARTMENTS | Main Roads, Dept, of, Auckland St., Bega | 187104 | Road Match | 0m |
| | BUILDERS & CONTRACTORS | Watling, C. L. and Son, Auckland St., Bega | 186970 | Road Match | 0m |

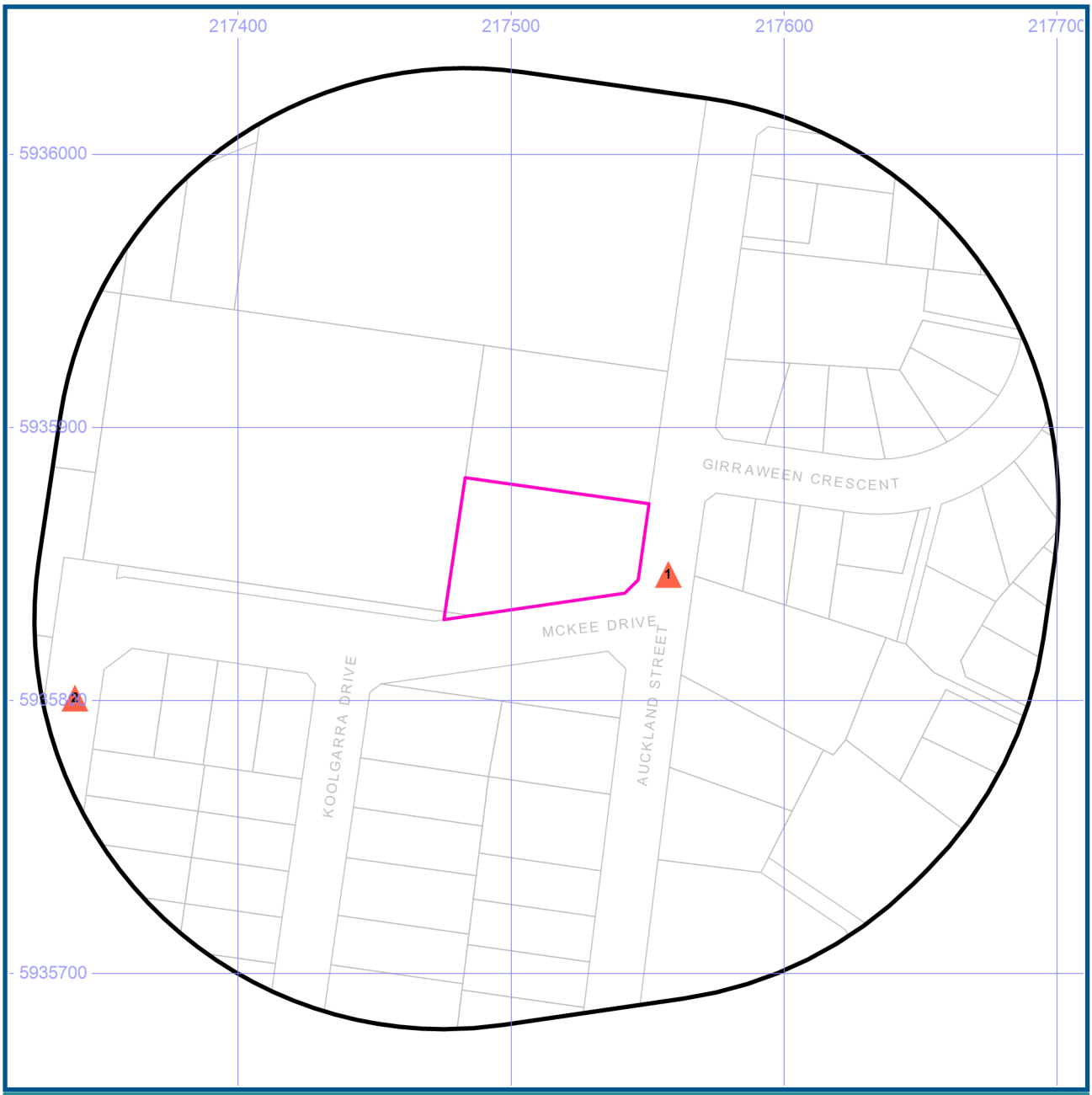
| Map Id | Business Activity | Premise | Ref No. | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|
| 2 | PLASTERERS-SOLID-& PLASTERING CONTRACTORS | Dickerson, W. E., Eden St., Bega | 187279 | Road Match | 145m |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 1950 Business Directory Records




Site Boundary

Buffer 150m

Property Boundaries

Business directory records mapped to a specific premise

Business directory records mapped to a road intersection

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: Universal Business Directories (UBD), derived data, licensed from Hardie Grant.
Property Boundaries © NSW Department Finance, Services & Innovation 2019

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## 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 | | | | | |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

## 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 | HOSTELS | Bega Boys Hostel, 35 Auckland St. Bega | 139725 | Road Match | 0m |
| | ASSOCIATIONS & SOCIETIES | Bega Co-operative Society Ltd. (The), Auckland St Bega | 139473 | Road Match | 0m |
| | GROCERS & GENERAL STOREKEEPERS | Bega Co-operative Society Ltd. (The), Auckland St. Bega | 139699 | Road Match | 0m |
| | DRAPERS-RETAIL | Bega Co-operative Society Ltd., Auckland St. Bega | 139620 | Road Match | 0m |
| | PAINT & VARNISH MERCHANTS | Bega Co-operative Society Ltd., Auckland St. Bega | 139880 | Road Match | 0m |
| | PRODUCE MERCHANTS-GRAIN, SEED, ETC.,-RETAIL | Bega Co-operative Society Ltd., Auckland St. Bega | 139904 | Road Match | 0m |
| | SCHOOLS | Bega Intermediate High School (H. D. Evans, M.E.C., B.Ed., Head; 24 Assistants), Auckland St. Bega | 139937 | Road Match | 0m |
| | MERCERS, MEN'S OUTFITTERS | Bega Co-operative Society Ltd., Auckland St. Bega | 139769 | Road Match | 0m |
| | MANCHESTER SPECIALISTS | Bega Co-operative Society Ltd., Auckland St. Bega | 139758 | Road Match | 0m |
| | MOTOR OIL & SPIRIT MERCHANTS | Grant Bros. Auckland Street, Bega | 139849 | Road Match | 0m |
| | BATTERY SERVICE STATIONS | Hergenhan, E. and Son, Auckland St. Bega | 139509 | Road Match | 0m |
| | RADIO DEALERS &/OR SERVICEMEN | Hergenhan, E. and Son (Agent, Philo), Auckland St., Bega | 139908 | Road Match | 0m |
| | REFRIGERATOR DIALERE &/OR SERVICEMEN | Hergenhan, E. and Son (Agent, Silent Knight, Electra Ice), Auckland St. Bega | 139922 | Road Match | 0m |
| | MOTOR CAR & TRUCK DEALERS | Hergenhan, E. and Son (Agents, De Soto, Willys),Auckland St. Bega | 139813 | Road Match | 0m |
| | MOTOR ACCESSORY DEALERS & SPARE PARTS | Hergenhan, E. and Son, Auckland St. Bega | 139796 | Road Match | 0m |
| | MOTOR ELECTRICIANS | Hergenhan, E. and Son, Auckland St. Bega | 139825 | Road Match | 0m |

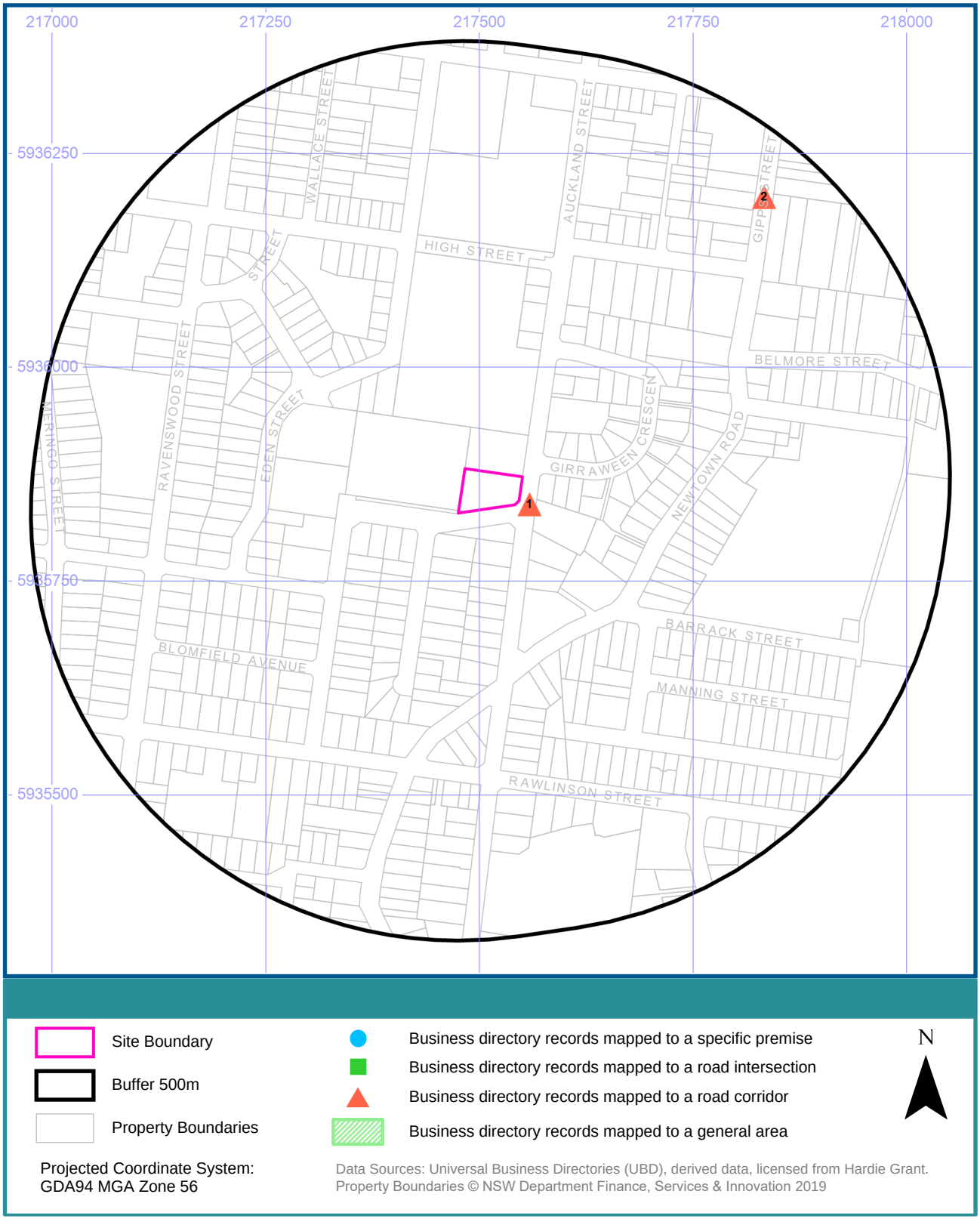
| Map Id | Business Activity | Premise | Ref No. | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|
| 1 | MOTOR GARAGES & ENGINEERS | Hergenhan, E. and Son, Auckland St. Bega | 139831 | Road Match | 0m |
| | MOTOR SERVICE STATIONS | Hergenhan, E. and Son, Auckland St. Bega | 139860 | Road Match | 0m |
| | TYRE DEALERS | Hergenhan, E. and Son, Auckland St. Bega | 139981 | Road Match | 0m |
| | TRACTOR DEALERS | Hyland, E. C., Auckland and Bega Sts. Bega | 139975 | Road Match | 0m |
| | BLACKSMITHS & FARRIERS | Johnson, W., Auckland St. Bega | 139517 | Road Match | 0m |
| | GOVERNMENT DEPARTMENTS | Main Roads, Dept. of, Auckland St. Bega | 139696 | Road Match | 0m |
| | SPORTS GOODS-RETAILERS | Ottan and Buckland, Auckland St. Bega | 139952 | Road Match | 0m |
| | GARDEN SUPPLIES | Otton and Buckland (Agents, Anderson's Seeds), Auckland St. Bega | 139687 | Road Match | 0m |
| | BUILDERS' SUPPLIES | Otton and Buckland, Auckland St. Bega | 139548 | Road Match | 0m |
| | CHINA, CRYSTAL & EARTHENWARE DEALERS | Otton and Buckland, Auckland St. Bega | 139593 | Road Match | 0m |
| | ELECTRICAL SUPPLIES & APPLIANCES-RETAIL | Otton and Buckland, Auckland St. Bega | 139644 | Road Match | 0m |
| | MILK BARS & CONFECTIONERS | Otton and Buckland, Auckland St. Bega | 139783 | Road Match | 0m |
| | PAINT & VARNISH MERCHANTS | Otton and Buckland, Auckland St. Bega | 139885 | Road Match | 0m |
| | PLUMBERS & DRAINLAYERS | Otton and Buckland, Auckland St. Bega | 139895 | Road Match | 0m |
| | PLUMBERS' SUPPLIES | Otton and Buckland, Auckland St. Bega | 139900 | Road Match | 0m |
| | RADIO DEALERS &/OR SERVICEMEN | Otton and Buckland, Auckland St. Bega | 139910 | Road Match | 0m |
| | REFRIGERATOR DIALERE &/OR SERVICEMEN | Otton and Buckland, Auckland St. Bega | 139925 | Road Match | 0m |
| | TOY DEALERS-RETAIL | Otton and Buckland, Auckland St. Bega | 139972 | Road Match | 0m |
| | TRAVEL GOODS-RETAIL | Otton and Buckland, Auckland St. Bega | 139978 | Road Match | 0m |
| | ELECTRICAL SUPPLIES & APPLIANCES-RETAIL | Ottons Pty. Ltd Auckland Street, Bega | 139583 | Road Match | 0m |
| | AERATED WATER & CORDIAL MANUFACTURERS | Ottons Pty. Ltd., Auckland St. Bega | 139459 | Road Match | 0m |
| | MOTOR WELDERS | Steward and Williams, 11 Auckland St. Bega | 139872 | Road Match | 0m |
| 2 | BUILDERS & BUILDING CONTRACTORS | Walden, H. S., Spindler St. Bega | 139545 | Road Match | 121m |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## Dry Cleaners, Motor Garages & Service Stations




Site Boundary

Buffer 500m

Property Boundaries

Business directory records mapped to a specific premise

Business directory records mapped to a road intersection

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: Universal Business Directories (UBD), derived data, licensed from Hardie Grant.
Property Boundaries © NSW Department Finance, Services & Innovation 2019

# Historical Business Directories

**1 McKee Drive, Bega, NSW 2550**

## Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

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

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

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Dry Cleaners, Motor Garages & Service Stations
# Road or Area Matches

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.

| Map Id | Business Activity | Premise | Ref No. | Year | Location Confidence | Distance to Road Corridor or Area |
|---|---|---|---|---|---|---|
| 1 | MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS | Balmain Bros., Auckland St., Bega | 146380 | 1982 | Road Match | 0m |
| | MOTOR GARAGES & ENGINEERS | Hergenhan, E. and Son, Auckland St. Bega | 139831 | 1950 | Road Match | 0m |
| | MOTOR SERVICE STATIONS | Hergenhan, E. and Son, Auckland St. Bega | 139860 | 1950 | Road Match | 0m |
| 2 | MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS | BP Service Station, Gipps St., Bega | 146382 | 1982 | Road Match | 363m |
| | MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS | Momsen Motors, Gipps St., Bega | 146386 | 1982 | Road Match | 363m |
| | MOTOR GARAGES &/OR ENGINEERS | Bega Service Station, Gipps St. Bega | 571110 | 1970 | Road Match | 363m |
| | MOTOR GARAGES &/OR ENGINEERS | Eurell & Whyman Pty. Ltd., 70-76 Gipps St. Bega | 571112 | 1970 | Road Match | 363m |
| | MOTOR GARAGES &/OR ENGINEERS | Momsen Motors, Gipps St. Bega | 571114 | 1970 | Road Match | 363m |
| | MOTOR GARAGES & ENGINEERS | Eurell & Whyman Pty. Ltd., 70-76 Gipps St., Bega | 187225 | 1961 | Road Match | 363m |
| | MOTOR GARAGES & ENGINEERS | Momsen, W. J., Gipps St., Bega | 187227 | 1961 | Road Match | 363m |
| | MOTOR GARAGES & ENGINEERS | Momsen, W. J., Gipps St. Bega | 139832 | 1950 | Road Match | 363m |
| | MOTOR SERVICE STATIONS | Momsen, W. J., Gipps St. Bega | 139861 | 1950 | Road Match | 363m |

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

# Aerial Imagery 2011

**1 McKee Drive, Bega, NSW 2550**

| Scale: | Data Source Aerial Imagery: © 2019 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc. | Coordinate System: GDA 1994 MGA Zone 56 | Date: 30 May, 2019 |
|---|---|---|---|

# Aerial Imagery 2003

**1 McKee Drive, Bega, NSW 2550**

# Aerial Imagery 1994

**1 McKee Drive, Bega, NSW 2550**

# Aerial Imagery 1987

**1 McKee Drive, Bega, NSW 2550**

# Aerial Imagery 1979

**1 McKee Drive, Bega, NSW 2550**

# Aerial Imagery 1967

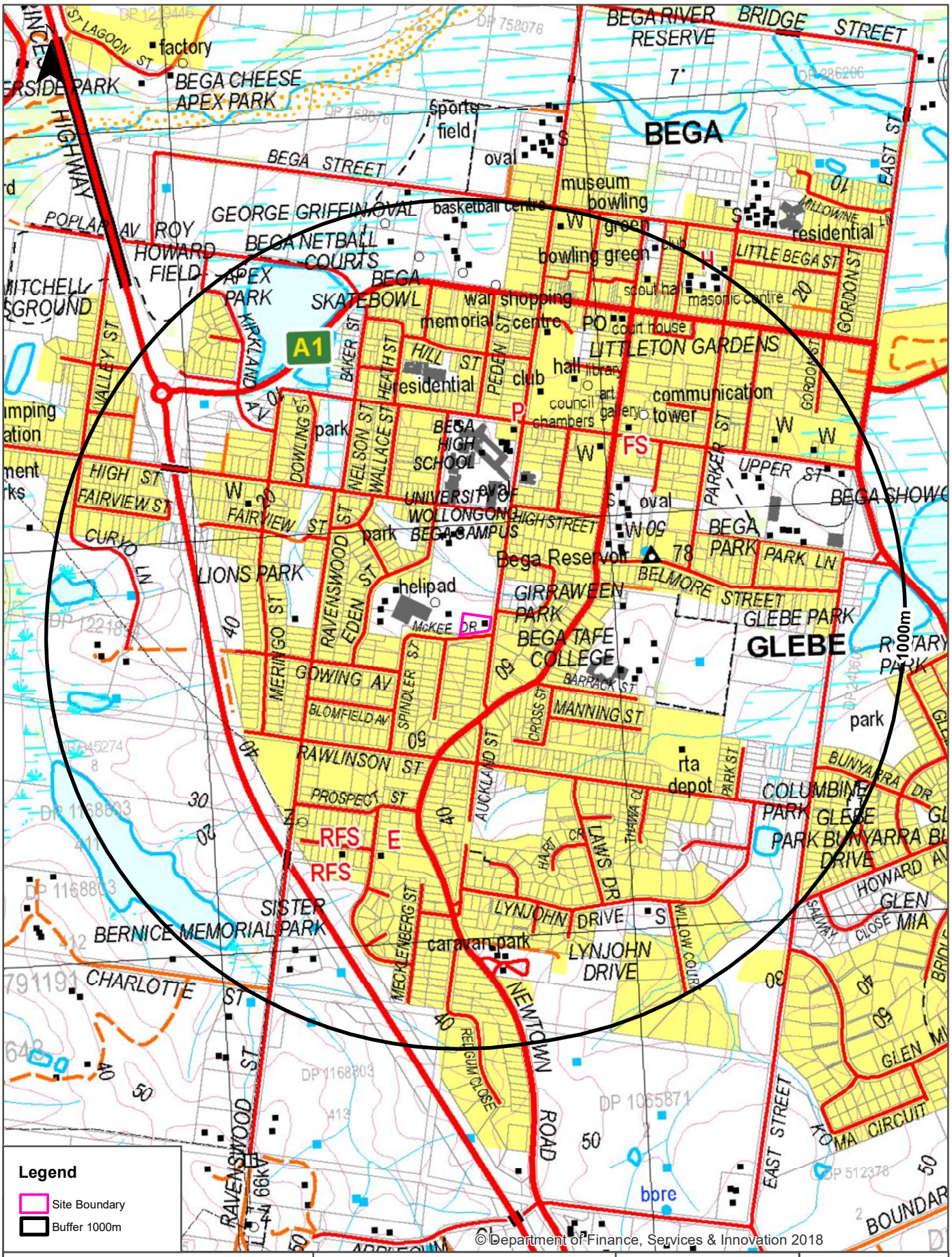
**1 McKee Drive, Bega, NSW 2550**

# Aerial Imagery 1957

**1 McKee Drive, Bega, NSW 2550**

# Topographic Map 2015

**1 McKee Drive, Bega, NSW 2550**




**Legend**

- Site Boundary
- Buffer 1000m

Scale: 0 100 200 400 600 Meters

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

Coordinate System: GDA 1994 MGA Zone 56

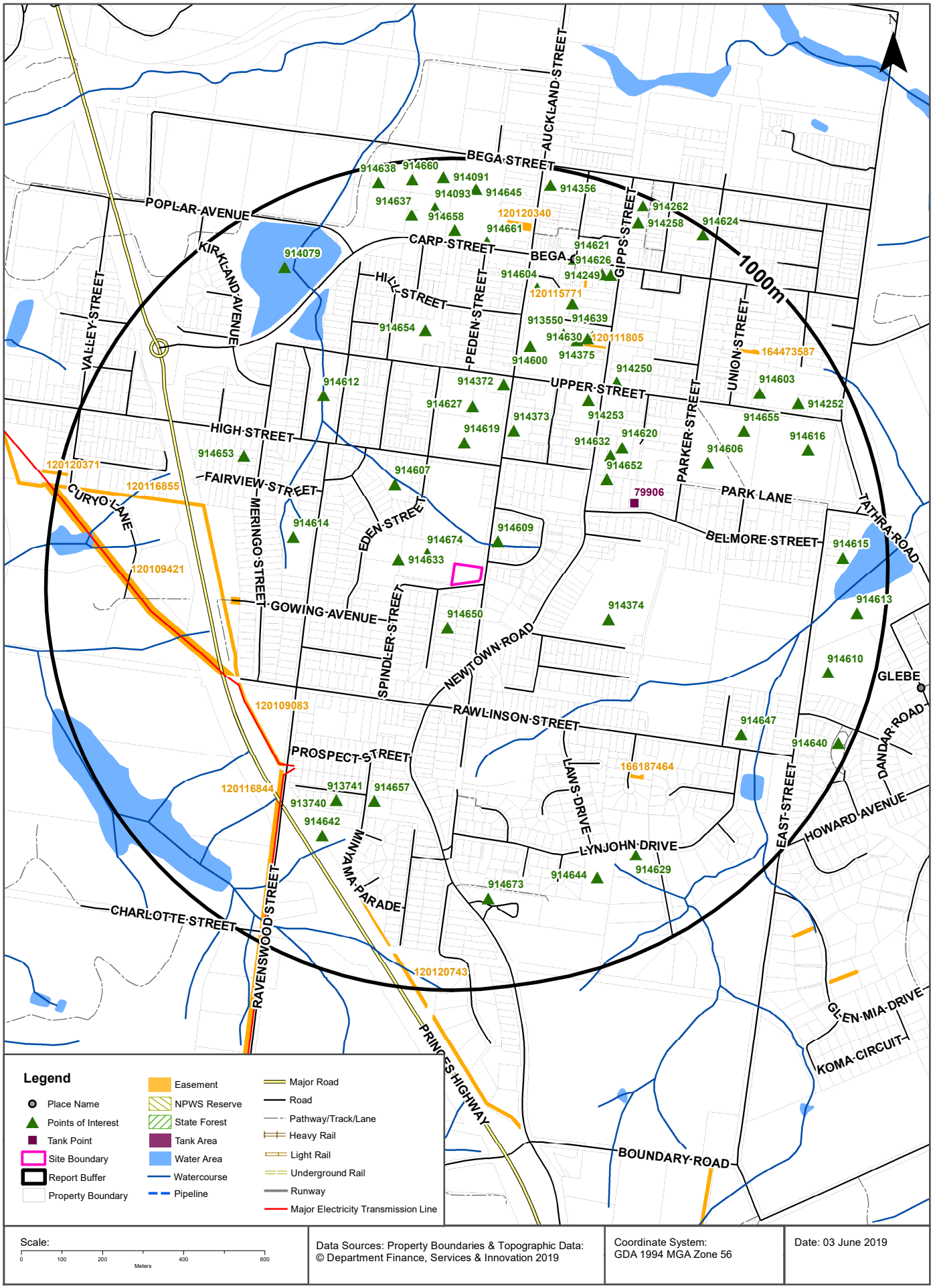
Date: 03 June 2019

# Historical Map 1979

1 McKee Drive, Bega, NSW 2550

# Topographic Features

**1 McKee Drive, Bega, NSW 2550**




Scale: 0 100 200 400 600 Meters

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

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 June 2019

# Topographic Features

**1 McKee Drive, Bega, NSW 2550**

## Points of Interest

What Points of Interest exist within the dataset buffer?

| Map Id | Feature Type | Label | Distance | Direction |
|---|---|---|---|---|
| 914674 | Helipad | Helipad | 72m | North West |
| 914609 | Park | GIRRAWEEN PARK | 76m | North East |
| 914650 | Child Care Centre | BEGA PRE-SCHOOL ASSOCIATION INC | 106m | South |
| 914633 | Medical Centre | BEGA COMMUNITY HEALTH CENTRE | 139m | West |
| 914607 | Park | Park | 246m | North West |
| 914619 | Sports Field | OVAL | 300m | North |
| 914374 | TAFE College | BEGA TAFE COLLEGE | 331m | East |
| 914373 | University | UNIVERSITY OF WOLLONGONG BEGA CAMPUS | 347m | North |
| 914652 | Place Of Worship | CATHOLIC CHURCH | 377m | North East |
| 914627 | High School | BEGA HIGH SCHOOL | 391m | North |
| 914614 | Park | LIONS PARK | 403m | West |
| 914632 | Primary School | ST PATRICK'S PRIMARY SCHOOL | 421m | North East |
| 914620 | Sports Field | OVAL | 455m | North East |
| 914372 | Police Station | BEGA POLICE STATION | 456m | North |
| 914253 | Place Of Worship | UNITING CHURCH | 489m | North East |
| 914612 | Park | Park | 526m | North West |
| 914600 | Club | BEGA RSL CLUB | 560m | North |
| 914250 | Fire Station | BEGA FIRE STATION | 566m | North East |
| 914657 | SES Facility | BEGA SES | 566m | South |
| 914654 | Nursing Home | HILLGROVE HOUSE | 581m | North |
| 914653 | Place Of Worship | BAPTIST CHURCH | 584m | North West |
| 913740 | Firestation - Bush | BEGA VALLEY FIRE CONTROL CENTRE | 601m | South West |
| 913741 | Firestation - Bush | BEGA HEADQUARTERS RFB | 601m | South West |
| 914375 | Local Government Chambers | BEGA VALLEY SHIRE COUNCIL | 608m | North East |
| 913550 | Community Facility | BEGA TOWN HALL | 610m | North |
| 914606 | Park | BEGA PARK | 613m | North East |
| 914599 | Art Gallery | BEGA ART GALLERY | 622m | North East |
| 914630 | Library | BEGA SHIRE LIBRARY | 632m | North East |
| 914639 | Park | LITTLETON GARDENS | 688m | North |
| 914642 | Park | SISTER BERNICE MEMORIAL PARK | 695m | South West |

| Map Id | Feature Type | Label | Distance | Direction |
|---|---|---|---|---|
| 914604 | Shopping Centre | BEGA CENTRE ARCADE | 704m | North |
| 914655 | Swimming Pool Facility | BEGA MEMORIAL POOL | 728m | North East |
| 914647 | Park | COLUMBINE PARK | 747m | South East |
| 914673 | Tourist Park / Home Village | BEGA CARAVAN PARK | 778m | South |
| 914629 | Primary School | THOMAS MORE CHRISTIAN MONTESSORI SCHOOL | 779m | South East |
| 914626 | Post Office | BEGA POST OFFICE | 783m | North East |
| 914644 | Park | LYNJOHN DRIVE | 787m | South East |
| 914249 | Court House | BEGA COURT HOUSE | 789m | North East |
| 914621 | Town | BEGA | 795m | North |
| 914661 | Monument | WAR MEMORIAL | 798m | North |
| 914603 | Place Of Worship | SEVENTH DAY ADVENTIST CHURCH | 808m | North East |
| 914658 | Sports Court | BEGA TENNIS COURTS | 824m | North |
| 914079 | Manmade Waterbody | KISSES LAGOON | 844m | North West |
| 914616 | Showground | BEGA SHOWGROUND | 854m | East |
| 914637 | Sports Court | BEGA SKATEBOWL | 867m | North |
| 914252 | Place Of Worship | PRESBYTERIAN CHURCH | 878m | North East |
| 914093 | Park | BEGA RECREATION GROUND | 881m | North |
| 914610 | Park | Park | 886m | East |
| 914615 | Park | GLEBE PARK | 888m | East |
| 914645 | Sports Field | RECREATION GROUND 1 | 927m | North |
| 914613 | Park | ROTARY PARK | 930m | East |
| 914258 | Sports Field | BOWLING GREEN | 934m | North East |
| 914660 | Sports Field | GEORGE GRIFFIN OVAL | 954m | North |
| 914091 | Sports Centre | BASKETBALL CENTRE | 955m | North |
| 914356 | Place Of Worship | ANGLICAN CHURCH | 960m | North |
| 914638 | Sports Court | BEGA NETBALL COURTS | 960m | North |
| 914640 | Park | GLEBE PARK BUNYARRA DRIVE | 969m | South East |
| 914262 | Club | CLUB BEGA | 977m | North East |
| 914624 | General Hospital | BEGA VALLEY DAY SURGERY AND PRIVATE HOSPITAL | 985m | North East |

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# Topographic Features

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|---|---|
| | No records in buffer | | | | | |

## 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 |
|---|---|---|---|---|---|---|
| 79906 | Water | Operational | | 22/12/2000 | 407m | North East |

Tanks Data Source: © Land and Property Information (2015)
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## 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 |
|---|---|---|---|---|---|
| 120109421 | Primary | Undefined | | 523m | West |
| 120116855 | Primary | Undefined | | 555m | West |
| 120109083 | Primary | Undefined | | 575m | South West |
| 120111805 | Primary | Undefined | | 604m | North East |
| 166187464 | Primary | Right of way | variable width | 607m | South East |
| 120116844 | Primary | Undefined | | 619m | South West |
| 120115771 | Primary | Undefined | | 739m | North |
| 120120743 | Primary | Undefined | | 811m | South |
| 164473587 | Primary | Right of way | | 830m | North East |
| 120120340 | Primary | Undefined | | 841m | North |
| 120120371 | Primary | Undefined | | 979m | West |

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

**1 McKee Drive, Bega, NSW 2550**

## 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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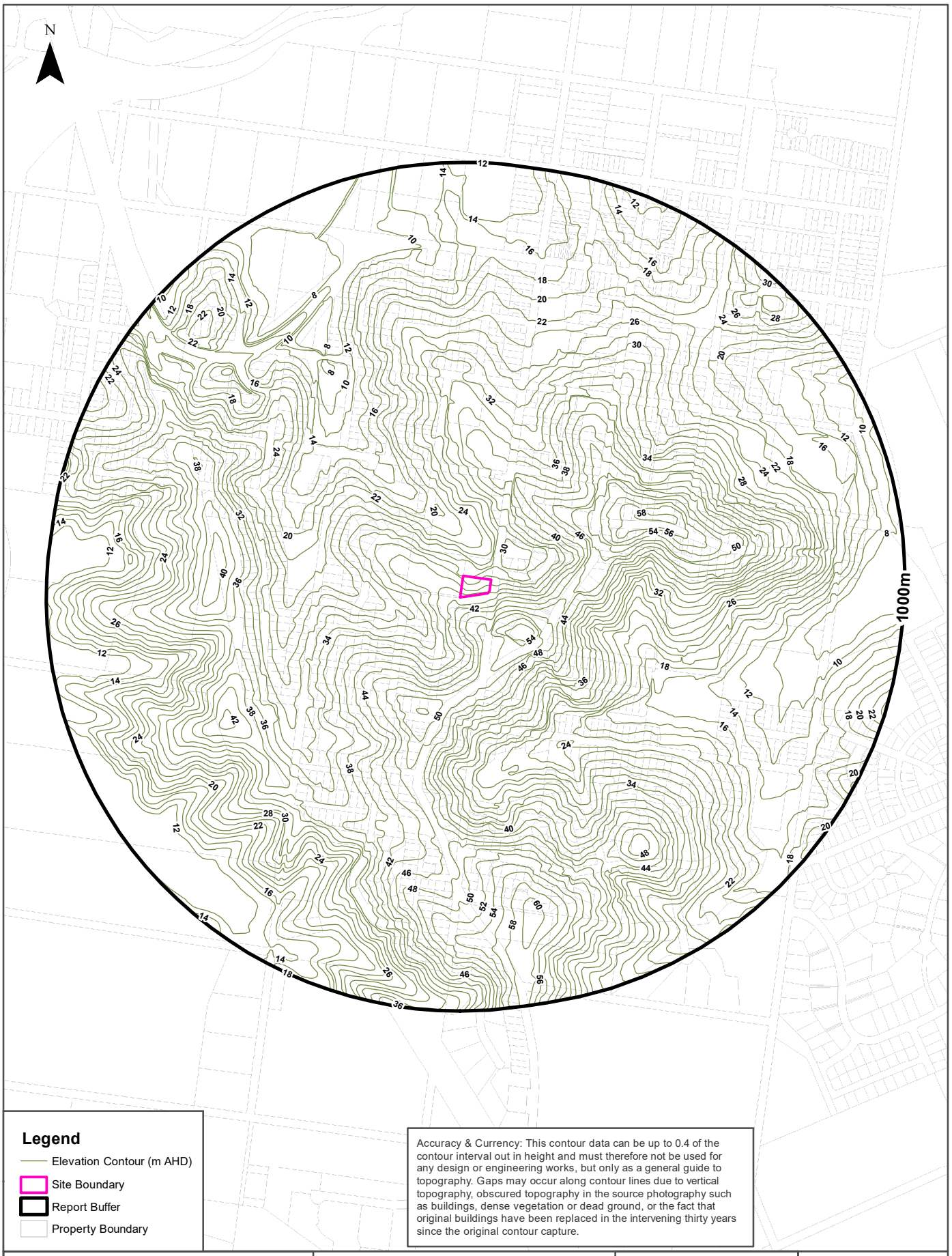
# Elevation Contours (m AHD)

**1 McKee Drive, Bega, NSW 2550**



# Hydrogeology & Groundwater

**1 McKee Drive, Bega, NSW 2550**

## Hydrogeology

Description of aquifers on-site:

| Description |
|---|
| Porous, extensive highly productive aquifers |

Description of aquifers within the dataset buffer:

| Description |
|---|
| Fractured or fissured, extensive aquifers of low to moderate productivity |
| Porous, extensive highly productive aquifers |

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)
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## Botany Groundwater Management Zones

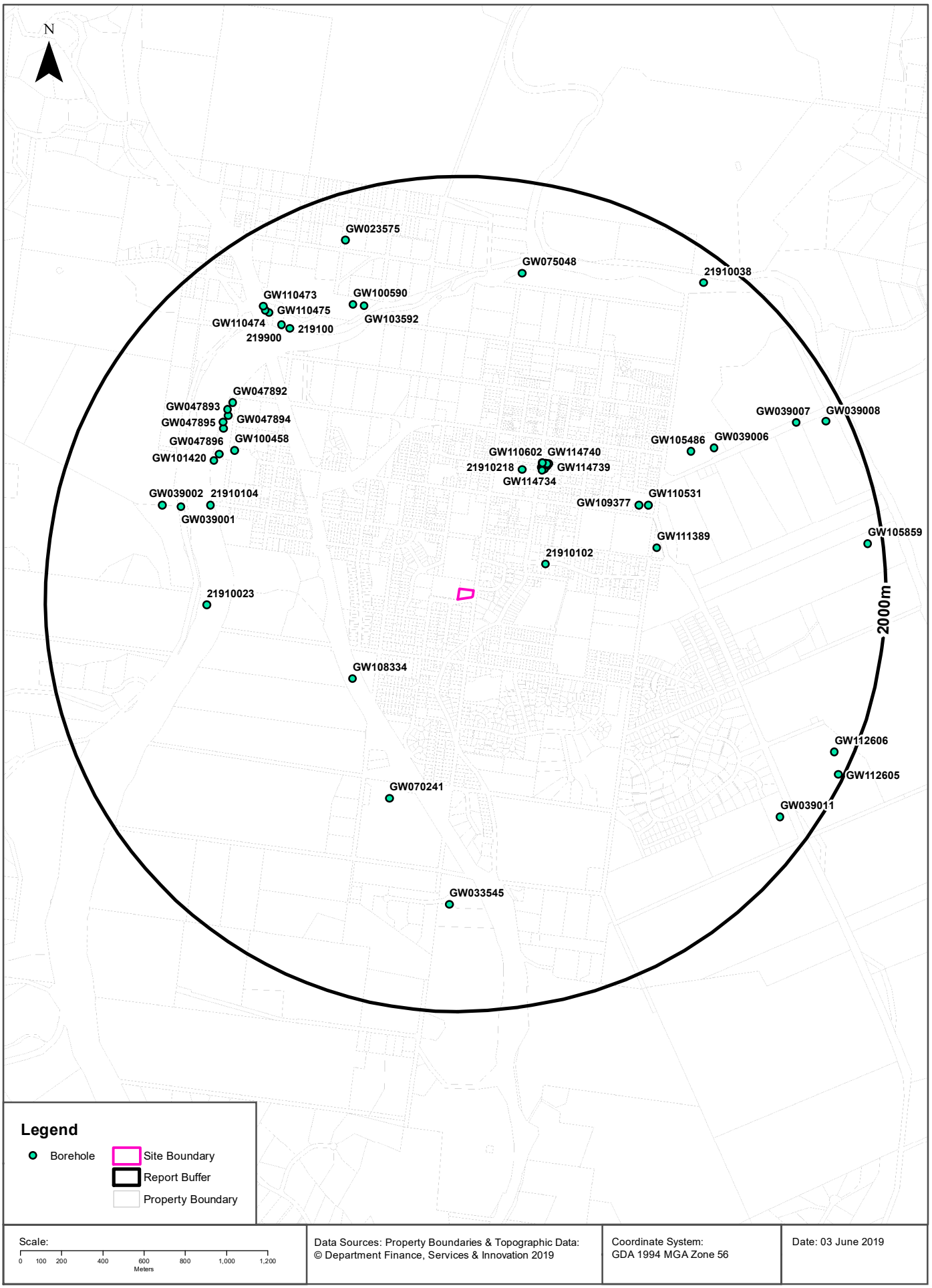
Groundwater management zones relating to the Botany Sand Beds aquifer within the dataset buffer:

| 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

**1 McKee Drive, Bega, NSW 2550**



# Hydrogeology & Groundwater

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21910102 | | | | | UNK | | | | | | | | 51.36 | 374m | East |
| 21910218 | | | | | UNK | | | | | | | | 27.58 | 633m | North East |
| GW108334 | 10BL600874 | Bore | | Domestic | | | 22/08/2007 | | | | | | | 638m | South West |
| GW114733 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 5.90 | | | 671m | North East |
| GW114734 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 4.80 | | | 678m | North East |
| GW114737 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 7.50 | 7.50 | | 4.00 | | | 682m | North East |
| GW110604 | 10BL603131 | Bore | Private | Monitoring Bore | Monitoring Bore | | 27/05/2009 | 13.50 | 13.50 | | | | | 682m | North East |
| GW114735 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 3.90 | | | 692m | North East |
| GW114738 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 4.20 | | | 702m | North East |
| GW110602 | 10BL603131 | Bore | Private | Monitoring Bore | Monitoring Bore | | 27/05/2009 | 12.00 | 12.00 | | 12.00 | | | 703m | North East |
| GW110603 | 10BL603131 | Bore | Private | Monitoring Bore | Monitoring Bore | | 27/05/2009 | 9.00 | 9.00 | | | | | 704m | North East |
| GW114736 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 3.70 | | | 704m | North East |
| GW114741 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 8.00 | 8.00 | | 6.00 | | | 710m | North East |
| GW114740 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 13.00 | 13.00 | | 11.80 | | | 712m | North East |
| GW114739 | 10BL605259 | Bore | Private | Monitoring Bore | Monitoring Bore | | 26/09/2012 | 13.50 | 13.50 | | 11.20 | | | 715m | North East |
| GW109377 | 10BL600754 | Bore | Private | Test Bore | Test Bore | | 02/10/2008 | 11.00 | 11.00 | | | | | 903m | North East |
| GW111389 | 10BL604435 | Bore | Private | Test Bore | Recreation (groundwater) | | 25/02/2011 | 37.50 | 37.50 | good | 3.50 | | | 914m | East |
| GW110531 | 10BL603295, 10BL603532 | Bore | Private | Industrial, Test Bore | Industrial | | 21/10/2009 | 62.00 | 62.00 | | 8.00 | 1.120 | | 944m | North East |
| GW070241 | | Bore open thru rock | Private | | Domestic, Stock | | 29/04/1992 | 18.00 | | Good | | | | 1021m | South |
| 21910023 | | | | | UNK | | | | | | | | 11.48 | 1217m | West |
| GW105486 | 10BL159713 | Bore | | Industrial | Industrial | | 17/12/2003 | 9.00 | 9.00 | | 9.00 | 0.500 | | 1254m | North East |
| 21910104 | | | | | UNK | | | | | | | | 11.71 | 1272m | West |
| GW100458 | 10BL157449, 10WA102303 | Bore | Private | Domestic | Domestic | | 17/01/1996 | 24.00 | 24.00 | Good | 8.00 | 0.310 | | 1279m | North West |
| GW051895 | 10BL106847 | Bore | Local Govt | Test Bore | Test Bore | | 01/05/1977 | 15.00 | 15.00 | | | | | 1334m | North West |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GW101420 | 10BL157796, 10WA102304 | Bore | Private | Domestic | Domestic | | 08/02/1997 | 18.00 | 18.00 | Good | 6.00 | 0.480 | | 1340m | North West |
| GW039006 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield Tarraganda Lane #1 | 01/08/1969 | 14.60 | 22.70 | 501-1000 ppm | | | 9.05 | 1358m | North East |
| GW047896 | 10BL106852, 10BL110486 | Bore | Local Govt | Test Bore, Town Water Supply | Town Water Supply | | 01/01/1979 | 21.50 | 21.50 | 0-500 ppm | | | 12.10 | 1382m | North West |
| GW047894 | 10BL106850, 10BL110484 | Bore | Local Govt | Test Bore, Town Water Supply | Town Water Supply | | 01/01/1978 | 21.30 | 21.80 | 0-500 ppm | | | 11.70 | 1400m | North West |
| GW047895 | 10BL106851, 10BL110485 | Bore | Local Govt | Test Bore, Town Water Supply | Town Water Supply | | 01/01/1979 | 21.50 | 21.50 | 0-500 ppm | | | 12.10 | 1400m | North West |
| GW039001 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield The Ranch | 24/07/1969 | 18.90 | 19.80 | | | | 11.73 | 1406m | West |
| GW047893 | 10BL106849, 10BL110483 | Bore | Local Govt | Test Bore, Town Water Supply | Town Water Supply | | 01/01/1978 | 22.00 | 22.50 | 0-500 ppm | | | 10.80 | 1419m | North West |
| GW047892 | 10BL106848, 10BL110482 | Bore | Local Govt | Test Bore, Town Water Supply | Town Water Supply | | 01/01/1978 | 21.20 | 21.20 | 0-500 ppm | | | 10.50 | 1420m | North West |
| GW103592 | 10BL137672, 10WA101755 | Bore | Private | Industrial | Industrial | | 19/04/1996 | 25.20 | 27.00 | | | | | 1445m | North |
| GW100590 | 10BL157995, 10WA101755 | Bore | Private | Industrial | Industrial | | 26/09/1996 | 23.60 | 27.00 | | 5.90 | | | 1470m | North |
| GW033545 | | Bore open thru rock | Private | | Domestic, Stock | | 01/11/1968 | 22.90 | 22.90 | Fresh | | | | 1482m | South |
| GW039002 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield The Ranch Bore #2 | 01/07/1969 | 23.00 | 23.01 | | | | 11.84 | 1495m | West |
| 219100 | | | | | UNK | | | | | | | | 11.00 | 1505m | North West |
| 219900 | | | | | UNK | | | | | | | | 11.49 | 1542m | North West |
| GW075048 | | Bore - Nested (2) | NSW Office of Water | | Monitoring Bore | GROUND WATER BORE AT RIVERSIDE PARK #01 | 02/06/1999 | 35.00 | 36.00 | 174.08 | 4.00 | | 7.63 | 1556m | North |
| GW110475 | 10BL602698 | Bore | Private | Monitoring Bore | Test Bore | | 28/10/2009 | 8.50 | | | | | | 1624m | North West |
| GW110474 | 10BL602698 | Bore | Private | Monitoring Bore | Test Bore | | 28/10/2009 | 8.50 | | | | | | 1644m | North West |
| GW110473 | 10BL602698 | Bore | Private | Monitoring Bore | Test Bore | | 23/08/2009 | 8.50 | | | | | | 1666m | North West |
| GW039007 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield Tarraganda Lane #2 | 01/08/1969 | 40.00 | 41.50 | 0-500 ppm | | | 9.30 | 1767m | North East |
| GW023575 | 10BL017490 | Well | Private | Domestic, Irrigation | Domestic, Irrigation | | 01/03/1966 | 2.10 | 2.10 | Fair | | | | 1778m | North |
| GW039011 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield Allawah | 01/09/1969 | 11.70 | 16.60 | 0-500 ppm | | | 6.40 | 1836m | South East |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21910038 | | | | | UNK | | | | | | | | 8.21 | 1864m | North East |
| GW039008 | | Bore | NSW Office of Water | | Monitoring Bore | Bega Borefield Tarraganda Lane #3 | 01/08/1969 | 21.30 | 22.30 | 0-500 ppm | | | 7.74 | 1897m | North East |
| GW112606 | 10BL605236 | Bore | Private | Monitoring Bore | Monitoring Bore | Health Infrastructure | 14/08/2012 | 3.50 | 3.50 | | | | | 1910m | South East |
| GW105859 | 10BL159574, 10CA101458 | Bore | | Irrigation | Irrigation | | 08/07/2004 | 39.00 | 39.00 | | 3.90 | 10.000 | | 1927m | East |
| GW112605 | 10BL605236 | Bore | Other Govt | Monitoring Bore | Monitoring Bore | Health Infrastructure | 15/08/2012 | 4.10 | 4.10 | | | | | 1973m | South East |

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

**1 McKee Drive, Bega, NSW 2550**

## Driller's Logs

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

| Groundwater No | Drillers Log | Distance | Direction |
|---|---|---|---|
| GW114733 | 0.00m-1.50m FILL<br>1.50m-8.00m GRAVEL | 671m | North East |
| GW114734 | 0.00m-8.00m GRAVEL | 678m | North East |
| GW110604 | 0.00m-5.00m CLAY<br>5.00m-13.50m GRANITE / CLAY | 682m | North East |
| GW114737 | 0.00m-5.50m FILL<br>5.50m-7.00m GRAVEL<br>7.00m-7.50m GRANODIORITE | 682m | North East |
| GW114735 | 0.00m-4.50m FILL<br>4.50m-8.00m GRAVEL | 692m | North East |
| GW114738 | 0.00m-4.00m FILL<br>4.00m-8.00m SANDY GRAVEL | 702m | North East |
| GW110602 | 0.00m-6.00m CLAY<br>6.00m-12.00m GRANITE CLAY | 703m | North East |
| GW110603 | 0.00m-5.00m CLAY<br>5.00m-9.00m GRANITE / CLAY | 704m | North East |
| GW114736 | 0.00m-0.80m FILL<br>0.80m-8.00m GRAVEL | 704m | North East |
| GW114741 | 0.00m-1.00m FILL<br>1.00m-8.00m CLAY | 710m | North East |
| GW114740 | 0.00m-4.00m FILL<br>4.00m-13.00m SANDY GRAVEL | 712m | North East |
| GW114739 | 0.00m-4.00m FILL<br>4.00m-12.50m SANDY GRAVEL<br>12.50m-13.50m GRANODIORITE | 715m | North East |
| GW109377 | 0.00m-2.00m TOPSOIL<br>2.00m-4.00m SILTY SAND<br>4.00m-6.00m COARSE SAND<br>6.00m-8.00m SILTY MUD<br>8.00m-9.00m GREY SANDY CLAY<br>9.00m-11.00m GREY SAND AND GRAVEL,WB,ROCK BOTTOM | 903m | North East |
| GW111389 | 0.00m-0.60m TOPSOIL<br>0.60m-7.60m SOFT,DECOMPOSED GRANITE<br>7.60m-13.10m GRANITE WEATHERED<br>13.10m-33.00m BLUE GRANITE,SOME FAULTED ZONES<br>33.00m-37.50m BLUE GRANITE | 914m | East |
| GW110531 | 0.00m-1.00m TOPSOIL<br>1.00m-8.50m CLAY SANDY<br>8.50m-15.00m WHITE SAND<br>15.00m-18.00m WEATHERED GRANITE<br>18.00m-62.00m GRANITE ROCK | 944m | North East |
| GW100458 | 0.00m-0.60m SOIL<br>0.60m-17.00m DECOMPOSED GRANITE<br>17.00m-24.00m GRANITE | 1279m | North West |
| GW051895 | 0.00m-3.00m Loam Grey Sandy<br>3.00m-3.50m Sand Black Silty<br>3.50m-6.85m Clay Sandy<br>6.85m-12.30m Sand Coarse Water Bearing<br>12.30m-14.57m Gravel Fine Water Bearing<br>14.57m-15.00m Shale<br>15.00m-15.01m Granite | 1334m | North West |

| Groundwater No | Drillers Log | Distance | Direction |
|---|---|---|---|
| GW101420 | 0.00m-0.80m SOIL<br>0.80m-2.00m CLAY<br>2.00m-12.00m GRANITE, DECOMPOSED<br>12.00m-18.00m GRANITE | 1340m | North West |
| GW039006 | 0.00m-1.52m Loam Black<br>1.52m-4.57m Loam Grey Sandy<br>4.57m-6.10m Sand Fine Dry<br>6.10m-10.67m Sand Medium Dry<br>10.67m-12.50m Sand Grey Fine Water Bearing<br>12.50m-13.72m Sand Grey Coarse Water Bearing<br>13.72m-14.63m Sand Grey Medium Water Bearing<br>14.63m-20.42m Sand Grey Fine Clay<br>20.42m-21.03m Sand Grey Coarse Clay<br>21.03m-22.25m Rock Green Decomposed<br>22.25m-22.56m Clay Light Brown<br>22.56m-22.71m Granite | 1358m | North East |
| GW047896 | 0.00m-4.00m Loam Silty<br>4.00m-8.00m Silt Sandy Water Supply<br>8.00m-12.00m Sand Coarse Water Supply<br>12.00m-21.50m Gravel Coarse Water Supply | 1382m | North West |
| GW047894 | 0.00m-2.00m Loam Silty<br>2.00m-8.00m Sand Fine Water Supply<br>8.00m-12.00m Gravel Water Supply<br>12.00m-20.00m Gravel Coarse Water Supply<br>20.00m-21.75m Gravel Coarse Rock | 1400m | North West |
| GW047895 | 0.00m-4.00m Loam Silty<br>4.00m-10.00m Sand Coarse Water Supply<br>10.00m-12.00m Gravel Coarse Water Supply<br>12.00m-21.50m Gravel Water Supply | 1400m | North West |
| GW047893 | 0.00m-2.00m Loam Silty<br>2.00m-8.00m Sand Fine Water Supply<br>8.00m-9.00m Sand Water Supply<br>9.00m-12.00m Sand Coarse Water Supply<br>12.00m-16.00m Gravel Water Supply<br>16.00m-22.00m Gravel Coarse Water Supply<br>22.00m-22.50m Clay Black | 1419m | North West |
| GW047892 | 0.00m-2.00m Loam Silty<br>2.00m-8.00m Sand Fine Water Supply<br>8.00m-10.00m Sand Coarse Water Supply<br>10.00m-14.00m Gravel Water Supply<br>14.00m-20.00m Gravel Coarse Water Supply<br>20.00m-21.20m Rock Solid | 1420m | North West |
| GW103592 | 0.00m-9.70m DARK SILT AND LOAM<br>9.70m-12.80m RED MED. SAND AND GRAVEL<br>12.80m-19.80m GREY MED. SAND WITH SILT BANDS<br>19.80m-24.20m GREY COARSE SAND<br>24.20m-27.00m SILTY GREY SAND | 1445m | North |
| GW100590 | 0.00m-9.70m DARK SILT AND LOAM<br>9.70m-12.80m RED MEDIUM SAND AND GRAVEL<br>12.80m-19.60m GREY MEDIUM SANDSTONE WITH SILT BANDS<br>19.60m-22.60m GREY COARSE SAND<br>22.60m-27.00m SILTY GREY SAND | 1470m | North |
| GW033545 | 0.00m-0.30m Topsoil<br>0.30m-4.57m Clay Black<br>4.57m-5.18m Granite Decomposed Water Supply<br>5.18m-21.03m Granite<br>21.03m-22.86m Granite Some Bands | 1482m | South |
| GW039002 | 0.00m-1.52m BLACK SOIL<br>1.52m-4.57m VERY FINE SANDY SOIL, CLAY<br>4.57m-9.14m FINE SANDY GREY SOIL<br>9.14m-10.67m FINE GREY SAND<br>10.67m-20.12m GREY SAND, COARSE GRAVEL - Water Bearing<br>20.12m-20.73m GREY ROCK<br>20.73m-22.86m GREY LARGE GRAVEL<br>22.86m-23.01m GRANITE | 1495m | West |
| GW075048 | <br>3.00m-7.00m SILTY SAND & GRAVEL<br>7.00m-11.00m GRAVEL<br>11.00m-18.00m SILTY TO CLAYEY GRAVEL<br>18.00m-35.50m SILTY SAND & GRAVEL<br>35.50m-36.00m GRANITE | 1556m | North |

| Groundwater No | Drillers Log | Distance | Direction |
|---|---|---|---|
| GW039007 | 0.00m-1.52m Topsoil Grey<br>1.52m-6.10m Soil Grey Sandy<br>6.10m-9.14m Sand Fine<br>9.14m-10.67m Sand Coarse Gravel Dry<br>10.67m-13.72m Sand Medium<br>13.72m-18.29m Sand Fine Very Heavy Silty<br>18.29m-25.91m Sand Very Silty<br>25.91m-28.96m Sand Grey Fine Water Bearing<br>28.96m-38.10m Sand Grey Medium Water Bearing<br>38.10m-40.54m Sand Grey Coarse Water Bearing<br>40.54m-40.84m Boulders Large Gravel Water Bearing<br>40.84m-41.45m Granite | 1767m | North East |
| GW023575 | 0.00m-2.13m Gravel Clayey Water Supply | 1778m | North |
| GW039011 | 0.00m-0.30m Topsoil Grey<br>0.30m-1.52m Soil Black<br>1.52m-3.05m Dirt Grey<br>3.05m-4.57m Loam Grey Sandy<br>4.57m-6.10m Sand Fine<br>6.10m-9.14m Sand Coarse<br>9.14m-12.19m Sand Grey Fine-medium Water Bearing<br>12.19m-13.72m Sand Grey Fine Silty<br>13.72m-16.15m Sand Grey Clay<br>16.15m-16.46m Shell Clay Sand<br>16.46m-16.61m Granite | 1836m | South East |
| GW039008 | 0.00m-4.57m Loam Dark Grey Sandy<br>4.57m-6.10m Sand Fine Dry<br>6.10m-7.62m Sand Dark Grey Fine Dry<br>7.62m-10.67m Sand Medium Dry<br>10.67m-17.98m Sand Dark Grey Clayey Silty Dry<br>17.98m-21.03m Loam Dark Grey Sandy Dry<br>21.03m-21.64m Sand Grey Medium Some Shell<br>21.64m-21.95m Granite Soft<br>21.95m-22.25m Granite Hard | 1897m | North East |
| GW112606 | 0.00m-3.50m TOPSOIL, SANDY CLAY | 1910m | South East |
| GW105859 | 0.00m-9.10m BLACK LOAM<br>9.10m-10.60m RED SAND<br>10.60m-27.40m BLACK SANDY LOAM<br>27.40m-39.00m MED. GREY SAND AND GRAVEL | 1927m | East |
| GW112605 | 0.00m-4.10m TOPSOIL.SANDY CLAY,SAND | 1973m | South East |

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp
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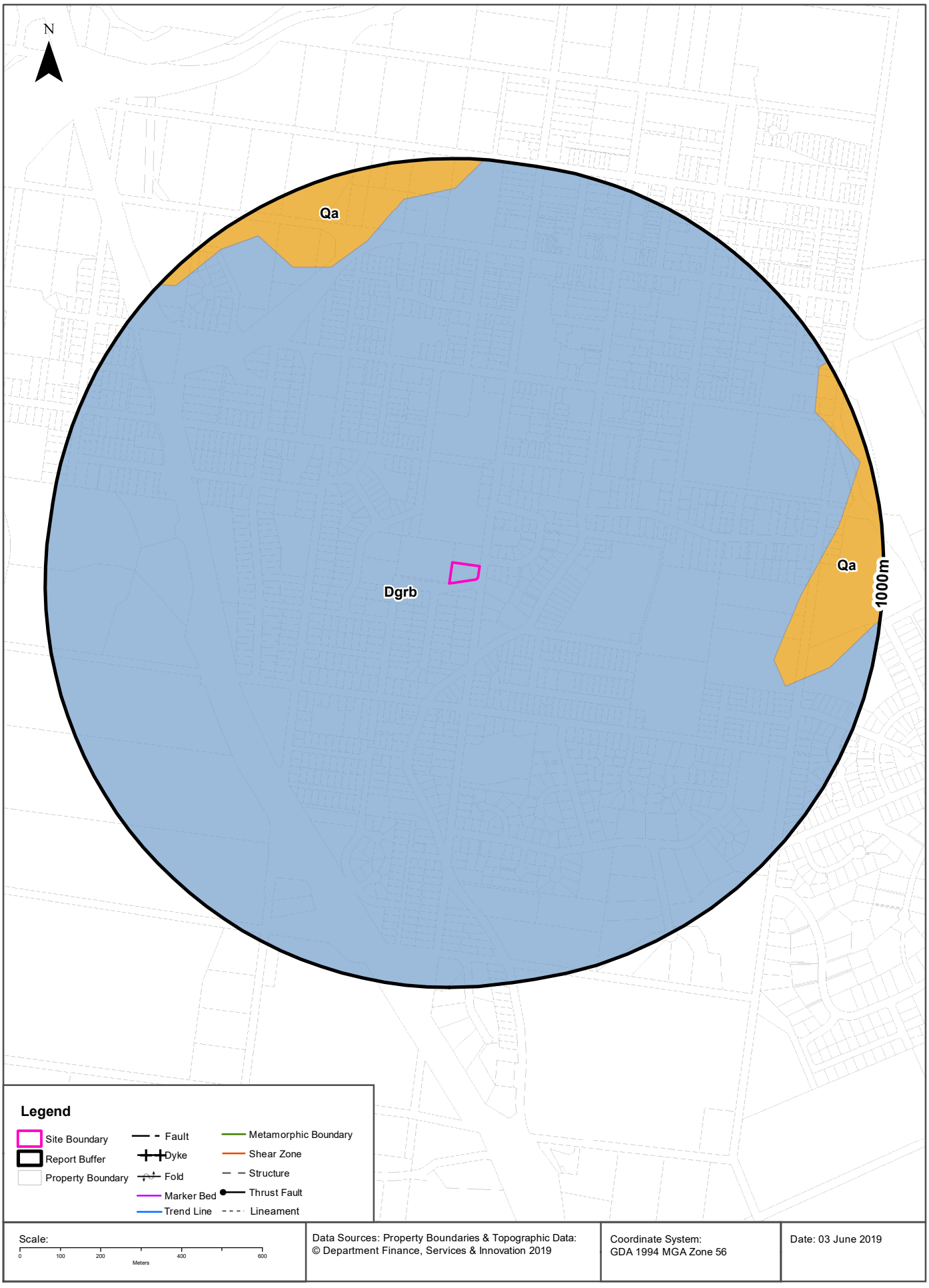
# Geology 1:250,000

**1 McKee Drive, Bega, NSW 2550**



# Geology

**1 McKee Drive, Bega, NSW 2550**

## Geological Units

What are the Geological Units onsite?

| Symbol | Description | Unit Name | Group | Sub Group | Age | Dom Lith | Map Sheet | Dataset |
|---|---|---|---|---|---|---|---|---|
| Dgrb | Granodiorite | Brogo Granodiorite | Brogo Suite | | Palaeozoic | | | 1:250,000 |

What are the Geological Units within the dataset buffer?

| Symbol | Description | Unit Name | Group | Sub Group | Age | Dom Lith | Map Sheet | Dataset |
|---|---|---|---|---|---|---|---|---|
| Dgrb | Granodiorite | Brogo Granodiorite | Brogo Suite | | Palaeozoic | | | 1:250,000 |
| Qa | Alluvium, fluvial deposits: gravel, sand, silt and clay | undifferentiated | | | Cainozoic | | | 1:250,000 |

## Geological Structures

What are the Geological Structures onsite?

| Feature | Name | Description | Map Sheet | Dataset |
|---|---|---|---|---|
| No features | | | | 1:250,000 |

What are the Geological Structures within the dataset buffer?

| Feature | Name | Description | Map Sheet | Dataset |
|---|---|---|---|---|
| No features | | | | 1:250,000 |

Geological Data Source : NSW Department of Industry, Resources & Energy
© State of New South Wales through the NSW Department of Industry, Resources & Energy

# Naturally Occurring Asbestos Potential

**1 McKee Drive, Bega, NSW 2550**

## Naturally Occurring Asbestos Potential

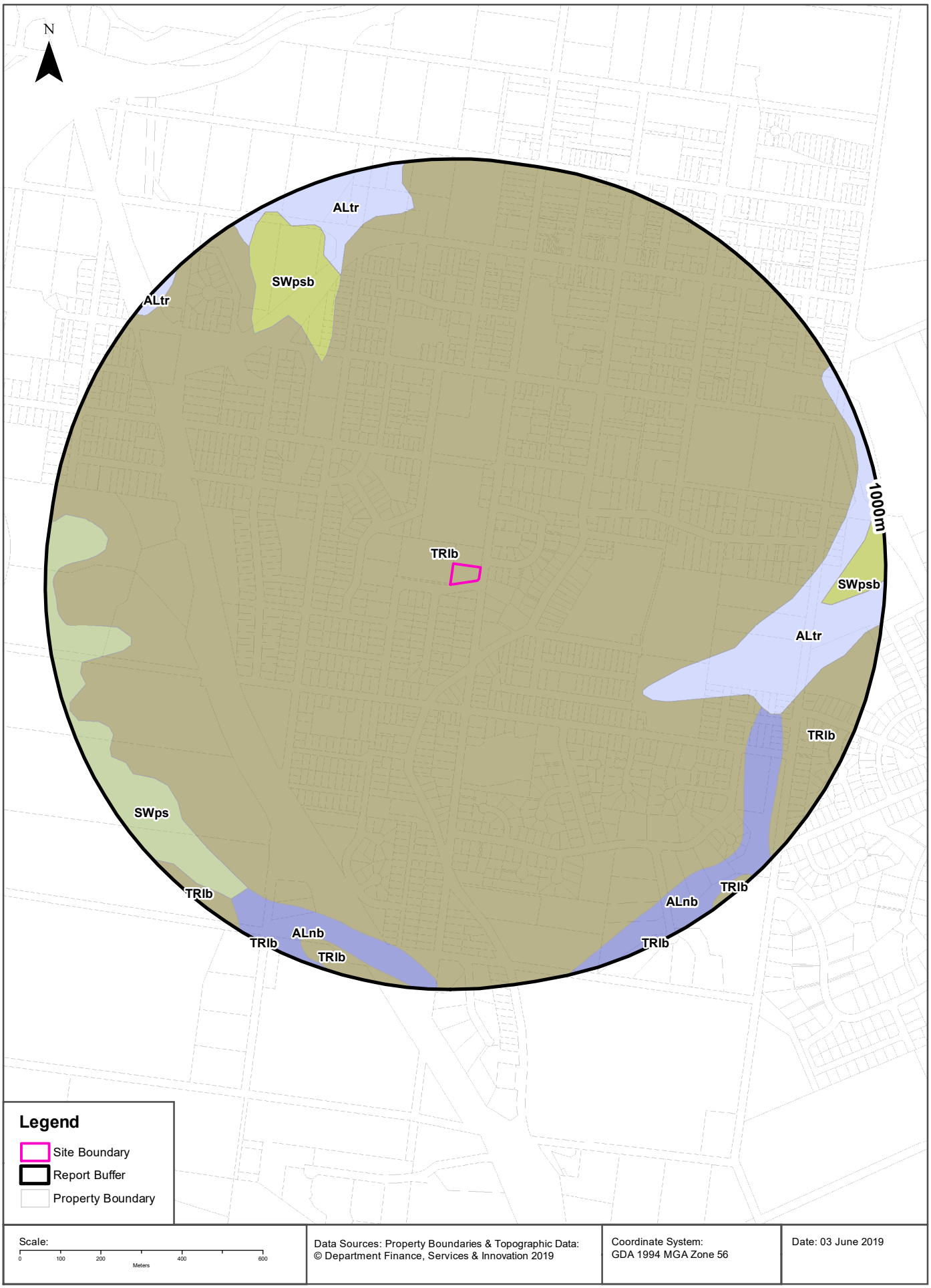
Naturally Occurring Asbestos Potential within the dataset buffer:

| 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

1 McKee Drive, Bega, NSW 2550



# Soils

**1 McKee Drive, Bega, NSW 2550**

## Soil Landscapes

What are the onsite Soil Landscapes?

| Soil Code | Name | Group | Process | Map Sheet | Scale |
|---|---|---|---|---|---|
| TRlb | LOWER BROGO | | TRANSFERRAL | Bega | 1:100,000 |

What are the Soil Landscapes within the dataset buffer?

| Soil Code | Name | Group | Process | Map Sheet | Scale |
|---|---|---|---|---|---|
| ALnb | NUMBUGGA-BUCKAJO SWAMPS | | ALLUVIAL | Bega | 1:100,000 |
| ALtr | TOWAMBA RIVER | | ALLUVIAL | Bega | 1:100,000 |
| SWps | PENOOKA SWAMP | | SWAMP | Bega | 1:100,000 |
| SWpsb | PENOOKA SWAMP variant b | | SWAMP | Bega | 1:100,000 |
| TRlb | LOWER BROGO | | TRANSFERRAL | Bega | 1:100,000 |

Soils Landscapes Data Source : NSW Office of Environment and Heritage
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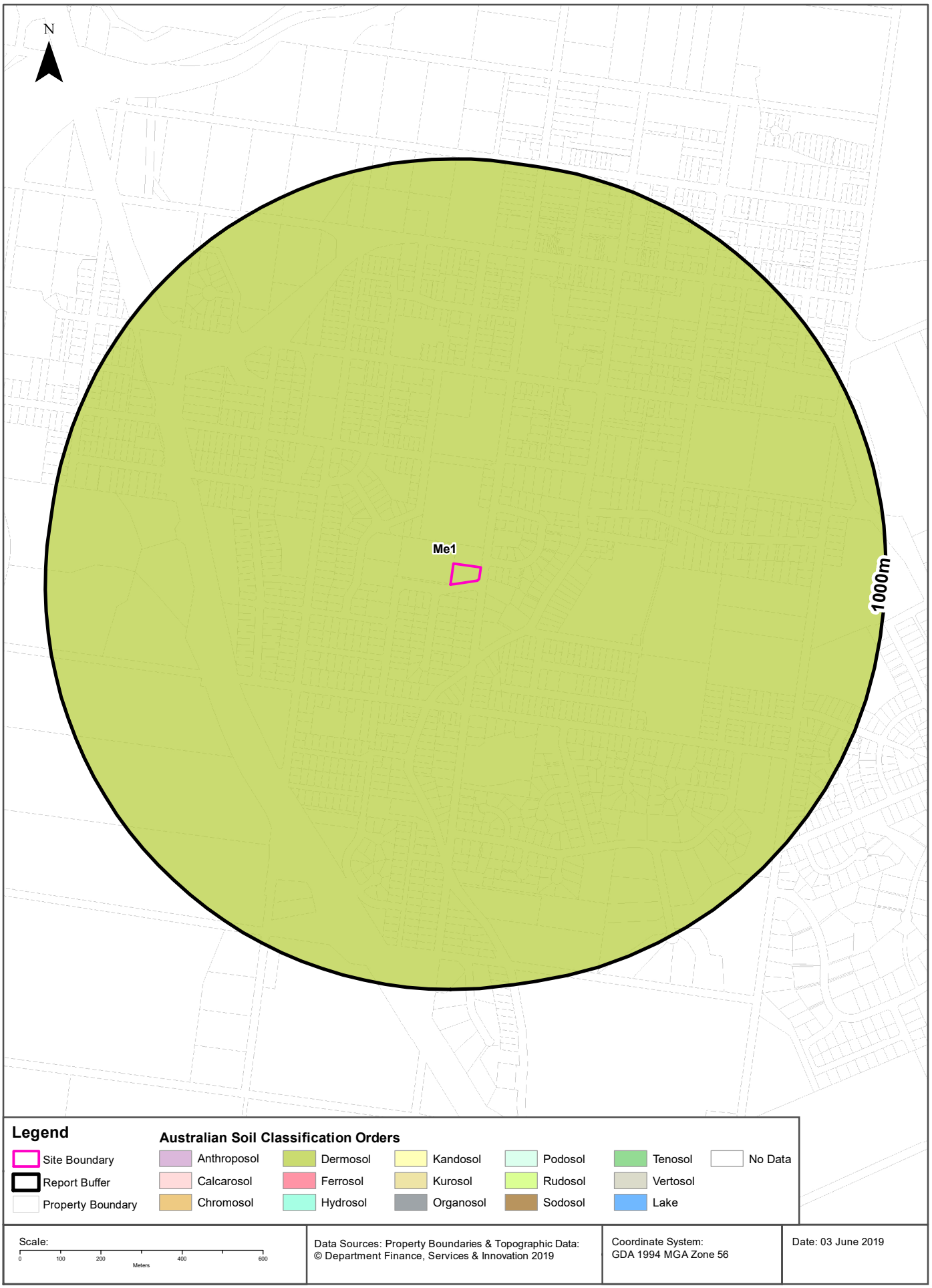
# Atlas of Australian Soils

1 McKee Drive, Bega, NSW 2550



# Soils

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|
| Me1 | Dermosol | Hilly with some steep slopes and small graded valleys: moderately steep rounded hills of brown and red friable earths (Gn3.21 and Gn3.22 and Gn3.11 and Gn3.12) in association with less rounded hill slopes of hard acidic yellow mottled soils (Dy3.41), hard acidic red soils (Dr2.21), and yellow leached earths (Gn3.54), and also other hill slopes of loamy soils having an A2 horizon (Um4.2) with yellow-brown earths (Gn2.44); stream valleys of various soils including (Dy4.41), (Dy5.41), and (Um6.11). | 0m |

Atlas of Australian Soils Data Source: CSIRO
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# Acid Sulfate Soils

**1 McKee Drive, Bega, NSW 2550**

## 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
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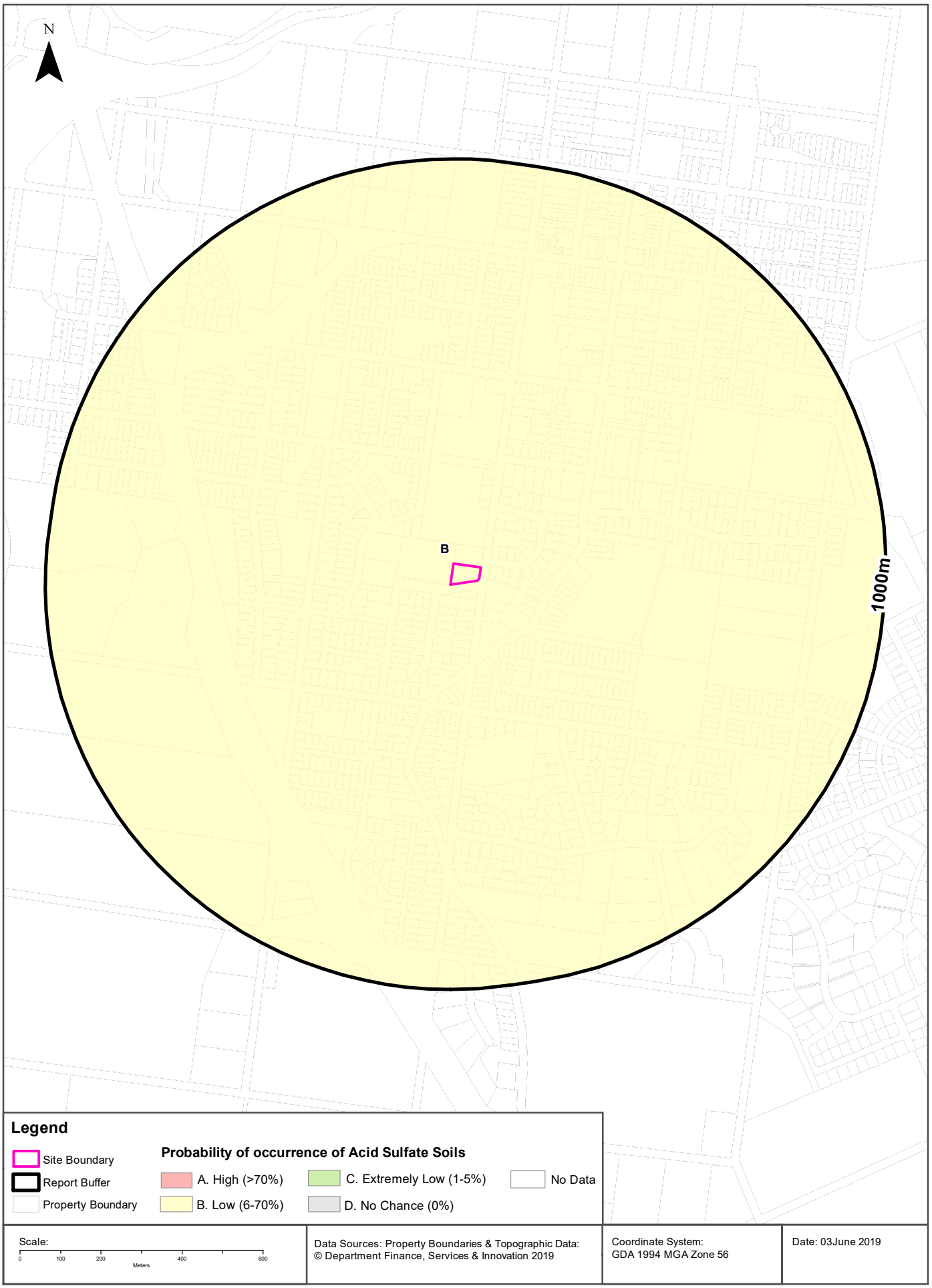
# Atlas of Australian Acid Sulfate Soils

1 McKee Drive, Bega, NSW 2550



# Acid Sulfate Soils

**1 McKee Drive, Bega, NSW 2550**

## Atlas of Australian Acid Sulfate Soils

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

| Class | Description | Distance |
|---|---|---|
| B | Low Probability of occurrence. 6-70% chance of occurrence. | 0m |

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO
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# Dryland Salinity

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|
| N/A | Outside Data Coverage | | | |

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage
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# Mining Subsidence Districts

**1 McKee Drive, Bega, NSW 2550**

## 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)
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# State Environmental Planning Policy

**1 McKee Drive, Bega, NSW 2550**

## 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
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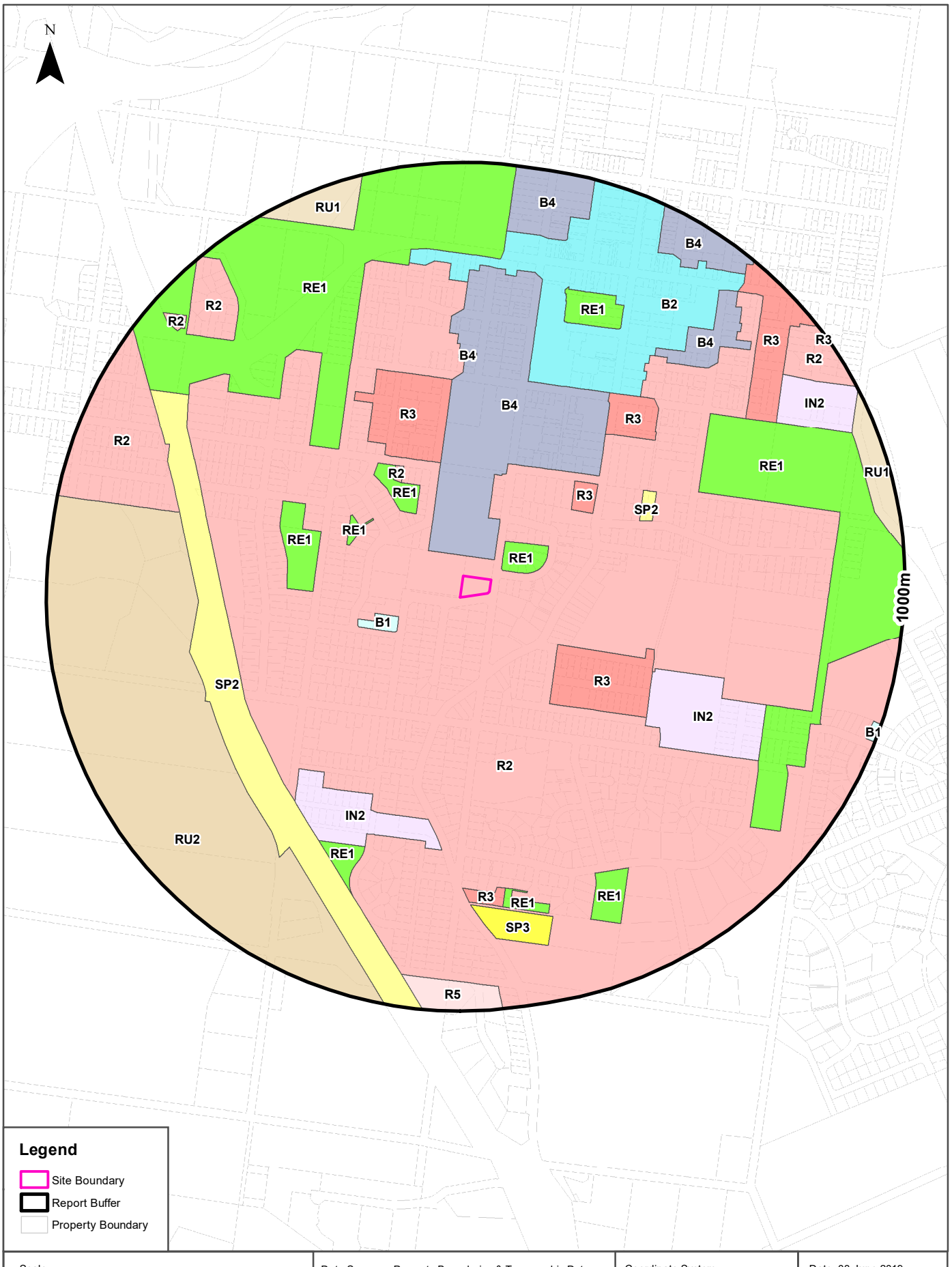
# EPI Planning Zones

1 McKee Drive, Bega, NSW 2550



# Environmental Planning Instrument

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|---|---|---|---|---|---|---|
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 0m | Onsite |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 36m | North East |
| B4 | Mixed Use | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 49m | North |
| B1 | Neighbourhood Centre | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 155m | West |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 190m | North West |
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 209m | South East |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 257m | North West |
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 258m | North East |
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 04/12/2015 | 04/12/2015 | 29/03/2019 | Amendment No 15 | 271m | North West |
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 279m | North |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 355m | West |
| SP2 | Infrastructure | Water Supply System | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 386m | North East |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 430m | North West |
| IN2 | Light Industrial | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 438m | South East |
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 447m | North East |
| B2 | Local Centre | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 489m | North East |
| IN2 | Light Industrial | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 520m | South West |
| B4 | Mixed Use | | Bega Valley Local Environmental Plan 2013 | 13/02/2015 | 13/02/2015 | 29/03/2019 | Amendment No 4 | 524m | North |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 544m | East |
| SP2 | Infrastructure | Classified Road | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 560m | South |
| RU2 | Rural Landscape | | Bega Valley Local Environmental Plan 2013 | 16/02/2018 | 16/02/2018 | 29/03/2019 | Amendment No 25 | 633m | South West |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 644m | South West |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 648m | North East |
| B4 | Mixed Use | | Bega Valley Local Environmental Plan 2013 | 13/02/2015 | 13/02/2015 | 29/03/2019 | Amendment No 4 | 671m | North East |
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 702m | South |
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 704m | North West |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 711m | South |
| RE1 | Public Recreation | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 724m | South East |

| Zone | Description | Purpose | EPI Name | Published Date | Commenced Date | Currency Date | Amendment | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| R3 | Medium Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 729m | North East |
| SP3 | Tourist | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 743m | South |
| IN2 | Light Industrial | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 787m | North East |
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 796m | North West |
| B4 | Mixed Use | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 837m | North |
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 863m | North East |
| RU1 | Primary Production | | Bega Valley Local Environmental Plan 2013 | 15/09/2017 | 15/09/2017 | 29/03/2019 | Amendment No 26 | 877m | North West |
| B4 | Mixed Use | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 885m | North East |
| R2 | Low Density Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 901m | North West |
| R5 | Large Lot Residential | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 921m | South |
| B1 | Neighbourhood Centre | | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 29/03/2019 | | 974m | East |

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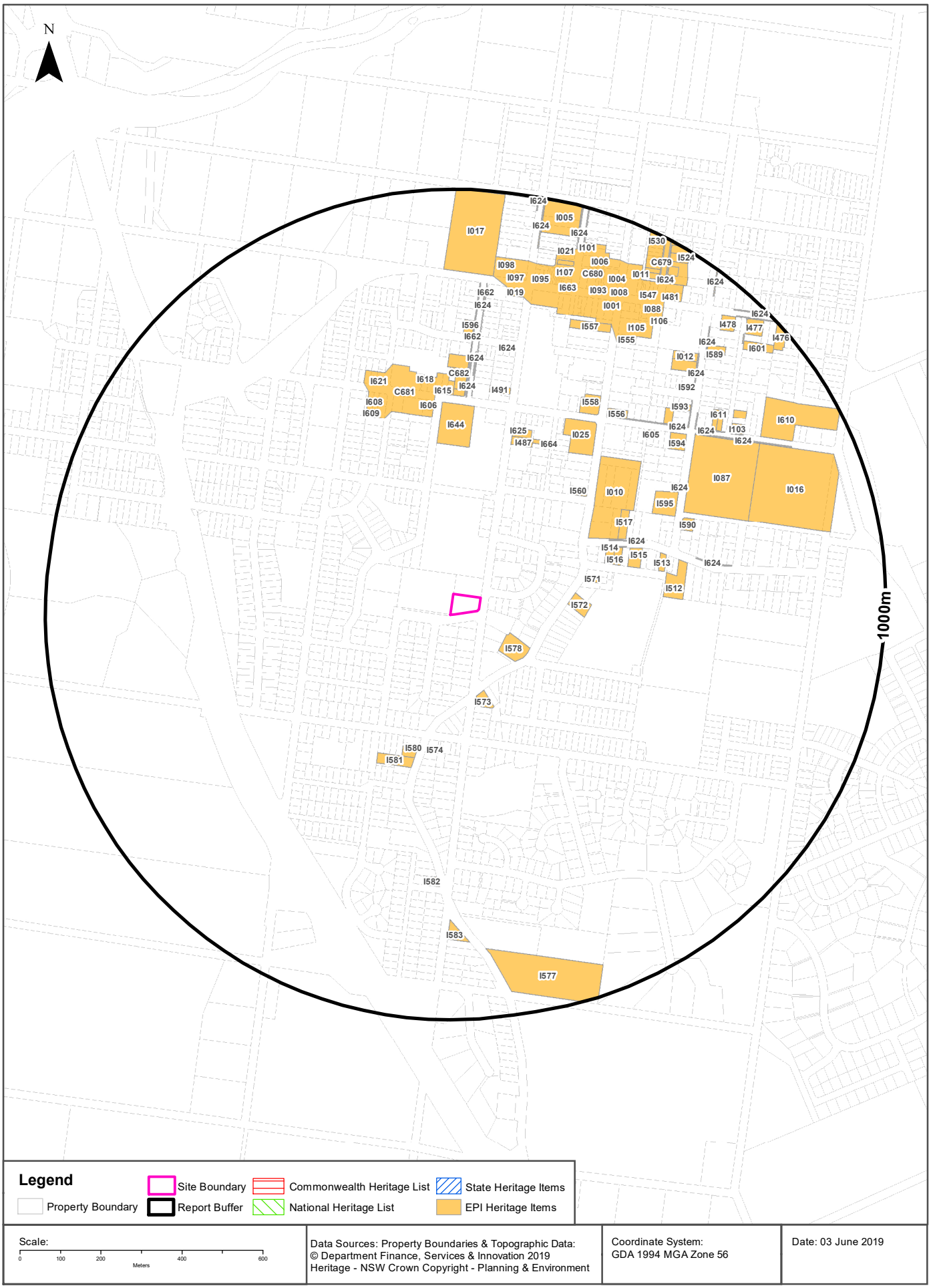
# Heritage Items

**1 McKee Drive, Bega, NSW 2550**




**Legend**

| | | | |
|---|---|---|---|
| Property Boundary | Site Boundary | Commonwealth Heritage List | State Heritage Items |
| | Report Buffer | National Heritage List | EPI Heritage Items |

Scale: 0 100 200 400 600 Meters

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

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 June 2019

# Heritage

**1 McKee Drive, Bega, NSW 2550**

## 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
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## 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
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## 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
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## 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 |
|---|---|---|---|---|---|---|---|---|---|
| I578 | Bismark House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 92m | South East |
| I573 | Slab and Batten Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 195m | South |
| I572 | Police Barracks former | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 214m | East |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I571 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 259m | East |
| I010 | St Patrick's Church and Presbytery | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 303m | North East |
| I514 | Weatherboard Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 317m | East |
| I574 | Weatherboard Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 328m | South |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 335m | East |
| I516 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 336m | East |
| I580 | Dick Rixon's House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 337m | South |
| I560 | Dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 338m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 347m | East |
| I581 | Victorian Georgian styled residence Cranbrook | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 363m | South West |
| I644 | Memorial Garden Bega High School | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 364m | North |
| I517 | Weatherboard Cottage-red roof | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 368m | North East |
| I515 | Weatherboard cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 371m | East |
| I487 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 387m | North |
| I664 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 403m | North East |
| I625 | Salvation Army Hall and Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 407m | North |
| I025 | Bega Uniting Church | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 420m | North East |
| C681 | Upper Street | Conservation Area - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 442m | North |
| I513 | Weatherboard Dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 443m | East |
| I512 | Weatherboard dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 450m | East |
| I606 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 457m | North |
| I595 | St Joseph's Convent | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 472m | North East |
| I608 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 477m | North West |
| I609 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 484m | North West |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 488m | North |
| I599 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 490m | North |
| C682 | Peden Street | Conservation Area - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 490m | North |
| I662 | Street Trees | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 492m | North |
| I614 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 493m | North |
| I615 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 495m | North |
| I617 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 501m | North |
| I618 | cottage 1100639 | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 506m | North |
| I491 | Picturesque Gothic Dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 509m | North |
| I558 | Presbyterian Church Former | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 520m | North East |
| I590 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 523m | East |
| I598 | House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 539m | North |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 540m | East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 542m | North |
| I621 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 544m | North |
| I087 | Boer War Memorial and Bega Park | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 544m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 545m | North East |
| I556 | Fire Station | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 547m | North East |
| I082 | House and Garden | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 556m | North |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 556m | North East |
| I605 | House Kookaburra | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 570m | North East |
| I594 | Weatherboard and lattice dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 592m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 621m | North |
| I613 | Bungalow and palm | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 624m | North East |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I596 | Brick Bungalow | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 642m | North |
| I582 | Weatherboard cottage - blue walls | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 648m | South |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 667m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 673m | North East |
| I593 | Parkview | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 675m | North East |
| I016 | Bega Showground Pavilion | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 687m | East |
| I557 | Tourist office | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 703m | North East |
| I612 | House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 704m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 706m | North |
| I611 | House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 713m | North East |
| I592 | Brick dwelling | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 714m | North East |
| I555 | Commonwealth Bank Former | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 716m | North East |
| C680 | Bega Commercial | Conservation Area - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 716m | North |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 734m | North East |
| I013 | Morella House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 735m | North East |
| I105 | Central Hotel and associated buildings | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 735m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 738m | North East |
| I103 | Parkview House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 740m | North East |
| I019 | Grand Hotel | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 751m | North |
| I001 | Bega Courthouse | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 751m | North East |
| I583 | Federation dwelling Narroon | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 751m | South |
| I012 | Lawson House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 758m | North East |
| I602 | Brick House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 766m | North East |
| I017 | Soldiers Memorial Gates, Park and Artillery | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 792m | North |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I098 | Buildings | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 792m | North |
| I095 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 793m | North |
| I096 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 793m | North |
| I097 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 793m | North |
| I565 | Motor Garage former | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 794m | North |
| I564 | Brick faced shop | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 795m | North |
| I094 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 795m | North |
| I563 | Star Newspaper and printing office | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 796m | North |
| I663 | Carp Street Survey Pole | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 796m | North |
| I610 | Gates and Pillars for Gas works | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 797m | North East |
| I562 | Bently Bros Hairdressers former | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 797m | North |
| I088 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 801m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 808m | North East |
| I106 | Building (Kings Cinema) | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 809m | North East |
| I020 | Rosevear Shop Front | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 812m | North |
| I093 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 814m | North East |
| I107 | McNamara Centennial building and shops | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 814m | North |
| I091 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 815m | North East |
| I090 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 816m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 818m | North |
| I004 | Commercial Hotel | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 819m | North East |
| I589 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 823m | North East |
| I008 | Clock Tower | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 827m | North East |
| I577 | Brick residence and garden setting | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 828m | South |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I029 | House (former Westpac residence) | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 831m | North East |
| I548 | Brick Chambers | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 840m | North East |
| I003 | Building (Blomfield Chambers) | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 844m | North East |
| I108 | French's Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 847m | North |
| I547 | Shop | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 851m | North East |
| I006 | Bank Hotel | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 857m | North |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 858m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 864m | North |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 866m | North East |
| I481 | Shop | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 866m | North East |
| I011 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 869m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 874m | North |
| I021 | Building (Red Cross Centre) | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 877m | North |
| I101 | Building | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 884m | North |
| I478 | Pickled Pear B and B | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 887m | North East |
| I538 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 888m | North East |
| C679 | Canning Street | Conservation Area - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 888m | North East |
| I601 | House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 892m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 901m | North East |
| I537 | Bega Band Room | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 902m | North East |
| I007 | Masonic Centre | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 903m | North East |
| I550 | Art Deco Shops | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 905m | North |
| I005 | St John's Anglican Rectory, Church, Hall | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 915m | North |
| I526 | Malcolm House | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 922m | North East |

| Map Id | Name | Classification | Significance | EPI Name | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I477 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 922m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 939m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 941m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 948m | North East |
| I476 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 948m | North East |
| I524 | Cottage Weetah | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 954m | North East |
| I624 | Granite Kerb and Gutter | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 966m | North |
| I530 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 972m | North East |
| I523 | Cottage | Item - General | Local | Bega Valley Local Environmental Plan 2013 | 02/08/2013 | 02/08/2013 | 15/09/2017 | 973m | North East |

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# Natural Hazards - Bush Fire Prone Land

**1 McKee Drive, Bega, NSW 2550**

Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2019. Property Boundaries: © Department Finance, Services & Innovation 2019

Coordinate System: GDA 1994 MGA Zone 56

Date: 03 June 2019

# Natural Hazards

**1 McKee Drive, Bega, NSW 2550**

## 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 |
|---|---|---|
| Vegetation Buffer | 578m | East |
| Vegetation Category 3 | 608m | South West |

NSW Bush Fire Prone Land - © NSW Rural Fire Service under Creative Commons 4.0 International Licence

# Ecological Constraints

**1 McKee Drive, Bega, NSW 2550**

## Ramsar Wetlands

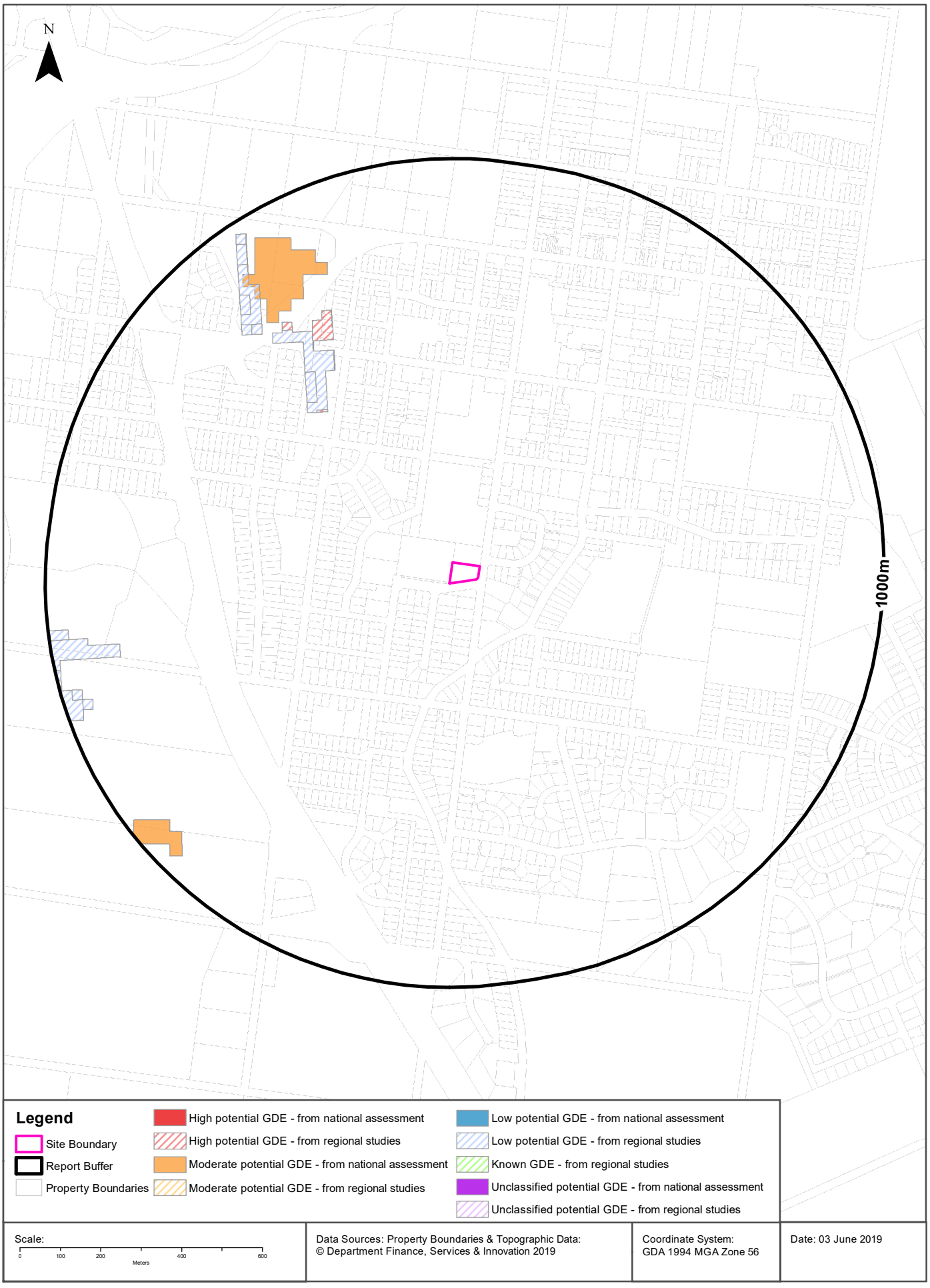
What Ramsar Wetland areas exist within the dataset buffer?

| 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

**1 McKee Drive, Bega, NSW 2550**



# Ecological Constraints

**1 McKee Drive, Bega, NSW 2550**

## Groundwater Dependent Ecosystems Atlas

| Type | GDE Potential | Geomorphology | Ecosystem Type | Aquifer Geology | Distance |
|---|---|---|---|---|---|
| Terrestrial | High potential GDE - from regional studies | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 485m |
| Terrestrial | Low potential GDE - from regional studies | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 489m |
| Aquatic | Moderate potential GDE - from national assessment | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Wetland | Fractured rock | 732m |

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology
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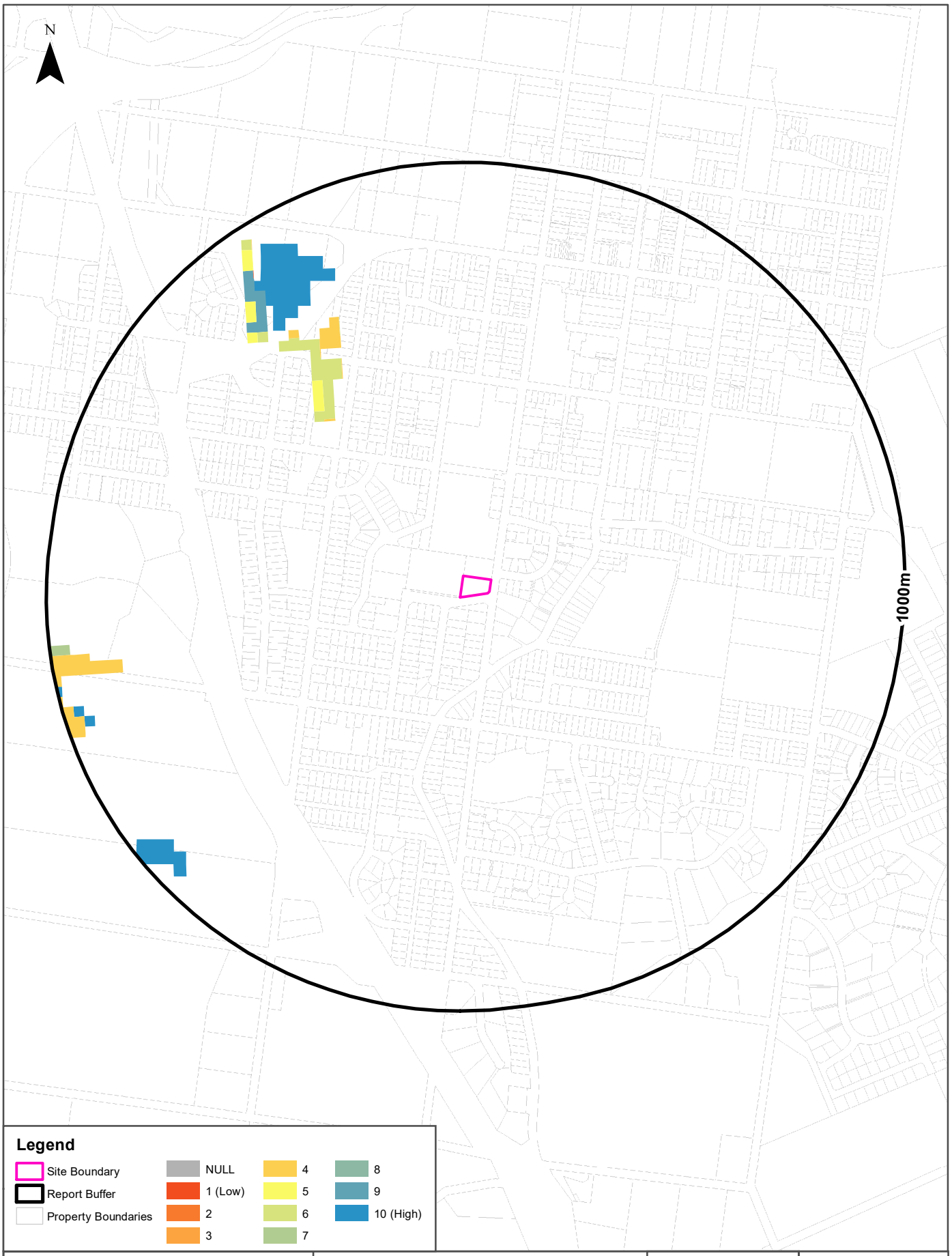
# Ecological Constraints - Inflow Dependent Ecosystems Likelihood

1 McKee Drive, Bega, NSW 2550



# Ecological Constraints

**1 McKee Drive, Bega, NSW 2550**

## Inflow Dependent Ecosystems Likelihood

| Type | IDE Likelihood | Geomorphology | Ecosystem Type | Aquifer Geology | Distance |
|---|---|---|---|---|---|
| Terrestrial | 4 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 485m |
| Terrestrial | 6 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 489m |
| Terrestrial | 5 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 520m |
| Aquatic | 10 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Wetland | Fractured rock | 732m |
| Terrestrial | 9 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 755m |
| Terrestrial | 1 | Deeply dissected sandstone plateaus. | Vegetation | | 878m |
| Terrestrial | 10 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 927m |
| Terrestrial | 7 | Deeply dissected steeply sloping plateau margin in metamorphics and granite. Bounded in the west by the Great Escarpment. | Vegetation | | 950m |

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology
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# Ecological Constraints

**1 McKee Drive, Bega, NSW 2550**

## 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 | Aves | Ardea ibis | Cattle Egret | Not Listed | Not Sensitive | Not Listed | CAMBA;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 | Callocephalon fimbriatum | Gang-gang Cockatoo | Vulnerable | Category 3 | Not Listed | |
| Animalia | Aves | Calyptorhynchus lathami | Glossy Black-Cockatoo | Vulnerable | Category 2 | Not Listed | |
| Animalia | Aves | Daphoenositta chrysoptera | Varied Sittella | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Aves | Egretta sacra | Eastern Reef Egret | Not Listed | Not Sensitive | Not Listed | CAMBA |
| Animalia | Aves | Falco hypoleucos | Grey Falcon | Endangered | Category 2 | Not Listed | |
| Animalia | Aves | Glossopsitta pusilla | Little Lorikeet | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Aves | Haematopus fuliginosus | Sooty Oystercatcher | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Aves | Haematopus longirostris | Pied Oystercatcher | Endangered | Not Sensitive | Not Listed | |
| 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 | Hydroprogne caspia | Caspian Tern | Not Listed | Not Sensitive | Not Listed | CAMBA;JAMBA |
| 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 | Ninox connivens | Barking Owl | Vulnerable | Category 3 | Not Listed | |
| Animalia | Aves | Ninox strenua | Powerful Owl | Vulnerable | Category 3 | Not Listed | |
| Animalia | Aves | Oxyura australis | Blue-billed Duck | Vulnerable | Not Sensitive | 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 | Pezoporus wallicus wallicus | Eastern Ground Parrot | Vulnerable | Category 3 | Not Listed | |
| Animalia | Aves | Plegadis falcinellus | Glossy Ibis | Not Listed | Not Sensitive | Not Listed | CAMBA |
| Animalia | Aves | Stagonopleura guttata | Diamond Firetail | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Aves | Stercorarius parasiticus | Arctic Jaeger | Not Listed | Not Sensitive | Not Listed | ROKAMBA;JAMBA |

| Kingdom | Class | Scientific | Common | NSW Conservation Status | NSW Sensitivity Class | Federal Conservation Status | Migratory Species Agreements |
|---|---|---|---|---|---|---|---|
| Animalia | Aves | Tringa stagnatilis | Marsh Sandpiper | Not Listed | Not Sensitive | Not Listed | ROKAMBA;CAMBA; JAMBA |
| Animalia | Aves | Tyto novaehollandiae | Masked Owl | Vulnerable | Category 3 | Not Listed | |
| Animalia | Aves | Tyto tenebricosa | Sooty Owl | Vulnerable | Category 3 | Not Listed | |
| Animalia | Mammalia | Arctocephalus pusillus doriferus | Australian Fur-seal | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Cercartetus nanus | Eastern Pygmy-possum | Vulnerable | Not Sensitive | Not Listed | |
| 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 | Miniopterus schreibersii oceanensis | Eastern Bentwing-bat | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Mormopterus norfolkensis | Eastern Freetail-bat | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Myotis macropus | Southern Myotis | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Petauroides volans | Greater Glider | Not Listed | Not Sensitive | Vulnerable | |
| Animalia | Mammalia | Petaurus australis | Yellow-bellied Glider | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Petaurus norfolcensis | Squirrel Glider | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Mammalia | Petrogale penicillata | Brush-tailed Rock-wallaby | Endangered | Not Sensitive | Vulnerable | |
| Animalia | Mammalia | Phascolarctos cinereus | Koala | Vulnerable | Not Sensitive | Vulnerable | |
| Animalia | Mammalia | Potorous tridactylus | Long-nosed Potoroo | Vulnerable | 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 | Sminthopsis leucopus | White-footed Dunnart | Vulnerable | Not Sensitive | Not Listed | |
| Animalia | Reptilia | Eretmochelys imbricata | Hawksbill Turtle | Not Listed | Not Sensitive | Vulnerable | |
| Plantae | Flora | Acacia georgensis | Bega Wattle | Vulnerable | Not Sensitive | Vulnerable | |
| Plantae | Flora | Astrotricha sp. Wallagaraugh | Merimbula Star-hair | Endangered | Not Sensitive | Not Listed | |
| Plantae | Flora | Eucalyptus nicholii | Narrow-leaved Black Peppermint | Vulnerable | Not Sensitive | Vulnerable | |
| Plantae | Flora | Gentiana baeuerlenii | Baeuerlen's Gentian | Endangered | Not Sensitive | Endangered | |
| Plantae | Flora | Lysimachia vulgaris var. davurica | Yellow Loosestrife | Endangered | Category 3 | Not Listed | |

Data does not include NSW category 1 sensitive species.
NSW BioNet: © State of NSW and Office of Environment and Heritage
Data obtained 03/06/2019

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# **Appendix E** – Historical title search results

# ADVANCE LEGAL SEARCHERS PTY LTD

(ACN 147 943 842)
ABN 82 147 943 842

18/36 Osborne Road,
Manly NSW 2095

Telephone: +612 9977 6713
Mobile: 0412 169 809
Email: search@alsearchers.com.au


31st May 2019

**LOTSEARCH PTY LTD**
**Level 3, 68 Alfred Street,**
**MILSONS POINT, NSW 2061**

**Attention: Rosemary Hulak,**

**RE:** **1 McKee Drive,**
**Bega**
**Reference: LS006566_EP**

## Current Search

Folio Identifier 2/1243054 (title attached)
DP 1243054 (plan attached)
Dated 31st May 2019
Registered Proprietor:
**SOUTHERN NSW LOCAL HEALTH DISTRICT**

# Title Tree
# Lot 2 DP 1243054

Folio Identifier 2/1243054

Folio Identifier C/351037

CA 53683

Conveyance Book 2001 No. 966

Conveyance Book 1620 No. 257

Conveyance Book 148 No. 490

****

**Part Portion 84 Parish Bega**
Granted to Carl Carl 23rd December 1857

****

# Summary of proprietor(s)
# Lot 2 DP 1243054

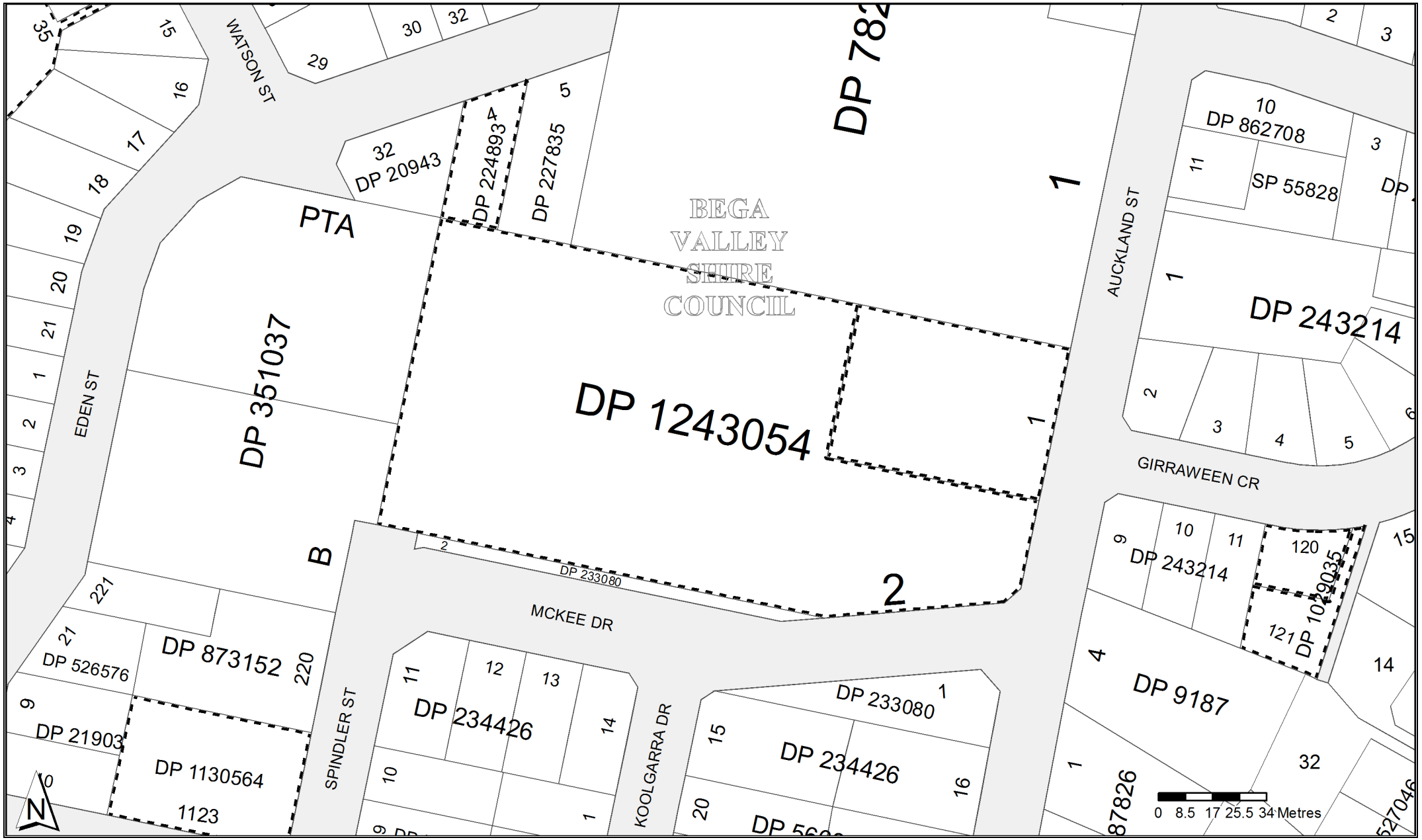
| Year | Proprietor(s) |
|---|---|
| | **(Lot 2 DP 1243054)** |
| 2018 – todate | Southern NSW Local Health District |
| | **(Lot C DP 351037)** |
| 2018 – 2018 | Southern NSW Local Health District |
| 1992 – 2018 | Bega District Hospital |
| | **(Part Portion 84 Parish Bega – Area 4 Acres 3 Roods 27 ¾ Perches – Conv Book 2001 No. 966)** |
| 1946 – 1992 | The Bega District Hospital |
| | **(Part Portion 84 Parish Bega – Area 14 Acres 2 Roods – Conv Book 1620 No. 257)** |
| 1931 – 1946 | Frederick William Spindler, bootmaker |
| | **(Part Portion 84 Parish Bega – Area 14 Acres 2 Roods – Conv Book 148 No. 490)** |
| 1875 – 1931 | Frederick Spindler, farmer |

****

# Cadastral Records Enquiry Report : Lot 2 DP 1243054

**Ref :** NOUSER

**Locality :** BEGA
**Parish :** BEGA
**LGA :** BEGA VALLEY
**County :** AUCKLAND

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**This information is provided as a searching aid only.Whilst every endeavour is made to ensure that current map, plan and titling information is accurately reflected, the Registrar General cannot guarantee the information provided. For ALL ACTIVITY PRIOR TO SEPTEMBER 2002 you must refer to the RGs Charting and Reference Maps**

| | Status | Surv/Comp | Purpose |
|---|---|---|---|
| DP20943 | | | |
| Lot(s): 35 | | | |
| NSW GAZ. 29-04-2005 Folio : 1597 | | | |
| LOT 35 DP20943 VESTED IN COUNCIL FOR PUBLIC GARDEN AND RECREATION SPACE | | | |
| DP224893 | | | |
| Lot(s): 4 | | | |
| CA113847 - LOT 4 DP224893 | | | |
| DP1029035 | | | |
| Lot(s): 120, 121 | | | |
| DP243214 | HISTORICAL | SURVEY | SUBDIVISION |
| DP1130564 | | | |
| Lot(s): 1123 | | | |
| DP21903 | HISTORICAL | SURVEY | UNRESEARCHED |
| DP1243054 | | | |
| Lot(s): 2 | | | |
| DP1252881 | UNREGISTERED | SURVEY | EASEMENT |
| Lot(s): 1, 2 | | | |
| DP351037 | HISTORICAL | COMPILATION | UNRESEARCHED |

**Caution:** This information is provided as a searching aid only. Whilst every endeavour is made the ensure that current map, plan and titling information is accurately reflected, the Registrar General cannot guarantee the information provided. For **ALL ACTIVITY PRIOR TO SEPTEMBER 2002** you must refer to the RGs Charting and Reference Maps.



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| Plan | Surv/Comp | Purpose |
|---|---|---|
| DP9187 | SURVEY | UNRESEARCHED |
| DP20943 | SURVEY | UNRESEARCHED |
| DP21903 | SURVEY | UNRESEARCHED |
| DP26273 | SURVEY | UNRESEARCHED |
| DP27772 | SURVEY | UNRESEARCHED |
| DP100269 | SURVEY | UNRESEARCHED |
| DP224893 | SURVEY | SUBDIVISION |
| DP227835 | SURVEY | OLD SYSTEM CONVERSION |
| DP233080 | SURVEY | SUBDIVISION |
| DP234426 | SURVEY | SUBDIVISION |
| DP243214 | SURVEY | SUBDIVISION |
| DP253567 | SURVEY | SUBDIVISION |
| DP351037 | COMPILATION | UNRESEARCHED |
| DP387826 | SURVEY | UNRESEARCHED |
| DP517580 | SURVEY | SUBDIVISION |
| DP523346 | SURVEY | SUBDIVISION |
| DP526576 | SURVEY | SUBDIVISION |
| DP527046 | SURVEY | SUBDIVISION |
| DP566306 | SURVEY | SUBDIVISION |
| DP732597 | SURVEY | SUBDIVISION |
| DP782400 | COMPILATION | DEPARTMENTAL |
| DP862708 | SURVEY | SUBDIVISION |
| DP873152 | SURVEY | SUBDIVISION |
| DP1029035 | SURVEY | SUBDIVISION |
| DP1083308 | COMPILATION | DEPARTMENTAL |
| DP1130564 | COMPILATION | CONSOLIDATION |
| DP1243054 | SURVEY | RESUMPTION OR ACQUISITION |
| SP55828 | COMPILATION | STRATA PLAN |

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Form: 10CN
Release: 5·4

# CHANGE OF NAME

New South Wales
Real Property Act 1900

AN488830D

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

(A) **TORRENS TITLE** C/351037

(B) **REGISTERED DEALING**

| Number | Torrens Title |
|---|---|
| | |

(C) **LODGED BY**

| Document Collection Box | Name, Address or DX, Telephone, and Customer Account Number if any | CODE |
|---|---|---|
| **813E** | Lea Armstrong - Crown Solicitor<br>DX 19 SYDNEY<br>Reference: 201800816 GAD | **CN** |

(D) **REGISTERED PROPRIETOR** Whose name is to be changed; show the name as it currently appears on the Torrens Title
Bega District Hospital

(E) **NEW NAME** Of the above registered proprietor in full
Southern NSW Local Health District

(F) The registered proprietor of the above land applies to have its new name recorded in the Register in respect of that land and hereby consents to the Registrar General contacting the relevant issuing authorities to validate any supporting evidence lodged with this application.

(G) **STATUTORY DECLARATION BY THE APPLICANT***

I, Mark Everingham

solemnly and sincerely declare that—

1. I am an employed solicitor of the Solicitor for the Applicant
2. on at in SELECT >>> >>> >>> >>> >>>
   I married
3. By Virtue of the attached Administrative changes orders, the name has changed from Bega District Hospital to Southern NSW Local Health District.

I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the Oaths Act 1900, and I certify this application to be correct for the purposes of the Real Property Act 1900.

Made and subscribed at Sydney in the State of New South Wales on 9 July 2018
in the presence of Rebecca Kiu of 60-70 Elizabeth St Sydney

☐ Justice of the Peace (J.P. Number: )
☐ Other qualified witness *[specify]*
☒ Practising Solicitor

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

1. I saw the face of the person ~~*OR I did not see the face of the person because the person was wearing a face covering, but I am satisfied that the person had a special justification for not removing the covering*~~; and
2. I have known the person for at least 12 months ~~*OR I have confirmed the person's identity using an identification document and the document I relied on was a*~~ *[Omit ID No.]*

Signature of witness: Signature of applicant:

* As the services of a qualified witness cannot be provided at lodgment, the declaration should be signed and witnessed prior to lodgment. ** If made outside NSW, cross out the witness certification. If made in NSW, cross out the text which does not apply.

(H) *This section is to be completed where a notice of sale is required and the relevant data has been forwarded through eNOS.*

The applicant's solicitor certifies that the eNOS data relevant to this dealing has been submitted and stored under eNOS ID No. 1606075 Full name: Mark Everingham Signature:

**This and the following 13 pages is Annexure A to Change of Name in respect of C/351037, from Bega District Hospital to Southern NSW Local Health District**

The land comprising Lot C in DP 351037 formerly held in the name of "Bega District Hospital" is now held by the "Southern NSW Local Health District" in accordance with the legislation shown in the table below.

| Name | Legislation | Page No of (this) Application to Record New Registered Proprietor |
|---|---|---|
| "Bega District Hospital to The Bega District Hospital" | **Public Hospitals Act 1929 – Section 4** Second Schedule pg. 74 | P. 3 |
| "The Bega District Hospital" To "Southern Health Service" | **Public Hospital Act 1929 Order** – Explanatory Note pg. 1 | p. 4, 5 & 6 |
| | **Public Hospital Act 1929 Order** Schedule 2 pg. 4 | |
| | **Public Hospital Act 1929 Order** Schedule 1 pg. 2 | |
| "Southern Health Service" To " Southern Area Health Service" | **Health Services Act 1997** – Section 19, Chapter 3, Part 1 p. 12 & Schedule 1 p. 99 | p. 7, 8 & 9 |
| | **Health Services Act 1997** – Section 131, Part 1 pg. 1 | |
| "" Southern Area Health Service" To "Greater Southern Area Health Service" | **Health Services (Amalgamation of Area Health Services) Order 2004 NSW Government Gazette 166, 2 October 2004** Folio 8129 | p. 10 |
| "Greater Southern Area Health Service" To "Southern NSW Health Network" | **Health Services Amendment (Local Health Networks) Act 2010** Amendments to Health Services Act 1997 p. 13 & 14 | p. 11 & 12 |
| | **Health Services (Transfer of Assets, Rights and Liabilities) Order 2010** – Schedule 1 Section 86 pg. 7 | p.13 |
| "Southern NSW Health Network" to **" Southern NSW Health District "** | **Health Services Amendment (Local Health Districts and Boards) Act 2011 -** Amendments to Health Services Act 1997 Schedule 1, Section 2 p. 14 | p. 14 |

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Ref:advlegs /Src:P



Sec. 4.

SECOND SCHEDULE.

| Hospital Incorporated. | Corporate Name. |
|---|---|
| Balmain District .. .. .. | The Balmain District Hospital.(1) |
| Manly Cottage .. .. .. | The Manly District Hospital. |
| Marrickville District .. .. | The Marrickville District Hospital. |
| Royal South Sydney (Zetland) .. | The Royal South Sydney Hospital. |
| St. George District .. .. | The St. George District Hospital.(2) |
| Sydney Homœopathic .. .. | The Sydney Homœopathic Hospital. |
| Western Suburbs .. .. .. | The Western Suburbs Hospital. |
| Albury District .. .. .. | The Albury District Hospital.(3) |
| Angledool .. .. .. .. | The Angledool Hospital.(4) |
| Armidale and New England Hospital. | The Armidale and New England Hospital. |
| Auburn District .. .. .. | The Auburn District Hospital. |
| Ballina District .. .. .. | The Ballina District Hospital. |
| Balranald District .. .. .. | The Balranald District Hospital. |
| Barraba .. .. .. .. | The Barraba Hospital.(5) |
| Bathurst District .. .. .. | The Bathurst District Hospital. |
| Bega District .. .. .. | The Bega District Hospital. |
| Bellingen .. .. .. .. | The Raleigh District Hospital.(6) |
| Bingara District .. .. .. | The Bingara District Hospital. |
| Blayney Cottage .. .. .. | The Blayney Cottage Hospital.(7) |
| Boggabri District .. .. .. | The Boggabri District Hospital. |
| Bombala District .. .. .. | The Bombala District Hospital. |
| Bourke District .. .. .. | The Bourke District Hospital. |
| Bowral .. .. .. .. | The Berrima District Hospital.(8) |
| Braidwood .. .. .. | The Braidwood District Hospital. |
| Brewarrina .. .. .. | The Brewarrina District Hospital. |

(1) Name altered to The Balmain and District Hospital. Government Gazette No. 97 of 12th July, 1940, p. 2807. Name altered to The Balmain Hospital. Government Gazette No. 126 of 25th October, 1968, p. 4252.

(2) Name altered to The St. George Hospital. Government Gazette No. 81 of 11th July, 1947, p. 1592.

(3) Name altered to The Albury Base Hospital. Government Gazette No. 113 of 12th June, 1953, p. 1921.

(4) Closed under sec. 13. Government Gazette No. 148 of 16th August, 1935, p. 3328.

(5) Name altered to The Barraba and District Hospital. Government Gazette No. 62 of 4th May, 1979, p. 2080.

(6) Name altered to The Bellinger River District Hospital. Government Gazette No. 114 of 14th June, 1935, p. 2387.

(7) Name altered to The Blayney District Hospital. Government Gazette No. 114 of 14th June, 1935, p. 2387.

(8) Name altered to The Bowral and District Hospital. Government Gazette No. 95 of 9th August, 1968, p. 3196.



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**1996—No. 90**

# PUBLIC HOSPITALS ACT 1929—ORDER

NEW SOUTH WALES

*[Published in Gazette No. 33 of 15 March 1996]*

G. J. SAMUELS, Governor.

I, the Honourable Gordon Samuels AC, Governor of the State of New South Wales, with the advice of the Executive Council, on the recommendation of the Minister for Health, and in pursuance of section 13A (2) of the Public Hospitals Act 1929, do, by this my Order, amalgamate, with effect on 16 March 1996, the hospitals listed in the second column of Schedule 1 to this Order under the name shown opposite those hospitals in the first column of that Schedule and, in pursuance of section 4 (2) of that Act, amend, with effect on 16 March 1996, the Second Schedule to that Act:

(a) by omitting the matter shown in Schedule 2 to this Order; and

(b) by inserting in the First and Second Columns, in, alphabetical order, the matter shown in Schedule 1 to this Order.

Signed and sealed at Sydney, this eleventh day of March 1996.

By His Excellency's Command,

ANDREW REFSHAUGE
Deputy Premier and
Minister for Health.

---

## SCHEDULE 1

| | |
|---|---|
| Far West Health Service. | Far West Health Service.<br>Orana Health Service. |

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| | |
|---|---|
| North West Health Service. | The Barraba and District Hospital.<br>The Gunnedah District Hospital and Health Service.<br>The Manilla District Hospital.<br>Quirindi Hospital and Health Service.<br>Tamworth Base Hospital and Health Service.<br>The Walcha District Hospital.<br>Werris Creek District Hospital. |
| Orana Health Service. | The Bourke District Hospital.<br>The Brewarrina District Hospital.<br>The Collarenebri District Hospital<br>The Goodooga District Hospital.<br>The Walgett District Hospital. |
| Richmond Health Service. | The Ballina District Hospital.<br>The Brunswick-Byron Health Service.<br>The Campbell Hospital, Coraki<br>The Casino and District Memorial Hospital.<br>The Kyogle Memorial Hospital.<br>The Lismore Base Hospital.<br>The Urbenville and District Hospital. |
| Riverina Health Service. | The Cootmundra Hospital.<br>The Gundagai District Hospital.<br>The Junee District Hospital.<br>The Temora and District Hospital.<br>The Wagga Wagga Base Hospital and District Health Service. |
| South Coast Health Service. | The Bateman's Bay District Hospital.<br>The Bega District Hospital.<br>The Moruya District Hospital.<br>The Pambula District Hospital. |

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| | |
|---|---|
| Greater Murray Health Service. | Hume Health Service.<br>Murray Health Service.<br>Murrumbidgee Health Service.<br>Riverina Health Service. |
| Macquarie Health Service. | Castlereagh Health Service.<br>Macquarie Health Service. |
| Mid North Coast Health Service. | Lower North Coast Health Service.<br>Macleay-Hastings Health Service.<br>Mid North Coast Health Service. |
| Mid Western Health Service. | Central West Health Service.<br>Evans Health Service.<br>Lachlan Health Service. |
| New England Health Service. | Barwon Health Services.<br>New England Health Service.<br>North West Health Service. |
| Northern Rivers Health Service. | Clarence Health Service.<br>Richmond Health Service.<br>Tweed Valley Health Service. |
| Southern Health Service. | Monaro Health Service.<br>South Coast Health Service.<br>Southern Tablelands Health Service. |

## SCHEDULE 2

| | |
|---|---|
| Barwon Health Services. | The Bingara District Hospital.<br>The Boggabri District Hospital.<br>Moree Plains Health Service.<br>The Narrabri District Hospital.<br>The Warialda District Hospital.<br>Wee Waa District Health Service. |

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(3) A reference in column 3 of Schedule 1 to the unincorporated area is a reference to such part of the land within the Western Division of the State as is not within a local government area.

**19 Amendment of Schedule 1 (Names and areas of area health services)** (cf AHS Act ss 6 and 8)

(1) The Governor may, by order published in the Gazette:

(a) amend column 1 of Schedule 1 by inserting, altering or omitting the name of an area health service, or

(b) amend column 2 or 3 (or both) of Schedule 1 by inserting, altering or omitting a description of the area in respect of which an area health service is (or was) constituted, or

(c) omit Schedule 1 and insert instead a Schedule containing the names of area health services and descriptions of the areas in respect of which the area health services are constituted.

(2) If an area in respect of which an area health service is constituted:

(a) is described by reference to a local government area that is constituted as a city, and

(b) the name of the city (but not the boundaries) is changed,

a reference in column 2 of Schedule 1 to the old name of the city is taken to include a reference to the new name of the city.

(3) The boundaries of the area in respect of which an area health service that is described by reference to any local government area or part of any local government area are unaffected by a change in the boundaries of the local government area and, for that purpose, the boundaries of the local government area are taken to remain the same as they were when reference to the local government area was included in column 2 of Schedule 1.

**20 Dissolution, amalgamation or change of name of area health services** (cf AHS Act s 9)

(1) The Governor may, by order published in the Gazette:

(a) dissolve an area health service, or

(b) amalgamate 2 or more area health services, or

(c) change the name of an area health service,

and may, in the order, amend Schedule 1 accordingly.

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| Column 1 | Column 2 | Column 3 |
|---|---|---|
| **Name of service** | **Description of local government area or city** | **Description of area other than local government area** |
| Southern Area Health Service | Bega Valley<br>Bombala<br>Boorowa<br>Cooma-Monaro<br>Crookwell<br>Eurobodalla<br>Goulburn<br>Gunning<br>Harden<br>Mulwaree<br>Queanbeyan<br>Snowy River<br>Tallaganda<br>Yarrowlumla<br>Yass<br>Young | |
| Wentworth Area Health Service | Blue Mountains<br>Penrith<br>Hawkesbury | |
| Western Sydney Area Health Service | Auburn<br>Baulkham Hills<br>Blacktown<br>Holroyd<br>Parramatta | |

# Health Services Act 1997 No 154

Historical version for 1 September 2001 to 6 December 2001 (accessed 27 June 2018 at 12:57) Current version



### 131 Transfer of hospitals, health institutions, services and property between area health services and statutory health corporations (cf AHS Act s 21)

(1) The Governor may, by order published in the Gazette, transfer to any statutory health organisation:

(a) any public hospital or health institution under the control of another statutory health organisation, or

(b) any health service or health support service under the control of another statutory health organisation, or

(c) any public hospital or health service controlled by the Crown (including any hospital or health service controlled by the Minister or the Health Administration Corporation), or

(d) any of the assets, rights or liabilities of another statutory health organisation,

and may amend Schedules 1 and 2 accordingly.

(2) An order made under this section must specify the date (being a date that is on or after the date it is published in the Gazette) on which it takes effect. However, if no date is specified in the order, the order is taken to have specified the date on which it is published in the Gazette as the date on which it takes effect.

(3) An order is not to be made under this section unless the Minister is of the opinion that the order is in the public interest and has recommended to the Governor that the order be made.

(4) A transfer under this section may be effected without holding an inquiry.

(5) In this section, ***statutory health organisation*** means an area health service or a statutory health corporation.

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# Orders

New South Wales

## Health Services (Amalgamation of Area Health Services) Order 2004

under the

Health Services Act 1997

MARIE BASHIR, Governor

I, Professor Marie Bashir AC, Governor of the State of New South Wales, with the advice of the Executive Council, and in pursuance of section 20 (1) of the *Health Services Act 1997*, make the following Order.

Dated, this 20th day of October 2004.

By Her Excellency's Command,

MORRIS IEMMA, M.P.,
Minister for Health

### Explanatory note

The object of this Order is to amalgamate the area health services listed in Schedule 1 to the *Health Services Act 1997*. The area health services listed in Column 2 are amalgamated into the area health services listed in Column 1.

| Column 1 | Column 2 |
|---|---|
| **Amalgamated area health service** | **Old area health services** |
| Greater Southern Area Health Service | Greater Murray Area Health Service<br>Southern Area Health Service |
| Greater Western Area Health Service | Far West Area Health Service<br>Macquarie Area Health Service<br>Mid Western Area Health Service |
| Hunter and New England Area Health Service | Hunter Area Health Service<br>New England Area Health Service |

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**[34] Schedule 1**

Omit the Schedule. Insert instead:

## Schedule 1 Names and areas of local health networks

(Sections 17 and 18)

| Column 1 | Column 2 | Column 3 |
|---|---|---|
| **Name of local health network** | **Description of local government area or city** | **Description of area other than local government area** |
| Sydney Local Health Network | Ashfield, Burwood, Canada Bay, Canterbury, Leichhardt, Marrickville, Strathfield, Sydney (part) | |
| South Western Sydney Local Health Network | Bankstown, Camden, Campbelltown, Fairfield, Liverpool, Wingecarribee, Wollondilly | |
| South Eastern Sydney Local Health Network | Botany Bay, Hurstville, Kogarah, Randwick, Rockdale, Sutherland, Sydney (part), Waverley, Woollahra | Lord Howe Island |
| Illawarra Shoalhaven Local Health Network | Kiama, Shellharbour, Shoalhaven, Wollongong | |
| Western Sydney Local Health Network | Auburn, Baulkham Hills, Blacktown, Holroyd, Parramatta | |
| Nepean Blue Mountains Local Health Network | Blue Mountains, Hawkesbury, Lithgow, Penrith | |
| Northern Sydney Local Health Network | Hornsby, Hunters Hill, Ku-ring-gai, Lane Cove, Manly, Mosman, North Sydney, Pittwater, Ryde, Warringah, Willoughby | |
| Central Coast Local Health Network | Gosford, Wyong | |

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| Column 1 | Column 2 | Column 3 |
|---|---|---|
| **Name of local health network** | **Description of local government area or city** | **Description of area other than local government area** |
| Hunter New England Local Health Network | Armidale Dumaresq, Cessnock, Dungog, Glen Innes Severn, Gloucester, Great Lakes, Greater Taree, Gunnedah, Guyra, Gwydir, Inverell, Lake Macquarie, Liverpool Plains, Maitland, Moree Plains, Muswellbrook, Narrabri, Newcastle, Port Stephens, Singleton, Tamworth Regional, Tenterfield, Upper Hunter, Uralla, Walcha | |
| Murrumbidgee Local Health Network | Balranald, Berrigan, Bland, Boorowa, Carrathool, Conargo, Coolamon, Cootamundra, Corowa, Deniliquin, Greater Hume, Griffith, Gundagai, Harden, Hay, Jerilderie, Junee, Leeton, Lockhart, Murray, Murrumbidgee, Narrandera, Temora, Tumbarumba, Tumut, Urana, Wagga Wagga, Wakool, Wentworth, Young | |
| Southern NSW Local Health Network | Bega Valley, Bombala, Cooma-Monaro, Eurobodalla, Goulburn Mulwaree, Palerang, Queanbeyan, Snowy River, Upper Lachlan, Yass Valley | |

Req:R456586 /Doc:DL AN488830 /Rev:12-Jul-2018 /Sts:NO.OK /Pgs:ALL /Prt:31-May-2019 11:42 /Seq:13 of 14
Ref:advlegs /Src:P



members (including chairpersons and deputy chairpersons) of local health district boards, and

(d) any person who ceases to be a member (including a chairperson or deputy chairperson) of an existing local health network governing council because of the operation of this clause is not entitled to any compensation for the loss of that office.

(2) Subject to this Division, on the dissolution of an existing local health network, the network's successor is taken for all purposes (including the rules of private international law) to be a continuation of and the same legal entity as the network.

**85 Constitution of initial local health districts**

(1) Each of the local health districts specified in Schedule 1 (as amended by the amending Act on the reconstitution day) is constituted as such on that day, subject to subclause (2).

(2) Nothing in this clause prevents the amendment of Schedule 1 (whether on or after the reconstitution day) by an order made under section 19 or 20.

**86 Transfer of existing local health network's undertaking to network's successor**

(1) The following provisions have effect in relation to the assets, rights and liabilities of an existing local health network on its dissolution:

(a) the assets of the network vest in the network's successor by virtue of this clause and without the need for any further conveyance, transfer, assignment or assurance,

(b) the rights or liabilities of the network become by virtue of this clause the rights or liabilities of the network's successor,

(c) all proceedings relating to the assets, rights or liabilities commenced before the network's dissolution by or against the network or a predecessor of the network and pending immediately before the network's dissolution are taken to be proceedings pending by or against the network's successor,

(d) any act, matter or thing done or omitted to be done in relation to the assets, rights or liabilities before the network's dissolution by, to or in respect of the network is (to the extent to which that act, matter or thing has any

Req:R456586 /Doc:DL AN488830 /Rev:12-Jul-2018 /Sts:NO.OK /Pgs:ALL /Prt:31-May-2019 11:42 /Seq:14 of 14
Ref:advlegs /Src:P



| Column 1 | Column 2 |
|---|---|
| networks | districts |
| governing council | board |
| governing councils | boards |
| network governed health corporation | specialty network governed health corporation |
| network governed health corporations | specialty network governed health corporations |

**[2] Section 4 Objects of Act**

Omit "local health networks" from section 4 (a).

Insert instead "local health districts".

**[3] Section 30 Combined management or assistance in management of public hospitals, health institutions, health services or health support services**

Omit "non-area" wherever occurring in section 30 (1), (2) and (4).

Insert instead "non-district".

**[4] Section 30 (5), definition of "non-area health organisation"**

Omit "***non-area***". Insert instead "***non-district***".

**[5] Section 133B Personal liability of members of boards of statutory health organisations**

Omit "or governing council" wherever occurring in section 133B (b) and (c).

**[6] Section 133B (d)**

Omit "organisation, board or governing council".

Insert instead "organisation or board".

**[7] Section 136 Proof of certain matters not required**

Omit "board, governing council or governing body" wherever occurring.

Insert instead "board or governing body".

PLANFORM 2 (A2) DP1243054

THIS PLAN IS UNSUITABLE FOR DELIMITATION PURPOSES AS REGARDS LOT 2

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

M.G.A. G.N.

| COORDINATE SCHEDULE - CLAUSE 70 OF THE SURVEYING AND SPATIAL INFORMATION REGULATION 2017 | | | | | | |
|---|---|---|---|---|---|---|
| MARK | MGA COORDINATES | | CLASS | ORDER | METHOD | STATE |
| | EASTING | NORTHING | | | | |
| PM 43729 | 753 598.999 | 5 936 737.445 | B | 3 | FROM SCIMS | FOUND |
| SSM 35669 | 753 451.363 | 5 936 660.908 | B | 3 | FROM SCIMS | FOUND |
| SSM 35671 | 753 702.790 | 5 936 698.906 | B | 3 | FROM SCIMS | FOUND |

MGA DATUM: GDA94 DATE OF SCIMS COORDINATES: 01/05/2018
MGA ZONE: 56 COMBINED SCALE FACTOR: 1.000384

(A) PROPOSED RIGHT OF CARRIAGEWAY VAR. WIDTH
(B) PROPOSED EASEMENT FOR ELECTRICITY PURPOSES 4.2 WIDE

SPINDLER STREET
McKEE
SSM35669 FD (ESTABLISHED)
BASE OF RM CB FD (0.6 DEEP) 197°44'-0.455 (DP233080)
DP 2 11 12 13 4 4 2 14 6 3
242° 35' 49" - 166.232 (MGA GND)
242° 35' 54" - 166.220 (SURVEY)
64.62
281°
25.47 WIDE)
"Y" PM43729 FD (ESTABLISHED)
KOOLGARRA DRIVE
146°43'40" 5.175
RM CB FD 281°45'-0.455 (DP234426)
43' 27.43
RM CB FD (EXPOSED) 188°36'-0.43 (VIDE DP1074159)
0.65
42° 36' 10" 29.675 (DP233080) – (20.115 WIDE)
110° 22' 14" - 110.672 (MGA GND) - 110.668 (SURVEY)
15 DP234426
87.695 (DP233080) 87.725 (SURVEY)
1 DP233080
RM CB NOT FD (DUG 0.7) (DP233080)
16 DP234426
18.13 190° 39' 11.46 05" 20.77 191°
ANGLE
5.86 228°28'
3.66 0.4 KERB OLD CONC. KERB
NOT 28.93
RM DHW FD 255°48'-1.4 (ORIGIN UNKNOWN)
358° 40' 33" - 73.293
"X" SSM35671 FD (ESTABLISHED)
AUCKLAND STREET
DP 2 9 10 4 3 2 11 1 4
47.245 39' 05"
BASE OF RM CB FD 191°39'-0.455 (DP243214) 101°
RM DHW FD 189°44'-5.83 (DP1029035)
GIRRAWEEN CRESCENT (20.115 WIDE)
1 DP782400
DHWs IN KERB RM DHW 304°04'-1.285
11° (6.585) 39' 48.96 05"
(A) 313°59'30" (13.12) (11.35)
281°
RM GIP 189°42'-0.62 20YO POST & WIRE FENCE
(0.15)
1 3329m²
POST & 68.0 WIRE
68.0 39'
05" FENCE
SEE DIAGRAM A (B)
2 1.607ha
134.265 DED'N
131.165 DED'N 44'
DP233080
36° 10' 34" - 60.065
56.615
17'
25" 14.715 265°
39' 05"
11° 39' 05" 4.2 (B) 101° 39' 05" 7.0
281° 39' 05" 7.0
(1.86) (4.2)
191° 39' 05"
1 DIAGRAM A 2
AUCKLAND STREET
(90.07) (0.3) 20YO POST & WIRE FENCE
48.96 39' FENCED
3.66 0.32 LINE OLD CONC. KERB
RM GIP GONE (DP351037) RM DHW 345°24'-8.93
RM GIP GONE (DUG 0.8) (DP523346)
RM DHW FD 185°18'20"-7.425 (DP862708)
281°38'55" 20.115 (SURVEY)
RM DHW GONE (DP862708)
(AL 3.66-12.8-3.66)
131.795 (DP1029035) 131.815 (SURVEY)
GIRRAWEEN CRESCENT (20.115 WIDE)
STREET
B DP351037
PT A DP351037
32 DP20943
4 DP224893
5 DP227835
4 DP523346
11 DP862708
10 DP862708
SP55828
2 DP243214
1 DP243214
98.36 DED'N
11° 38' 05"
13.075 DED'N 281° 41' 05"

Surveyor: MARK NICHOLAS SCANLON
Date of Survey: 4 MAY 2018
Surveyor's Ref: B1743DP_STG1
2018M710(75)PARTIAL SURVEY

PLAN OF ACQUISITION OF LOT 1 BEING PART OF LOT C IN DP351037

LGA: BEGA VALLEY
Locality: BEGA
Subdivision No: ——
Lengths are in metres. Reduction Ratio 1: 600

Registered
17.5.2018

DP1243054

ePlan Sheet 1 of 1 sheet(s)

| PLAN FORM 6 (2017) | **DEPOSITED PLAN ADMINISTRATION SHEET** | Sheet 1 of 2 sheet(s) |
|---|---|---|

Office Use Only

Registered: 17.5.2018

Title System: TORRENS

Office Use Only

# DP1243054

**PLAN OF ACQUISITION OF LOT 1 BEING PART OF LOT C IN DP351037**

LGA: BEGA VALLEY

Locality: BEGA

Parish: BEGA

County: AUCKLAND

## Survey Certificate

I, MARK NICHOLAS SCANLON

of PARKER SCANLON PTY LTD PO BOX 986 HAMILTON

a surveyor registered under the *Surveying and Spatial Information Act 2002*, certify that:

~~*(a) The land shown in the plan was surveyed in accordance with the *Surveying and Spatial Information Regulation 2017*, is accurate and the survey was completed on .....~~

*(b) The part of the land shown in the plan (being LOT 1) was surveyed in accordance with the *Surveying and Spatial Information Regulation 2017*, the part surveyed is accurate and the survey was completed on 4TH MAY 2018, the part not surveyed was compiled in accordance with that Regulation, or

~~*(c) The land shown in this plan was compiled in accordance with the *Surveying and Spatial Information Regulation 2017*.~~

Datum Line: X - Y

Type: *Urban/~~*Rural~~

The terrain is *Level-Undulating / ~~*Steep-Mountainous.~~

Signature: ..... Dated: 8/5/2018

Surveyor Identification No: 187
Surveyor registered under
the *Surveying and Spatial Information Act 2002*

*Strike out inappropriate words.

**Specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey.

## ~~Crown Lands NSW/Western Lands Office Approval~~

~~I, ..... (Authorised Officer) in approving this plan certify that all necessary approvals in regard to the allocation of the land shown herein have been given.~~

~~Signature: .....~~

~~Date: .....~~

~~File Number: .....~~

~~Office: .....~~

## ~~Subdivision Certificate~~

~~I, .....~~

~~*Authorised Person/*General Manager/*Accredited Certifier, certify that the provisions of s.109J of the *Environmental Planning and Assessment Act 1979* have been satisfied in relation to the proposed subdivision, new road or reserve set out herein.~~

~~Signature: .....~~

~~Accreditation number: .....~~

~~Consent Authority: .....~~

~~Date of endorsement: .....~~

~~Subdivision Certificate number: .....~~

~~File number: .....~~

*Strike through if inapplicable.

Plans used in the preparation of survey/~~compilation~~.

DP233080

DP243214

DP351037

DP862708

DP1029035

DP1074159

Statements of intention to dedicate public roads, create public reserves and drainage reserves, acquire/resume land.

Surveyor's Reference: B1743DP-STG1 - 2018M710(75)

Signatures, Seals and Section 88B Statements should appear on PLAN FORM 6A

PLAN FORM 6A (2017) WARNING: Creasing or folding will lead to rejection ePlan

# DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 2 of 2 sheet(s)

Office Use Only

**Registered:** 17.5.2018

Office Use Only

# DP1243054

**PLAN OF ACQUISITION OF LOT 1 BEING PART OF LOT C IN DP351037**

~~Subdivision Certificate number:~~ .....

~~Date of Endorsement:~~ .....

This sheet is for the provision of the following information as required:

- A schedule of lots and addresses – See 60© *SSI Regulation 2017*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919*
- Signatures and seals- see 195D *Conveyancing Act 1919*
- Any information which cannot fit in the appropriate panel of Sheet 1 of the administration sheets.

SCHEDULE OF ADDRESSES NOT AVAILABLE AT THE TIME OF SURVEY

IT IS INTENDED TO ACQUIRE LOT 1 FOR EDUCATION PURPOSES

**Signed** for and on behalf of the **Minister administering the Technical and Further Education Commission Act 1990** by its duly authorised delegate in the presence of:

Catriona Selwood.

Signature of witness

Signature of delegate

CATRIONA SELWOOD

Name of witness (print)

Gwendy Arnot

Name of delegate (print)

23 Sheoak Place,
Alfords Point 2234

Surveyor's Reference: B1743DP-STG1 – 2018M710(75)

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
31/5/2019 11:32AM

FOLIO: C/351037

First Title(s): OLD SYSTEM
Prior Title(s): CA53683

| Recorded | Number | Type of Instrument | C.T. Issue |
|---|---|---|---|
| 28/4/1992 | CA53683 | CONVERSION ACTION | FOLIO CREATED EDITION 1 |
| 18/12/2013 | AI252761 | DEPARTMENTAL DEALING | |
| 14/9/2015 | AJ811575 | DEPARTMENTAL DEALING | |
| 17/5/2018 | DP1243054 | DEPOSITED PLAN | |
| 11/7/2018 | AN488829 | APPLICATION FOR REPLACEMENT CERTIFICATE OF TITLE | |
| 11/7/2018 | AN488830 | CHANGE OF NAME | EDITION 2 |
| 14/8/2018 | AN515104 | TRANSFER | FOLIO CANCELLED |

*** END OF SEARCH ***

advlegs PRINTED ON 31/5/2019

Obtained from NSW LRS on 31 May 2019 11:32 AM AEST

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NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 2/1243054

| SEARCH DATE | TIME | EDITION NO | DATE |
|---|---|---|---|
| 31/5/2019 | 11:22 AM | 1 | 14/8/2018 |

LAND

LOT 2 IN DEPOSITED PLAN 1243054
AT BEGA
LOCAL GOVERNMENT AREA BEGA VALLEY
PARISH OF BEGA COUNTY OF AUCKLAND
TITLE DIAGRAM DP1243054

FIRST SCHEDULE

SOUTHERN NSW LOCAL HEALTH DISTRICT

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
* 3 AP133463 RIGHT OF CARRIAGEWAY VARIABLE WIDTH APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE PART(S) DESIGNATED (A) SHOWN IN DP1243054

NOTATIONS

UNREGISTERED DEALINGS: DP1252881.

*** END OF SEARCH ***

advlegs PRINTED ON 31/5/2019

Obtained from NSW LRS on 31 May 2019 11:22 AM AEST

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

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# **Appendix F** – Council records including Section 10.7 Planning Certificate

PO Box 492, Bega NSW 2550
P. (02) 6499 2222
F. (02) 6499 2200
E. council@begavalley.nsw.gov.au

ABN. 26 987 935 332
DX. 4904 Bega

# Planning certificate under Section 10.7(2) Environmental Planning and Assessment Act 1979

**Applicant:** R Hulak
3/68 Alfred Street
MILSONS POINT NSW 2061

| | | | |
|---|---|---|---|
| **Certificate No:** | 19510 | **Receipt No:** | 1373380 |
| **Certificate Date:** | 07/06/2019 | **Applicant's Ref:** | |

**Property:** 1 McKee Drive BEGA 2550

**Description:** Lot: 2 DP: 1243054 **Parcel No:** 42558

In accordance with the requirements of section 10.7(2) of the *Environmental Planning and Assessment Act 1979*, the following prescribed matters relate to the land at the date of this certificate.

## 1 Names of relevant planning instruments and DCPs that apply to the carrying out of development on the land

(a) The name of each environmental planning instrument that applies to the carrying out of development on the land.
Bega Valley Local Environmental Plan 2013
State Environmental Planning Policy No. 6 - Number of Storeys in a Building
State Environmental Planning Policy (integrated and Repeals) 2016 (Rural Land Sharing)
State Environmental Planning Policy No. 21 - Caravan Parks
State Environmental Planning Policy No. 32 - Urban Consolidation (Re-Development of Urban Land)
State Environmental Planning Policy No. 33 - Hazardous and Offensive Development
State Environmental Planning Policy No. 36 - Manufactured Home Estates
State Environmental Planning Policy No. 44 - Koala Habitat Protection
State Environmental Planning Policy No. 50 - Canal Estate
State Environmental Planning Policy No. 55 - Remediation of Land
State Environmental Planning Policy No. 64 - Advertising Signs
State Environmental Planning Policy No. 65 - Design Quality of Residential Flat Development
State Environmental Planning Policy (Affordable Rental Housing) 2009

State Environmental Planning Policy (Building Sustainability Index: BASIX 2004)
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
State Environmental Planning Policy (Infrastructure) 2007
State Environmental Planning Policy (Major Development) 2005
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy (State and Regional Development) 2011
State Environmental Planning Policy (Temporary Structures) 2007
State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017
State Environmental Planning Policy (Primary Production and Rural Development) 2019

(b) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the *Environmental Planning and Assessment Act 1979* (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).
Draft State Environmental Planning Policy (Application of Development Standards) 2004
Draft State Environmental Planning Policy No. 66 - Integration of Land Use and Transport
Draft State Environmental Planning Policy (Competition) 2010
Draft State Environmental Planning Policy 44 (Koala Habitat Protection) – Review
Draft State Environmental Planning Policy Remediation of Land

(c) The name of each development control plan that applies to the carrying out of development on the land.

Bega Valley Development Control Plan 2013

In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

## 2 Zoning and land use under relevant LEPs

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone:

(a) The identity of the zone

Zone R2 Low Density Residential

(b) The purposes for which the instrument provides that development may be carried out within the zone without the need for development consent

Environmental protection works; Home businesses; Home industries; Home occupations

(c)The purposes for which the instrument provides that development may not be carried out within the zone except with development consent

Bed and breakfast accommodation; Boarding houses; Boat launching ramps; Building identification signs; Business identification signs; Child care centres; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Exhibition homes; Exhibition villages; Group homes; Health consulting rooms; Hostels; Jetties; Neighbourhood shops; Places of public worship; Recreation areas; Respite day care centres; Roads; Semi-detached dwellings; Seniors housing; Water recreation structures; Wharf or boating facilities

(d) The purposes for which the instrument provides that development is prohibited within the zone

Any development not specified in item 2 b) or c)

(e) Are there any development standards applying for the land that fix minimum dimensions for the erection of a dwelling house on the land?

Yes, 550sqm. However, development consent may be not granted to the erection of a dwelling house on an unsewered allotment in the R2 Low Density Residential zone, R3 Medium Density Residential Zone, RU5 Village Zone or B4 Mixed Use Zone that is less than 2000sqm. See Clause 4.1A of the Bega Valley Local Environmental Plan 2013 for details.

(f) Does the land include or comprise critical habitat?

Council does not have any notification of where critical habitat is located within the Bega Valley Shire. Council is aware that a number of endangered species and endangered ecological communities do exist in the Shire. It is strongly recommended that the purchaser make their own enquiries with regard to critical habitat.

(g) Is the land in a conservation area?

No, the land is not in a conservation area.

(h) Is an item of environmental heritage situated on the land?

No, an item of environmental heritage is not situated on the land.

## 3 Complying development

Is the land, land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A(1)(c) to (e), (2), (3) and (4), 1.18(1)(c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*? If complying development may not be carried out on that land because of the provisions of clauses 1.17A(1)-(c) to (e), (2), (3) and (4), 1.18(1)(c3) and 1.19 of that Policy, what are the reasons why it may not be carried out?

(a) General Housing Code

Yes. Complying development under the General Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(b) Housing Alterations Code

Yes. Complying development under the Housing Internal Alterations Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(c) General Commercial and Industrial Code

Yes. Complying development under the General Commercial and Industrial Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(d) Subdivision Code

Yes. Complying development under the Subdivisions Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(e) Rural Housing Code

Yes. Complying development under the Rural Housing Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(f) General Development Code

Yes. Complying development under the General Development Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(g) Demolition Code

Yes. Complying development under the Demolition Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(h) Commercial and Industrial (New Buildings and Additions) Code

Yes. Complying development under the Commercial and Industrial (New Buildings and Alterations) Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

(i) Fire Safety Code

Yes. Complying development under the Fire Safety Code in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be carried out on this land.

## 4B Annual charges for coastal protection services under *Local Government Act 1993*

Has the owner (or any previous owner) of the land consented in writing to the land being subject to annual charges under section 496B of the *Local Government Act 1993* for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

Note. "Existing coastal protection works" are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of section 553B of the *Local Government Act 1993*.

No.

## 5 Mine subsidence

Is the land proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961*?

No, the land is not within an area proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

## 6 Road widening and road realignment

Is the land affected by any road widening or road realignment under:

(a) Division 2 of Part 3 of the *Roads Act 1993*, or

No

(b) any environmental planning instrument, or

No

(c) any resolution of the council?

No

## 7 Council and other public authority policies on hazard risk restrictions

(a) Is the land affected by a policy adopted by the council that restricts the development of the land because of the likelihood of:

(i) land slip

No

(ii) bushfire

No

(iii) tidal inundation

No

(iv) subsidence

No

(v) acid sulphate soils

No

(vi) coastal hazard

No

(vii) any other risk (other than flooding)
No

Note: The fact that the subject land has not been identified as being affected by a policy to restrict development because of the risks referred to does not mean that the risk is non-existent.

(b) Is the land affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council that restricts the development of the land because of the likelihood of:

(i) land slip

No

(ii) bushfire

No, the subject land is not bushfire prone land.

(iii) tidal inundation

No

(iv) subsidence

No

(v) acid sulphate soils

No

(vi) coastal hazard

No

(vii) any other risk (other than flooding)

No

Note: The fact that the subject land has not been identified as being affected by a policy to restrict development because of the risks referred to does not mean that the risk is non-existent.

## 7A Flood related development controls information

(a) Is development on the land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls?

No (However it is strongly recommended that the purchaser make their own enquiries in regard to flooding).

(b) Is development on that land or part of the land for any other purpose subject to flood related development controls?

No (However it is strongly recommended that the purchaser make their own enquiries in regard to flooding).

Note: Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006

## 8 Land reserved for acquisition

Does any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 make provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the *Environmental Planning and Assessment Act 1979*?

No, an environmental planning instrument or proposed environmental planning instrument referred to in clause 1 does not make provision in relation to the acquisition of the land by a public authority.

No, an environmental planning instrument or proposed environmental planning instrument referred to in clause 1 does not make provision in relation to the acquisition of the land by a public authority.

## 9 Contribution plans

**The name of each contribution plan applying to the land**

Bega Valley Section 94 & 94A Contribution Plan 2014
Bega Valley Shire Council Development Servicing Plan for Sewerage February 2013
Bega Valley Shire Council Development Servicing Plan for Water February 2013

Procedure 4.07.5 'Water Supply & Sewerage Section 64 Charges' applies to all vacant allotments and developed allotments within areas mapped in the current Bega Valley Water Supply and Sewer Development Servicing Plans. You can view this on Council's website at www.begavalley.nsw.gov.au under the heading Council and Infrastructure. As this lot may be affected by this Procedure, any prospective purchaser is strongly advised to read the document to be fully aware of its implications prior to purchase.

## 9A Biodiversity certified land

Is the land biodiversity certified land (within the meaning of Part 7AA of the *Threatened Species Conservation Act 1995*)?

No

## 10 Biodiversity stewardship sites

To the extent that the council has been notified by the Chief Executive of the Office of Environment and Heritage, is the land identified as a biodiversity stewardship site under Part 5 of the *Biodiversity Conservation Act 2016*?

No, the land is not affected by a biodiversity stewardship agreement under Biodiversity Conservation Act 2016, but only to the extent that Council has been notified by the Chief Executive of the Office of Environment and Heritage.

Note: Biodiversity stewardship agreements include biobanking agreements under Part 7A of the *Threatened Species Conservation Act 1995* that are taken to be biodiversity stewardship agreements under Part 5 the *Biodiversity Conservation Act 2016*.

## 10A Native vegetation clearing set asides

Has Council been notified whether the land contains as set aside area under section 60ZC of the *Local Land Services Act 2013*?

No

## 11 Bush fire prone land

Is any of the land bush fire prone land (as defined in the *Environmental Planning and Assessment Act 1979*)?

See question 7 (a)(ii) and (b)(ii)

## 12 Property vegetation plans

Has council been notified whether the land is land to which a property vegetation plan under the *Native Vegetation Act 2003* applies to the land?

No, Council has not been notified of the existence of a property vegetation plan.

## 13 Orders under Trees (Disputes Between Neighbours) Act 2006

Has council been notified whether an order has been made under the *Trees (Disputes Between Neighbours) Act 2006* to carry out work in relation to a tree on the land?

No, Council has not been notified of an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

## 14 Directions under Part 3A

Is there a direction by the Minister in force under section 75P (2) (c1) of the *Environmental Planning and Assessment Act 1979* that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the *Environmental Planning and Assessment Act 1979* does not have effect?

No, Council is not aware of a direction by the Minister that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Environmental Planning and Assessment Act 1979 does not have effect.

## 15 Site compatibility certificates and conditions for seniors housing

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

Has a current site compatibility certificate (seniors housing), of which the council is aware, been issued under clause 25 of *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* in respect of proposed development on the land?

No, Council is not aware of a current site compatibility statement being issued.

## 16 Site compatibility certificates for infrastructure, schools or TAFE establishments

Has a valid site compatibility certificate (infrastructure) or site compatibility certificate (schools or TAFE establishments), of which the council is aware, in respect of proposed development on the land?

No, Council is not aware of a current site compatibility statement being issued

## 17 Site compatibility certificates and conditions for affordable rental housing

Has a current site compatibility certificate (affordable rental housing), of which the council is aware, been issued under clause 17 (1) or 38 (1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* in respect of proposed development on the land?

No, Council is not aware of a current site compatibility statement being issued

## 18 Paper subdivision information

(1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

No

(2) The date of any subdivision order that applies to the land.

No

(3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.

No

## 19 Site verification certificates

Has a current site verification certificate of which the council is aware, been issued under clause Division 3 of Part 4AA of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 in respect of the land?

No

## 20 Loose-fill asbestos insulation

Bega Valley Shire Council has been identified as a local government area where some residential homes may contain loose-fill asbestos insulation, for example in the roof space. NSW Fair Trading maintains a Register of homes that are affected by loose-fill asbestos insulation.

You should make your own enquiries as to the age of the buildings on the land to which this certificate relates and, if it contains a building constructed prior to 1980, Council strongly recommends that any potential purchaser obtain advice from a licenced asbestos assessor to determine whether loose-fill asbestos is present in any building on the land and, if so, the health risks (if any) this may pose for the buildings occupants.

Contact NSW Fair Trading for further information.

## 21 Affected building notices and building product rectification orders

(1) Is there any affected building notice of which Council is aware that is in force in respect of the land?

No, Council is not aware of any affected building notice in force in respect of the land.

(2) Is there any building product rectification order of which Council is aware that is in force in respect of the land and has not been fully complied with?

No, Council is not aware of any building product rectification order in force in respect of the land.

**Note:**
Affected building notice has the same meaning as Part 4 of the *Building Products (Safety) Act 2017*.

Building product rectification order has the same meaning as Part 4 of the *Building Products (Safety) Act 2017*.

## NOTE:

Note: The following matters are prescribed by section 59 (2) of the Contaminated Land Management Act 1997:

(a) Is the land (or part of the land) significantly contaminated land with the meaning of the Contaminated Land Management Act 1997 at the date of this certificate?

No

(b) Is the land subject to a management order within the meaning of the Contaminated Land Management Act 1997 at the date of this certificate?

No

(c) Is the land the subject of an approved voluntary management proposal with the meaning of the Contaminated Land Management Act 1997 at the date of this certificate?

No

(d) Is the land subject to an ongoing maintenance order with the meaning of the Contaminated Land Management Act 1997 at the date of this certificate?

No

(e) Is the land subject of a site audit statement that has been provided to the Council within the meaning of the Contaminated Land Management Act 1997 at the date of this certificate?

No

## CAUTION:

The absence of any reference to a matter affecting the land shall not imply that the land is not affected by that matter not referenced in this certificate.

Information provided under section 10.7(2) is in accordance with the matters prescribed under schedule 4 of the *Environmental Planning and Assessment Regulation 2000* and is provided only to the extent that the Council has been notified by the Department of Planning and Environment.

Should any additional information be required, please contact Council's Customer Service and Administration section to obtain the procedure and cost of the relevant development or planning enquiry.

Purchasers of rural land become responsible for control of any weeds or invasive species and may wish to negotiate the cost of controlling any existing infestations with the vendor. Prospective purchasers of rural land should seek an inspection and report by way of separate application to Council's Biosecurity and Invasive Species Section. A fee for this service is applicable and available through Council's Fees and Charges schedule.

bega valley shire council

PO Box 492, Bega NSW 2550
P. (02) 6499 2222
F. (02) 6499 2200
E. council@begavalley.nsw.gov.au

ABN. 26 987 935 332
DX. 4904 Bega

# Planning certificate under Section 10.7(5) Environmental Planning and Assessment Act 1979

**Applicant:** R Hulak
3/68 Alfred Street
MILSONS POINT NSW 2061

| | | | |
|---|---|---|---|
| **Certificate No:** | 19511 | **Receipt No:** | 1373380 |
| **Certificate Date:** | 07/06/2019 | **Applicant's Ref:** | |

| | | | |
|---|---|---|---|
| **Property:** | 1 McKee Drive BEGA 2550 | | |
| **Description:** | Lot: 2 DP: 1243054 | **Parcel No:** | 42558 |

In accordance with the requirements of section 10.7(5) of the *Environmental Planning and Assessment Act 1979*, the following prescribed matters relate to the land at the date of this certificate.

## 1 Is the land affected by Council's preservation of trees or vegetation provisions?

Yes, see Clause 5.6 of the Bega Valley Development Control Plan 2013. Clause 5.6 applies to land zoned RU5, R2, R3, R5, B1, B2, B4, IN1, IN2, SP2, SP3, RE1, RE2, E2, E3 and E4.

## 2 The following development consent has been granted by Council within the previous five years.

Development Applications
01/08/2018 - Development Applications APPROVAL 2018/188 Educational Facility - TAFE Connected Learning Centre

Complying Developments

None

10.7 (5) certificate

### 3 Has any development consent with respect to the subject land been granted by the Minister for Planning?

No

### 4 Does any order under the Heritage Act 1977 affect the land?

No

### 5 Does the subject land contain land that is classified as being steep? That is, it has a gradient of equal or greater than 15% or 7.5°.

No

### 6 Does the subject land fall within an extractive industry buffer?

No

### CAUTION:

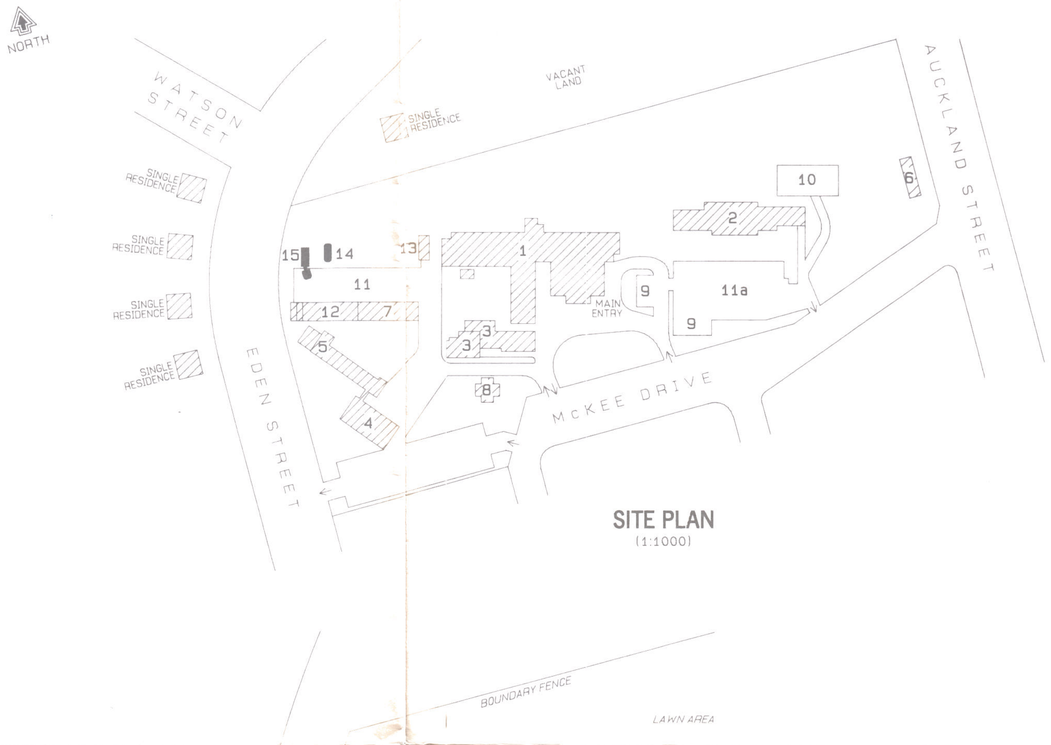
The absence of any reference to a matter affecting the land shall not imply that the land is not affected by that matter not referenced in this certificate.

When advice in accordance with Section 10.7(5) of the *Environmental Planning and Assessment Act 1979*, (the Act) is requested the Council is under no obligation to furnish any advice. If advice is provided, Council draws your attention to section 149(6) and section 145B of the Act which have the effect that the Council shall not incur any liability in respect of advice provided in good faith pursuant to section 10.7(5), including the furnishing of advice in respect of contaminated land.

Should any additional information be required, please contact Council's Customer Service and Administration section to obtain the procedure and cost of the relevant development or planning enquiry.

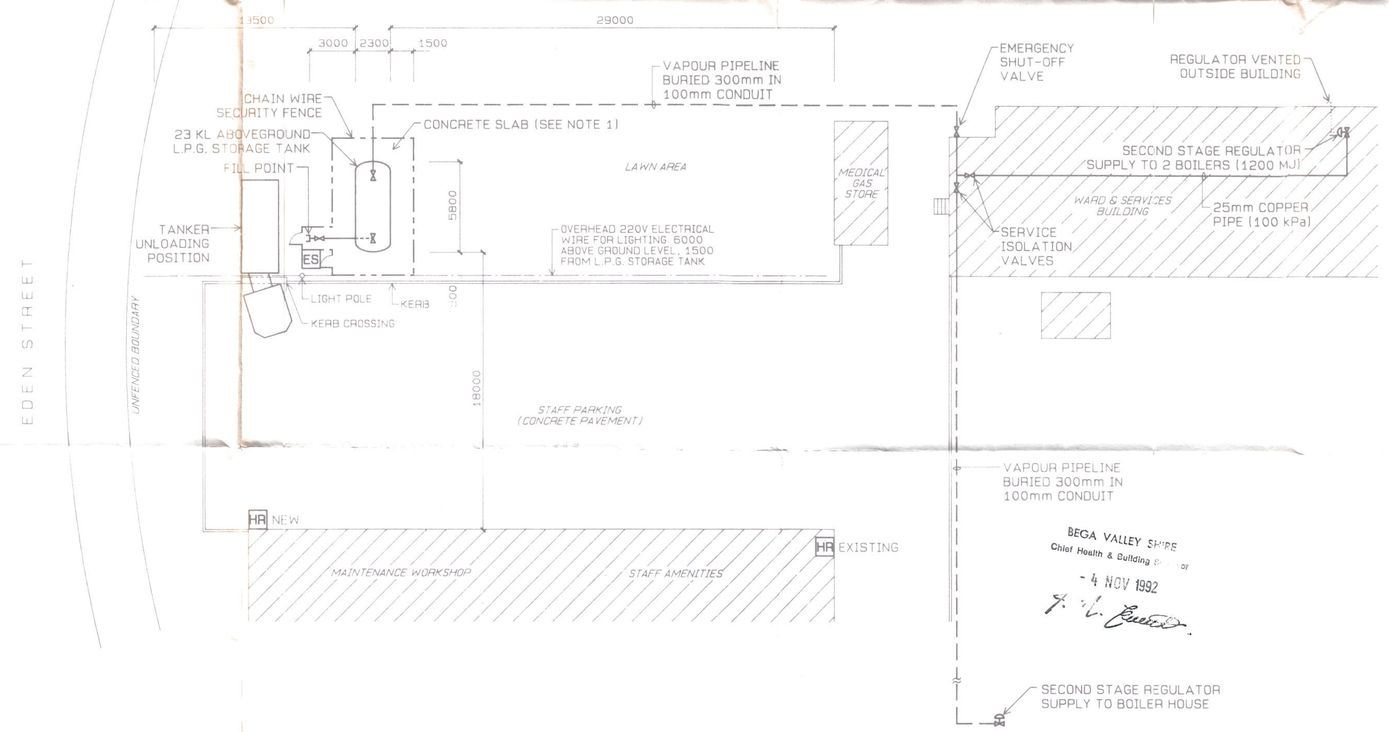
THIS DRAWING AND THE COPYRIGHT THEREIN ARE THE PROPERTY OF ELGAS AND ALL INFORMATION WHICH IT CONTAINS IS CONFIDENTIAL. THE DRAWING MUST NOT BE REPRODUCED OR DISCLOSED, NOR MUST ANY INFORMATION TAKEN THEREFROM BE DISCLOSED WITHOUT THE PRIOR CONSENT OF ELGAS.

DO NOT SCALE DRG – IF IN DOUBT – ASK




SITE PLAN
(1:1000)

| SITE PLAN – LEGEND | |
|---|---|
| 1 | Ward & Services Building |
| 2 | Community Health Centre |
| 3 | Laundry/Boiler House |
| 4 | Physiotherapy, Pathology, Pharmacy & Day Care |
| 5 | Specialist Clinics & Stores |
| 6 | Career Medical Officers Cottage |
| 7 | Staff Amenities |
| 8 | Mortuary |
| 9 | Doctor Parking |
| 10 | Resident Staff Parking |
| 11 | Staff Parking |
| 11A | Visitor Parking Only |
| 12 | Maintenance Workshop |
| 13 | Medical Gas Store |
| 14 | 23kl L.P.G. Storage Tank |
| 15 | Tanker Unloading Position |




ENLARGED DETAIL
(Scale 1:200)

BEGA VALLEY SHIRE
Chief Health & Building Surveyor
- 4 NOV 1992

| No. | Revision | Date |
|---|---|---|
| | | |

BEGA VALLEY SHIRE
Chief Health & Building Surveyor
- 4 NOV 1992

NOTES

1. CONCRETE PLINTH – GRADE 25 MPA WITH A 28 DAY CURE OR 40 MPA WITH A 7 DAY CURE. REINFORCED – F72 MESH TOP AND BOTTOM WITH 50MM COVER.
2. THIS DRAWING HAS BEEN PREPARED IN ACCORDANCE WITH AS1596–1989, AND DANGEROUS GOODS REGULATION 1978.

LEGEND

ES EMERGENCY STOP BUTTON

HR FIRE HOSE REEL

This plan conforms with the Dangerous Goods Act NSW 1975 and Austr Standard AS 1596 signed for Elgas Limited.
Date 27/10/92

This is to certify that this drawing complies with current NSW regulations.
Drawing Number: ELG-A1-0166
Register Number: 514
Installation Details: 23KL LPG/LP SERVICE
Contractors Authority Number: A 2243
Date: 27/10/92
Signed:
ELGAS

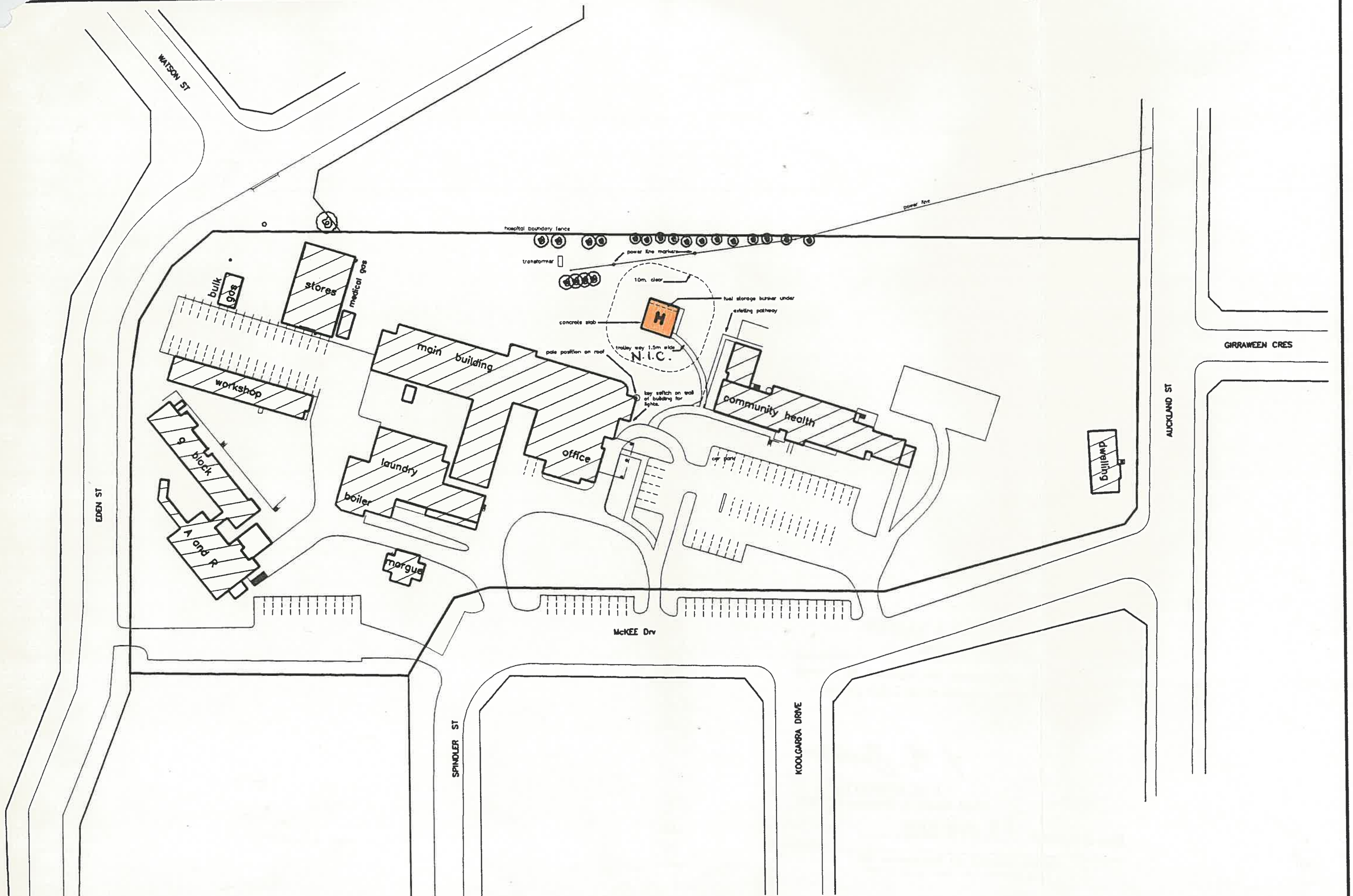
Project
BEGA DISTRICT HOSPITAL,
McKEE DRIVE,
BEGA, 2550.

ELGAS

| Scale | Date |
|---|---|
| AS SHOWN | OCT. 22, 1992 |
| Drawn by: L.J. DRAFTING | Prepared for: A. PERACH |
| Checked: A. PERACH | Approved: A. PERACH |

Drawing Title
23KL ABOVEGROUND L.P.G. STORAGE TANK INSTALLATION

| Drawing No. | Rev. |
|---|---|
| ELG-A1-0166 | |




# BEGA DISTRICT HOSPITAL

PLAN BY K.L & C.M GORDON - DRAFTING SERVICE
PO BOX 320 BEGA 2550 - PHONE (064)921723 AND MERIMBULA (064)951044

N

SCALE: METRES 0 10 20 30

helipad site plan

D:\BDH\SITE

| ISSUE A | DATUM: ASSUMED |
|---|---|
| DRAWN S.L.G. | DRAWING No 2763.H |
| DATE 2/95 | |
| PLOT DATE. 14/03/95 | |

# **Appendix G** – Engineering Borehole Logs and Explanatory Notes

# SOIL DESCRIPTION

**GHD**
Specialist Services in Geotechnical Engineering, Geology, Field/Laboratory Testing and Hydrogeology
www.ghd.com/global/services/geotechnical/

This procedure involves the description of a soil in terms of its visual and tactile properties, and relates to both laboratory samples and field exposures as applicable. A detailed soil profile description, in association with local geology and experience, will facilitate the initial (and often complete) site assessment for engineering purposes.

The method involves an evaluation of each of the items listed below and is in general agreement with both Australian Standard AS 1726 (the Site Investigation Code) and ASTM D2487 and D2488.

## MOISTURE

The moisture condition of the soil is most applicable for cohesive soils as a precursor to the assessment of consistency and workability. The moisture condition is described as:-

***Dry*** (dusty, dry to the touch) ***Slightly Moist*** ***Moist*** (damp, no visible water) ***Very Moist*** or ***Wet*** (visible free water, saturated condition)

In addition, the presence of any seepage or free water is noted on the testhole logs.

## COLOUR

Colour is important for correlation of data between testholes and during subsequent excavation operations. The prominent colour is noted, followed by (spotted, mottled, streaked etc.) then secondary colours as applicable. Colour is usually described at as-received moisture condition, though both wet and dry colours may also be appropriate.

## CONSISTENCY / DENSITY INDEX

This assessment is based on the effort required to penetrate and/or mould the soil, and is an indicator of shear strength.

Granular soils are generally described in terms of density index as listed in AS 1726. These soils are inherently difficult to assess and normally a penetration test procedure (SPT, DCP or CPT) is used in conjunction with published correlations. Alternatively, in-situ density tests can be conducted in association with minimum and maximum densities performed in the laboratory.

| Term | Symbol | Density Index (%) |
|---|---|---|
| Very Loose | VL | < 15 |
| Loose | L | 15 - 35 |
| Medium Dense | MD | 35 - 65 |
| Dense | D | 65 - 85 |
| Very Dense | VD | >85 |

Cohesive soils can be assessed by direct measurement (shear vane, CPT etc), or estimated approximately by tactile means and/or the aid of a geological pick as given on the following table. It is emphasised that a “design shear strength” must take cognisance of the mode of testing and the in-situ moisture content with the possible variations of moisture with time.

| Term | Symbol | Tactile Properties | Undrained Strength $S_u$ (kPa) |
|---|---|---|---|
| Very Soft | VS | Extrudes between fingers when squeezed in hand | <12 |
| Soft | S | Easily penetrated by thumb about 30-40 mm. Pick head can be pushed in up to shaft. | 12-25 |
| Firm | F | Penetrated by thumb 20-30mm with moderate effort. Sharp end of pick pushed in 30-40mm. | 25-50 |
| Stiff | St | Indented by thumb about 5mm with moderate effort. Pick pushed in up to 10mm. | 50-100 |
| Very Stiff | VSt | Readily indented by thumb nail. Slight indentation produced by pushing pick into soil. | 100-200 |
| Hard | H | Difficult to indent with thumb nail. Requires power tools for excavation. | >200 |

## STRUCTURE/OTHER FEATURES

The soil structure is generally applicable to cohesive soils and mainly refers to the presence or absence of joints and layering. Typical terms use are intact (no joints), fissured (closed joints), shattered (open joints), slickensided (polished joints indicative of movement), and stratified/laminated. In addition, the presence of other features (ferricrete nodules, timber inclusions) should also be noted as applicable.

For granular soils, an assessment of grading (well, uniform or poor), particle size (fine, medium etc.) and angularity and shape may also be given.

## SOIL TYPE

The soil is described in terms of its estimated grain size composition and the tactile behaviour (plasticity of any fines (less than *0.06 mm)). This system does not differentiate on grading below 0.06 mm, in accordance with the Unified Soil Classification (USC) procedure.

However, in some situations a soil can exhibit different characteristics between the undisturbed and disturbed/remolded condition (eg. ‘sand’ sized particles which break down a clay). The Soil Type generally relates to the latter state but the former condition should be noted where applicable.

Furthermore, as most natural soils frequently are combinations of various constituents, the primary soil is described and modified by minor components. In brief, the system is as follows:-

| Coarse Grained Soils | | Fine Grained Soils | |
|---|---|---|---|
| % Fines | Modifier | % Coarse | Modifier |
| <5 | omit, or use “trace” | <15 | omit, or use “trace” |
| 5-12 | describe as “with clay/silt” as applicable | 15-30 | described as “with sand/gravel” as applicable |
| >12 | prefix soil as “silty/clayey” as applicable | >30 | prefix soil as “sandy/gravelly” as applicable |

(*The 200# sieve (0.075 mm) is commonly used in practice to differentiate between fine and coarse grained soils).

Note: For soils containing both sand and gravel the minor coarse fraction is omitted if less than 15%, or described as “with sand/gravel” as applicable when greater than 15%.

The appropriate USC symbol may also be given after the soil type description in accordance with ASTM D2487 and D2488.

## ORIGIN

An attempt is made, where possible, to assess origin (transported, residual, pedogenic, or fill etc.) since this assists in the judgement of probable engineering behaviour. This assessment is generally restricted to field logging activities. An interpretation of landform is a useful guide to the origin of transported soils (e.g. colluvium, talus, slide debris, slope wash, alluvium, lacustrine, estuarine, aeolian and littoral deposits) while local geology and remnant fabric will assist identification of residual soils.

Ref: DS6.5.1.1 Issue 1.7 Date: 13/03/2012

# ROCK DESCRIPTION

**GHD**
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www.ghd.com/global/services/geotechnical/

This method is based on Australian Standard AS 1726 and is orientated to the field logging of diamond drill core, but may be used for the profiling of natural exposures and cuttings, as applicable. The procedure involves a visual and tactile assessment of the rock mass and the nature of defects within it in order to facilitate a prediction of engineering behaviour.

*DESCRIPTION:* Rock Type is described on the basis of origin (sedimentary, metamorphic and igneous) with the common types listed below:-

| Sedimentary | | | | Metamorphic | Igneous | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Clastic** | **Non clastic (chemical)** | **Non clastic (organic)** | **Pyroclastic** | | | **Acid** | **Intermediate** | | **Basic** |
| Conglomerate<br>Sandstone<br>Siltstone<br>Shale<br>Claystone | Limestone<br>Chert<br>Gypsum<br>Salt | Coal<br>Some<br>Limestone | Tuff<br>Agglomerate<br>Volcanic<br>Breccia | Slate<br>Phyllite<br>Schist<br>Quartzite<br>Gneiss | Extrusive | Rhyolite | Trachyte | Andesite | Basalt |
| | | | | | Intrusive (medium grained) | Quartz Porphyry | Porphyry | Porphyrite | Dolerite |
| | | | | | (coarse grained) | Granite | Syenite | Diorite | Gabbro |

Colour is given to assist in rock identification and the interpolation of field data. Colour is usually described at as-received moisture condition, though both wet and dry colours may also be appropriate.

Texture refers to the degree of crystallinity and granularity (grain size) and the fabric relationship between the constituents of a rock. Often only grain size is given for simplified descriptions of certain sedimentary rocks.

Structure and texture are commonly used synonymously in describing rocks since there is no clear delineation between terms. In general, structure refers to large-scale features recognisable in the field (banding, lineation, massive, porphyritic, schistose etc.). For sedimentary rocks in particular, the thickness of sedimentary layering (bedding) is described as:-

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinly laminated | <6mm | very thinly bedded | 20-60mm | medium bedded | 0.2-0.6m | very thickly bedded | >2m |
| Laminated | 6-20mm | thinly bedded | 60-200mm | thickly bedded | 0.6-2m | | |

In addition, mineral composition, hardness, alteration, cementation is given as applicable.

*WEATHERING*: The assignment of weathering is somewhat subjective. Weathering assists identification and does not imply engineering behaviour. No distinction is drawn between chemical weathering and alteration for most engineering purposes. These procedures are collectively described as "weathering" using the following terms which do not describe the related strength change. This system is general, and in this format may not apply to all rock types. Carbonate rocks generally do not conform to this classification.

| Term | Symbol | Definition |
|---|---|---|
| Completely Weathered | CW | Residual soil with rock fabric not visible. |
| Extremely Weathered | EW | The rock exhibits soil-like properties though the texture of the original rock is still evident. |
| Highly Weathered | HW | Limonite staining or colour change affects the whole of the rock mass and other signs of chemical or physical decomposition are evident. |
| Moderately Weathered | MW | Staining extends throughout the whole of the rock mass and the original colour is no longer recognisable. |
| Slightly Weathered | SW | Partial staining or discolouration of the rock mass, usually by limonite, has taken place. |
| Fresh | Fr | Rock mass unaffected by weathering. |

*ESTIMATED STRENGTH*: This refers to the strength of the rock substance and not that of the rock mass. The strength of the rock substance is estimated by the Point Load Strength Index $I_S(50)$ and refers to the strength measured in the direction normal to the bedding for sedimentary rocks. A field guide is given below:-

| Term | Symbol | $I_S(50)$ MPa | Field Guide (The core refers to a 150mm long x 50mm dia. sample) |
|---|---|---|---|
| Extremely Low | EL | <0.03 | Remoulded by hand to a material with soil properties. |
| Very Low | VL | 0.03-0.1 | May be crumbled in the hand. Sandstone is "sugary" and friable. |
| Low | L | 0.1-0.3 | The core may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling. |
| Medium | M | 0.3-1.0 | The core may be broken by hand with considerable difficulty. Readily scored with knife. |
| High | H | 1-3 | The core cannot be broken by unaided hands, can be slightly scratched or scored with knife. |
| Very High | VH | 3-10 | The core may be broken readily with hand held hammer. Cannot be scratched with knife. |
| Extremely High | EH | >10 | The core is difficult to break with hand held hammer. Rings when struck with a hammer. |

*DEFECTS*: This important feature can control the overall engineering behaviour of a rock mass. All types of natural fractures across which the core is discontinuous are noted. These fractures include bedding plane partings, joints and other defects but exclude artificial fractures such as drilling breaks. The nature of the defects (joints, bedding partings, seams, zones and veins) is also noted with description, orientation, infilling or coating, shape, roughness, thickness, etc. given generally in accordance with AS 1726. The spacing of natural fractures excludes bedding partings unless there is evidence that they were separated prior to drilling. This notwithstanding, bedding partings maybe considered as planes of weakness in an engineering assessment.

Ref: DS6.5.2.1 Issue 1.7 Date: 13/03/2012

# CORE LOG SHEET NOTES

**GHD**
Specialist Services in Geotechnical Engineering,
Geology, Field/Laboratory Testing and Hydrogeology
www.ghd.com/global/services/geotechnical/

The intention of Core Log Sheets is to present factual information measured from the core or as recorded in the field. Some interpretative information is inevitable in the location of core loss, description of weathering and identification of drilling induced fractures. This should be noted in the use of Core Log Sheets and remembered in their utilisation.

**DRILLING AND CASING**

The types of drilling used to advance the drill hole are recorded for relevant intervals. The types of drilling may include: NMLC coring, NQTT (NQ triple tube wire line), HW, HX, NW and NX casing, wash boring (tri-cone roller bit, TC drag bit, TC blade bit), or auger drilling (V-bit, TC drag bit).

The relevant progress is shown by abbreviated dates in the column.

**WATER**

Water lost or water made during drilling is recorded and subsequent readings of water levels in the borehole or piezometers are recorded here with dates of observation.

**DRILL DEPTH AND CORE LOSS**

Drilling intervals are shown by depth increments and horizontal marker lines. Core loss is measured as a percentage of the drill run. If the location of the core loss is known or strongly suspected, it is shown in a region of the column bounded by dashed horizontal lines. If unknown, core loss is assigned to the bottom of a coring run.

**SAMPLES AND FIELD TESTS**

The location of samples taken for testing or the location of field tests are indicated by the appropriate symbol from the GLOSSARY OF SYMBOLS Standard Sheet (or as applicable for the project) and are shown at the relevant location or over the relevant depth interval.

**DEPTH (RL)**

Changes in rock types or the locations of piezometer tips, samples, test intervals or other depths are shown as appropriate in terms of depth from the hole collar or in terms of RL.

For inclined holes the depths shown on the log refer to the drilled length along the borehole. The RL, where used, is the only transformed reference to true vertical depth.

**STRATA**

Rock types are presented graphically using the symbols shown on the GLOSSARY OF SYMBOLS Standard Sheet or as assigned for the project.

**DESCRIPTION**

The rock type is described in accordance with the ROCK DESCRIPTION Standard Sheet.

**WEATHERING**

Weathering is described, by code letters, in accordance with the ROCK DESCRIPTION Standard Sheet. A weathering term or range of terms is usually assigned to various strata.

It is noted, however, that the assignment of a term of weathering is subjective and is normally used for identification and does not imply engineering behaviour (such behaviour being controlled principally by rock substances strength and defect frequency - collectively, rock mass strength). Consequently, boundaries are often not shown and weathering may even not be reported where potentially misleading.

**ESTIMATED STRENGTH**

The strength of the rock substance is estimated by a combination of Point Load testing and tactile appraisal in accordance with the ROCK DESCRIPTION Standard Sheet. The estimated strength is presented in a histogram form. Both axial and diametric point load test results can be presented using the symbols on the GLOSSARY OF SYMBOLS Standard Sheet and the variation between axial and diametric values is indicative of anisotropy or fissility of the rock unit.

**NATURAL FRACTURES**

The identification of natural fractures requires an endeavour to exclude drilling induced breaks in the core and, as such, can be somewhat subjective. Natural fractures exist prior to coring the rock, whereas artificial fractures occur either during coring, during placing core in the core boxes, or during examination or transportation, or core after being boxed.

The log of Natural Fractures is presented as a combination of Fracture Spacing, Visual and Description columns. Coding is presented on the GLOSSARY OF SYMBOLS Standard Sheet.

**ROCK QUALITY DESIGNATION (RQD) INDEX OPTION**

The Core Log Sheet has an optional field column to record the RQD index. For certain projects, such as tunnelling or underground mining investigations, rock mass ratings or classifications can be required as part of the design process. The Rock Quality Designation (RQD) Index forms a component of these rock mass ratings and provides a quantitative estimate of rock mass quality from rock core logs. The core must be a minimum of 54.7mm diameter (although NMLC-sized core is probably OK) for derivation of an RQD index.

The RQD index is expressed as a percentage of intact rock core (excludes extremely weathered rock/residual soil) greater than 100 mm in length over the total selected core length. The total selected core length should be based on identifiable engineering geological domain characteristics. Should this not be practicable, RQD can be measured on a per run basis.

Ref: DS6.2.1 Issue 1.6 Date: 13/03/2012

**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH01

**SHEET 1 OF 3**

**Position :** 753657.5 E 5936769.3 N MGA94 | **Surface RL:** 32.61m | **Angle from Horiz. :** 90° | **Processed :** HAL

**Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ

**Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | **Logged by :** CCQ | **Date:** 26/8/2019

| DRILLING | | | | | MATERIAL | | | | | | Note: * indicates signatures on original issue of log or last revision of log |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| 0 | TC-bit auger | Nil | ▽ 16/7/19, @4:50pm | E<br>E<br>SPT 7/10/9 N=19<br>E<br>SPT 8/10/13 N=23<br>SPT 14/23/ 20 for 100mm N=ref | | | - | FILL: Clayey SAND/Sandy CLAY: dark brown, low plasticity, fine grained, with some silt, trace fine, sub-rounded gravel (fill/topsoil?). | <Wp/ D | MD/ F | No odour/ACM<br>No foreign materials<br>No staining<br>0.0-0.1m, PID=0.7ppm<br>0.3-0.5m, PID=0.8ppm<br>BS=0.0-0.2 (A)<br>BS=1.0-1.5 (A)<br>BS=0.0-0.5 (B+C) |
| 1 | | | | | 1.00 | | GP | Sandy GRAVEL: orange/brown, fine, sub-angular to sub-rounded, medium to coarse grained sand, gravel appears to be decomposed granodiorite, with / trace clay (XW Granodiorite). | D/ M | MD | XW Granodiorite<br>1.1-1.45m, PID=0.9ppm |
| 2 | | | | | | | | ~2.0m, becoming brown/green orange mottled.<br>~2.1m, clay content increases to gravelly clay. | | | 2.0-2.45m, PID=0.4ppm<br>2.2m, PP>400kPa<br>2.25m, PP>400kPa |
| 3 | | | | | | | | 3.0m, becoming pink, distinct granodiorite appearance in soil fabric, pink with black (biotite), quartz gravel. | | D/ VD | SPT Bouncing 3.0-3.4m, PID=0.4ppm |
| 4 | | | | | | | | ~4.0-5.0m, moisture increase, clay content also increased. | | | |
| 5 | | | | | | | | | | | |

**See standard sheets for details of abbreviations & basis of descriptions**

**GHD**
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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

**Job No.** 23-16678

**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH01

**SHEET 2 OF 3**

| | | | | |
|---|---|---|---|---|
| **Position :** 753657.5 E 5936769.3 N MGA94 | **Surface RL:** 32.61m | **Angle from Horiz. :** 90° | | **Processed :** HAL |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

| DRILLING | | | | | MATERIAL | | | | | | Note: * indicates signatures on original issue of log or last revision of log |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| 6 | TC-bit auger | Nil | ▶ | SPT 17/ 31 for 150mm N=ref | | | GP | Sandy GRAVEL: as previous. | D/ M | D/ VD | |
| | | | | | | | | 5.3m, becoming orange with pale yellow banding, quartz gravel, sub-angular to sub-rounded. | | | |
| | | | | | | | | From 5.5m, becoming clayey gravel. | W | | SPT Bouncing 5.5-5.8m, PID=0.8ppm |
| | | | | | 6.70 | | | End of borehole at 6.70 metres.<br>TC-Bit Refusal | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

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**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH02

**SHEET 1 OF 4**

| | | | | |
|---|---|---|---|---|
| **Position :** 753687.8 E 5936770.5 N MGA94 | **Surface RL:** 34.80m | **Angle from Horiz. :** 90° | | **Processed :** HAL |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

| DRILLING | | | | | MATERIAL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| | | | | | | | | [COBBLES/BOULDERS/FILL/TOPSOIL] then SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin) and ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | | | Note: * indicates signatures on original issue of log or last revision of log |
| 0 | TC-bit auger | Casing | | E<br>BS | | | - | FILL: Sandy CLAY: dark brown, low plasticity, fine to medium grained sand, with sub-rounded to rounded gravel (fill/topsoil?).<br>From 0.2m, becoming brown/orange, with trace white mottles. | <Wp | F/ Fb | No odour/ACM<br>No foreign materials<br>No staining<br>0.0-0.2m, PID=2.7ppm |
| | | | | | 0.50 | | CL | Sandy CLAY: brown with white mottles, low plasticity, fine grained sand (residual). | <Wp | Fb | 0.5-0.8m, PID=2.0ppm |
| 1 | | | | E | 1.00 | | GP | Sandy GRAVEL: pale red/orange white mottles, fine to medium, sub-angular to sub-rounded, fine grained sand (XW Granodiorite). | M | MD | XW Granodiorite<br>1.15-1.45m, PID=1.2ppm |
| | | | | SPT 7/9/3 N=17 | | | | | | | |
| 2 | | | | | | | | From 2.0m, trace of clay, pale red/orange, white mottled. | | | 2.15-2.45m, PID=1.2ppm |
| | | | | SPT 7/18/21 N=39 | | | | 2.45m, distinct granodiorite appearance in the soil fabric. | | MD/ D | At 2.5-2.6m, Slightly harder band |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | From 4.2m, becoming gravelly sand, dark grey mottled red/orange, medium to coarse grained, fine gravel, trace of low plasticity clay. | | | 4.2-4.45m, PID=1.2ppm |
| | | | | SPT 14/25/28 N=53 | | | | | | | |
| 5 | | | | | | | | | | | |

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**Job No.**
**23-16678**

**BOREHOLE LOG SHEET**

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH02

**SHEET 2 OF 4**

| | | | | |
|---|---|---|---|---|
| **Position :** 753687.8 E 5936770.5 N MGA94 | **Surface RL:** 34.80m | **Angle from Horiz. :** 90° | | **Processed :** HAL |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

| DRILLING | | | | | MATERIAL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Note: * indicates signatures on original issue of log or last revision of log<br>Comments/ Observations |
| 6 | TC-bit auger | Casing | ▽ 16/7/19 @4.50pm | | | | GP | Sandy GRAVEL: as previous.<br><br>~5.5-6.5m, clay content increased. | M | MD/ D | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | 8.2-9.0m, harder band. | | | |
| 9 | | | | | 9.70 | | | | | | |
| 10 | | | | | | | | Start of coring at 9.7 metres.<br>For cored interval, see Core Log Sheet. | | | |

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**Job No.** 23-16678

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**CORE LOG SHEET**

GEO_COREHOLE_VISUAL_AS1726 2017 23166678 BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH02

**SHEET 3 OF 4**

| | | | | | |
|---|---|---|---|---|---|
| **Position :** 753687.8 E 5936770.5 N MGA94 | **Surface RL:** 34.80m | **Angle from Horiz. :** 90° | **Processed :** HAL |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Casing Dia. :** NMLC | **Barrel (m) :** NMLC | **Bit :** Diamond | **Bit Condition :** N/A | **Date:** 26/8/2019 |
| **Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | **Logged by :** CCQ | **Date Logged :** 26/7/2019 | Note: * indicates signatures on original issue of log or last revision of log |

| DRILLING | | | | | | MATERIAL | | | | NATURAL FRACTURES | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Progress | | | | | | | | | | | | |
| SCALE (m) | Drilling & Casing | Water | Drill Depth (m) | (Core Loss / Run %) | RQD(%) /Samples/ Tests | Depth / (RL) metres | Graphic Log | **Description**<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, moisture, durability and [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin) | Weathering | **Estimated Strength $Is_{(50)}$ MPa**<br>●- Axial ○- Diametral<br>Soil 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH | **Spacing (mm)**<br>20 40 100 300 1000 | Visual | **Additional Data**<br>(joints, partings, seams, zones and veins)<br>Fracture type, orientation, infilling or coating, shape, roughness, other. |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | Start of coring at 9.7 metres.<br>For Non Cored interval, see Borehole Log Sheet. | | | | |
| | | | | | | 9.70 | | NO CORE: 1.3m (9.70-11.0m). | - | | | |
| 10 | | | | | | | | | | | | |

**See standard sheets for details of abbreviations & basis of descriptions**

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**Job No.**
**23-16678**

**CORE LOG SHEET**

GEO_COREHOLE_VISUAL_AS1726 2017 23166678 BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH02

**SHEET 4 OF 4**

| | | | | | |
|---|---|---|---|---|---|
| **Position :** 753687.8 E 5936770.5 N MGA94 | **Surface RL:** 34.80m | **Angle from Horiz. :** 90° | **Processed :** HAL |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Casing Dia. :** NMLC | **Barrel (m) :** NMLC | **Bit :** Diamond | **Bit Condition :** N/A | **Date:** 26/8/2019 |
| **Date Started :** 16/7/2019 | **Date Completed :** 16/7/2019 | **Logged by :** CCQ | **Date Logged :** 26/7/2019 | Note: * indicates signatures on original issue of log or last revision of log |

**DRILLING** | **MATERIAL** | **NATURAL FRACTURES**

**Progress**

SCALE (m) | Drilling & Casing | Water | Drill Depth (m) | (Core Loss / Run %) | RQD(%) /Samples/ Tests | Depth / (RL) metres | Graphic Log

**Description**
ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, moisture, durability and [COBBLES / BOULDERS / FILL / TOPSOIL] then SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)

Weathering | **Estimated Strength $Is_{(50)}$ MPa** (●- Axial, O- Diametral) Soil 0.03 VL 0.1 L 0.3 M 1 H 3 VH 10 EH

**Spacing (mm)** 20 40 100 300 1000 | Visual

**Additional Data**
(joints, partings, seams, zones and veins)
Fracture type, orientation, infilling or coating, shape, roughness, other.

| Depth | Description | Weathering | Additional Data |
|---|---|---|---|
| 10.40 | NO CORE: as previous. (0) (0) | - | |
| 11.00 | Sandy GRAVEL: brown, fine to coarse, sub-rounded to sub-angular, fine to coarse grained sand, trace clay (XW Granodiorite). (0) (0) | N/A | 11.0m, SM, Sandy GRAVEL, 400mm |
| 11.40 | NO CORE: 0.2m (11.40-11.60m). | - | |
| 11.60 | | | |
| 11.70 | Sandy GRAVEL: brown, fine to coarse, sub-rounded to sub-angular, fine to coarse grained sand (XW Granodiorite). | - | 11.65m, FZ, Rf, Fe |
| | GRANODIORITE: grey, massive. Aggressivity Test | HW-MW | 11.74m, Jt, 65°, Rf, Ir, Fe<br>11.79m, Jt, 60°, Rf, St, Fe<br>11.82m, Jt, 40°, Rf, Pln, Fe<br>11.88m, Jt, 15°, Rf, Pln, Fe<br>11.93m, Jt, 60°, Rf, Pln, Fe |
| 12.05 | GRANODIORITE: grey, massive, phaneritic texture, joint planes have iron staining. (10) (65) | SW | 12.09m, Jt, 10°, Rf, Pln, Fe<br>12.11m, Jt, 10°, Rf, Pln, Fe<br>12.18m, Jt, 10-15°, Rf, Pln, Fe<br>12.57m, Jt, 30°, Rf, Pln, Fe<br>13.18m, Jt, 35°, Rf, Pln, Cn |
| 13.40 | End of Borehole at 13.40 metres. Refusal of HW Granodiorite | | |

NMLC coring

11 12 13 14 15

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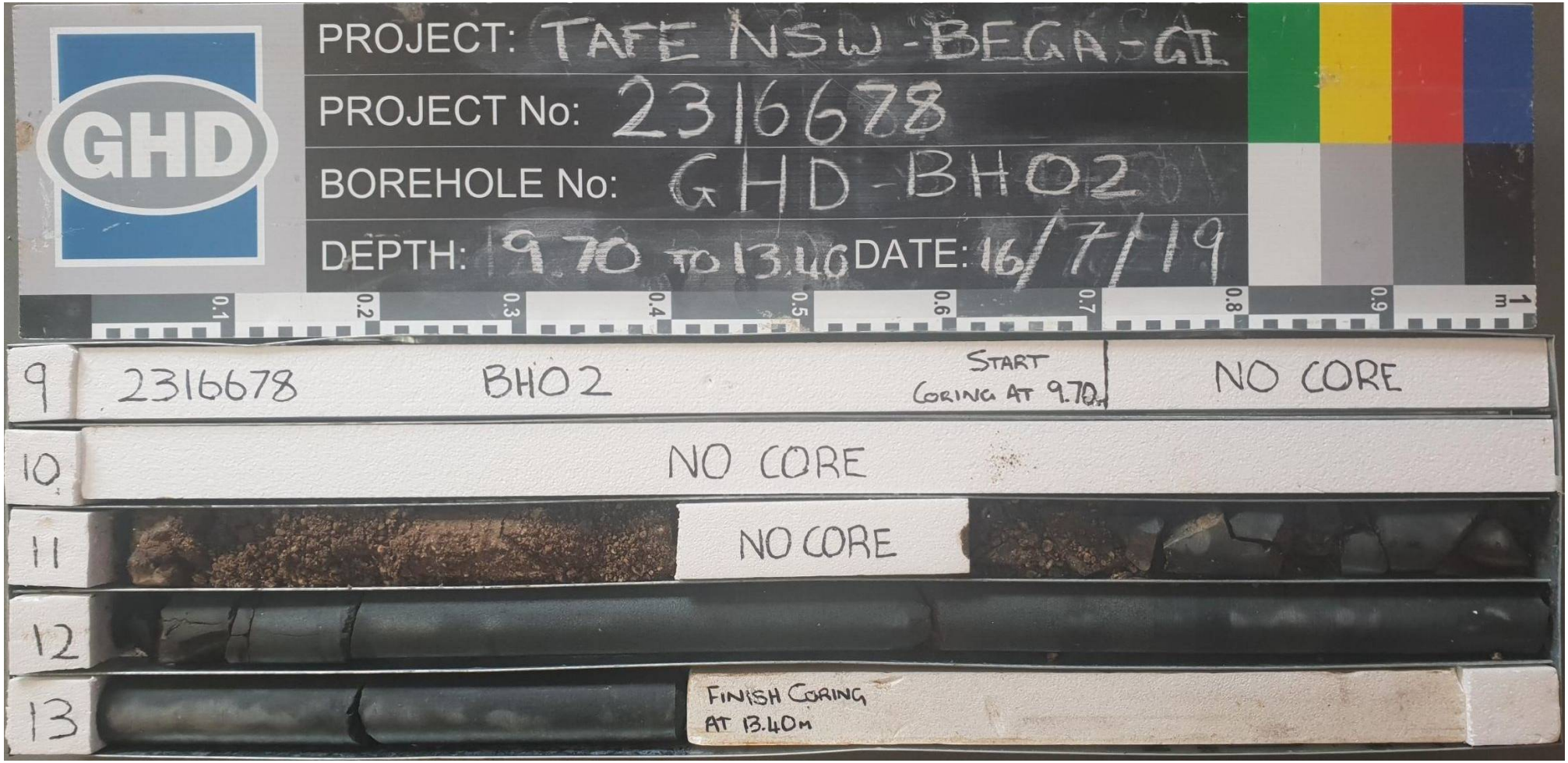


PointID : BH02 Depth Range: 9.70 - 13.40 m

| | | | |
|---|---|---|---|
| | TAFE NSW<br>PSI for Stage 2 Contamination and Geotechnical Investigation<br>No.1 McKee Drive Bega, NSW<br>Core Photograph | DRAWN HW / DATE 30/08/2019<br>CHECKED CCQ / DATE 30/08/2019<br>SCALE Not To Scale / A4<br>PROJECT No 23-16678 / FIGURE No BH02 1/1 | |

**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH03

**SHEET 1 OF 1**

| | | | | |
|---|---|---|---|---|
| **Position :** 753691.3 E 5936743.1 N MGA94 | **Surface RL:** 37.81m | **Angle from Horiz. :** 90° | | **Processed :** RCO |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 17/7/2019 | **Date Completed :** 17/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

| DRILLING | | | | | MATERIAL | | | | | | Note: * indicates signatures on original issue of log or last revision of log |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| 0 | TC-bit auger | Nil | Groundwater Not Encountered | E | | | - | FILL: Clayey SILT: dark brown, with some medium to coarse grained sand, fine, sub-angular gravel, rootlets (fill/topsoil?). | D | F | No odour/ACM<br>No foreign materials<br>No staining<br>0.0-0.2m,<br>PID=0.7ppm |
| | | | | | 0.40 | | SC | Clayey SAND: dark brown with white mottles, medium to coarse grained, low plasticity clay, trace fine gravel (residual). | D/M | MD/ Fb | 0.5-0.7m,<br>PID=0.7ppm |
| 1 | | | | E | | | | | | | |
| | | | | SPT 5/7/10 N=17 | 1.20 | | SC | Clayey SAND: brown/orange, medium to coarse grained, low plasticity clay, with fine, sub-rounded to sub-angular gravel, inconsistent white mottling (XW Granodiorite/Residual). | D/M | MD/ Fb | 1.1-1.23m,<br>PID=0.7ppm<br>XW Granodiorite/Residual<br>1.22-1.25m,<br>PID=0.7ppm |
| 2 | | | | SPT 10/15/20 N=35 | 2.45 | | | From 2.2m, distinct granodiorite appearance increase in fine gravel content (XW Granodiorite). | | | 2.15-2.45m,<br>PID=0.6ppm<br>XW Granodiorite |
| | | | | | | | | End of borehole at 2.45 metres.<br>Steady progress | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |

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**Job No.**
**23-16678**

**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH04

**SHEET 1 OF 1**

| | | | | |
|---|---|---|---|---|
| **Position :** 753649.6 E 5936738.6 N MGA94 | **Surface RL:** 38.41m | **Angle from Horiz. :** 90° | | **Processed :** RCO |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 17/7/2019 | **Date Completed :** 17/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

| DRILLING | | | | | MATERIAL | | | | | | Note: * indicates signatures on original issue of log or last revision of log |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| 1 | TC-bit auger | Nil | Groundwater Not Encountered | E<br>SPT 3/4/5 N=9 | | | SC | Clayey SAND: dark brown with white mottles, medium to coarse grained, low to medium plasticity clay, with fine, sub-angular gravel and silt, rootlets mainly in upper 2cm of soil profile (grass rootlets) (possible residual?). | M | MD/ Fb | No odour/ACM<br>No foreign materials<br>No staining<br>0.0-0.2m, PID=0.4ppm |
| | | | | | | | | At 0.8m, trace rootlets. | | | 0.75-0.95m, PID=0.3ppm |
| | | | | | 1.20 | | CL/ SC | Sandy CLAY/Clayey SAND: dark brown with white mottles, low to medium plasticity clay, medium to coarse grained sand, trace gravel (XW Granodiorite). | <Mp/ M | Fb/ VSt/ H | XW Granodiorite |
| 2 | | | | SPT 4/5/7 N=12 | 2.00 | | | End of borehole at 2.00 metres.<br>Refusal on possible rock. Possible boulder? | | MD | 1.75-1.95m, PID=0.3ppm<br>1.9m, PP>400kPa |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |

**See standard sheets for details of abbreviations & basis of descriptions**

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**BOREHOLE LOG SHEET**

GEO_BOREHOLE_AS1726 2017 23166678_BEGA PSI.GPJ GHD_GEO_TEMPLATE 2.00.GDT 2/9/19

**Client :** TAFE NSW

**Project :** PSI for Stage 2 Contamination and Geotechnical Investigation

**Location :** No.1 McKee Drive, Bega, NSW

# HOLE No. BH05

**SHEET 1 OF 1**

| | | | | |
|---|---|---|---|---|
| **Position :** 753669.8 E 5936777.9 N MGA94 | **Surface RL:** 32.18m | **Angle from Horiz. :** 90° | | **Processed :** MAG |
| **Rig Type :** Gemco 210 SD | **Mounting:** Trailer | **Contractor :** Sea to Summit | **Driller :** Jim Sheather | **Checked :** CCQ |
| **Date Started :** 17/7/2019 | **Date Completed :** 17/7/2019 | | **Logged by :** CCQ | **Date:** 26/8/2019 |

Note: * indicates signatures on original issue of log or last revision of log

| DRILLING | | | | | MATERIAL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL] then<br>SOIL NAME: colour, plasticity / primary particle characteristics, secondary and minor components, zoning (origin)<br>and<br>ROCK NAME: grain size, colour, fabric and texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/ Observations |
| 0 | TC-bit auger | Nil | | E | | | - | FILL: Clayey GRAVEL: brown, fine to coarse, low plasticity clay, with sand (fill).<br>Some gravel appeared to be of basalt origin. | M | MD | No odour/ACM<br>No foregin materials<br>No staining<br>0.0-0.2m, PID=0.3ppm<br>Trace ash gravel at surface<br>0.1-0.2m, PID=0.7ppm |
| | | | | SPT 3/5/7 N=12 | 0.50 | | ML | Clayey SILT: dark brown, with fine grained sand (possible residual?). | <Wp | VSt | 0.8-0.95m, PID=0.6ppm |
| 1 | | | | | 1.50 | | CH | Sandy CLAY: brown-orange, green, white mottled, high plasticity, with fine, sub-angular gravel (XW Granodiorite/Residual). | <Wp | VSt/ H | XW Granodiorite<br>1.6m, PP=360kPa<br>1.7m, PP=490kPa<br>1.7-1.95m, PID=0.3ppm<br>1.8m, PP=430kPa |
| | | | | SPT 3/4/6 N=10 | | | | | | | |
| 2 | | | 17/7/19 | | 2.40 | | | | >Wp | | |
| | | | | SPT 9/16/21 N=37 | | | SP | Gravelly SAND: red, brown, slightly mottled, fine to coarse grained, gravel appears to be quartz, fine, sub-angular, with clay (XW Granodiorite). | M | D | XW Granodiorite<br>2.6-2.95m, PID=1.3ppm |
| 3 | | | | | 2.95 | | | End of borehole at 2.95 metres.<br>Target Depth | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |

**See standard sheets for details of abbreviations & basis of descriptions**

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

**Job No.**
**23-16678**

# **Appendix H** – Calibration Certificates

## PID Calibration Certificate

**Instrument** **PhoCheck Tiger**
**Serial No.** **T-113989**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

| Item | Test | Pass | Comments | | | |
|---|---|---|---|---|---|---|
| Battery | Charge Condition | ✓ | | | | |
| | Fuses | ✓ | | | | |
| | Capacity | ✓ | | | | |
| | Recharge OK? | ✓ | | | | |
| Switch/keypad | Operation | ✓ | | | | |
| Display | Intensity | ✓ | | | | |
| | Operation (segments) | ✓ | | | | |
| Grill Filter | Condition | ✓ | | | | |
| | Seal | ✓ | | | | |
| Pump | Operation | ✓ | | | | |
| | Filter | ✓ | | | | |
| | Flow | ✓ | | | | |
| | Valves, Diaphragm | ✓ | | | | |
| PCB | Condition | ✓ | | | | |
| Connectors | Condition | ✓ | | | | |
| Sensor | PID | ✓ | 10.6ev | | | |
| | | | | | | |
| Alarms | Beeper | ✓ | Low | High | TWA | STEL |
| | Settings | ✓ | 50ppm | 100ppm | N/A | N/A |
| Software | Version | ✓ | | | | |
| Data logger | Operation | ✓ | | | | |
| Download | Operation | ✓ | | | | |
| Other tests: | | | | | | |

## *Certificate of Calibration*

This is to certify that the above instrument has been calibrated to the following specifications:

| Sensor | Serial no | Calibration gas and concentration | Certified | Gas bottle No | | Instrument Reading |
|---|---|---|---|---|---|---|
| PID Lamp | | 92ppm Isobutylene | NATA | SY245 | | 92.6ppm |

***Calibrated by:*** K.Boardman **Kylie Boardman**

***Calibration date:*** **11/07/2019**

***Next calibration due:*** **7/01/2020**

# **Appendix I** – Laboratory Results (Chemical)

**GHD Pty Ltd WOLLONGONG**
**Level 3, 200 Crown St**
**Wollongong**
**NSW 2500**

**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.

**Attention:** **Daniel Deen**

**Report** **666751-S**
Project name PSI FOR CONTAMINATION
Project ID 2316678
Received Date Jul 19, 2019

| **Client Sample ID** | | | **BH01_0.0-0.1** | **BH01_0.3-0.5** | **BH02_0.0-0.2** | **BH02_0.5-0.8** |
|---|---|---|---|---|---|---|
| **Sample Matrix** | | | **Soil** | **Soil** | **Soil** | **Soil** |
| **Eurofins Sample No.** | | | **S19-Jl27375** | **S19-Jl27376** | **S19-Jl27377** | **S19-Jl27378** |
| **Date Sampled** | | | **Jul 16, 2019** | **Jul 16, 2019** | **Jul 16, 2019** | **Jul 16, 2019** |
| Test/Reference | LOR | Unit | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | |
| Naphthalene[N02] | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| TRH C6-C10 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C6-C10 less BTEX (F1)[N04] | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH >C10-C16 | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |
| TRH >C10-C16 less Naphthalene (F2)[N01] | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |
| TRH >C16-C34 | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| TRH >C34-C40 | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| TRH >C10-C40 (total)* | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | |
| TRH C6-C9 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C10-C14 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C15-C28 | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |
| TRH C29-C36 | 50 | mg/kg | 77 | < 50 | < 50 | < 50 |
| TRH C10-36 (Total) | 50 | mg/kg | 77 | < 50 | < 50 | < 50 |
| **BTEX** | | | | | | |
| Benzene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Toluene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Ethylbenzene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| m&p-Xylenes | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| o-Xylene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Xylenes - Total | 0.3 | mg/kg | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| 4-Bromofluorobenzene (surr.) | 1 | % | 92 | 112 | 90 | 76 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Benzo(a)pyrene TEQ (lower bound) * | 0.5 | mg/kg | 1.0 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(a)pyrene TEQ (medium bound) * | 0.5 | mg/kg | 1.3 | 0.6 | 0.6 | 0.6 |
| Benzo(a)pyrene TEQ (upper bound) * | 0.5 | mg/kg | 1.6 | 1.2 | 1.2 | 1.2 |
| Acenaphthene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Acenaphthylene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benz(a)anthracene | 0.5 | mg/kg | 0.7 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(a)pyrene | 0.5 | mg/kg | 0.8 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(b&j)fluoranthene[N07] | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(g.h.i)perylene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(k)fluoranthene | 0.5 | mg/kg | 0.6 | < 0.5 | < 0.5 | < 0.5 |
| Chrysene | 0.5 | mg/kg | 0.7 | < 0.5 | < 0.5 | < 0.5 |

| Client Sample ID | | | BH01_0.0-0.1 | BH01_0.3-0.5 | BH02_0.0-0.2 | BH02_0.5-0.8 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27375 | S19-Jl27376 | S19-Jl27377 | S19-Jl27378 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Dibenz(a.h)anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Fluoranthene | 0.5 | mg/kg | 1.3 | < 0.5 | < 0.5 | < 0.5 |
| Fluorene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Indeno(1.2.3-cd)pyrene | 0.5 | mg/kg | 0.6 | < 0.5 | < 0.5 | < 0.5 |
| Naphthalene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Phenanthrene | 0.5 | mg/kg | 0.6 | < 0.5 | < 0.5 | < 0.5 |
| Pyrene | 0.5 | mg/kg | 1.3 | < 0.5 | < 0.5 | < 0.5 |
| Total PAH* | 0.5 | mg/kg | 6.6 | < 0.5 | < 0.5 | < 0.5 |
| 2-Fluorobiphenyl (surr.) | 1 | % | 69 | 92 | 91 | 112 |
| p-Terphenyl-d14 (surr.) | 1 | % | 90 | 96 | 107 | 129 |
| **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 | 0.05 | mg/kg | < 0.05 | - | - | - |
| 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 | < 0.1 | - | - | - |
| Vic EPA IWRG 621 Other OCP (Total)* | 0.1 | mg/kg | < 0.1 | - | - | - |
| Dibutylchlorendate (surr.) | 1 | % | 102 | - | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | 71 | - | - | - |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Bolstar | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorfenvinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorpyrifos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorpyrifos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Coumaphos | 2 | mg/kg | < 2 | - | - | - |
| Demeton-S | 0.2 | mg/kg | < 0.2 | - | - | - |
| Demeton-O | 0.2 | mg/kg | < 0.2 | - | - | - |
| Diazinon | 0.2 | mg/kg | < 0.2 | - | - | - |
| Dichlorvos | 0.2 | mg/kg | < 0.2 | - | - | - |

| Client Sample ID | | | BH01_0.0-0.1 | BH01_0.3-0.5 | BH02_0.0-0.2 | BH02_0.5-0.8 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27375 | S19-Jl27376 | S19-Jl27377 | S19-Jl27378 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organophosphorus Pesticides** | | | | | | |
| Dimethoate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Disulfoton | 0.2 | mg/kg | < 0.2 | - | - | - |
| EPN | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethoprop | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethyl parathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fenitrothion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fensulfothion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fenthion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Malathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Merphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Methyl parathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Mevinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Monocrotophos | 2 | mg/kg | < 2 | - | - | - |
| Naled | 0.2 | mg/kg | < 0.2 | - | - | - |
| Omethoate | 2 | mg/kg | < 2 | - | - | - |
| Phorate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Pirimiphos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Pyrazophos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ronnel | 0.2 | mg/kg | < 0.2 | - | - | - |
| Terbufos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Tetrachlorvinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Tokuthion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Trichloronate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Triphenylphosphate (surr.) | 1 | % | 113 | - | - | - |
| **Polychlorinated Biphenyls** | | | | | | |
| Aroclor-1016 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1221 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1232 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1242 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1248 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1254 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Aroclor-1260 | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Total PCB* | 0.1 | mg/kg | < 0.1 | - | - | < 0.1 |
| Dibutylchlorendate (surr.) | 1 | % | 102 | - | - | 72 |
| Tetrachloro-m-xylene (surr.) | 1 | % | 71 | - | - | 114 |
| **Heavy Metals** | | | | | | |
| Arsenic | 2 | mg/kg | 2.1 | < 2 | 2.3 | - |
| Cadmium | 0.4 | mg/kg | < 0.4 | < 0.4 | < 0.4 | - |
| Chromium | 5 | mg/kg | 25 | 15 | 44 | - |
| Copper | 5 | mg/kg | 12 | < 5 | 15 | - |
| Lead | 5 | mg/kg | 56 | 14 | 20 | - |
| Mercury | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | - |
| Nickel | 5 | mg/kg | 14 | < 5 | 21 | - |
| Zinc | 5 | mg/kg | 100 | 16 | 80 | - |
| | | | | | | |
| % Moisture | 1 | % | 5.0 | 7.3 | 11 | 9.1 |

| Client Sample ID | | | BH02_4.2-4.5 | BH03_0.0-0.2 | BH03_0.5-0.7 | BH04_0.0-0.2 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27379 | S19-Jl27380 | S19-Jl27381 | S19-Jl27382 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 17, 2019 | Jul 17, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | |
| Naphthalene[N02] | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| TRH C6-C10 | 20 | mg/kg | - | < 20 | - | < 20 |
| TRH C6-C10 less BTEX (F1)[N04] | 20 | mg/kg | - | < 20 | - | < 20 |
| TRH >C10-C16 | 50 | mg/kg | - | < 50 | - | < 50 |
| TRH >C10-C16 less Naphthalene (F2)[N01] | 50 | mg/kg | - | < 50 | - | < 50 |
| TRH >C16-C34 | 100 | mg/kg | - | 110 | - | 100 |
| TRH >C34-C40 | 100 | mg/kg | - | < 100 | - | < 100 |
| TRH >C10-C40 (total)* | 100 | mg/kg | - | 110 | - | 100 |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | |
| TRH C6-C9 | 20 | mg/kg | - | < 20 | - | < 20 |
| TRH C10-C14 | 20 | mg/kg | - | < 20 | - | < 20 |
| TRH C15-C28 | 50 | mg/kg | - | < 50 | - | < 50 |
| TRH C29-C36 | 50 | mg/kg | - | 110 | - | 81 |
| TRH C10-36 (Total) | 50 | mg/kg | - | 110 | - | 81 |
| **BTEX** | | | | | | |
| Benzene | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Toluene | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Ethylbenzene | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| m&p-Xylenes | 0.2 | mg/kg | - | < 0.2 | - | < 0.2 |
| o-Xylene | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Xylenes - Total | 0.3 | mg/kg | - | < 0.3 | - | < 0.3 |
| 4-Bromofluorobenzene (surr.) | 1 | % | - | 124 | - | 101 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Benzo(a)pyrene TEQ (lower bound) * | 0.5 | mg/kg | - | 0.8 | - | 0.5 |
| Benzo(a)pyrene TEQ (medium bound) * | 0.5 | mg/kg | - | 1.1 | - | 0.9 |
| Benzo(a)pyrene TEQ (upper bound) * | 0.5 | mg/kg | - | 1.4 | - | 1.2 |
| Acenaphthene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Acenaphthylene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Anthracene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Benz(a)anthracene | 0.5 | mg/kg | - | 0.6 | - | < 0.5 |
| Benzo(a)pyrene | 0.5 | mg/kg | - | 0.6 | - | 0.5 |
| Benzo(b&j)fluoranthene[N07] | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Benzo(g.h.i)perylene | 0.5 | mg/kg | - | 0.6 | - | < 0.5 |
| Benzo(k)fluoranthene | 0.5 | mg/kg | - | 0.6 | - | < 0.5 |
| Chrysene | 0.5 | mg/kg | - | 0.6 | - | < 0.5 |
| Dibenz(a.h)anthracene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Fluoranthene | 0.5 | mg/kg | - | 1.0 | - | 0.9 |
| Fluorene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Indeno(1.2.3-cd)pyrene | 0.5 | mg/kg | - | 0.7 | - | < 0.5 |
| Naphthalene | 0.5 | mg/kg | - | < 0.5 | - | < 0.5 |
| Phenanthrene | 0.5 | mg/kg | - | < 0.5 | - | 0.5 |
| Pyrene | 0.5 | mg/kg | - | 1.1 | - | 0.9 |
| Total PAH* | 0.5 | mg/kg | - | 5.8 | - | 2.8 |
| 2-Fluorobiphenyl (surr.) | 1 | % | - | 107 | - | 105 |
| p-Terphenyl-d14 (surr.) | 1 | % | - | 129 | - | 133 |

| Client Sample ID | | | BH02_4.2-4.5 | BH03_0.0-0.2 | BH03_0.5-0.7 | BH04_0.0-0.2 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27379 | S19-Jl27380 | S19-Jl27381 | S19-Jl27382 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 17, 2019 | Jul 17, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **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 | 0.05 | mg/kg | - | - | - | < 0.05 |
| 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 | - | - | - | < 0.1 |
| Vic EPA IWRG 621 Other OCP (Total)* | 0.1 | mg/kg | - | - | - | < 0.1 |
| Dibutylchlorendate (surr.) | 1 | % | - | - | - | 95 |
| Tetrachloro-m-xylene (surr.) | 1 | % | - | - | - | 113 |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos-methyl | 0.2 | mg/kg | - | - | - | < 0.2 |
| Bolstar | 0.2 | mg/kg | - | - | - | < 0.2 |
| Chlorfenvinphos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Chlorpyrifos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Chlorpyrifos-methyl | 0.2 | mg/kg | - | - | - | < 0.2 |
| Coumaphos | 2 | mg/kg | - | - | - | < 2 |
| Demeton-S | 0.2 | mg/kg | - | - | - | < 0.2 |
| Demeton-O | 0.2 | mg/kg | - | - | - | < 0.2 |
| Diazinon | 0.2 | mg/kg | - | - | - | < 0.2 |
| Dichlorvos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Dimethoate | 0.2 | mg/kg | - | - | - | < 0.2 |
| Disulfoton | 0.2 | mg/kg | - | - | - | < 0.2 |
| EPN | 0.2 | mg/kg | - | - | - | < 0.2 |
| Ethion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Ethoprop | 0.2 | mg/kg | - | - | - | < 0.2 |
| Ethyl parathion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Fenitrothion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Fensulfothion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Fenthion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Malathion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Merphos | 0.2 | mg/kg | - | - | - | < 0.2 |

| Client Sample ID | | | BH02_4.2-4.5 | BH03_0.0-0.2 | BH03_0.5-0.7 | BH04_0.0-0.2 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27379 | S19-Jl27380 | S19-Jl27381 | S19-Jl27382 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 17, 2019 | Jul 17, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organophosphorus Pesticides** | | | | | | |
| Methyl parathion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Mevinphos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Monocrotophos | 2 | mg/kg | - | - | - | < 2 |
| Naled | 0.2 | mg/kg | - | - | - | < 0.2 |
| Omethoate | 2 | mg/kg | - | - | - | < 2 |
| Phorate | 0.2 | mg/kg | - | - | - | < 0.2 |
| Pirimiphos-methyl | 0.2 | mg/kg | - | - | - | < 0.2 |
| Pyrazophos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Ronnel | 0.2 | mg/kg | - | - | - | < 0.2 |
| Terbufos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Tetrachlorvinphos | 0.2 | mg/kg | - | - | - | < 0.2 |
| Tokuthion | 0.2 | mg/kg | - | - | - | < 0.2 |
| Trichloronate | 0.2 | mg/kg | - | - | - | < 0.2 |
| Triphenylphosphate (surr.) | 1 | % | - | - | - | 77 |
| **Polychlorinated Biphenyls** | | | | | | |
| Aroclor-1016 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1221 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1232 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1242 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1248 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1254 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Aroclor-1260 | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Total PCB* | 0.1 | mg/kg | - | < 0.1 | - | < 0.1 |
| Dibutylchlorendate (surr.) | 1 | % | - | 83 | - | 95 |
| Tetrachloro-m-xylene (surr.) | 1 | % | - | 110 | - | 113 |
| **Heavy Metals** | | | | | | |
| Arsenic | 2 | mg/kg | 2.4 | < 2 | < 2 | < 2 |
| Cadmium | 0.4 | mg/kg | < 0.4 | < 0.4 | < 0.4 | < 0.4 |
| Chromium | 5 | mg/kg | 32 | 15 | 34 | 27 |
| Copper | 5 | mg/kg | 35 | 5.3 | 5.4 | 5.4 |
| Lead | 5 | mg/kg | < 5 | 24 | 5.6 | 22 |
| Mercury | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Nickel | 5 | mg/kg | 16 | 5.5 | 13 | 10 |
| Zinc | 5 | mg/kg | 46 | 35 | 30 | 48 |
| | | | | | | |
| % Moisture | 1 | % | 7.5 | 13 | 9.6 | 6.1 |

| Client Sample ID | | | BH05_0.0-0.2 | BH05_0.8-0.95 | SS01_0.0-0.1 | SS02_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27383 | S19-Jl27384 | S19-Jl27385 | S19-Jl27386 |
| Date Sampled | | | Jul 17, 2019 | Jul 17, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | |
| Naphthalene[N02] | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| TRH C6-C10 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C6-C10 less BTEX (F1)[N04] | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH >C10-C16 | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |
| TRH >C10-C16 less Naphthalene (F2)[N01] | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |

| Client Sample ID | | | BH05_0.0-0.2 | BH05_0.8-0.95 | SS01_0.0-0.1 | SS02_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27383 | S19-Jl27384 | S19-Jl27385 | S19-Jl27386 |
| Date Sampled | | | Jul 17, 2019 | Jul 17, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | |
| TRH >C16-C34 | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| TRH >C34-C40 | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| TRH >C10-C40 (total)* | 100 | mg/kg | < 100 | < 100 | < 100 | < 100 |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | |
| TRH C6-C9 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C10-C14 | 20 | mg/kg | < 20 | < 20 | < 20 | < 20 |
| TRH C15-C28 | 50 | mg/kg | < 50 | < 50 | < 50 | < 50 |
| TRH C29-C36 | 50 | mg/kg | < 50 | < 50 | < 50 | 88 |
| TRH C10-36 (Total) | 50 | mg/kg | < 50 | < 50 | < 50 | 88 |
| **BTEX** | | | | | | |
| Benzene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Toluene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Ethylbenzene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| m&p-Xylenes | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| o-Xylene | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Xylenes - Total | 0.3 | mg/kg | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| 4-Bromofluorobenzene (surr.) | 1 | % | 140 | 81 | 93 | 113 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Benzo(a)pyrene TEQ (lower bound) * | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(a)pyrene TEQ (medium bound) * | 0.5 | mg/kg | 0.6 | 0.6 | 0.6 | 0.6 |
| Benzo(a)pyrene TEQ (upper bound) * | 0.5 | mg/kg | 1.2 | 1.2 | 1.2 | 1.2 |
| Acenaphthene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Acenaphthylene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benz(a)anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(a)pyrene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(b&j)fluoranthene[N07] | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(g.h.i)perylene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Benzo(k)fluoranthene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Chrysene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Dibenz(a.h)anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Fluoranthene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Fluorene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Indeno(1.2.3-cd)pyrene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Naphthalene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Phenanthrene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pyrene | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Total PAH* | 0.5 | mg/kg | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 2-Fluorobiphenyl (surr.) | 1 | % | 114 | 86 | 86 | 81 |
| p-Terphenyl-d14 (surr.) | 1 | % | 141 | 92 | 97 | 83 |
| **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 | - | - | - |

| Client Sample ID | | | BH05_0.0-0.2 | BH05_0.8-0.95 | SS01_0.0-0.1 | SS02_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27383 | S19-Jl27384 | S19-Jl27385 | S19-Jl27386 |
| Date Sampled | | | Jul 17, 2019 | Jul 17, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organochlorine Pesticides** | | | | | | |
| 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 | 0.05 | mg/kg | < 0.05 | - | - | - |
| 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 | < 0.1 | - | - | - |
| Vic EPA IWRG 621 Other OCP (Total)* | 0.1 | mg/kg | < 0.1 | - | - | - |
| Dibutylchlorendate (surr.) | 1 | % | 84 | - | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | 124 | - | - | - |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Bolstar | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorfenvinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorpyrifos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Chlorpyrifos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Coumaphos | 2 | mg/kg | < 2 | - | - | - |
| Demeton-S | 0.2 | mg/kg | < 0.2 | - | - | - |
| Demeton-O | 0.2 | mg/kg | < 0.2 | - | - | - |
| Diazinon | 0.2 | mg/kg | < 0.2 | - | - | - |
| Dichlorvos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Dimethoate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Disulfoton | 0.2 | mg/kg | < 0.2 | - | - | - |
| EPN | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethoprop | 0.2 | mg/kg | < 0.2 | - | - | - |
| Ethyl parathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fenitrothion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fensulfothion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Fenthion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Malathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Merphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Methyl parathion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Mevinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Monocrotophos | 2 | mg/kg | < 2 | - | - | - |
| Naled | 0.2 | mg/kg | < 0.2 | - | - | - |
| Omethoate | 2 | mg/kg | < 2 | - | - | - |
| Phorate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Pirimiphos-methyl | 0.2 | mg/kg | < 0.2 | - | - | - |
| Pyrazophos | 0.2 | mg/kg | < 0.2 | - | - | - |

| Client Sample ID | | | BH05_0.0-0.2 | BH05_0.8-0.95 | SS01_0.0-0.1 | SS02_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27383 | S19-Jl27384 | S19-Jl27385 | S19-Jl27386 |
| Date Sampled | | | Jul 17, 2019 | Jul 17, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organophosphorus Pesticides** | | | | | | |
| Ronnel | 0.2 | mg/kg | < 0.2 | - | - | - |
| Terbufos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Tetrachlorvinphos | 0.2 | mg/kg | < 0.2 | - | - | - |
| Tokuthion | 0.2 | mg/kg | < 0.2 | - | - | - |
| Trichloronate | 0.2 | mg/kg | < 0.2 | - | - | - |
| Triphenylphosphate (surr.) | 1 | % | 125 | - | - | - |
| **Polychlorinated Biphenyls** | | | | | | |
| Aroclor-1016 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1221 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1232 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1242 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1248 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1254 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1260 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Total PCB* | 0.1 | mg/kg | < 0.1 | - | - | - |
| Dibutylchlorendate (surr.) | 1 | % | 84 | - | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | 124 | - | - | - |
| **Heavy Metals** | | | | | | |
| Arsenic | 2 | mg/kg | < 2 | < 2 | < 2 | - |
| Cadmium | 0.4 | mg/kg | < 0.4 | < 0.4 | < 0.4 | - |
| Chromium | 5 | mg/kg | 57 | 55 | 8.8 | - |
| Copper | 5 | mg/kg | 12 | 14 | 14 | - |
| Lead | 5 | mg/kg | 8.0 | 6.6 | 7.3 | - |
| Mercury | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | - |
| Nickel | 5 | mg/kg | 33 | 14 | 46 | - |
| Zinc | 5 | mg/kg | 100 | 31 | 21 | - |
| | | | | | | |
| % Moisture | 1 | % | 8.6 | 16 | 3.8 | 15 |

| Client Sample ID | | | SS03_0.0-0.1 | SS04_0.0-0.1 | SS05_0.0-0.1 | SS06_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27387 | S19-Jl27388 | S19-Jl27389 | S19-Jl27390 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **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 | - | - | - | 410 |
| TRH >C34-C40 | 100 | mg/kg | - | - | - | 390 |
| TRH >C10-C40 (total)* | 100 | mg/kg | - | - | - | 800 |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | |
| TRH C6-C9 | 20 | mg/kg | - | - | - | < 20 |
| TRH C10-C14 | 20 | mg/kg | - | - | - | < 20 |
| TRH C15-C28 | 50 | mg/kg | - | - | - | 210 |
| TRH C29-C36 | 50 | mg/kg | - | - | - | 370 |
| TRH C10-36 (Total) | 50 | mg/kg | - | - | - | 580 |

| Client Sample ID | | | SS03_0.0-0.1 | SS04_0.0-0.1 | SS05_0.0-0.1 | SS06_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27387 | S19-Jl27388 | S19-Jl27389 | S19-Jl27390 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 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 | % | - | - | - | 145 |
| **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 |
| 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 | % | - | - | - | 78 |
| p-Terphenyl-d14 (surr.) | 1 | % | - | - | - | 87 |
| **Organochlorine Pesticides** | | | | | | |
| Chlordanes - Total | 0.1 | mg/kg | 0.2 | < 0.1 | 0.3 | - |
| 4.4'-DDD | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| 4.4'-DDE | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| 4.4'-DDT | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| a-BHC | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Aldrin | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| b-BHC | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| d-BHC | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Dieldrin | 0.05 | mg/kg | 0.53 | < 0.05 | 0.21 | - |
| Endosulfan I | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Endosulfan II | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Endosulfan sulphate | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Endrin | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Endrin aldehyde | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Endrin ketone | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| g-BHC (Lindane) | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Heptachlor | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Heptachlor epoxide | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |

| Client Sample ID | | | SS03_0.0-0.1 | SS04_0.0-0.1 | SS05_0.0-0.1 | SS06_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27387 | S19-Jl27388 | S19-Jl27389 | S19-Jl27390 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organochlorine Pesticides** | | | | | | |
| Hexachlorobenzene | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Methoxychlor | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Toxaphene | 1 | mg/kg | < 1 | < 1 | < 1 | - |
| Aldrin and Dieldrin (Total)* | 0.05 | mg/kg | 0.53 | < 0.05 | 0.21 | - |
| DDT + DDE + DDD (Total)* | 0.05 | mg/kg | < 0.05 | < 0.05 | < 0.05 | - |
| Vic EPA IWRG 621 OCP (Total)* | 0.1 | mg/kg | 0.73 | < 0.1 | 0.51 | - |
| Vic EPA IWRG 621 Other OCP (Total)* | 0.1 | mg/kg | 0.2 | < 0.1 | 0.3 | - |
| Dibutylchlorendate (surr.) | 1 | % | 98 | 142 | 144 | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | 91 | 108 | 118 | - |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos-methyl | 0.2 | mg/kg | < 0.2 | < 0.2 | 0.3 | - |
| Bolstar | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Chlorfenvinphos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Chlorpyrifos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Chlorpyrifos-methyl | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Coumaphos | 2 | mg/kg | < 2 | < 2 | < 2 | - |
| Demeton-S | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Demeton-O | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Diazinon | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Dichlorvos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Dimethoate | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Disulfoton | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| EPN | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Ethion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Ethoprop | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Ethyl parathion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Fenitrothion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Fensulfothion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Fenthion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Malathion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Merphos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Methyl parathion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Mevinphos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Monocrotophos | 2 | mg/kg | < 2 | < 2 | < 2 | - |
| Naled | 0.2 | mg/kg | < 0.2 | < 0.2 | 0.6 | - |
| Omethoate | 2 | mg/kg | < 2 | < 2 | < 2 | - |
| Phorate | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Pirimiphos-methyl | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Pyrazophos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Ronnel | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Terbufos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Tetrachlorvinphos | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Tokuthion | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Trichloronate | 0.2 | mg/kg | < 0.2 | < 0.2 | < 0.2 | - |
| Triphenylphosphate (surr.) | 1 | % | 69 | 100 | 131 | - |

| Client Sample ID | | | SS03_0.0-0.1 | SS04_0.0-0.1 | SS05_0.0-0.1 | SS06_0.0-0.1 |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27387 | S19-Jl27388 | S19-Jl27389 | S19-Jl27390 |
| Date Sampled | | | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 | Jul 16, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Polychlorinated Biphenyls** | | | | | | |
| Aroclor-1016 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1221 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1232 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1242 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1248 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1254 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Aroclor-1260 | 0.1 | mg/kg | < 0.1 | - | - | - |
| Total PCB* | 0.1 | mg/kg | < 0.1 | - | - | - |
| Dibutylchlorendate (surr.) | 1 | % | 98 | - | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | 91 | - | - | - |
| **Heavy Metals** | | | | | | |
| Arsenic | 2 | mg/kg | 2.9 | 2.0 | < 2 | 4.0 |
| Cadmium | 0.4 | mg/kg | < 0.4 | < 0.4 | < 0.4 | < 0.4 |
| Chromium | 5 | mg/kg | 26 | 20 | 8.5 | 38 |
| Copper | 5 | mg/kg | 13 | 21 | 11 | 39 |
| Lead | 5 | mg/kg | 26 | 33 | 21 | 69 |
| Mercury | 0.1 | mg/kg | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Nickel | 5 | mg/kg | 14 | 9.8 | < 5 | 32 |
| Zinc | 5 | mg/kg | 97 | 1200 | 140 | 170 |
| | | | | | | |
| % Moisture | 1 | % | 3.5 | 16 | 34 | 7.9 |

| Client Sample ID | | | QC2 | QC3 | [R20]TRIP SPIKE | TRIP BLANK |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27391 | S19-Jl27392 | S19-Jl27393 | S19-Jl27394 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 08, 2019 | Jul 08, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | |
| Naphthalene[N02] | 0.5 | mg/kg | < 0.5 | < 0.5 | - | < 0.5 |
| TRH C6-C10 | 20 | mg/kg | < 20 | < 20 | - | < 20 |
| TRH C6-C10 less BTEX (F1)[N04] | 20 | mg/kg | < 20 | < 20 | - | < 20 |
| TRH >C10-C16 | 50 | mg/kg | < 50 | < 50 | - | - |
| TRH >C10-C16 less Naphthalene (F2)[N01] | 50 | mg/kg | < 50 | < 50 | - | - |
| TRH >C16-C34 | 100 | mg/kg | < 100 | < 100 | - | - |
| TRH >C34-C40 | 100 | mg/kg | < 100 | < 100 | - | - |
| TRH >C10-C40 (total)* | 100 | mg/kg | < 100 | < 100 | - | - |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | |
| TRH C6-C9 | 20 | mg/kg | < 20 | < 20 | - | < 20 |
| TRH C10-C14 | 20 | mg/kg | < 20 | < 20 | - | - |
| TRH C15-C28 | 50 | mg/kg | < 50 | < 50 | - | - |
| TRH C29-C36 | 50 | mg/kg | < 50 | < 50 | - | - |
| TRH C10-36 (Total) | 50 | mg/kg | < 50 | < 50 | - | - |
| **BTEX** | | | | | | |
| Benzene | 0.1 | mg/kg | < 0.1 | < 0.1 | 82 | < 0.1 |
| Toluene | 0.1 | mg/kg | < 0.1 | < 0.1 | 82 | < 0.1 |
| Ethylbenzene | 0.1 | mg/kg | < 0.1 | < 0.1 | 86 | < 0.1 |
| m&p-Xylenes | 0.2 | mg/kg | < 0.2 | < 0.2 | 93 | < 0.2 |
| o-Xylene | 0.1 | mg/kg | < 0.1 | < 0.1 | 95 | < 0.1 |

| Client Sample ID | | | QC2 | QC3 | [R20]TRIP SPIKE | TRIP BLANK |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27391 | S19-Jl27392 | S19-Jl27393 | S19-Jl27394 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 08, 2019 | Jul 08, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **BTEX** | | | | | | |
| Xylenes - Total | 0.3 | mg/kg | < 0.3 | < 0.3 | 94 | < 0.3 |
| 4-Bromofluorobenzene (surr.) | 1 | % | 94 | 104 | 102 | 56 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Benzo(a)pyrene TEQ (lower bound) * | 0.5 | mg/kg | < 0.5 | 0.7 | - | - |
| Benzo(a)pyrene TEQ (medium bound) * | 0.5 | mg/kg | 0.6 | 1.0 | - | - |
| Benzo(a)pyrene TEQ (upper bound) * | 0.5 | mg/kg | 1.2 | 1.3 | - | - |
| Acenaphthene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Acenaphthylene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Benz(a)anthracene | 0.5 | mg/kg | < 0.5 | 0.5 | - | - |
| Benzo(a)pyrene | 0.5 | mg/kg | < 0.5 | 0.6 | - | - |
| Benzo(b&j)fluoranthene[N07] | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Benzo(g.h.i)perylene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Benzo(k)fluoranthene | 0.5 | mg/kg | < 0.5 | 0.5 | - | - |
| Chrysene | 0.5 | mg/kg | < 0.5 | 0.5 | - | - |
| Dibenz(a.h)anthracene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Fluoranthene | 0.5 | mg/kg | < 0.5 | 0.9 | - | - |
| Fluorene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Indeno(1.2.3-cd)pyrene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Naphthalene | 0.5 | mg/kg | < 0.5 | < 0.5 | - | - |
| Phenanthrene | 0.5 | mg/kg | < 0.5 | 0.6 | - | - |
| Pyrene | 0.5 | mg/kg | < 0.5 | 1.0 | - | - |
| Total PAH* | 0.5 | mg/kg | < 0.5 | 4.6 | - | - |
| 2-Fluorobiphenyl (surr.) | 1 | % | 92 | 64 | - | - |
| p-Terphenyl-d14 (surr.) | 1 | % | 97 | 79 | - | - |
| **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 | 0.05 | mg/kg | - | < 0.05 | - | - |
| 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 | - | - |

| Client Sample ID | | | QC2 | QC3 | [R20]TRIP SPIKE | TRIP BLANK |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-Jl27391 | S19-Jl27392 | S19-Jl27393 | S19-Jl27394 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 08, 2019 | Jul 08, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Organochlorine Pesticides** | | | | | | |
| Vic EPA IWRG 621 OCP (Total)* | 0.1 | mg/kg | - | < 0.1 | - | - |
| Vic EPA IWRG 621 Other OCP (Total)* | 0.1 | mg/kg | - | < 0.1 | - | - |
| Dibutylchlorendate (surr.) | 1 | % | - | 106 | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | - | 133 | - | - |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos-methyl | 0.2 | mg/kg | - | < 0.2 | - | - |
| Bolstar | 0.2 | mg/kg | - | < 0.2 | - | - |
| Chlorfenvinphos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Chlorpyrifos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Chlorpyrifos-methyl | 0.2 | mg/kg | - | < 0.2 | - | - |
| Coumaphos | 2 | mg/kg | - | < 2 | - | - |
| Demeton-S | 0.2 | mg/kg | - | < 0.2 | - | - |
| Demeton-O | 0.2 | mg/kg | - | < 0.2 | - | - |
| Diazinon | 0.2 | mg/kg | - | < 0.2 | - | - |
| Dichlorvos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Dimethoate | 0.2 | mg/kg | - | < 0.2 | - | - |
| Disulfoton | 0.2 | mg/kg | - | < 0.2 | - | - |
| EPN | 0.2 | mg/kg | - | < 0.2 | - | - |
| Ethion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Ethoprop | 0.2 | mg/kg | - | < 0.2 | - | - |
| Ethyl parathion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Fenitrothion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Fensulfothion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Fenthion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Malathion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Merphos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Methyl parathion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Mevinphos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Monocrotophos | 2 | mg/kg | - | < 2 | - | - |
| Naled | 0.2 | mg/kg | - | < 0.2 | - | - |
| Omethoate | 2 | mg/kg | - | < 2 | - | - |
| Phorate | 0.2 | mg/kg | - | < 0.2 | - | - |
| Pirimiphos-methyl | 0.2 | mg/kg | - | < 0.2 | - | - |
| Pyrazophos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Ronnel | 0.2 | mg/kg | - | < 0.2 | - | - |
| Terbufos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Tetrachlorvinphos | 0.2 | mg/kg | - | < 0.2 | - | - |
| Tokuthion | 0.2 | mg/kg | - | < 0.2 | - | - |
| Trichloronate | 0.2 | mg/kg | - | < 0.2 | - | - |
| Triphenylphosphate (surr.) | 1 | % | - | 81 | - | - |
| **Polychlorinated Biphenyls** | | | | | | |
| Aroclor-1016 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1221 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1232 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1242 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1248 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1254 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Aroclor-1260 | 0.1 | mg/kg | - | < 0.1 | - | - |
| Total PCB* | 0.1 | mg/kg | - | < 0.1 | - | - |

| Client Sample ID | | | QC2 | QC3 | R20TRIP SPIKE | TRIP BLANK |
|---|---|---|---|---|---|---|
| Sample Matrix | | | Soil | Soil | Soil | Soil |
| Eurofins Sample No. | | | S19-JI27391 | S19-JI27392 | S19-JI27393 | S19-JI27394 |
| Date Sampled | | | Jul 16, 2019 | Jul 17, 2019 | Jul 08, 2019 | Jul 08, 2019 |
| Test/Reference | LOR | Unit | | | | |
| **Polychlorinated Biphenyls** | | | | | | |
| Dibutylchlorendate (surr.) | 1 | % | - | 106 | - | - |
| Tetrachloro-m-xylene (surr.) | 1 | % | - | 133 | - | - |
| **Heavy Metals** | | | | | | |
| Arsenic | 2 | mg/kg | < 2 | < 2 | - | - |
| Cadmium | 0.4 | mg/kg | < 0.4 | < 0.4 | - | - |
| Chromium | 5 | mg/kg | 8.4 | 27 | - | - |
| Copper | 5 | mg/kg | 12 | 5.2 | - | - |
| Lead | 5 | mg/kg | 7.0 | 28 | - | - |
| Mercury | 0.1 | mg/kg | < 0.1 | < 0.1 | - | - |
| Nickel | 5 | mg/kg | 43 | 11 | - | - |
| Zinc | 5 | mg/kg | 20 | 47 | - | - |
| | | | | | | |
| % Moisture | 1 | % | 4.0 | 6.3 | - | - |

## 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 (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

| Description | Testing Site | Extracted | Holding Time |
|---|---|---|---|
| Total Recoverable Hydrocarbons - 2013 NEPM Fractions | Melbourne | Jul 23, 2019 | 14 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Total Recoverable Hydrocarbons | Sydney | Jul 24, 2019 | 14 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Total Recoverable Hydrocarbons - 1999 NEPM Fractions | Sydney | Jul 24, 2019 | 14 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| BTEX | Sydney | Jul 24, 2019 | 14 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Eurofins \| mgt Suite B4 | | | |
| Total Recoverable Hydrocarbons - 2013 NEPM Fractions | Melbourne | Jul 23, 2019 | |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Polycyclic Aromatic Hydrocarbons | Melbourne | Jul 23, 2019 | 14 Days |
| - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water | | | |
| Eurofins \| mgt Suite B14 | | | |
| Organochlorine Pesticides | Melbourne | Jul 23, 2019 | 14 Days |
| - Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270) | | | |
| Organophosphorus Pesticides | Melbourne | Jul 23, 2019 | 14 Days |
| - Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS (USEPA 8081) | | | |
| Polychlorinated Biphenyls | Melbourne | Jul 23, 2019 | 28 Days |
| - Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082) | | | |
| Eurofins \| mgt Suite B7 | | | |
| Metals M8 | Melbourne | Jul 23, 2019 | 180 Days |
| - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS | | | |
| % Moisture | Melbourne | Jul 19, 2019 | 14 Days |
| - Method: LTM-GEN-7080 Moisture | | | |

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**Brisbane**
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NATA # 1261 Site # 20794

**Perth**
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

**Company Name:** GHD Pty Ltd WOLLONGONG
**Address:** Level 3, 200 Crown St
Wollongong
NSW 2500

**Project Name:** PSI FOR CONTAMINATION
**Project ID:** 2316678

**Order No.:**
**Report #:** 666751
**Phone:** 02 4222 2300
**Fax:** 02 4222 2301

**Received:** Jul 19, 2019 11:00 AM
**Due:** Jul 26, 2019
**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins | mgt Analytical Services Manager : Alena Bounkeua**

| Sample Detail | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | X | | | | X | | | 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 | BH01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27375 | X | | X | X | | X | X | | X | |
| 2 | BH01_0.3-0.5 | Jul 16, 2019 | | Soil | S19-Jl27376 | | | | X | | | X | | X | |
| 3 | BH02_0.0-0.2 | Jul 16, 2019 | | Soil | S19-Jl27377 | | | | X | | | X | | X | |
| 4 | BH02_0.5-0.8 | Jul 16, 2019 | | Soil | S19-Jl27378 | | | X | | | | X | | X | |
| 5 | BH02_4.2-4.5 | Jul 16, 2019 | | Soil | S19-Jl27379 | | | | X | | | X | | | |
| 6 | BH03_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27380 | X | | X | X | | | X | | X | |
| 7 | BH03_0.5-0.7 | Jul 17, 2019 | | Soil | S19-Jl27381 | | | | X | | | X | | | |
| 8 | BH04_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27382 | X | | X | X | | X | X | | X | |
| 9 | BH05_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27383 | X | | X | X | | X | X | | X | |

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| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 10 | BH05_0.8-0.95 | Jul 17, 2019 | | Soil | S19-Jl27384 | | | | X | | | X | | X | |
| 11 | SS01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27385 | X | | | X | | | X | | X | |
| 12 | SS02_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27386 | X | | | | | | X | | X | |
| 13 | SS03_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27387 | X | | X | X | | X | X | | | |
| 14 | SS04_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27388 | | | | X | | X | X | | | |
| 15 | SS05_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27389 | X | | | X | | X | X | | | |
| 16 | SS06_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27390 | X | | | X | | | X | | X | |
| 17 | QC2 | Jul 16, 2019 | | Soil | S19-Jl27391 | | | | X | | | X | | X | |
| 18 | QC3 | Jul 17, 2019 | | Soil | S19-Jl27392 | | | X | X | | X | X | | X | |
| 19 | TRIP SPIKE | Jul 08, 2019 | | Soil | S19-Jl27393 | | | | | X | | | | | |
| 20 | TRIP BLANK | Jul 08, 2019 | | Soil | S19-Jl27394 | | | | | | | | | | X |
| 21 | WB1 | Jul 17, 2019 | | Water | S19-Jl27396 | | | | | | | | X | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 22 | BH01_1.1-1.45 | Jul 16, 2019 | | Soil | S19-Jl27397 | | X | | | | | | | | |
| 23 | BH03_1.25-1.45 | Jul 17, 2019 | | Soil | S19-Jl27398 | | X | | | | | | | | |
| 24 | BH03_2.15-2.45 | Jul 17, 2019 | | Soil | S19-Jl27399 | | X | | | | | | | | |
| 25 | BH04_0.75-0.95 | Jul 17, 2019 | | Soil | S19-Jl27400 | | X | | | | | | | | |
| 26 | BH04_1.75-1.95 | Jul 17, 2019 | | Soil | S19-Jl27401 | | X | | | | | | | | |
| 27 | BH05_1.6-1.7 | Jul 17, 2019 | | Soil | S19-Jl27402 | | X | | | | | | | | |
| 28 | BH05_2.6-2.95 | Jul 17, 2019 | | Soil | S19-Jl27403 | | X | | | | | | | | |
| 29 | QC1 | Jul 16, 2019 | | Soil | S19-Jl27404 | | X | | | | | | | | |
| **Test Counts** | | | | | | 9 | 8 | 7 | 16 | 1 | 7 | 18 | 1 | 13 | 1 |

## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

| | |
|---|---|
| **Dry** | Where a moisture has been determined on a solid sample the result is expressed on a dry basis. |
| **LOR** | Limit of Reporting. |
| **SPIKE** | Addition of the analyte to the sample and reported as percentage recovery. |
| **RPD** | Relative Percent Difference between two Duplicate pieces of analysis. |
| **LCS** | Laboratory Control Sample - reported as percent recovery. |
| **CRM** | Certified Reference Material - reported as percent recovery. |
| **Method Blank** | In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water. |
| **Surr - Surrogate** | The addition of a like compound to the analyte target and reported as percentage recovery. |
| **Duplicate** | A second piece of analysis from the same sample and reported in the same units as the result to show comparison. |
| **USEPA** | United States Environmental Protection Agency |
| **APHA** | American Public Health Association |
| **TCLP** | Toxicity Characteristic Leaching Procedure |
| **COC** | Chain of Custody |
| **SRA** | Sample Receipt Advice |
| **QSM** | US Department of Defense Quality Systems Manual Version 5.3 |
| **CP** | Client Parent - QC was performed on samples pertaining to this report |
| **NCP** | Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within. |
| **TEQ** | Toxic Equivalency Quotient |

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

| Test | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|
| **Method Blank** | | | | | | | |
| **Total Recoverable Hydrocarbons - 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 - 1999 NEPM Fractions** | | | | | | | |
| TRH C6-C9 | mg/kg | < 20 | | | 20 | Pass | |
| TRH C10-C14 | mg/kg | < 20 | | | 20 | Pass | |
| TRH C15-C28 | mg/kg | < 50 | | | 50 | Pass | |
| TRH C29-C36 | mg/kg | < 50 | | | 50 | Pass | |
| **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** | | | | | | | |
| **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 | |
| Endosulfan I | mg/kg | < 0.05 | | | 0.05 | Pass | |
| Endosulfan II | mg/kg | < 0.05 | | | 0.05 | Pass | |

| Test | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|
| 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 | < 0.05 | | | 0.05 | Pass | |
| Toxaphene | mg/kg | < 1 | | | 1 | Pass | |
| **Method Blank** | | | | | | | |
| **Organophosphorus Pesticides** | | | | | | | |
| Azinphos-methyl | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Bolstar | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Chlorfenvinphos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Chlorpyrifos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Chlorpyrifos-methyl | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Coumaphos | mg/kg | < 2 | | | 2 | Pass | |
| Demeton-S | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Demeton-O | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Diazinon | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Dichlorvos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Dimethoate | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Disulfoton | mg/kg | < 0.2 | | | 0.2 | Pass | |
| EPN | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Ethion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Ethoprop | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Ethyl parathion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Fenitrothion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Fensulfothion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Fenthion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Malathion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Merphos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Methyl parathion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Mevinphos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Monocrotophos | mg/kg | < 2 | | | 2 | Pass | |
| Naled | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Omethoate | mg/kg | < 2 | | | 2 | Pass | |
| Phorate | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Pirimiphos-methyl | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Pyrazophos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Ronnel | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Terbufos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Tetrachlorvinphos | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Tokuthion | mg/kg | < 0.2 | | | 0.2 | Pass | |
| Trichloronate | mg/kg | < 0.2 | | | 0.2 | Pass | |
| **Method Blank** | | | | | | | |
| **Polychlorinated Biphenyls** | | | | | | | |
| Aroclor-1016 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Aroclor-1221 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Aroclor-1232 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Aroclor-1242 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Aroclor-1248 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Aroclor-1254 | mg/kg | < 0.1 | | | 0.1 | Pass | |

| Test | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|
| Aroclor-1260 | mg/kg | < 0.1 | | | 0.1 | Pass | |
| Total PCB* | mg/kg | < 0.1 | | | 0.1 | 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** | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | | |
| Naphthalene | % | 102 | | | 70-130 | Pass | |
| TRH C6-C10 | % | 88 | | | 70-130 | Pass | |
| TRH >C10-C16 | % | 97 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | | |
| TRH C6-C9 | % | 89 | | | 70-130 | Pass | |
| TRH C10-C14 | % | 103 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **BTEX** | | | | | | | |
| Benzene | % | 84 | | | 70-130 | Pass | |
| Toluene | % | 87 | | | 70-130 | Pass | |
| Ethylbenzene | % | 89 | | | 70-130 | Pass | |
| m&p-Xylenes | % | 87 | | | 70-130 | Pass | |
| Xylenes - Total | % | 87 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | | |
| Acenaphthene | % | 79 | | | 70-130 | Pass | |
| Acenaphthylene | % | 80 | | | 70-130 | Pass | |
| Anthracene | % | 73 | | | 70-130 | Pass | |
| Benz(a)anthracene | % | 79 | | | 70-130 | Pass | |
| Benzo(a)pyrene | % | 87 | | | 70-130 | Pass | |
| Benzo(b&j)fluoranthene | % | 80 | | | 70-130 | Pass | |
| Benzo(g.h.i)perylene | % | 83 | | | 70-130 | Pass | |
| Benzo(k)fluoranthene | % | 87 | | | 70-130 | Pass | |
| Chrysene | % | 83 | | | 70-130 | Pass | |
| Dibenz(a.h)anthracene | % | 94 | | | 70-130 | Pass | |
| Fluoranthene | % | 86 | | | 70-130 | Pass | |
| Fluorene | % | 80 | | | 70-130 | Pass | |
| Indeno(1.2.3-cd)pyrene | % | 85 | | | 70-130 | Pass | |
| Naphthalene | % | 77 | | | 70-130 | Pass | |
| Phenanthrene | % | 81 | | | 70-130 | Pass | |
| Pyrene | % | 86 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Organochlorine Pesticides** | | | | | | | |
| Chlordanes - Total | % | 94 | | | 70-130 | Pass | |
| 4.4'-DDD | % | 91 | | | 70-130 | Pass | |
| 4.4'-DDE | % | 95 | | | 70-130 | Pass | |
| 4.4'-DDT | % | 95 | | | 70-130 | Pass | |
| a-BHC | % | 99 | | | 70-130 | Pass | |
| Aldrin | % | 92 | | | 70-130 | Pass | |

| Test | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|
| b-BHC | % | 94 | | | 70-130 | Pass | |
| d-BHC | % | 96 | | | 70-130 | Pass | |
| Dieldrin | % | 99 | | | 70-130 | Pass | |
| Endosulfan I | % | 96 | | | 70-130 | Pass | |
| Endosulfan II | % | 101 | | | 70-130 | Pass | |
| Endosulfan sulphate | % | 95 | | | 70-130 | Pass | |
| Endrin | % | 91 | | | 70-130 | Pass | |
| Endrin aldehyde | % | 90 | | | 70-130 | Pass | |
| Endrin ketone | % | 104 | | | 70-130 | Pass | |
| g-BHC (Lindane) | % | 97 | | | 70-130 | Pass | |
| Heptachlor | % | 97 | | | 70-130 | Pass | |
| Heptachlor epoxide | % | 100 | | | 70-130 | Pass | |
| Hexachlorobenzene | % | 92 | | | 70-130 | Pass | |
| Methoxychlor | % | 78 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Organophosphorus Pesticides** | | | | | | | |
| Diazinon | % | 96 | | | 70-130 | Pass | |
| Dimethoate | % | 75 | | | 70-130 | Pass | |
| Ethion | % | 106 | | | 70-130 | Pass | |
| Fenitrothion | % | 113 | | | 70-130 | Pass | |
| Methyl parathion | % | 110 | | | 70-130 | Pass | |
| Mevinphos | % | 90 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Polychlorinated Biphenyls** | | | | | | | |
| Aroclor-1260 | % | 99 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Heavy Metals** | | | | | | | |
| Arsenic | % | 120 | | | 80-120 | Pass | |
| Cadmium | % | 109 | | | 80-120 | Pass | |
| Chromium | % | 101 | | | 80-120 | Pass | |
| Copper | % | 103 | | | 80-120 | Pass | |
| Lead | % | 111 | | | 80-120 | Pass | |
| Mercury | % | 114 | | | 75-125 | Pass | |
| Nickel | % | 103 | | | 80-120 | Pass | |
| Zinc | % | 99 | | | 80-120 | Pass | |

| Test | Lab Sample ID | QA Source | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|---|---|
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | | | | | |
| TRH >C10-C16 | M19-Jl33355 | NCP | % | 82 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | | | | | |
| TRH C10-C14 | M19-Jl33355 | NCP | % | 86 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Organochlorine Pesticides** | | | | Result 1 | | | | | |
| Chlordanes - Total | S19-Jl28092 | NCP | % | 89 | | | 70-130 | Pass | |
| 4.4'-DDD | S19-Jl28092 | NCP | % | 92 | | | 70-130 | Pass | |
| 4.4'-DDE | S19-Jl28092 | NCP | % | 93 | | | 70-130 | Pass | |
| 4.4'-DDT | S19-Jl28092 | NCP | % | 75 | | | 70-130 | Pass | |
| a-BHC | S19-Jl28092 | NCP | % | 123 | | | 70-130 | Pass | |
| Aldrin | S19-Jl28092 | NCP | % | 102 | | | 70-130 | Pass | |
| b-BHC | S19-Jl28092 | NCP | % | 100 | | | 70-130 | Pass | |
| d-BHC | S19-Jl28092 | NCP | % | 107 | | | 70-130 | Pass | |
| Dieldrin | S19-Jl28092 | NCP | % | 96 | | | 70-130 | Pass | |
| Endosulfan I | S19-Jl28092 | NCP | % | 96 | | | 70-130 | Pass | |

| Test | Lab Sample ID | QA Source | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|---|---|
| Endosulfan II | S19-Jl28092 | NCP | % | 104 | | | 70-130 | Pass | |
| Endosulfan sulphate | S19-Jl28092 | NCP | % | 113 | | | 70-130 | Pass | |
| Endrin | S19-Jl28092 | NCP | % | 73 | | | 70-130 | Pass | |
| Endrin aldehyde | S19-Jl28092 | NCP | % | 122 | | | 70-130 | Pass | |
| Endrin ketone | S19-Jl28092 | NCP | % | 111 | | | 70-130 | Pass | |
| g-BHC (Lindane) | S19-Jl28092 | NCP | % | 109 | | | 70-130 | Pass | |
| Heptachlor | S19-Jl28092 | NCP | % | 76 | | | 70-130 | Pass | |
| Heptachlor epoxide | S19-Jl28092 | NCP | % | 89 | | | 70-130 | Pass | |
| Hexachlorobenzene | S19-Jl28092 | NCP | % | 92 | | | 70-130 | Pass | |
| Methoxychlor | S19-Jl25001 | NCP | % | 80 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Organophosphorus Pesticides** | | | | Result 1 | | | | | |
| Diazinon | M19-Jl26659 | NCP | % | 89 | | | 70-130 | Pass | |
| Dimethoate | S19-Jl25011 | NCP | % | 93 | | | 70-130 | Pass | |
| Ethion | M19-Jl26659 | NCP | % | 76 | | | 70-130 | Pass | |
| Fenitrothion | M19-Jl26659 | NCP | % | 82 | | | 70-130 | Pass | |
| Methyl parathion | M19-Jl26659 | NCP | % | 73 | | | 70-130 | Pass | |
| Mevinphos | M19-Jl26659 | NCP | % | 85 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Polychlorinated Biphenyls** | | | | Result 1 | | | | | |
| Aroclor-1016 | S19-Jl25011 | NCP | % | 88 | | | 70-130 | Pass | |
| Aroclor-1260 | S19-Jl25011 | NCP | % | 103 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | Result 1 | | | | | |
| Acenaphthene | S19-Jl27376 | CP | % | 99 | | | 70-130 | Pass | |
| Acenaphthylene | S19-Jl27376 | CP | % | 99 | | | 70-130 | Pass | |
| Anthracene | S19-Jl27376 | CP | % | 92 | | | 70-130 | Pass | |
| Benz(a)anthracene | S19-Jl27376 | CP | % | 93 | | | 70-130 | Pass | |
| Benzo(a)pyrene | S19-Jl27376 | CP | % | 91 | | | 70-130 | Pass | |
| Benzo(b&j)fluoranthene | S19-Jl27376 | CP | % | 127 | | | 70-130 | Pass | |
| Benzo(g.h.i)perylene | S19-Jl27376 | CP | % | 83 | | | 70-130 | Pass | |
| Benzo(k)fluoranthene | S19-Jl27376 | CP | % | 108 | | | 70-130 | Pass | |
| Chrysene | S19-Jl27376 | CP | % | 99 | | | 70-130 | Pass | |
| Dibenz(a.h)anthracene | S19-Jl27376 | CP | % | 73 | | | 70-130 | Pass | |
| Fluoranthene | S19-Jl27376 | CP | % | 100 | | | 70-130 | Pass | |
| Fluorene | S19-Jl27376 | CP | % | 99 | | | 70-130 | Pass | |
| Indeno(1.2.3-cd)pyrene | S19-Jl27376 | CP | % | 75 | | | 70-130 | Pass | |
| Naphthalene | S19-Jl27376 | CP | % | 98 | | | 70-130 | Pass | |
| Phenanthrene | S19-Jl27376 | CP | % | 92 | | | 70-130 | Pass | |
| Pyrene | S19-Jl27376 | CP | % | 101 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | | | | | |
| Arsenic | S19-Jl27376 | CP | % | 91 | | | 75-125 | Pass | |
| Cadmium | S19-Jl27376 | CP | % | 94 | | | 75-125 | Pass | |
| Chromium | S19-Jl27376 | CP | % | 105 | | | 75-125 | Pass | |
| Copper | S19-Jl27376 | CP | % | 100 | | | 75-125 | Pass | |
| Lead | S19-Jl27376 | CP | % | 103 | | | 75-125 | Pass | |
| Mercury | S19-Jl27376 | CP | % | 105 | | | 70-130 | Pass | |
| Nickel | S19-Jl27376 | CP | % | 101 | | | 75-125 | Pass | |
| Zinc | S19-Jl27376 | CP | % | 99 | | | 75-125 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | | | | | |
| Naphthalene | S19-Jl27383 | CP | % | 100 | | | 70-130 | Pass | |
| TRH C6-C10 | S19-Jl27383 | CP | % | 84 | | | 70-130 | Pass | |

| Test | Lab Sample ID | QA Source | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|---|---|
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | | | | | |
| TRH C6-C9 | S19-Jl27383 | CP | % | 86 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **BTEX** | | | | Result 1 | | | | | |
| Benzene | S19-Jl27383 | CP | % | 100 | | | 70-130 | Pass | |
| Toluene | S19-Jl27383 | CP | % | 85 | | | 70-130 | Pass | |
| Ethylbenzene | S19-Jl27383 | CP | % | 88 | | | 70-130 | Pass | |
| m&p-Xylenes | S19-Jl27383 | CP | % | 89 | | | 70-130 | Pass | |
| o-Xylene | S19-Jl27383 | CP | % | 88 | | | 70-130 | Pass | |
| Xylenes - Total | S19-Jl27383 | CP | % | 88 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | | | | | |
| Arsenic | S19-Jl27388 | CP | % | 105 | | | 75-125 | Pass | |
| Cadmium | S19-Jl27388 | CP | % | 99 | | | 75-125 | Pass | |
| Chromium | S19-Jl27388 | CP | % | 118 | | | 75-125 | Pass | |
| Copper | S19-Jl27388 | CP | % | 92 | | | 75-125 | Pass | |
| Lead | S19-Jl27388 | CP | % | 114 | | | 75-125 | Pass | |
| Mercury | S19-Jl27388 | CP | % | 106 | | | 70-130 | Pass | |
| Nickel | S19-Jl27388 | CP | % | 114 | | | 75-125 | Pass | |
| Zinc | S19-Jl27388 | CP | % | 9.3 | | | 75-125 | Fail | Q08 |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | | | | | |
| Naphthalene | S19-Jl27391 | CP | % | 90 | | | 70-130 | Pass | |
| TRH C6-C10 | S19-Jl27391 | CP | % | 93 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | | | | | |
| TRH C6-C9 | S19-Jl27391 | CP | % | 96 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **BTEX** | | | | Result 1 | | | | | |
| Benzene | S19-Jl27391 | CP | % | 104 | | | 70-130 | Pass | |
| Toluene | S19-Jl27391 | CP | % | 106 | | | 70-130 | Pass | |
| Ethylbenzene | S19-Jl27391 | CP | % | 110 | | | 70-130 | Pass | |
| m&p-Xylenes | S19-Jl27391 | CP | % | 111 | | | 70-130 | Pass | |
| o-Xylene | S19-Jl27391 | CP | % | 114 | | | 70-130 | Pass | |
| Xylenes - Total | S19-Jl27391 | CP | % | 112 | | | 70-130 | Pass | |
| **Test** | **Lab Sample ID** | **QA Source** | **Units** | **Result 1** | | | **Acceptance Limits** | **Pass Limits** | **Qualifying Code** |
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| TRH >C10-C16 | M19-Jl33201 | NCP | mg/kg | < 50 | < 50 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| TRH C10-C14 | M19-Jl33201 | NCP | mg/kg | < 20 | < 20 | <1 | 30% | Pass | |
| TRH C15-C28 | M19-Jl33201 | NCP | mg/kg | < 50 | < 50 | <1 | 30% | Pass | |
| TRH C29-C36 | M19-Jl33201 | NCP | mg/kg | < 50 | < 50 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Polychlorinated Biphenyls** | | | | Result 1 | Result 2 | RPD | | | |
| Aroclor-1016 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1221 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1232 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1242 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1248 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1254 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Aroclor-1260 | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Total PCB* | S19-Jl25004 | NCP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Arsenic | S19-Jl27375 | CP | mg/kg | 2.1 | < 2 | 8.0 | 30% | Pass | |
| Cadmium | S19-Jl27375 | CP | mg/kg | < 0.4 | < 0.4 | <1 | 30% | Pass | |
| Chromium | S19-Jl27375 | CP | mg/kg | 25 | 25 | 1.0 | 30% | Pass | |
| Copper | S19-Jl27375 | CP | mg/kg | 12 | 12 | 4.0 | 30% | Pass | |
| Lead | S19-Jl27375 | CP | mg/kg | 56 | 54 | 4.0 | 30% | Pass | |
| Mercury | S19-Jl27375 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Nickel | S19-Jl27375 | CP | mg/kg | 14 | 14 | 5.0 | 30% | Pass | |
| Zinc | S19-Jl27375 | CP | mg/kg | 100 | 88 | 15 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| | | | | Result 1 | Result 2 | RPD | | | |
| % Moisture | M19-Jl27332 | NCP | % | 1.8 | 1.8 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Arsenic | S19-Jl27376 | CP | mg/kg | < 2 | < 2 | <1 | 30% | Pass | |
| Cadmium | S19-Jl27376 | CP | mg/kg | < 0.4 | < 0.4 | <1 | 30% | Pass | |
| Chromium | S19-Jl27376 | CP | mg/kg | 15 | 17 | 11 | 30% | Pass | |
| Copper | S19-Jl27376 | CP | mg/kg | < 5 | < 5 | <1 | 30% | Pass | |
| Lead | S19-Jl27376 | CP | mg/kg | 14 | 15 | 10 | 30% | Pass | |
| Mercury | S19-Jl27376 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Nickel | S19-Jl27376 | CP | mg/kg | < 5 | 5.1 | 9.0 | 30% | Pass | |
| Zinc | S19-Jl27376 | CP | mg/kg | 16 | 18 | 12 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Organochlorine Pesticides** | | | | Result 1 | Result 2 | RPD | | | |
| Toxaphene | S19-Jl24906 | NCP | mg/kg | < 1 | < 1 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | Result 1 | Result 2 | RPD | | | |
| Acenaphthene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Acenaphthylene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Anthracene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Benz(a)anthracene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Benzo(a)pyrene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Benzo(b&j)fluoranthene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Benzo(g.h.i)perylene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Benzo(k)fluoranthene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Chrysene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Dibenz(a.h)anthracene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Fluoranthene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Fluorene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Indeno(1.2.3-cd)pyrene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Naphthalene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Phenanthrene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| Pyrene | S19-Jl27387 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Organochlorine Pesticides** | | | | Result 1 | Result 2 | RPD | | | |
| Chlordanes - Total | S19-Jl27387 | CP | mg/kg | 0.2 | 0.2 | 17 | 30% | Pass | |
| 4.4'-DDD | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| 4.4'-DDE | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| 4.4'-DDT | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| a-BHC | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Aldrin | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| b-BHC | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| d-BHC | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Dieldrin | S19-Jl27387 | CP | mg/kg | 0.53 | 0.44 | 20 | 30% | Pass | |
| Endosulfan I | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Duplicate** | | | | | | | | | |
| **Organochlorine Pesticides** | | | | Result 1 | Result 2 | RPD | | | |
| Endosulfan II | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Endosulfan sulphate | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Endrin | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Endrin aldehyde | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Endrin ketone | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| g-BHC (Lindane) | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Heptachlor | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Heptachlor epoxide | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Hexachlorobenzene | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| Methoxychlor | S19-Jl27387 | CP | mg/kg | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Organophosphorus Pesticides** | | | | Result 1 | Result 2 | RPD | | | |
| Azinphos-methyl | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Bolstar | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Chlorfenvinphos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Chlorpyrifos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Chlorpyrifos-methyl | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Coumaphos | S19-Jl27387 | CP | mg/kg | < 2 | < 2 | <1 | 30% | Pass | |
| Demeton-S | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Demeton-O | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Diazinon | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Dichlorvos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Dimethoate | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Disulfoton | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| EPN | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Ethion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Ethoprop | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Ethyl parathion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Fenitrothion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Fensulfothion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Fenthion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Malathion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Merphos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Methyl parathion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Mevinphos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Monocrotophos | S19-Jl27387 | CP | mg/kg | < 2 | < 2 | <1 | 30% | Pass | |
| Naled | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Omethoate | S19-Jl27387 | CP | mg/kg | < 2 | < 2 | <1 | 30% | Pass | |
| Phorate | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Pirimiphos-methyl | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Pyrazophos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Ronnel | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Terbufos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Tetrachlorvinphos | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Tokuthion | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| Trichloronate | S19-Jl27387 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Arsenic | S19-Jl27387 | CP | mg/kg | 2.9 | 2.6 | 8.0 | 30% | Pass | |
| Cadmium | S19-Jl27387 | CP | mg/kg | < 0.4 | < 0.4 | <1 | 30% | Pass | |
| Chromium | S19-Jl27387 | CP | mg/kg | 26 | 24 | 9.0 | 30% | Pass | |
| Copper | S19-Jl27387 | CP | mg/kg | 13 | 11 | 10 | 30% | Pass | |
| Lead | S19-Jl27387 | CP | mg/kg | 26 | 24 | 10 | 30% | Pass | |
| Mercury | S19-Jl27387 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Nickel | S19-Jl27387 | CP | mg/kg | 14 | 13 | 11 | 30% | Pass | |
| Zinc | S19-Jl27387 | CP | mg/kg | 97 | 89 | 8.0 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Arsenic | S19-Jl27388 | CP | mg/kg | 2.0 | < 2 | 3.0 | 30% | Pass | |
| Cadmium | S19-Jl27388 | CP | mg/kg | < 0.4 | < 0.4 | <1 | 30% | Pass | |
| Chromium | S19-Jl27388 | CP | mg/kg | 20 | 20 | 1.0 | 30% | Pass | |
| Copper | S19-Jl27388 | CP | mg/kg | 21 | 21 | 2.0 | 30% | Pass | |
| Lead | S19-Jl27388 | CP | mg/kg | 33 | 32 | 1.0 | 30% | Pass | |
| Mercury | S19-Jl27388 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Nickel | S19-Jl27388 | CP | mg/kg | 9.8 | 9.6 | 2.0 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| Naphthalene | S19-Jl27390 | CP | mg/kg | < 0.5 | < 0.5 | <1 | 30% | Pass | |
| TRH C6-C10 | S19-Jl27390 | CP | mg/kg | < 20 | < 20 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| TRH C6-C9 | S19-Jl27390 | CP | mg/kg | < 20 | < 20 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **BTEX** | | | | Result 1 | Result 2 | RPD | | | |
| Benzene | S19-Jl27390 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Toluene | S19-Jl27390 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Ethylbenzene | S19-Jl27390 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| m&p-Xylenes | S19-Jl27390 | CP | mg/kg | < 0.2 | < 0.2 | <1 | 30% | Pass | |
| o-Xylene | S19-Jl27390 | CP | mg/kg | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| Xylenes - Total | S19-Jl27390 | CP | mg/kg | < 0.3 | < 0.3 | <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 |
| R20 | This sample is a Trip Spike and therefore all results are reported as a percentage |

## Authorised By

| | |
|---|---|
| Alena Bounkeua | Analytical Services Manager |
| Joseph Edouard | Senior Analyst-Organic (VIC) |
| Harry Bacalis | Senior Analyst-Volatile (VIC) |
| Nibha Vaidya | Senior Analyst-Asbestos (NSW) |
| Emily Rosenberg | Senior Analyst-Metal (VIC) |

**Glenn Jackson**
**General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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**GHD Pty Ltd WOLLONGONG**
**Level 3, 200 Crown St**
**Wollongong**
**NSW 2500**

**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.

**Attention:** **Daniel Deen**

**Report** **666751-W**
Project name PSI FOR CONTAMINATION
Project ID 2316678
Received Date Jul 19, 2019

| **Client Sample ID** | | | **WB1** |
|---|---|---|---|
| **Sample Matrix** | | | **Water** |
| **Eurofins Sample No.** | | | **S19-Jl27396** |
| **Date Sampled** | | | **Jul 17, 2019** |
| Test/Reference | LOR | Unit | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | |
| TRH C6-C9 | 0.02 | mg/L | < 0.02 |
| TRH C10-C14 | 0.05 | mg/L | < 0.05 |
| TRH C15-C28 | 0.1 | mg/L | < 0.1 |
| TRH C29-C36 | 0.1 | mg/L | < 0.1 |
| TRH C10-36 (Total) | 0.1 | mg/L | < 0.1 |
| **BTEX** | | | |
| Benzene | 0.001 | mg/L | < 0.001 |
| Toluene | 0.001 | mg/L | < 0.001 |
| Ethylbenzene | 0.001 | mg/L | < 0.001 |
| m&p-Xylenes | 0.002 | mg/L | < 0.002 |
| o-Xylene | 0.001 | mg/L | < 0.001 |
| Xylenes - Total | 0.003 | mg/L | < 0.003 |
| 4-Bromofluorobenzene (surr.) | 1 | % | 84 |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | |
| Naphthalene[N02] | 0.01 | mg/L | < 0.01 |
| TRH C6-C10 | 0.02 | mg/L | < 0.02 |
| TRH C6-C10 less BTEX (F1)[N04] | 0.02 | mg/L | < 0.02 |
| TRH >C10-C16 | 0.05 | mg/L | < 0.05 |
| TRH >C10-C16 less Naphthalene (F2)[N01] | 0.05 | mg/L | < 0.05 |
| TRH >C16-C34 | 0.1 | mg/L | < 0.1 |
| TRH >C34-C40 | 0.1 | mg/L | < 0.1 |
| TRH >C10-C40 (total)* | 0.1 | mg/L | < 0.1 |
| **Polycyclic Aromatic Hydrocarbons** | | | |
| Acenaphthene | 0.001 | mg/L | < 0.001 |
| Acenaphthylene | 0.001 | mg/L | < 0.001 |
| Anthracene | 0.001 | mg/L | < 0.001 |
| Benz(a)anthracene | 0.001 | mg/L | < 0.001 |
| Benzo(a)pyrene | 0.001 | mg/L | < 0.001 |
| Benzo(b&j)fluoranthene[N07] | 0.001 | mg/L | < 0.001 |
| Benzo(g.h.i)perylene | 0.001 | mg/L | < 0.001 |
| Benzo(k)fluoranthene | 0.001 | mg/L | < 0.001 |
| Chrysene | 0.001 | mg/L | < 0.001 |
| Dibenz(a.h)anthracene | 0.001 | mg/L | < 0.001 |
| Fluoranthene | 0.001 | mg/L | < 0.001 |
| Fluorene | 0.001 | mg/L | < 0.001 |

| Client Sample ID | | | WB1 |
|---|---|---|---|
| Sample Matrix | | | Water |
| Eurofins Sample No. | | | S19-Jl27396 |
| Date Sampled | | | Jul 17, 2019 |
| Test/Reference | LOR | Unit | |
| **Polycyclic Aromatic Hydrocarbons** | | | |
| Indeno(1.2.3-cd)pyrene | 0.001 | mg/L | < 0.001 |
| Naphthalene | 0.001 | mg/L | < 0.001 |
| Phenanthrene | 0.001 | mg/L | < 0.001 |
| Pyrene | 0.001 | mg/L | < 0.001 |
| Total PAH* | 0.001 | mg/L | < 0.001 |
| 2-Fluorobiphenyl (surr.) | 1 | % | 136 |
| p-Terphenyl-d14 (surr.) | 1 | % | 112 |
| **Heavy Metals** | | | |
| Arsenic | 0.001 | mg/L | < 0.001 |
| Cadmium | 0.0002 | mg/L | < 0.0002 |
| Chromium | 0.001 | mg/L | < 0.001 |
| Copper | 0.001 | mg/L | < 0.001 |
| Lead | 0.001 | mg/L | < 0.001 |
| Mercury | 0.0001 | mg/L | < 0.0001 |
| Nickel | 0.001 | mg/L | < 0.001 |
| Zinc | 0.005 | mg/L | < 0.005 |

## Sample History

Where samples are submitted/analysed over several days, the last date of extraction 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 (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

| Description | Testing Site | Extracted | Holding Time |
|---|---|---|---|
| Total Recoverable Hydrocarbons - 1999 NEPM Fractions | Melbourne | Jul 23, 2019 | 7 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| BTEX | Melbourne | Jul 22, 2019 | 14 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Total Recoverable Hydrocarbons - 2013 NEPM Fractions | Melbourne | Jul 22, 2019 | 7 Days |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Eurofins \| mgt Suite B4 | | | |
| Total Recoverable Hydrocarbons - 2013 NEPM Fractions | Melbourne | Jul 23, 2019 | |
| - Method: LTM-ORG-2010 TRH C6-C40 | | | |
| Polycyclic Aromatic Hydrocarbons | Melbourne | Jul 23, 2019 | 7 Days |
| - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water | | | |
| Eurofins \| mgt Suite B7 | | | |
| Metals M8 | Melbourne | Jul 24, 2019 | 180 Days |
| - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS | | | |

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Site # 23736

**Company Name:** GHD Pty Ltd WOLLONGONG
**Address:** Level 3, 200 Crown St
Wollongong
NSW 2500

**Project Name:** PSI FOR CONTAMINATION
**Project ID:** 2316678

**Order No.:**
**Report #:** 666751
**Phone:** 02 4222 2300
**Fax:** 02 4222 2301

**Received:** Jul 19, 2019 11:00 AM
**Due:** Jul 26, 2019
**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins | mgt Analytical Services Manager : Alena Bounkeua**

| Sample Detail | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | X | | | | X | | | 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 | BH01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27375 | X | | X | X | | X | X | | X | |
| 2 | BH01_0.3-0.5 | Jul 16, 2019 | | Soil | S19-Jl27376 | | | | X | | | X | | X | |
| 3 | BH02_0.0-0.2 | Jul 16, 2019 | | Soil | S19-Jl27377 | | | | X | | | X | | X | |
| 4 | BH02_0.5-0.8 | Jul 16, 2019 | | Soil | S19-Jl27378 | | | X | | | | X | | X | |
| 5 | BH02_4.2-4.5 | Jul 16, 2019 | | Soil | S19-Jl27379 | | | | X | | | X | | | |
| 6 | BH03_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27380 | X | | X | X | | | X | | X | |
| 7 | BH03_0.5-0.7 | Jul 17, 2019 | | Soil | S19-Jl27381 | | | | X | | | X | | | |
| 8 | BH04_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27382 | X | | X | X | | X | X | | X | |
| 9 | BH05_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27383 | X | | X | X | | X | X | | X | |

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**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins | mgt Analytical Services Manager : Alena Bounkeua**

| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 10 | BH05_0.8-0.95 | Jul 17, 2019 | | Soil | S19-Jl27384 | | | | X | | | X | | X | |
| 11 | SS01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27385 | X | | | X | | | X | | X | |
| 12 | SS02_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27386 | X | | | | | | X | | X | |
| 13 | SS03_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27387 | X | | X | X | | X | X | | | |
| 14 | SS04_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27388 | | | | X | | X | X | | | |
| 15 | SS05_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27389 | X | | | X | | X | X | | | |
| 16 | SS06_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27390 | X | | | X | | | X | | X | |
| 17 | QC2 | Jul 16, 2019 | | Soil | S19-Jl27391 | | | | X | | | X | | X | |
| 18 | QC3 | Jul 17, 2019 | | Soil | S19-Jl27392 | | | X | X | | X | X | | X | |
| 19 | TRIP SPIKE | Jul 08, 2019 | | Soil | S19-Jl27393 | | | | | X | | | | | |
| 20 | TRIP BLANK | Jul 08, 2019 | | Soil | S19-Jl27394 | | | | | | | | | | X |
| 21 | WB1 | Jul 17, 2019 | | Water | S19-Jl27396 | | | | | | | | X | | |

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| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 22 | BH01_1.1-1.45 | Jul 16, 2019 | | Soil | S19-Jl27397 | | X | | | | | | | | |
| 23 | BH03_1.25-1.45 | Jul 17, 2019 | | Soil | S19-Jl27398 | | X | | | | | | | | |
| 24 | BH03_2.15-2.45 | Jul 17, 2019 | | Soil | S19-Jl27399 | | X | | | | | | | | |
| 25 | BH04_0.75-0.95 | Jul 17, 2019 | | Soil | S19-Jl27400 | | X | | | | | | | | |
| 26 | BH04_1.75-1.95 | Jul 17, 2019 | | Soil | S19-Jl27401 | | X | | | | | | | | |
| 27 | BH05_1.6-1.7 | Jul 17, 2019 | | Soil | S19-Jl27402 | | X | | | | | | | | |
| 28 | BH05_2.6-2.95 | Jul 17, 2019 | | Soil | S19-Jl27403 | | X | | | | | | | | |
| 29 | QC1 | Jul 16, 2019 | | Soil | S19-Jl27404 | | X | | | | | | | | |
| **Test Counts** | | | | | | 9 | 8 | 7 | 16 | 1 | 7 | 18 | 1 | 13 | 1 |

## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

| | |
|---|---|
| **Dry** | Where a moisture has been determined on a solid sample the result is expressed on a dry basis. |
| **LOR** | Limit of Reporting. |
| **SPIKE** | Addition of the analyte to the sample and reported as percentage recovery. |
| **RPD** | Relative Percent Difference between two Duplicate pieces of analysis. |
| **LCS** | Laboratory Control Sample - reported as percent recovery. |
| **CRM** | Certified Reference Material - reported as percent recovery. |
| **Method Blank** | In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water. |
| **Surr - Surrogate** | The addition of a like compound to the analyte target and reported as percentage recovery. |
| **Duplicate** | A second piece of analysis from the same sample and reported in the same units as the result to show comparison. |
| **USEPA** | United States Environmental Protection Agency |
| **APHA** | American Public Health Association |
| **TCLP** | Toxicity Characteristic Leaching Procedure |
| **COC** | Chain of Custody |
| **SRA** | Sample Receipt Advice |
| **QSM** | US Department of Defense Quality Systems Manual Version 5.3 |
| **CP** | Client Parent - QC was performed on samples pertaining to this report |
| **NCP** | Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within. |
| **TEQ** | Toxic Equivalency Quotient |

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

| Test | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|
| **Method Blank** | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | | |
| TRH C6-C9 | mg/L | < 0.02 | | | 0.02 | Pass | |
| TRH C10-C14 | mg/L | < 0.05 | | | 0.05 | Pass | |
| TRH C15-C28 | mg/L | < 0.1 | | | 0.1 | Pass | |
| TRH C29-C36 | mg/L | < 0.1 | | | 0.1 | Pass | |
| **Method Blank** | | | | | | | |
| **BTEX** | | | | | | | |
| Benzene | mg/L | < 0.001 | | | 0.001 | Pass | |
| Toluene | mg/L | < 0.001 | | | 0.001 | Pass | |
| Ethylbenzene | mg/L | < 0.001 | | | 0.001 | Pass | |
| m&p-Xylenes | mg/L | < 0.002 | | | 0.002 | Pass | |
| o-Xylene | mg/L | < 0.001 | | | 0.001 | Pass | |
| Xylenes - Total | mg/L | < 0.003 | | | 0.003 | Pass | |
| **Method Blank** | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | | |
| Naphthalene | mg/L | < 0.01 | | | 0.01 | Pass | |
| TRH C6-C10 | mg/L | < 0.02 | | | 0.02 | Pass | |
| TRH >C10-C16 | mg/L | < 0.05 | | | 0.05 | Pass | |
| TRH >C16-C34 | mg/L | < 0.1 | | | 0.1 | Pass | |
| TRH >C34-C40 | mg/L | < 0.1 | | | 0.1 | Pass | |
| **Method Blank** | | | | | | | |
| **Heavy Metals** | | | | | | | |
| Arsenic | mg/L | < 0.001 | | | 0.001 | Pass | |
| Cadmium | mg/L | < 0.0002 | | | 0.0002 | Pass | |
| Chromium | mg/L | < 0.001 | | | 0.001 | Pass | |
| Copper | mg/L | < 0.001 | | | 0.001 | Pass | |
| Lead | mg/L | < 0.001 | | | 0.001 | Pass | |
| Mercury | mg/L | < 0.0001 | | | 0.0001 | Pass | |
| Nickel | mg/L | < 0.001 | | | 0.001 | Pass | |
| Zinc | mg/L | < 0.005 | | | 0.005 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | | | | |
| TRH C6-C9 | % | 100 | | | 70-130 | Pass | |
| TRH C10-C14 | % | 86 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **BTEX** | | | | | | | |
| Benzene | % | 103 | | | 70-130 | Pass | |
| Toluene | % | 96 | | | 70-130 | Pass | |
| Ethylbenzene | % | 92 | | | 70-130 | Pass | |
| m&p-Xylenes | % | 88 | | | 70-130 | Pass | |
| Xylenes - Total | % | 90 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | | | | |
| Naphthalene | % | 94 | | | 70-130 | Pass | |
| TRH C6-C10 | % | 101 | | | 70-130 | Pass | |
| TRH >C10-C16 | % | 80 | | | 70-130 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| **Heavy Metals** | | | | | | | |
| Arsenic | % | 90 | | | 80-120 | Pass | |
| Cadmium | % | 91 | | | 80-120 | Pass | |
| Chromium | % | 90 | | | 80-120 | Pass | |

| Test | | | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|---|---|
| Copper | | | % | 91 | | | 80-120 | Pass | |
| Lead | | | % | 90 | | | 80-120 | Pass | |
| Mercury | | | % | 85 | | | 75-125 | Pass | |
| Nickel | | | % | 91 | | | 80-120 | Pass | |
| Zinc | | | % | 90 | | | 80-120 | Pass | |
| **Test** | **Lab Sample ID** | **QA Source** | **Units** | **Result 1** | | | **Acceptance Limits** | **Pass Limits** | **Qualifying Code** |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | | | | | |
| TRH C6-C9 | M19-Jl28337 | NCP | % | 122 | | | 70-130 | Pass | |
| TRH C10-C14 | B19-Jl28475 | NCP | % | 91 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **BTEX** | | | | Result 1 | | | | | |
| Benzene | M19-Jl28337 | NCP | % | 110 | | | 70-130 | Pass | |
| Toluene | M19-Jl28337 | NCP | % | 109 | | | 70-130 | Pass | |
| Ethylbenzene | M19-Jl28337 | NCP | % | 105 | | | 70-130 | Pass | |
| m&p-Xylenes | M19-Jl28337 | NCP | % | 105 | | | 70-130 | Pass | |
| o-Xylene | M19-Jl28337 | NCP | % | 107 | | | 70-130 | Pass | |
| Xylenes - Total | M19-Jl28337 | NCP | % | 106 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | | | | | |
| Naphthalene | M19-Jl28337 | NCP | % | 98 | | | 70-130 | Pass | |
| TRH C6-C10 | M19-Jl28337 | NCP | % | 120 | | | 70-130 | Pass | |
| TRH >C10-C16 | B19-Jl28475 | NCP | % | 86 | | | 70-130 | Pass | |
| **Spike - % Recovery** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | | | | | |
| Arsenic | M19-Jl27125 | NCP | % | 97 | | | 75-125 | Pass | |
| Cadmium | M19-Jl27125 | NCP | % | 95 | | | 75-125 | Pass | |
| Chromium | M19-Jl27125 | NCP | % | 95 | | | 75-125 | Pass | |
| Copper | M19-Jl27125 | NCP | % | 93 | | | 75-125 | Pass | |
| Lead | M19-Jl27125 | NCP | % | 93 | | | 75-125 | Pass | |
| Mercury | M19-Jl27125 | NCP | % | 89 | | | 70-130 | Pass | |
| Nickel | M19-Jl27125 | NCP | % | 79 | | | 75-125 | Pass | |
| Zinc | M19-Jl27125 | NCP | % | 93 | | | 75-125 | Pass | |
| **Test** | **Lab Sample ID** | **QA Source** | **Units** | **Result 1** | | | **Acceptance Limits** | **Pass Limits** | **Qualifying Code** |
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 1999 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| TRH C6-C9 | M19-Jl26642 | NCP | mg/L | < 0.02 | < 0.02 | <1 | 30% | Pass | |
| TRH C10-C14 | S19-Jl30267 | NCP | mg/L | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| TRH C15-C28 | S19-Jl30267 | NCP | mg/L | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| TRH C29-C36 | S19-Jl30267 | NCP | mg/L | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **BTEX** | | | | Result 1 | Result 2 | RPD | | | |
| Benzene | M19-Jl26642 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| Toluene | M19-Jl26642 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| Ethylbenzene | M19-Jl26642 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| m&p-Xylenes | M19-Jl26642 | NCP | mg/L | < 0.002 | < 0.002 | <1 | 30% | Pass | |
| o-Xylene | M19-Jl26642 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| Xylenes - Total | M19-Jl26642 | NCP | mg/L | < 0.003 | < 0.003 | <1 | 30% | Pass | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Duplicate** | | | | | | | | | |
| **Total Recoverable Hydrocarbons - 2013 NEPM Fractions** | | | | Result 1 | Result 2 | RPD | | | |
| Naphthalene | M19-Jl26642 | NCP | mg/L | < 0.01 | < 0.01 | <1 | 30% | Pass | |
| TRH C6-C10 | M19-Jl26642 | NCP | mg/L | < 0.02 | < 0.02 | <1 | 30% | Pass | |
| TRH >C10-C16 | S19-Jl30267 | NCP | mg/L | < 0.05 | < 0.05 | <1 | 30% | Pass | |
| TRH >C16-C34 | S19-Jl30267 | NCP | mg/L | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| TRH >C34-C40 | S19-Jl30267 | NCP | mg/L | < 0.1 | < 0.1 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| **Heavy Metals** | | | | Result 1 | Result 2 | RPD | | | |
| Arsenic | M19-Jl27125 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| Cadmium | M19-Jl27125 | NCP | mg/L | < 0.0002 | < 0.0002 | <1 | 30% | Pass | |
| Chromium | M19-Jl27125 | NCP | mg/L | 0.004 | 0.004 | 2.0 | 30% | Pass | |
| Copper | M19-Jl27125 | NCP | mg/L | 0.006 | 0.006 | 4.0 | 30% | Pass | |
| Lead | M19-Jl27125 | NCP | mg/L | < 0.001 | < 0.001 | <1 | 30% | Pass | |
| Mercury | M19-Jl27125 | NCP | mg/L | < 0.0001 | < 0.0001 | <1 | 30% | Pass | |
| Nickel | M19-Jl27125 | NCP | mg/L | 0.17 | 0.16 | 6.0 | 30% | Pass | |
| Zinc | M19-Jl27125 | NCP | mg/L | 0.005 | 0.011 | 76 | 30% | Fail | Q15 |

## 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 |
| Q15 | The RPD reported passes Eurofins \| mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report. |

## Authorised By

| | |
|---|---|
| Alena Bounkeua | Analytical Services Manager |
| Joseph Edouard | Senior Analyst-Organic (VIC) |
| Harry Bacalis | Senior Analyst-Volatile (VIC) |
| Emily Rosenberg | Senior Analyst-Metal (VIC) |

**Glenn Jackson**

**General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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# Certificate of Analysis

Environment Testing

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.

**GHD Pty Ltd WOLLONGONG**
**Level 3, 200 Crown St**
**Wollongong**
**NSW 2500**

| | |
|---|---|
| **Attention:** | Daniel Deen |
| **Report** | 666751-AID |
| **Project Name** | PSI FOR CONTAMINATION |
| **Project ID** | 2316678 |
| **Received Date** | Jul 19, 2019 |
| **Date Reported** | Jul 26, 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.<br>*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.<br>*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.<br>*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.<br>*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).<br>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).<br>*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.* |

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.

**Project Name** PSI FOR CONTAMINATION
**Project ID** 2316678
**Date Sampled** Jul 16, 2019 to Jul 17, 2019
**Report** 666751-AID

| Client Sample ID | Eurofins Sample No. | Date Sampled | Sample Description | Result |
|---|---|---|---|---|
| BH01_0.0-0.1 | 19-JI27375 | Jul 16, 2019 | Approximate Sample 168g<br>Sample consisted of: Brown fine-grained soil and rocks | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| BH03_0.0-0.2 | 19-JI27380 | Jul 17, 2019 | Approximate Sample 136g<br>Sample consisted of: Brown fine-grained soil and rocks | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| BH04_0.0-0.2 | 19-JI27382 | Jul 17, 2019 | Approximate Sample 187g<br>Sample consisted of: Brown fine-grained soil and rocks | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| BH05_0.0-0.2 | 19-JI27383 | Jul 17, 2019 | Approximate Sample 158g<br>Sample consisted of: Brown fine-grained soil and rocks | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| SS01_0.0-0.1 | 19-JI27385 | Jul 16, 2019 | Approximate Sample 143g<br>Sample consisted of: Grey fine-grained soil, rocks and bituminous fragments | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| SS02_0.0-0.1 | 19-JI27386 | Jul 16, 2019 | Approximate Sample 208g<br>Sample consisted of: Brown coarse-grained soil, rocks and organic debris | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| SS03_0.0-0.1 | 19-JI27387 | Jul 16, 2019 | Approximate Sample 196g<br>Sample consisted of: Brown coarse-grained soil, rocks and organic debris | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |
| SS05_0.0-0.1 | 19-JI27389 | Jul 16, 2019 | Approximate Sample 48g<br>Sample consisted of: Brown fine-grained soil, rocks and organic debris | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres detected. |

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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.

| Client Sample ID | Eurofins Sample No. | Date Sampled | Sample Description | Result |
|---|---|---|---|---|
| SS06_0.0-0.1 | 19-Jl27390 | Jul 16, 2019 | Approximate Sample 214g<br>Sample consisted of: Brown fine-grained soil and rocks | No asbestos detected at the reporting limit of 0.01% w/w.<br>Organic fibre detected.<br>No respirable fibres 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 (regarding both quality and NATA accreditation).

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 | Jul 19, 2019 | Indefinite |

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e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

**Melbourne**
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NATA # 1261
Site # 1254 & 14271

**Sydney**
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Lane Cove West NSW 2066
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**Brisbane**
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NATA # 1261 Site # 20794

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

**Company Name:** GHD Pty Ltd WOLLONGONG
**Address:** Level 3, 200 Crown St
Wollongong
NSW 2500

**Project Name:** PSI FOR CONTAMINATION
**Project ID:** 2316678

**Order No.:**
**Report #:** 666751
**Phone:** 02 4222 2300
**Fax:** 02 4222 2301

**Received:** Jul 19, 2019 11:00 AM
**Due:** Jul 26, 2019
**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins Analytical Services Manager : Alena Bounkeua**

| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | 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 | BH01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27375 | X | | X | X | | X | X | | X | |
| 2 | BH01_0.3-0.5 | Jul 16, 2019 | | Soil | S19-Jl27376 | | | | X | | | X | | X | |
| 3 | BH02_0.0-0.2 | Jul 16, 2019 | | Soil | S19-Jl27377 | | | | X | | | X | | X | |
| 4 | BH02_0.5-0.8 | Jul 16, 2019 | | Soil | S19-Jl27378 | | | X | | | | X | | X | |
| 5 | BH02_4.2-4.5 | Jul 16, 2019 | | Soil | S19-Jl27379 | | | | X | | | X | | | |
| 6 | BH03_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27380 | X | | X | X | | | X | | X | |
| 7 | BH03_0.5-0.7 | Jul 17, 2019 | | Soil | S19-Jl27381 | | | | X | | | X | | | |
| 8 | BH04_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27382 | X | | X | X | | X | X | | X | |
| 9 | BH05_0.0-0.2 | Jul 17, 2019 | | Soil | S19-Jl27383 | X | | X | X | | X | X | | X | |

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**Received:** Jul 19, 2019 11:00 AM
**Due:** Jul 26, 2019
**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins Analytical Services Manager : Alena Bounkeua**

| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 10 | BH05_0.8-0.95 | Jul 17, 2019 | | Soil | S19-Jl27384 | | | | X | | | X | | X | |
| 11 | SS01_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27385 | X | | | X | | | X | | X | |
| 12 | SS02_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27386 | X | | | | | | X | | X | |
| 13 | SS03_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27387 | X | | X | X | | X | X | | | |
| 14 | SS04_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27388 | | | | X | | X | X | | | |
| 15 | SS05_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27389 | X | | | X | | X | X | | | |
| 16 | SS06_0.0-0.1 | Jul 16, 2019 | | Soil | S19-Jl27390 | X | | | X | | | X | | X | |
| 17 | QC2 | Jul 16, 2019 | | Soil | S19-Jl27391 | | | | X | | | X | | X | |
| 18 | QC3 | Jul 17, 2019 | | Soil | S19-Jl27392 | | | X | X | | X | X | | X | |
| 19 | TRIP SPIKE | Jul 08, 2019 | | Soil | S19-Jl27393 | | | | | X | | | | | |
| 20 | TRIP BLANK | Jul 08, 2019 | | Soil | S19-Jl27394 | | | | | | | | | | X |
| 21 | WB1 | Jul 17, 2019 | | Water | S19-Jl27396 | | | | | | | | X | | |

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**Eurofins Analytical Services Manager : Alena Bounkeua**

| Sample Detail | | | | | | Asbestos - AS4964 | HOLD | Polychlorinated Biphenyls | Metals M8 | BTEX | Eurofins \| mgt Suite B14 | Moisture Set | Eurofins \| mgt Suite B7 | Eurofins \| mgt Suite B4 | BTEXN and Volatile TRH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | | X | X | X | | X | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | | | | X | | | X | X | X |
| **Brisbane Laboratory - NATA Site # 20794** | | | | | | | | | | | | | | | |
| **Perth Laboratory - NATA Site # 23736** | | | | | | | | | | | | | | | |
| 22 | BH01_1.1-1.45 | Jul 16, 2019 | | Soil | S19-Jl27397 | | X | | | | | | | | |
| 23 | BH03_1.25-1.45 | Jul 17, 2019 | | Soil | S19-Jl27398 | | X | | | | | | | | |
| 24 | BH03_2.15-2.45 | Jul 17, 2019 | | Soil | S19-Jl27399 | | X | | | | | | | | |
| 25 | BH04_0.75-0.95 | Jul 17, 2019 | | Soil | S19-Jl27400 | | X | | | | | | | | |
| 26 | BH04_1.75-1.95 | Jul 17, 2019 | | Soil | S19-Jl27401 | | X | | | | | | | | |
| 27 | BH05_1.6-1.7 | Jul 17, 2019 | | Soil | S19-Jl27402 | | X | | | | | | | | |
| 28 | BH05_2.6-2.95 | Jul 17, 2019 | | Soil | S19-Jl27403 | | X | | | | | | | | |
| 29 | QC1 | Jul 16, 2019 | | Soil | S19-Jl27404 | | X | | | | | | | | |
| **Test Counts** | | | | | | 9 | 8 | 7 | 16 | 1 | 7 | 18 | 1 | 13 | 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 | Yes |
| Sample correctly preserved | Yes |
| Appropriate sample containers have been used | Yes |
| Sample containers for volatile analysis received with minimal headspace | Yes |
| Samples received within HoldingTime | Yes |
| Some samples have been subcontracted | No |

## Authorised By

| | |
|---|---|
| Alena Bounkeua | Analytical Services Manager |
| Joseph Edouard | Senior Analyst-Organic (VIC) |
| Harry Bacalis | Senior Analyst-Volatile (VIC) |
| Nibha Vaidya | Senior Analyst-Asbestos (NSW) |
| Emily Rosenberg | Senior Analyst-Metal (VIC) |

**Glenn Jackson**
**General Manager**

- Indicates Not Requested
* Indicates NATA accreditation does not cover the performance of this service
Measurement uncertainty of test data is available on request or please click here.

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## Asbestos Counter/Identifier:

| | |
|---|---|
| Karthik Surisetty | Senior Analyst-Asbestos (NSW) |

## Authorised by:

| | |
|---|---|
| Sayeed Abu | 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.

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

# Sample Receipt Advice

Company name: **GHD Pty Ltd WOLLONGONG**

Contact name: Daniel Deen
Project name: PSI FOR CONTAMINATION
Project ID: 2316678
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jul 19, 2019 11:00 AM
Eurofins | mgt reference: **666751**

## Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☑ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

## Notes

QC3A forwarded to ALS.

## Contact notes

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

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Daniel Deen - Daniel.Deen@ghd.com.

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Email: enquiries.melb@mgtlabmark.com.au

# CHAIN OF CUSTODY RECORD



**CLIENT DETAILS**

| | | | | | |
|---|---|---|---|---|---|
| **Company Name :** | GHD Pty Ltd | **Contact Name:** | Colee Quayle 0403 242 431 | **Purchase Order :** | N/A |
| **Office Address :** | Level 11 200 Crown St | **Project Manager :** | Daniel Deen | **PROJECT Number :** | 2316678 |
| | Wollongong, NSW 2500 | **Email for results :** | colee.quayle@ghd.com | **PROJECT Name :** | PSI for Contamination |

| | |
|---|---|
| **COC Number :** | 20190719C |
| **Eurofins \| mgt quote ID :** | National Agreement |
| **Data output format:** | ESDAT |

**Special Directions & Comments:**

**Eurofins | mgt DI water batch number:**

| | Sample ID | Depth | Date | Matrix | Suite B4: TRH, BTEX, PAH | Suite M8: Metals | Suite: B14: OCP/OPP | PCB | Asbestos (Absence / Presence) | TRH C6-C9 | BTEX | Suite B7: TRH, BTEX, PAH, metals) | Hold |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BH01 | 0.0-0.1 | 16/07/2019 | Soil | x | x | x | x | x | | | | |
| 2 | BH01 | 0.3-0.5 | 16/07/2019 | Soil | x | x | | | | | | | |
| 3 | BH01 | 1.1-1.45 | 16/07/2019 | Soil | | | | | | | | | x |
| 4 | BH02 | 0.0-0.2 | 16/07/2019 | Soil | x | x | | | | | | | |
| 5 | BH02 | 0.5-0.8 | 16/07/2019 | Soil | x | | | x | | | | | |
| 6 | BH02 | 4.2-4.45 | 16/07/2019 | Soil | | x | | | | | | | |
| 7 | BH03 | 0.0-0.2 | 17/07/2019 | Soil | x | x | | x | x | | | | |
| 8 | BH03 | 0.5-0.7 | 17/07/2019 | Soil | | x | | | | | | | |
| 9 | BH03 | 1.25-1.45 | 17/07/2019 | Soil | | | | | | | | | x |
| 10 | BH03 | 2.15-2.45 | 17/07/2019 | Soil | | | | | | | | | x |
| 11 | BH04 | 0.0-0.2 | 17/07/2019 | Soil | x | x | x | x | x | | | | |
| 12 | BH04 | 0.75-0.95 | 17/07/2019 | Soil | | | | | | | | | x |
| 13 | BH04 | 1.75-1.95 | 17/07/2019 | Soil | | | | | | | | | x |
| 14 | BH05 | 0.0-0.2 | 17/07/2019 | Soil | x | x | x | x | x | | | | |
| 15 | BH05 | 0.8-0.95 | 17/07/2019 | Soil | x | x | | | | | | | |
| 16 | BH05 | 1.6-1.7 | 17/07/2019 | Soil | | | | | | | | | x |

**Some common holding times (with correct preservation). For further information contact the lab**

| Waters | | Soils | |
|---|---|---|---|
| BTEX, MAH, VOC | 14 days | BTEX, MAH, VOC | 14 days |
| TRH, PAH, Phenols, Pesticides | 7 days | TRH, PAH, Phenols, Pesticides | 14 days |
| Heavy Metals | 6 months | Heavy Metals | 6 months |
| Mercury, CrVI | 28 days | Mercury, CrVI | 28 days |
| Microbiological testing | 24 hours | Microbiological testing | 72 hours |
| BOD, Nitrate, Nitrite, Total N | 2 days | Anions | 28 days |
| Solids - TSS, TDS etc | 7 days | SPOCAS, pH Field and FOX, CrS | 24 hours |
| Ferrous iron | 7 days | ASLP, TCLP | 7 days |

| Containers: | | | | | | Please test volatile components on the following individual samples |
|---|---|---|---|---|---|---|
| Glass Jar | Ziplock | Vials | Plastic | Amber | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | x | | | | | |
| x | | | | | | |
| x | | | | | | |

| GHD Staff | Courier | Laboratory Staff | Turn around time | Method Of Shipment | Temperature on arrival: |
|---|---|---|---|---|---|
| **Relinquished By:** Colee Quayle | **Received By:** | **Received By:** | 1 DAY ☐ 2 DAY ☐ 3 DAY ☐ | ☑ Courier | 10.70'C |
| **Date & Time** 19/07/2019 | **Date & Time:** 19/07 11:00AM | **Date & Time:** | 5 DAY ☑ 10 DAY ☐ Other: Same Day | ☐ Hand Delivered | **Report number:** |
| **Signature:** | **Signature:** | **Signature:** | | ☐ Postal | 666751 |
| | | | | **Courier Consignment # :** | |

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# CHAIN OF CUSTODY RECORD



**CLIENT DETAILS**

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|---|---|---|---|---|---|
| **Company Name :** | GHD Pty Ltd | **Contact Name:** | Colee Quayle 0403 242 431 | **Purchase Order :** | N/A |
| **Office Address :** | Level 11 200 Crown St | **Project Manager :** | Daniel Deen | **PROJECT Number :** | 2316678 |
| | Wollongong, NSW 2500 | **Email for results :** | colee.quayle@ghd.com | **PROJECT Name :** | PSI for Contamination |

| | |
|---|---|
| **COC Number :** | 20190719D |
| **Eurofins \| mgt quote ID :** | National Agreement |
| **Data output format:** | ESDAT |

**Special Directions & Comments:**

**Eurofins | mgt DI water batch number:**

| | Sample ID | Depth | Date | Matrix | Suite B4: TRH, BTEX, PAH | Suite M8: Metals | Suite: B14: OCP/OPP | PCB | Asbestos (Absence / Presence) | TRH C6-C9 | BTEX | Suite B7: TRH, BTEX, PAH, metals) | Hold |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BH05 | 2.6-2.95 | 17/07/2019 | Soil | | | | | | | | | x |
| 2 | SS01 | 0.0-0.1 | 16/07/2019 | Soil | x | x | | | x | | | | |
| 3 | SS02 | 0.0-0.1 | 16/07/2019 | Soil | x | | | | x | | | | |
| 4 | SS03 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | x | x | | | | |
| 5 | SS04 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | | | | | | |
| 6 | SS05 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | | x | | | | |
| 7 | SS06 | 0.0-0.1 | 16/07/2019 | Soil | x | x | | | x | | | | |
| 8 | QC1 | - | 16/07/2019 | Soil | | | | | | | | | x |
| 9 | QC2 | - | 16/07/2019 | Soil | x | x | | | | | | | |
| 10 | QC3 | - | 17/07/2019 | Soil | x | x | x | x | | | | | |
| 11 | QC3A | - | 17/07/2019 | Soil | x | x | | | | | | | |
| 12 | Trip Spike | - | 8/07/2019 | Soil | | | | | | | x | | |
| 13 | Trip Blank | - | 8/07/2019 | Soil | | | | | | x | x | | |
| 14 | WB1 | - | 17/07/2019 | Water | | | | | | | | x | |
| 15 | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | |

**Some common holding times (with correct preservation). For further information contact the lab**

| Waters | | Soils | |
|---|---|---|---|
| BTEX, MAH, VOC | 14 days | BTEX, MAH, VOC | 14 days |
| TRH, PAH, Phenols, Pesticides | 7 days | TRH, PAH, Phenols, Pesticides | 14 days |
| Heavy Metals | 6 months | Heavy Metals | 6 months |
| Mercury, CrVI | 28 days | Mercury, CrVI | 28 days |
| Microbiological testing | 24 hours | Microbiological testing | 72 hours |
| BOD, Nitrate, Nitrite, Total N | 2 days | Anions | 28 days |
| Solids - TSS, TDS etc | 7 days | SPOCAS, pH Field and FOX, CrS | 24 hours |
| Ferrous iron | 7 days | ASLP, TCLP | 7 days |

**Containers:**

| Glass Jar | Ziplock | Vials | Plastic | Amber | |
|---|---|---|---|---|---|
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | | | | | |
| x | | | | | |
| x | | | | | |
| x | | | | | |
| | | x | | | |
| | | x | | | |
| | | x | x | x | |

**Please test volatile components on the following individual samples**

**Please send to ALS**

| GHD Staff | Courier | Laboratory Staff |
|---|---|---|
| **Relinquished By:** Colee Quayle | **Received By:** | **Received By:** |
| **Date & Time** 19/07/2019 | **Date & Time:** | **Date & Time:** |
| **Signature:** | **Signature:** | **Signature:** |

**Turn around time**

1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other: Same Day

**Method Of Shipment**

☑ Courier
☐ Hand Delivered
☐ Postal
**Courier Consignment # :**

**Temperature on arrival:**

**Report number:**

ALS Environmental

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **ES1922956** | Page | : 1 of 6 |
| Client | : **GHD PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : Colee Quayle | Contact | : Customer Services ES |
| Address | : Level 11, 200 Crown Street, Wollongong, NSW 2500 2500 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : 2316678 | Date Samples Received | : 22-Jul-2019 14:20 |
| Order number | : 2316672 | Date Analysis Commenced | : 24-Jul-2019 |
| C-O-C number | : 20190719D | Issue Date | : 29-Jul-2019 22:35 |
| Sampler | : ---- | | |
| Site | : | | |
| Quote number | : EN/005/18 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Celine Conceicao | Senior Spectroscopist | Sydney Inorganics, Smithfield, NSW |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |
| Evie Sidarta | Inorganic Chemist | Sydney Inorganics, Smithfield, NSW |
| Sanjeshni Jyoti | Senior Chemist Volatiles | Sydney Organics, Smithfield, NSW |

## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | Client sample ID | QC3A | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|
| | | | Client sampling date / time | 17-Jul-2019 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | ES1922956-001 | -------- | -------- | -------- | -------- |
| | | | | Result | ---- | ---- | ---- | ---- |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | | |
| Moisture Content | ---- | 1.0 | % | **5.9** | ---- | ---- | ---- | ---- |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | | |
| Arsenic | 7440-38-2 | 5 | mg/kg | <5 | ---- | ---- | ---- | ---- |
| Cadmium | 7440-43-9 | 1 | mg/kg | <1 | ---- | ---- | ---- | ---- |
| Chromium | 7440-47-3 | 2 | mg/kg | **22** | ---- | ---- | ---- | ---- |
| Copper | 7440-50-8 | 5 | mg/kg | **5** | ---- | ---- | ---- | ---- |
| Lead | 7439-92-1 | 5 | mg/kg | **29** | ---- | ---- | ---- | ---- |
| Nickel | 7440-02-0 | 2 | mg/kg | **9** | ---- | ---- | ---- | ---- |
| Zinc | 7440-66-6 | 5 | mg/kg | **51** | ---- | ---- | ---- | ---- |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | | |
| Mercury | 7439-97-6 | 0.1 | mg/kg | <0.1 | ---- | ---- | ---- | ---- |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | | |
| Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Fluoranthene | 206-44-0 | 0.5 | mg/kg | **0.8** | ---- | ---- | ---- | ---- |
| Pyrene | 129-00-0 | 0.5 | mg/kg | **0.8** | ---- | ---- | ---- | ---- |
| Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Benzo(b+j)fluoranthene | 205-99-2 205-82-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Indeno(1.2.3.cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Dibenz(a.h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| Benzo(g.h.i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| ^ Sum of polycyclic aromatic hydrocarbons | ---- | 0.5 | mg/kg | **1.6** | ---- | ---- | ---- | ---- |
| ^ Benzo(a)pyrene TEQ (zero) | ---- | 0.5 | mg/kg | <0.5 | ---- | ---- | ---- | ---- |
| ^ Benzo(a)pyrene TEQ (half LOR) | ---- | 0.5 | mg/kg | **0.6** | ---- | ---- | ---- | ---- |
| ^ Benzo(a)pyrene TEQ (LOR) | ---- | 0.5 | mg/kg | **1.2** | ---- | ---- | ---- | ---- |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | |
| C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Client sample ID | QC3A | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 17-Jul-2019 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | ES1922956-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EP080/071: Total Petroleum Hydrocarbons - Continued** | | | | | | | | | |
| **C10 - C14 Fraction** | ---- | 50 | mg/kg | | <50 | ---- | ---- | ---- | ---- |
| **C15 - C28 Fraction** | ---- | 100 | mg/kg | | <100 | ---- | ---- | ---- | ---- |
| **C29 - C36 Fraction** | ---- | 100 | mg/kg | | <100 | ---- | ---- | ---- | ---- |
| ^ **C10 - C36 Fraction (sum)** | ---- | 50 | mg/kg | | <50 | ---- | ---- | ---- | ---- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |
| **C6 - C10 Fraction** | C6_C10 | 10 | mg/kg | | <10 | ---- | ---- | ---- | ---- |
| ^ **C6 - C10 Fraction minus BTEX (F1)** | C6_C10-BTEX | 10 | mg/kg | | <10 | ---- | ---- | ---- | ---- |
| **>C10 - C16 Fraction** | ---- | 50 | mg/kg | | <50 | ---- | ---- | ---- | ---- |
| **>C16 - C34 Fraction** | ---- | 100 | mg/kg | | **110** | ---- | ---- | ---- | ---- |
| **>C34 - C40 Fraction** | ---- | 100 | mg/kg | | <100 | ---- | ---- | ---- | ---- |
| ^ **>C10 - C40 Fraction (sum)** | ---- | 50 | mg/kg | | **110** | ---- | ---- | ---- | ---- |
| ^ **>C10 - C16 Fraction minus Naphthalene (F2)** | ---- | 50 | mg/kg | | <50 | ---- | ---- | ---- | ---- |
| **EP080: BTEXN** | | | | | | | | | |
| **Benzene** | 71-43-2 | 0.2 | mg/kg | | <0.2 | ---- | ---- | ---- | ---- |
| **Toluene** | 108-88-3 | 0.5 | mg/kg | | <0.5 | ---- | ---- | ---- | ---- |
| **Ethylbenzene** | 100-41-4 | 0.5 | mg/kg | | <0.5 | ---- | ---- | ---- | ---- |
| **meta- & para-Xylene** | 108-38-3 106-42-3 | 0.5 | mg/kg | | <0.5 | ---- | ---- | ---- | ---- |
| **ortho-Xylene** | 95-47-6 | 0.5 | mg/kg | | <0.5 | ---- | ---- | ---- | ---- |
| ^ **Sum of BTEX** | ---- | 0.2 | mg/kg | | <0.2 | ---- | ---- | ---- | ---- |
| ^ **Total Xylenes** | ---- | 0.5 | mg/kg | | <0.5 | ---- | ---- | ---- | ---- |
| **Naphthalene** | 91-20-3 | 1 | mg/kg | | <1 | ---- | ---- | ---- | ---- |
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | | | | | | | |
| **Phenol-d6** | 13127-88-3 | 0.5 | % | | **90.1** | ---- | ---- | ---- | ---- |
| **2-Chlorophenol-D4** | 93951-73-6 | 0.5 | % | | **93.7** | ---- | ---- | ---- | ---- |
| **2.4.6-Tribromophenol** | 118-79-6 | 0.5 | % | | **56.6** | ---- | ---- | ---- | ---- |
| **EP075(SIM)T: PAH Surrogates** | | | | | | | | | |
| **2-Fluorobiphenyl** | 321-60-8 | 0.5 | % | | **92.0** | ---- | ---- | ---- | ---- |
| **Anthracene-d10** | 1719-06-8 | 0.5 | % | | **97.5** | ---- | ---- | ---- | ---- |
| **4-Terphenyl-d14** | 1718-51-0 | 0.5 | % | | **94.1** | ---- | ---- | ---- | ---- |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| **1.2-Dichloroethane-D4** | 17060-07-0 | 0.2 | % | | **103** | ---- | ---- | ---- | ---- |
| **Toluene-D8** | 2037-26-5 | 0.2 | % | | **106** | ---- | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: SOIL (Matrix: SOIL) | | | | Client sample ID | QC3A | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 17-Jul-2019 00:00 | ---- | ---- | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | ES1922956-001 | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- |
| **EP080S: TPH(V)/BTEX Surrogates - Continued** | | | | | | | | | |
| **4-Bromofluorobenzene** | 460-00-4 | 0.2 | % | | **111** | ---- | ---- | ---- | ---- |

## Surrogate Control Limits

Sub-Matrix: **SOIL**

| Compound | CAS Number | Recovery Limits (%) Low | High |
|---|---|---|---|
| **EP075(SIM)S: Phenolic Compound Surrogates** | | | |
| **Phenol-d6** | 13127-88-3 | 63 | 123 |
| **2-Chlorophenol-D4** | 93951-73-6 | 66 | 122 |
| **2.4.6-Tribromophenol** | 118-79-6 | 40 | 138 |
| **EP075(SIM)T: PAH Surrogates** | | | |
| **2-Fluorobiphenyl** | 321-60-8 | 70 | 122 |
| **Anthracene-d10** | 1719-06-8 | 66 | 128 |
| **4-Terphenyl-d14** | 1718-51-0 | 65 | 129 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | |
| **1.2-Dichloroethane-D4** | 17060-07-0 | 73 | 133 |
| **Toluene-D8** | 2037-26-5 | 74 | 132 |
| **4-Bromofluorobenzene** | 460-00-4 | 72 | 130 |

ALS Environmental

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **ES1922956** | Page | : 1 of 7 |
| Client | : **GHD PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : Colee Quayle | Contact | : Customer Services ES |
| Address | : Level 11, 200 Crown Street, Wollongong, NSW 2500 2500 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : 2316678 | Date Samples Received | : 22-Jul-2019 |
| Order number | : 2316672 | Date Analysis Commenced | : 24-Jul-2019 |
| C-O-C number | : 20190719D | Issue Date | : 29-Jul-2019 |
| Sampler | : ---- | | |
| Site | : | | |
| Quote number | : EN/005/18 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Celine Conceicao | Senior Spectroscopist | Sydney Inorganics, Smithfield, NSW |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |
| Evie Sidarta | Inorganic Chemist | Sydney Inorganics, Smithfield, NSW |
| Sanjeshni Jyoti | Senior Chemist Volatiles | Sydney Organics, Smithfield, NSW |

## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Recovery Limits (%)* |
| **EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2486176)** | | | | | | | | | |
| ES1922909-010 | Anonymous | EG005T: Copper | 7440-50-8 | 5 | mg/kg | 113 | 114 | 0.00 | 0% - 20% |
| | | EG005T: Lead | 7439-92-1 | 5 | mg/kg | 262 | 274 | 4.30 | 0% - 20% |
| | | EG005T: Zinc | 7440-66-6 | 5 | mg/kg | 312 | 308 | 1.35 | 0% - 20% |
| ES1922909-010 | Anonymous | EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | 1 | 1 | 0.00 | No Limit |
| | | EG005T: Chromium | 7440-47-3 | 2 | mg/kg | 12 | 8 | 41.2 | No Limit |
| | | EG005T: Nickel | 7440-02-0 | 2 | mg/kg | 10 | 7 | 37.1 | No Limit |
| | | EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | <5 | <5 | 0.00 | No Limit |
| ES1922968-032 | Anonymous | EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |
| | | EG005T: Chromium | 7440-47-3 | 2 | mg/kg | 33 | 36 | 10.3 | 0% - 50% |
| | | EG005T: Nickel | 7440-02-0 | 2 | mg/kg | 14 | 20 | 36.2 | 0% - 50% |
| | | EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | 12 | 17 | 29.4 | No Limit |
| | | EG005T: Copper | 7440-50-8 | 5 | mg/kg | 71 | 98 | 32.3 | 0% - 50% |
| | | EG005T: Lead | 7439-92-1 | 5 | mg/kg | 29 | 39 | 29.1 | No Limit |
| | | EG005T: Zinc | 7440-66-6 | 5 | mg/kg | 169 | 203 | 18.5 | 0% - 20% |
| **EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2486181)** | | | | | | | | | |
| ES1922591-006 | Anonymous | EA055: Moisture Content | ---- | 0.1 | % | 11.3 | 10.7 | 5.13 | 0% - 50% |
| ES1922909-008 | Anonymous | EA055: Moisture Content | ---- | 0.1 | % | 8.7 | 8.3 | 4.94 | No Limit |
| **EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2486177)** | | | | | | | | | |
| ES1922909-010 | Anonymous | EG035T: Mercury | 7439-97-6 | 0.1 | mg/kg | 0.7 | 0.6 | 28.4 | No Limit |
| ES1922968-032 | Anonymous | EG035T: Mercury | 7439-97-6 | 0.1 | mg/kg | <0.1 | <0.1 | 0.00 | No Limit |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2482801)** | | | | | | | | | |
| ES1922960-001 | Anonymous | EP075(SIM): Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |

Sub-Matrix: **SOIL**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Recovery Limits (%)* |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2482801) - continued** | | | | | | | | | |
| ES1922960-001 | Anonymous | EP075(SIM): Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Fluoranthene | 206-44-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Pyrene | 129-00-0 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Indeno(1.2.3.cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Dibenz(a.h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(g.h.i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Sum of polycyclic aromatic hydrocarbons | ---- | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP075(SIM): Benzo(a)pyrene TEQ (zero) | ---- | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2482802)** | | | | | | | | | |
| ES1922960-001 | Anonymous | EP071: C15 - C28 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: C10 - C14 Fraction | ---- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2485948)** | | | | | | | | | |
| ES1922956-001 | QC3A | EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| ES1922968-047 | Anonymous | EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2482802)** | | | | | | | | | |
| ES1922960-001 | Anonymous | EP071: >C16 - C34 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | <100 | 0.00 | No Limit |
| | | EP071: >C10 - C16 Fraction | ---- | 50 | mg/kg | <50 | <50 | 0.00 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2485948)** | | | | | | | | | |
| ES1922956-001 | QC3A | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| ES1922968-047 | Anonymous | EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | <10 | 0.00 | No Limit |
| **EP080: BTEXN (QC Lot: 2485948)** | | | | | | | | | |
| ES1922956-001 | QC3A | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |

Sub-Matrix: **SOIL**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Recovery Limits (%)* |
| **EP080: BTEXN (QC Lot: 2485948) - continued** | | | | | | | | | |
| ES1922968-047 | Anonymous | EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | <0.2 | 0.00 | No Limit |
| | | EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | <0.5 | 0.00 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | <1 | 0.00 | No Limit |

## Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2486176)** | | | | | | | | |
| EG005T: Arsenic | 7440-38-2 | 5 | mg/kg | <5 | 21.7 mg/kg | 116 | 86 | 126 |
| EG005T: Cadmium | 7440-43-9 | 1 | mg/kg | <1 | 4.64 mg/kg | 113 | 83 | 113 |
| EG005T: Chromium | 7440-47-3 | 2 | mg/kg | <2 | 43.9 mg/kg | 117 | 76 | 128 |
| EG005T: Copper | 7440-50-8 | 5 | mg/kg | <5 | 32 mg/kg | 112 | 86 | 120 |
| EG005T: Lead | 7439-92-1 | 5 | mg/kg | <5 | 40 mg/kg | 112 | 80 | 114 |
| EG005T: Nickel | 7440-02-0 | 2 | mg/kg | <2 | 55 mg/kg | 121 | 87 | 123 |
| EG005T: Zinc | 7440-66-6 | 5 | mg/kg | <5 | 60.8 mg/kg | 121 | 80 | 122 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 2486177)** | | | | | | | | |
| EG035T: Mercury | 7439-97-6 | 0.1 | mg/kg | <0.1 | 2.57 mg/kg | 99.0 | 70 | 105 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2482801)** | | | | | | | | |
| EP075(SIM): Naphthalene | 91-20-3 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 98.4 | 77 | 125 |
| EP075(SIM): Acenaphthylene | 208-96-8 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 97.7 | 72 | 124 |
| EP075(SIM): Acenaphthene | 83-32-9 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 95.9 | 73 | 127 |
| EP075(SIM): Fluorene | 86-73-7 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 94.1 | 72 | 126 |
| EP075(SIM): Phenanthrene | 85-01-8 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 99.1 | 75 | 127 |
| EP075(SIM): Anthracene | 120-12-7 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 89.2 | 77 | 127 |
| EP075(SIM): Fluoranthene | 206-44-0 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 93.4 | 73 | 127 |
| EP075(SIM): Pyrene | 129-00-0 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 97.8 | 74 | 128 |
| EP075(SIM): Benz(a)anthracene | 56-55-3 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 88.7 | 69 | 123 |
| EP075(SIM): Chrysene | 218-01-9 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 89.3 | 75 | 127 |
| EP075(SIM): Benzo(b+j)fluoranthene | 205-99-2<br>205-82-3 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 91.1 | 68 | 116 |
| EP075(SIM): Benzo(k)fluoranthene | 207-08-9 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 90.9 | 74 | 126 |
| EP075(SIM): Benzo(a)pyrene | 50-32-8 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 91.2 | 70 | 126 |
| EP075(SIM): Indeno(1.2.3.cd)pyrene | 193-39-5 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 82.2 | 61 | 121 |
| EP075(SIM): Dibenz(a.h)anthracene | 53-70-3 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 85.1 | 62 | 118 |
| EP075(SIM): Benzo(g.h.i)perylene | 191-24-2 | 0.5 | mg/kg | <0.5 | 6 mg/kg | 85.9 | 63 | 121 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 2482802)** | | | | | | | | |
| EP071: C10 - C14 Fraction | ---- | 50 | mg/kg | <50 | 300 mg/kg | 95.4 | 75 | 129 |
| EP071: C15 - C28 Fraction | ---- | 100 | mg/kg | <100 | 450 mg/kg | 94.7 | 77 | 131 |
| EP071: C29 - C36 Fraction | ---- | 100 | mg/kg | <100 | 300 mg/kg | 91.0 | 71 | 129 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 2485948)** | | | | | | | | |
| EP080: C6 - C9 Fraction | ---- | 10 | mg/kg | <10 | 26 mg/kg | 75.8 | 68 | 128 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2482802)** | | | | | | | | |

Sub-Matrix: **SOIL**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Recovery Limits (%): Low | Recovery Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2482802) - continued** | | | | | | | | |
| EP071: >C10 - C16 Fraction | ---- | 50 | mg/kg | <50 | 375 mg/kg | 95.0 | 77 | 125 |
| EP071: >C16 - C34 Fraction | ---- | 100 | mg/kg | <100 | 525 mg/kg | 93.8 | 74 | 138 |
| EP071: >C34 - C40 Fraction | ---- | 100 | mg/kg | <100 | 225 mg/kg | 81.1 | 63 | 131 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2485948)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 10 | mg/kg | <10 | 31 mg/kg | 76.8 | 68 | 128 |
| **EP080: BTEXN (QCLot: 2485948)** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 0.2 | mg/kg | <0.2 | 1 mg/kg | 83.6 | 62 | 116 |
| EP080: Toluene | 108-88-3 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 80.6 | 67 | 121 |
| EP080: Ethylbenzene | 100-41-4 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 80.0 | 65 | 117 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 0.5 | mg/kg | <0.5 | 2 mg/kg | 81.2 | 66 | 118 |
| EP080: ortho-Xylene | 95-47-6 | 0.5 | mg/kg | <0.5 | 1 mg/kg | 84.1 | 68 | 120 |
| EP080: Naphthalene | 91-20-3 | 1 | mg/kg | <1 | 1 mg/kg | 93.7 | 63 | 119 |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | SpikeRecovery(%): MS | Recovery Limits (%): Low | Recovery Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2486176)** | | | | | | | |
| ES1922909-010 | Anonymous | EG005T: Arsenic | 7440-38-2 | 50 mg/kg | 103 | 70 | 130 |
| | | EG005T: Cadmium | 7440-43-9 | 50 mg/kg | 99.1 | 70 | 130 |
| | | EG005T: Chromium | 7440-47-3 | 50 mg/kg | 99.6 | 70 | 130 |
| | | EG005T: Copper | 7440-50-8 | 250 mg/kg | 103 | 70 | 130 |
| | | EG005T: Lead | 7439-92-1 | 250 mg/kg | 104 | 70 | 130 |
| | | EG005T: Nickel | 7440-02-0 | 50 mg/kg | 107 | 70 | 130 |
| | | EG005T: Zinc | 7440-66-6 | 250 mg/kg | 96.6 | 70 | 130 |
| **EG035T: Total Recoverable Mercury by FIMS (QCLot: 2486177)** | | | | | | | |
| ES1922909-010 | Anonymous | EG035T: Mercury | 7439-97-6 | 5 mg/kg | 96.8 | 70 | 130 |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2482801)** | | | | | | | |
| ES1922960-001 | Anonymous | EP075(SIM): Acenaphthene | 83-32-9 | 10 mg/kg | 88.7 | 70 | 130 |
| | | EP075(SIM): Pyrene | 129-00-0 | 10 mg/kg | 98.6 | 70 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 2482802)** | | | | | | | |
| ES1922960-001 | Anonymous | EP071: C10 - C14 Fraction | ---- | 523 mg/kg | 81.4 | 73 | 137 |
| | | EP071: C15 - C28 Fraction | ---- | 2319 mg/kg | 84.8 | 53 | 131 |

Sub-Matrix: **SOIL**

| | | | | Matrix Spike (MS) Report | | | |
|---|---|---|---|---|---|---|---|
| | | | | Spike | SpikeRecovery(%) | Recovery Limits (%) | |
| *Laboratory sample ID* | *Client sample ID* | *Method: Compound* | *CAS Number* | *Concentration* | *MS* | *Low* | *High* |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 2482802) - continued** | | | | | | | |
| ES1922960-001 | Anonymous | EP071: C29 - C36 Fraction | ---- | 1714 mg/kg | 80.4 | 52 | 132 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 2485948)** | | | | | | | |
| ES1922956-001 | QC3A | EP080: C6 - C9 Fraction | ---- | 32.5 mg/kg | 88.8 | 70 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2482802)** | | | | | | | |
| ES1922960-001 | Anonymous | EP071: >C10 - C16 Fraction | ---- | 860 mg/kg | 78.4 | 73 | 137 |
| | | EP071: >C16 - C34 Fraction | ---- | 3223 mg/kg | 82.2 | 53 | 131 |
| | | EP071: >C34 - C40 Fraction | ---- | 1058 mg/kg | 81.4 | 52 | 132 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2485948)** | | | | | | | |
| ES1922956-001 | QC3A | EP080: C6 - C10 Fraction | C6_C10 | 37.5 mg/kg | 88.7 | 70 | 130 |
| **EP080: BTEXN (QCLot: 2485948)** | | | | | | | |
| ES1922956-001 | QC3A | EP080: Benzene | 71-43-2 | 2.5 mg/kg | 86.9 | 70 | 130 |
| | | EP080: Toluene | 108-88-3 | 2.5 mg/kg | 87.6 | 70 | 130 |
| | | EP080: Ethylbenzene | 100-41-4 | 2.5 mg/kg | 90.0 | 70 | 130 |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2.5 mg/kg | 89.0 | 70 | 130 |
| | | EP080: ortho-Xylene | 95-47-6 | 2.5 mg/kg | 91.8 | 70 | 130 |
| | | EP080: Naphthalene | 91-20-3 | 2.5 mg/kg | 101 | 70 | 130 |

ALS Environmental

# QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| **Work Order** | : **ES1922956** | Page | : 1 of 4 |
| Client | : **GHD PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : Colee Quayle | Telephone | : +61-2-8784 8555 |
| Project | : 2316678 | Date Samples Received | : 22-Jul-2019 |
| Site | : | Issue Date | : 29-Jul-2019 |
| Sampler | : ---- | No. of samples received | : 1 |
| Order number | : 2316672 | No. of samples analysed | : 1 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

## Summary of Outliers

### Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

### Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

### Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

# Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EA055: Moisture Content (Dried @ 105-110°C)** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EA055)** | | | | | | | |
| QC3A | **17-Jul-2019** | **----** | ---- | ---- | **24-Jul-2019** | 31-Jul-2019 | ✓ |
| **EG005(ED093)T: Total Metals by ICP-AES** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EG005T)** | | | | | | | |
| QC3A | **17-Jul-2019** | **25-Jul-2019** | 13-Jan-2020 | ✓ | **25-Jul-2019** | 13-Jan-2020 | ✓ |
| **EG035T: Total Recoverable Mercury by FIMS** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EG035T)** | | | | | | | |
| QC3A | **17-Jul-2019** | **25-Jul-2019** | 14-Aug-2019 | ✓ | **26-Jul-2019** | 14-Aug-2019 | ✓ |
| **EP075(SIM)B: Polynuclear Aromatic Hydrocarbons** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP075(SIM))** | | | | | | | |
| QC3A | **17-Jul-2019** | **26-Jul-2019** | 31-Jul-2019 | ✓ | **27-Jul-2019** | 04-Sep-2019 | ✓ |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP080)** | | | | | | | |
| QC3A | **17-Jul-2019** | **24-Jul-2019** | 31-Jul-2019 | ✓ | **26-Jul-2019** | 31-Jul-2019 | ✓ |
| **Soil Glass Jar - Unpreserved (EP071)** | | | | | | | |
| QC3A | **17-Jul-2019** | **26-Jul-2019** | 31-Jul-2019 | ✓ | **27-Jul-2019** | 04-Sep-2019 | ✓ |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP080)** | | | | | | | |
| QC3A | **17-Jul-2019** | **24-Jul-2019** | 31-Jul-2019 | ✓ | **26-Jul-2019** | 31-Jul-2019 | ✓ |
| **Soil Glass Jar - Unpreserved (EP071)** | | | | | | | |
| QC3A | **17-Jul-2019** | **26-Jul-2019** | 31-Jul-2019 | ✓ | **27-Jul-2019** | 04-Sep-2019 | ✓ |
| **EP080: BTEXN** | | | | | | | |
| **Soil Glass Jar - Unpreserved (EP080)** | | | | | | | |
| QC3A | **17-Jul-2019** | **24-Jul-2019** | 31-Jul-2019 | ✓ | **26-Jul-2019** | 31-Jul-2019 | ✓ |

# Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Moisture Content | EA055 | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 7 | **14.29** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Mercury by FIMS | EG035T | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 3 | 20 | **15.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 7 | **14.29** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Mercury by FIMS | EG035T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 7 | **14.29** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Mercury by FIMS | EG035T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| PAH/Phenols (SIM) | EP075(SIM) | 1 | 7 | **14.29** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Mercury by FIMS | EG035T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Metals by ICP-AES | EG005T | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Moisture Content | EA055 | SOIL | In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time). |
| Total Metals by ICP-AES | EG005T | SOIL | In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3) |
| Total Mercury by FIMS | EG035T | SOIL | In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3) |
| TRH - Semivolatile Fraction | EP071 | SOIL | In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013. |
| PAH/Phenols (SIM) | EP075(SIM) | SOIL | In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507) |
| TRH Volatiles/BTEX | EP080 | SOIL | In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013. |

| Preparation Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Hot Block Digest for metals in soils sediments and sludges | EN69 | SOIL | In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202) |
| Methanolic Extraction of Soils for Purge and Trap | ORG16 | SOIL | In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS. |
| Tumbler Extraction of Solids | ORG17 | SOIL | In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis. |

# SAMPLE RECEIPT NOTIFICATION (SRN)

**Work Order** : **ES1922956**

| | | | |
|---|---|---|---|
| Client | : **GHD PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : Colee Quayle | Contact | : Customer Services ES |
| Address | : Level 11, 200 Crown Street, Wollongong, NSW 2500 2500 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail | : colee.quayle@ghd.com | E-mail | : ALSEnviro.Sydney@ALSGlobal.com |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Facsimile | : ---- | Facsimile | : +61-2-8784 8500 |
| Project | : 2316678 | Page | : 1 of 2 |
| Order number | : 2316672 | Quote number | : ES2018GHDSER0025 (EN/005/18) |
| C-O-C number | : 20190719D | QC Level | : NEPM 2013 B3 & ALS QC Standard |
| Site | : | | |
| Sampler | : | | |

## Dates

| | | | |
|---|---|---|---|
| Date Samples Received | : 22-Jul-2019 14:20 | Issue Date | : 23-Jul-2019 |
| Client Requested Due Date | : 29-Jul-2019 | Scheduled Reporting Date | : **29-Jul-2019** |

## Delivery Details

| | | | |
|---|---|---|---|
| Mode of Delivery | : Carrier | Security Seal | : Not Available |
| No. of coolers/boxes | : 1 | Temperature | : 10.1'C - Ice Bricks present |
| Receipt Detail | : | No. of samples received / analysed | : 1 / 1 |

## General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

## Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

## Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

| Laboratory sample ID | Client sampling date / time | Client sample ID | SOIL - EA055-103 Moisture Content | SOIL - S-26 8 metals/TRH/BTEXN/PAH |
|---|---|---|---|---|
| ES1922956-001 | 17-Jul-2019 00:00 | QC3A | ✓ | ✓ |

## Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

## Requested Deliverables

| | | |
|---|---|---|
| **ACCOUNTS PAYABLE (Hobart)** | | |
| - A4 - AU Tax Invoice (INV) | Email | accountspayableAU@ghd.com |
| **Accounts Payable Australia** | | |
| - A4 - AU Tax Invoice (INV) | Email | accountspayableAU@ghd.com |
| **Colee Quayle** | | |
| - *AU Certificate of Analysis - NATA (COA) | Email | colee.quayle@ghd.com |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | colee.quayle@ghd.com |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | colee.quayle@ghd.com |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | colee.quayle@ghd.com |
| - A4 - AU Tax Invoice (INV) | Email | colee.quayle@ghd.com |
| - Chain of Custody (CoC) (COC) | Email | colee.quayle@ghd.com |
| - EDI Format - ENMRG (ENMRG) | Email | colee.quayle@ghd.com |
| - EDI Format - ESDAT (ESDAT) | Email | colee.quayle@ghd.com |
| - Electronic SRN for ESdat (ESRN_ESDAT) | Email | colee.quayle@ghd.com |
| **GHD LAB REPORTS** | | |
| - *AU Certificate of Analysis - NATA (COA) | Email | ghdlabreports@ghd.com |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | ghdlabreports@ghd.com |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | ghdlabreports@ghd.com |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | ghdlabreports@ghd.com |
| - EDI Format - ESDAT (ESDAT) | Email | ghdlabreports@ghd.com |
| - Electronic SRN for ESdat (ESRN_ESDAT) | Email | ghdlabreports@ghd.com |

eurofins | mgt

**Sydney** ☑
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
Phone: +612 9900 8400
Email: enviro.syd@mgtlabmark.com.au

**Brisbane** ☐
Unit 1-21 Smallwood Place, Murrarie
Phone: +617 3902 4600
Email: enviro.bris@mgtlabmark.com.au

**Melbourne** ☐
2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

# CHAIN OF CUSTODY RECORD



**CLIENT DETAILS**

Company Name : GHD Pty Ltd
Office Address : Level 11 200 Crown St
Wollongong, NSW 2500

Contact Name: Colee Quayle 0403 242 431
Project Manager : Daniel Deen
Email for results : colee.quayle@ghd.com

Purchase Order : N/A
PROJECT Number : 2316678
PROJECT Name : PSI for Contamination

COC Number : 20190719D
Eurofins | mgt quote ID : National Agreement
Data output format: ESDAT

Special Directions & Comments:

Eurofins | mgt DI water batch number:

Environmental Division
Sydney
Work Order Reference
ES1922956

Telephone : +61-2-8784 8555

| | Sample ID | Depth | Date | Matrix | Suite B4: TRH, BTEX, PAH | Suite M8: Metals | Suite: B14: OCP/OPP | PCB | Asbestos (Absence / Presence) | TRH C6-C9 | BTEX | Suite B7: TRH, BTEX, PAH, metals) | Hold |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BH05 | 2.6-2.95 | 17/07/2019 | Soil | | | | | | | | | |
| 2 | SS01 | 0.0-0.1 | 16/07/2019 | Soil | x | x | | | x | | | | x |
| 3 | SS02 | 0.0-0.1 | 16/07/2019 | Soil | x | | | | x | | | | |
| 4 | SS03 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | x | x | | | | |
| 5 | SS04 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | | | | | | |
| 6 | SS05 | 0.0-0.1 | 16/07/2019 | Soil | | x | x | | x | | | | |
| 7 | SS06 | 0.0-0.1 | 16/07/2019 | Soil | x | x | | | x | | | | |
| 8 | QC1 | - | 16/07/2019 | Soil | | | | | | | | | |
| 9 | QC2 | - | 16/07/2019 | Soil | x | x | | | | | | | x |
| 10 | QC3 | - | 17/07/2019 | Soil | x | x | x | x | | | | | |
| 11 | QC3A | - | 17/07/2019 | Soil | x | x | | | | | | | |
| 12 | Trip Spike | - | 8/07/2019 | Soil | | | | | | x | | | |
| 13 | Trip Blank | - | 8/07/2019 | Soil | | | | | x | x | | | |
| 14 | WB1 | - | 17/07/2019 | Water | | | | | | | x | | |
| 15 | | | | | | | | | | | | x | |
| 16 | | | | | | | | | | | | | |

**Some common holding times (with correct preservation).**
For further information contact the lab

| Waters | | Soils | |
|---|---|---|---|
| BTEX, MAH, VOC | 14 days | BTEX, MAH, VOC | 14 days |
| TRH, PAH, Phenols, Pesticides | 7 days | TRH, PAH, Phenols, Pesticides | 14 days |
| Heavy Metals | 6 months | Heavy Metals | 6 months |
| Mercury, CrVI | 28 days | Mercury, CrVI | 28 days |
| Microbiological testing | 24 hours | Microbiological testing | 72 hours |
| BOD, Nitrate, Nitrite, Total N | 2 days | Anions | 28 days |
| Solids - TSS, TDS etc | 7 days | SPOCAS, pH Field and FOX, CrS | 24 hours |
| Ferrous iron | 7 days | ASLP, TCLP | 7 days |

**Containers:**

| Glass Jar | Ziplock | Vials | Plastic | Amber | |
|---|---|---|---|---|---|
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | x | | | | |
| x | | | | | |
| x | | | | | |
| x | | | | | |
| x | | | | | |
| | | x | | | |
| | | x | | | |
| | | x | x | x | |
| | | | | | |

**Please test volatile components on the following individual samples**

**Please send to ALS**

**GHD Staff**
Relinquished By: Colee Quayle
Date & Time 19/07/2019
Signature:

**Courier**
Received By: Lupan
Date & Time: 19/07
Signature:

**Laboratory Staff**
Received By:
Date & Time:
Signature:

**Turn around time**
1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other: Same Day

**Method Of Shipment**
☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival:

Report number:

Received: Sep - ALS Gows Nest
22/7/19 1420

# **Appendix J** – Laboratory Results (Geotechnical)

**Sydney Laboratory**
Unit 5/43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax:(02) 9462 4710

# Aggregate/Soil Test Report

**Report No: SYD1901812**
**Issue No: 1**
*This report replaces all previous issues of report no 'SYD1901812'.*

**Client:**
TAFE NSW
PO Box W154
Parramatta NSW

**Project:** 2316678

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 8/08/2019

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

## Sample Details

| | |
|---|---|
| **GHD Sample No** | SYD19-0323-01 |
| **Date Sampled** | 16/07/2019 |
| **Sampled By** | Sampled by GHD |
| **Location** | 1 McKee Dr, Bega |
| **BH / TP No.** | BH01A |
| **Depth (m)** | 0.0 - 0.2 |
| **Soil Description** | Sandy SILT trace gravel brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Moisture Content (%) | AS 1289.2.1.1 | 9.4 | |
| Date Tested | | 1/08/2019 | |
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | 8.5 | |
| Mould Length (mm) | | 125 | |
| Crumbling | | No | |
| Curling | | No | |
| Cracking | | Yes | |
| Liquid Limit (%) | AS 1289.3.1.1 | 43 | |
| Method | | Four Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 35 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 8 | |
| Date Tested | | 5/08/2019 | |

## Comments

N/A


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**Sydney Laboratory**
Unit 5/43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax:(02) 9462 4710

# Aggregate/Soil Test Report

**Report No: SYD1901813**
**Issue No: 1**
*This report replaces all previous issues of report no 'SYD1901813'.*

**Client:**
TAFE NSW
PO Box W154
Parramatta NSW

**Project:** 2316678

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 8/08/2019

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

## Sample Details

| | |
|---|---|
| **GHD Sample No** | SYD19-0323-02 |
| **Date Sampled** | 16/07/2019 |
| **Sampled By** | Sampled by GHD |
| **Location** | 1 McKee Dr, Bega |
| **BH / TP No.** | BH02 |
| **Depth (m)** | 0.1 - 0.2 |
| **Soil Description** | Sandy SILT brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Moisture Content (%) | AS 1289.2.1.1 | 12.8 | |
| Date Tested | | 1/08/2019 | |
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | N/A | |
| Mould Length (mm) | | 0 | |
| Crumbling | | No | |
| Curling | | No | |
| Cracking | | No | |
| Liquid Limit (%) | AS 1289.3.1.1 | 43 | |
| Method | | Four Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 28 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 15 | |
| Date Tested | | 5/08/2019 | |

## Comments

N/A


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**Sydney Laboratory**
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Artarmon NSW 2064
email: artarmon@ghd.com.au
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Tel: (02) 9462 4860
Fax:(02) 9462 4710

# Aggregate/Soil Test Report

**Report No: SYD1901814**
**Issue No: 1**
*This report replaces all previous issues of report no 'SYD1901814'.*

**Client:**
TAFE NSW
PO Box W154
Parramatta NSW

**Project:** 2316678

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 8/08/2019

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

## Sample Details

| | |
|---|---|
| **GHD Sample No** | SYD19-0323-03 |
| **Date Sampled** | 16/07/2019 |
| **Sampled By** | Sampled by GHD |
| **Location** | 1 McKee Dr, Bega |
| **BH / TP No.** | BH03 |
| **Depth (m)** | 1.1 - 1.45 |
| **Soil Description** | Silty SAND brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Moisture Content (%) | AS 1289.2.1.1 | 12.1 | |
| Date Tested | | 1/08/2019 | |
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | 4.5 | |
| Mould Length (mm) | | 125 | |
| Crumbling | | No | |
| Curling | | No | |
| Cracking | | No | |
| Liquid Limit (%) | AS 1289.3.1.2 | 29 | |
| Method | | One Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 27 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 2 | |
| Date Tested | | 5/08/2019 | |

## Comments

N/A


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**Sydney Laboratory**
Unit 5/43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
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Fax:(02) 9462 4710

# Aggregate/Soil Test Report

**Report No: SYD1901815**
**Issue No: 1**
*This report replaces all previous issues of report no 'SYD1901815'.*

**Client:**
TAFE NSW
PO Box W154
Parramatta NSW

**Project:** 2316678

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 8/08/2019

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

## Sample Details

| | |
|---|---|
| **GHD Sample No** | SYD19-0323-04 |
| **Date Sampled** | 16/07/2019 |
| **Sampled By** | Sampled by GHD |
| **Location** | 1 McKee Dr, Bega |
| **BH / TP No.** | BH05 |
| **Depth (m)** | 1.7 - 1.95 |
| **Soil Description** | CLAY with gravel trace sand mottled grey & brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Moisture Content (%) | AS 1289.2.1.1 | 21.2 | |
| Date Tested | | 1/08/2019 | |
| Sample History | AS 1289.1.1 | Oven-dried | |
| Preparation | AS 1289.1.1 | Dry Sieved | |
| Linear Shrinkage (%) | AS 1289.3.4.1 | 12.5 | |
| Mould Length (mm) | | 125 | |
| Crumbling | | No | |
| Curling | | No | |
| Cracking | | No | |
| Liquid Limit (%) | AS 1289.3.1.1 | 67 | |
| Method | | Four Point | |
| Plastic Limit (%) | AS 1289.3.2.1 | 30 | |
| Plasticity Index (%) | AS 1289.3.3.1 | 37 | |
| Date Tested | | 5/08/2019 | |

## Comments

N/A


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**Sydney Laboratory**
Unit 5/43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax:(02) 9462 4710

# Aggregate/Soil Test Report

**Report No: SYD1902153**
**Issue No: 1**
*This report replaces all previous issues of report no 'SYD1902153'.*

**Client:**
TAFE NSW
PO Box W154
Parramatta NSW

**Project:** 2316678

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 679

Approved Signatory: D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 2/09/2019

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

## Sample Details

| | |
|---|---|
| **GHD Sample No** | SYD19-0371-01 |
| **Sampled By** | Sampled by GHD |
| **Location** | Bega, NSW |
| **BH / TP No.** | BH 01 B-C |
| **Depth (m)** | 0.00 - 0.50 |
| **Soil Description** | Clayey SAND brown |

## Test Results

| Description | Method | Result | Limits |
|---|---|---|---|
| Moisture Content (%) | AS 1289.2.1.1 | 9.5 | |
| Date Tested | | 26/08/2019 | |
| Standard Maximum Dry Density (t/m³) | AS 1289.5.1.1 | 1.66 | |
| Standard Optimum Moisture Content (%) | | 17.5 | |
| Retained Sieve 19mm (%) | | 0 | |
| Compactive Effort | | standard | |
| Date Tested | | 26/08/2019 | |
| **CBR At 2.5mm (%)** | AS 1289.6.1.1 - 2014 | **6** | |
| **CBR At 5.0mm (%)** | | **7** | |
| Maximum Dry Density (t/m³) | | 1.66 | |
| Optimum Moisture Content (%) | | 17.5 | |
| Dry Density before Soaking (t/m³) | | 1.64 | |
| Density Ratio before Soaking (%) | | 98.5 | |
| Moisture Content before Soaking (%) | | 18.4 | |
| Moisture Ratio before Soaking (%) | | 105.0 | |
| Dry Density after Soaking (t/m³) | | 1.63 | |
| Density Ratio after Soaking (%) | | 98.0 | |
| Swell (%) | | 0.5 | |
| Moisture Content of Top 30mm (%) | | 21.1 | |
| Moisture Content of Remaining Depth (%) | | 19.9 | |
| Compactive Effort | | Standard | |
| Surcharge Mass (kg) | | 4.50 | |
| Period of Soaking (Days) | | 4 | |
| Oversize Material (%) | | 0.0 | |

## Comments

N/A


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**GHD Pty Ltd WOLLONGONG**
**Level 3, 200 Crown St**
**Wollongong**
**NSW 2500**

**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.

**Attention:** **Daniel Deen**

**Report** **668788-S**
Project name GEOTECHNICAL INVESTIGATION
Project ID 2316678
Received Date Jul 31, 2019

| **Client Sample ID** | | | **BH02 11.85-12.0** | [G01]**BH03 0.5-0.7** |
|---|---|---|---|---|
| **Sample Matrix** | | | **Rock** | **Rock** |
| **Eurofins Sample No.** | | | **S19-Jl49876** | **S19-Jl49877** |
| **Date Sampled** | | | **Jul 16, 2019** | **Jul 16, 2019** |
| Test/Reference | LOR | Unit | | |
| | | | | |
| Chloride | 10 | mg/kg | < 10 | 20 |
| Conductivity (1:5 aqueous extract at 25°C as rec.) | 5 | uS/cm | 32 | 17 |
| pH (1:5 Aqueous extract at 25°C as rec.) | 0.1 | pH Units | 5.8 | 7.4 |
| Resistivity* | 0.5 | ohm.m | 1600 | 580 |
| Sulphate (as SO4) | 10 | mg/kg | < 10 | < 30 |
| % Moisture | 1 | % | < 1 | 9.1 |

## 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 |
|---|---|---|---|
| Chloride | Sydney | Aug 06, 2019 | 28 Days |
| - Method: E045 /E047 Chloride | | | |
| - Method: LTM-INO-4090 Chloride by Discrete Analyser | | | |
| Conductivity (1:5 aqueous extract at 25°C as rec.) | Sydney | Aug 06, 2019 | 7 Days |
| - Method: LTM-INO-4030 Conductivity | | | |
| pH (1:5 Aqueous extract at 25°C as rec.) | Sydney | Aug 06, 2019 | 7 Days |
| - Method: LTM-GEN-7090 pH in soil by ISE | | | |
| Sulphate (as SO4) | Sydney | Aug 06, 2019 | 28 Days |
| - Method: E045 Anions by Ion Chromatography | | | |
| - Method: LTM-INO-4110 Sulfate by Discrete Analyser | | | |
| % Moisture | Melbourne | Jul 31, 2019 | 14 Days |
| - Method: LTM-GEN-7080 Moisture | | | |

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

**Company Name:** GHD Pty Ltd WOLLONGONG
**Address:** Level 3, 200 Crown St
Wollongong
NSW 2500

**Project Name:** GEOTECHNICAL INVESTIGATION
**Project ID:** 2316678

**Order No.:**
**Report #:** 668788
**Phone:** 02 4222 2300
**Fax:** 02 4222 2301

**Received:** Jul 31, 2019 11:30 PM
**Due:** Aug 8, 2019
**Priority:** 5 Day
**Contact Name:** Daniel Deen

**Eurofins Analytical Services Manager : Alena Bounkeua**

| Sample Detail | | | | | | Aggressivity Soil Set | Aggressivity Soil Set | Moisture Set | Moisture Set |
|---|---|---|---|---|---|---|---|---|---|
| **Melbourne Laboratory - NATA Site # 1254 & 14271** | | | | | | X | X | X | X |
| **Sydney Laboratory - NATA Site # 18217** | | | | | | X | 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 | BH02 11.85-12.0 | Jul 16, 2019 | | Rock | S19-Jl49876 | | X | | X |
| 2 | BH03 0.5-0.7 | Jul 16, 2019 | | Rock | S19-Jl49877 | X | | X | |
| **Test Counts** | | | | | | 2 | 2 | 2 | 2 |

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## 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** | | | | | | | |
| Chloride | mg/kg | < 10 | | | 10 | Pass | |
| Conductivity (1:5 aqueous extract at 25°C as rec.) | uS/cm | < 5 | | | 5 | Pass | |
| Sulphate (as SO4) | mg/kg | < 10 | | | 10 | Pass | |
| **LCS - % Recovery** | | | | | | | |
| Chloride | % | 112 | | | 70-130 | Pass | |
| Conductivity (1:5 aqueous extract at 25°C as rec.) | % | 101 | | | 70-130 | Pass | |
| Resistivity* | % | 101 | | | 70-130 | Pass | |
| Sulphate (as SO4) | % | 109 | | | 70-130 | Pass | |

| Test | Lab Sample ID | QA Source | Units | Result 1 | | | Acceptance Limits | Pass Limits | Qualifying Code |
|---|---|---|---|---|---|---|---|---|---|
| **Duplicate** | | | | | | | | | |
| | | | | Result 1 | Result 2 | RPD | | | |
| Chloride | S19-Jl49876 | CP | mg/kg | < 10 | < 10 | <1 | 30% | Pass | |
| Sulphate (as SO4) | S19-Jl49876 | CP | mg/kg | < 10 | < 10 | <1 | 30% | Pass | |
| **Duplicate** | | | | | | | | | |
| | | | | Result 1 | Result 2 | RPD | | | |
| Conductivity (1:5 aqueous extract at 25°C as rec.) | M19-Au01606 | NCP | uS/cm | 160 | 160 | 2.0 | 30% | Pass | |
| pH (1:5 Aqueous extract at 25°C as rec.) | M19-Au05445 | NCP | pH Units | 6.5 | 6.6 | pass | 30% | Pass | |
| Resistivity* | M19-Au01606 | NCP | ohm.m | 62 | 64 | 2.0 | 30% | Pass | |
| % Moisture | M19-Jl49607 | NCP | % | 43 | 47 | 9.0 | 30% | Pass | |

## Comments

### Sample Integrity

| | |
|---|---|
| Custody Seals Intact (if used) | N/A |
| Attempt to Chill was evident | No |
| 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 |
|---|---|
| G01 | The LORs have been raised due to matrix interference |

### Authorised By

| | |
|---|---|
| Alena Bounkeua | Analytical Services Manager |
| Gabriele Cordero | Senior Analyst-Inorganic (NSW) |
| Julie Kay | Senior Analyst-Inorganic (VIC) |

**Glenn Jackson**
**General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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# Sample Receipt Advice

| | |
|---|---|
| Company name: | **GHD Pty Ltd WOLLONGONG** |
| Contact name: | Daniel Deen |
| Project name: | GEOTECHNICAL INVESTIGATION |
| Project ID: | 2316678 |
| COC number: | 20190731 |
| Turn around time: | 5 Day |
| Date/Time received: | Jul 31, 2019 11:30 PM |
| Eurofins reference: | **668788** |

## 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:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Daniel Deen - Daniel.Deen@ghd.com.

eurofins | mgt


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# CHAIN OF CUSTODY RECORD



**CLIENT DETAILS**

| | | | | | |
|---|---|---|---|---|---|
| **Company Name :** | GHD Pty Ltd | **Contact Name:** | Colee Quayle 0403 242 431 | **Purchase Order :** | N/A |
| **Office Address :** | Level 11 200 Crown St | **Project Manager :** | Daniel Deen | **PROJECT Number :** | 2316678 |
| | Wollongong, NSW 2500 | **Email for results :** | colee.quayle@ghd.com | **PROJECT Name :** | Geotechnical Investigation |

| | |
|---|---|
| **COC Number :** | 20190731 |
| **Eurofins \| mgt quote ID :** | National Agreement |
| **Data output format:** | ESDAT |

**Special Directions & Comments:**

**Eurofins | mgt DI water batch number:**

**Analytes**

| | Sample ID | Depth | Date | Matrix | Aggressivity Suite (pH, EC, Cl, Resisivity, SO4) |
|---|---|---|---|---|---|
| 1 | BH02 | 11.85-12.0 | 16/07/2019 | Rock | x |
| 2 | BH03 | 0.5-0.7 | 17/07/2019 | Soil | x |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |

**Some common holding times (with correct preservation).**
For further information contact the lab

| Waters | | Soils | |
|---|---|---|---|
| BTEX, MAH, VOC | 14 days | BTEX, MAH, VOC | 14 days |
| TRH, PAH, Phenols, Pesticides | 7 days | TRH, PAH, Phenols, Pesticides | 14 days |
| Heavy Metals | 6 months | Heavy Metals | 6 months |
| Mercury, CrVI | 28 days | Mercury, CrVI | 28 days |
| Microbiological testing | 24 hours | Microbiological testing | 72 hours |
| BOD, Nitrate, Nitrite, Total N | 2 days | Anions | 28 days |
| Solids - TSS, TDS etc | 7 days | SPOCAS, pH Field and FOX, CrS | 24 hours |
| Ferrous iron | 7 days | ASLP, TCLP | 7 days |

**Containers:**

| Glass Jar | Ziplock | Vials | Plastic | Amber | |
|---|---|---|---|---|---|
| | X | | | | |
| X | | | | | |

**Please test volatile components on the following individual samples**

| GHD Staff | Courier | Laboratory Staff |
|---|---|---|
| **Relinquished By:** Colee Quayle | **Received By:** | **Received By:** Susanne Ford |
| **Date & Time** 31/07/2019 | **Date & Time:** | **Date & Time:** 31/7/19 11:30AM |
| **Signature:** | **Signature:** | **Signature:** |

**Turn around time**

1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other: Same Day

**Method Of Shipment**

☑ Courier
☐ Hand Delivered
☐ Postal
**Courier Consignment # :**

**Temperature on arrival:**

**Report number:** 668788

# **Appendix K** – Summary of Laboratory Results

**TABLE LR1:**
**SUMMARY OF LABORATORY RESULTS FOR SOIL SAMPLES ASSESSING CONTAMINATION**
**TRH, BTEX, PAH, OCP, OPP, PCB, asbestos and heavy metals**
**(All results in mg/kg, unless otherwise stated)**

| Sample ID | THRESHOLD CONCENTRATIONS | | | | | | BH01 | BH01 | BH02 | QC2 (Intra-lab duplicate) | BH02 | BH02 | BH03 | BH03 | BH04 | QC3 (Intra-lab duplicate) | QC3A (Inter-lab duplicate) | BH05 | BH05 | SS01 | SS02 | SS03 | SS04 | SS05 | SS06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch** | HIL B (Residential with minimal opportunities for soil access inc. dwellings with fully and permanently paved yard space such as high rise | EIL/ESL (Urban Residential / Open Public Spaces)[1] Coarse Soil Texture | HSL-A&B (Residential)[1] 0-<1m[a] | HSL-B[2] (Direct Contact) | Intrusive maintenance worker (Direct Contact)[2] | Intrusive maintenance worker (Vapour Intrusion)[3] 0-<2m[b] | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | ES1922956 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 | 666751 |
| **Date of Sampling** | | | | | | | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 17-Jul-19 | 17-Jul-19 | 17-Jul-19 | 17-Jul-19 | 17-Jul-19 | 17-Jul-19 | 17-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 | 16-Jul-19 |
| **Soil Layer Description (Texture)** | | | | | | | Fill (Clayey Sand / Sany Clay) | XW Granodiorite (Sandy Gravel) | Fill (Sandy Clay) | Fill (Sandy Clay) | Possible Residual (Sandy Clay) | XW Granodiorite (Gravelly Sand) | Fill (Clayey Silt) | Residual (Clayey Sand) | Possible Residual (Clayey Sand) | Possible Residual (Clayey Sand) | Possible Residual (Clayey Sand) | Fill (Clayey Gravel) | Residual (Clayey Silt) | Fill (Ash) | Fill / Topsoil (Clayey Silt) | Fill / Topsoil (Clayey Silt) | Fill / Topsoil (Clayey Sand) | Fill / Topsoil (Gravelly Silt) | Fill (Silty Sand) |
| **Depth (m)** | | | | | | | 0.0-0.1 | 0.3-0.5 | 0.0-0.2 | 0.0-0.2 | 0.5-0.8 | 4.2-4.5 | 0.0-0.2 | 0.5-0.7 | 0.0-0.2 | 0.0-0.2 | 0.0-0.2 | 0.0-0.2 | 0.8-0.95 | 0.0-0.1 | 0.0-0.1 | 0.0-0.1 | 0.0-0.1 | 0.0-0.1 | 0.0-0.1 |
| **HEAVY METALS (TOTAL)** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 500 | 100 | - | - | - | - | 2.1 | < 2 | 2.3 | < 2 | - | 2.4 | < 2 | < 2 | < 2 | < 2 | <5 | < 2 | < 2 | < 2 | - | 2.9 | 2.0 | < 2 | 4.0 |
| Cadmium | 150 | - | - | - | - | - | < 0.4 | < 0.4 | < 0.4 | < 0.4 | - | < 0.4 | < 0.4 | < 0.4 | < 0.4 | < 0.4 | <1 | < 0.4 | < 0.4 | < 0.4 | - | < 0.4 | < 0.4 | < 0.4 | < 0.4 |
| Chromium | 500 [c] | 430 [d] | - | - | - | - | 25 | 15 | 44 | 8.4 | - | 32 | 15 | 34 | 27 | 27 | 22 | 57 | 55 | 8.8 | - | 26 | 20 | 8.5 | 38 |
| Copper | 30,000 | 110 | - | - | - | - | 12 | < 5 | 15 | 12 | - | 35 | 5.3 | 5.4 | 5.4 | 5.2 | 5.0 | 12 | 14 | 14 | - | 13 | 21 | 11 | 39 |
| Lead | 1,200 | 1,100 | - | - | - | - | 56 | 14 | 20 | 7.0 | - | < 5 | 24 | 5.6 | 22 | 28 | 29 | 8.0 | 6.6 | 7.3 | - | 26 | 33 | 21 | 69 |
| Mercury | 120 | - | - | - | - | - | < 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 |
| Nickel | 1,200 | 180 | - | - | - | - | 14 | < 5 | 21 | 43 | - | 16 | 5.5 | 13 | 10 | 11 | 9.0 | 33 | 14 | 46 | - | 14 | 9.8 | < 5 | 32 |
| Zinc | 60,000 | 220 | - | - | - | - | 100 | 16 | 80 | 20 | - | 46 | 35 | 30 | 48 | 47 | 51 | 100 | 31 | 21 | - | 97 | **1200** | 140 | 170 |
| **TOTAL RECOVERABLE HYDROCARBONS** | | | | | | | | | | | | | | | | | | | | | | | | | |
| C6 - C10 Fraction | - | - | - | - | - | - | < 20 | < 20 | < 20 | < 20 | < 20 | - | < 20 | - | < 20 | < 20 | <10 | < 20 | < 20 | < 20 | < 20 | - | - | - | < 20 |
| C6 - C10 Fraction minus BTEX (F1) | - | 180 | 45 | 5,600 | 82,000 | NL | < 20 | < 20 | < 20 | < 20 | < 20 | - | < 20 | - | < 20 | < 20 | <10 | < 20 | < 20 | < 20 | < 20 | - | - | - | < 20 |
| >C10 - C16 Fraction | - | 120 | - | - | - | - | < 50 | < 50 | < 50 | < 50 | < 50 | - | < 50 | - | < 50 | < 50 | <50 | < 50 | < 50 | < 50 | < 50 | - | - | - | < 50 |
| >C10 - C16 Fraction minus Naphthalene (F2) | - | - | 110 | 4,200 | 62,000 | NL | < 50 | < 50 | < 50 | < 50 | < 50 | - | < 50 | - | < 50 | < 50 | <50 | < 50 | < 50 | < 50 | < 50 | - | - | - | < 50 |
| >C16 - C34 Fraction (F3) | - | 300 | - | 5,800 | 85,000 | NL | < 100 | < 100 | < 100 | < 100 | < 100 | - | 110 | - | 100 | < 100 | 110 | < 100 | < 100 | < 100 | < 100 | - | - | - | **410** |
| >C34 - C40 Fraction (F4) | - | 2,800 | - | 8,100 | 120,000 | NL | < 100 | < 100 | < 100 | < 100 | < 100 | - | < 100 | - | < 100 | < 100 | <100 | < 100 | < 100 | < 100 | < 100 | - | - | - | 390 |
| **BTEX** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | - | 50 | 0.5 | 140 | 1,100 | 77 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | < 0.1 | - | < 0.1 | < 0.1 | <0.2 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | - | - | < 0.1 |
| Toluene | - | 85 | 160 | 21,000 | 120,000 | NL | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | < 0.1 | - | < 0.1 | < 0.1 | <0.5 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | - | - | < 0.1 |
| Ethylbenzene | - | 70 | 55 | 5,900 | 85,000 | NL | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | < 0.1 | - | < 0.1 | < 0.1 | <0.5 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | - | - | - | < 0.1 |
| Total Xylene | - | 105 | 40 | 17,000 | 130,000 | NL | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | - | < 0.3 | - | < 0.3 | < 0.3 | <0.5 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | - | - | - | < 0.3 |
| **POLYCYCLIC AROMATIC HYDROCARBONS** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | - | 170 | 3 | 2,200 | 29,000 | NL | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | < 0.5 | - | < 0.5 | < 0.5 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | - | - | < 0.5 |
| Carcenogenic PAHs (as BaP TEQ) | 4 | - | - | - | - | - | 1.3 | 0.6 | 0.6 | 0.6 | 0.6 | - | 1.1 | - | 0.9 | 1.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | - | - | - | 0.6 |
| Benzo(a)pyrene | - | 0.7 | - | - | - | - | **0.8** | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | 0.6 | - | 0.5 | 0.6 | <0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | - | - | < 0.5 |
| Total PAH | 400 | - | - | - | - | - | 6.6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | 5.8 | - | 2.8 | 4.6 | 1.6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | - | - | - | < 0.5 |
| **ORGANOCHLORINE PESTICIDES** | 10 to 600 | - | - | - | - | - | < LOR | - | - | - | - | - | - | - | < LOR | < LOR | - | < LOR | - | - | - | 1.26 | < LOR | 0.72 | - |
| Aldrin | - | - | - | - | - | - | < 0.05 | - | - | - | - | - | - | - | < 0.05 | < 0.05 | - | < 0.05 | - | - | - | < 0.05 | < 0.05 | < 0.05 | - |
| Dieldrin | - | - | - | - | - | - | < 0.05 | - | - | - | - | - | - | - | < 0.05 | < 0.05 | - | < 0.05 | - | - | - | 0.53 | < 0.05 | 0.21 | - |
| Aldrin and Dieldrin (Total) | 10 | - | - | - | - | - | < 0.05 | - | - | - | - | - | - | - | < 0.05 | < 0.05 | - | < 0.05 | - | - | - | 0.53 | < 0.05 | 0.21 | - |
| Chlordanes - Total | 90 | - | - | - | - | - | < 0.1 | - | - | - | - | - | - | - | < 0.1 | < 0.1 | - | < 0.1 | - | - | - | 0.20 | < 0.1 | 0.30 | - |
| DDT + DDE + DDD (Total) | 600 | - | - | - | - | - | < 0.05 | - | - | - | - | - | - | - | < 0.05 | < 0.05 | - | < 0.05 | - | - | - | < 0.05 | < 0.05 | < 0.05 | - |
| DDT | - | 180 [e] | - | - | - | - | < 0.05 | - | - | - | - | - | - | - | < 0.05 | < 0.05 | - | < 0.05 | - | - | - | < 0.05 | < 0.05 | < 0.05 | - |
| **ORGANOPHOSPHORUS PESTICIDES** | 160 to 600 | - | - | - | - | - | < LOR | - | - | - | - | - | - | - | < LOR | < LOR | - | < LOR | - | - | - | < LOR | < LOR | 0.9 | - |
| **POLYCHLORINATED BIPHENYLS** | 1 | - | - | - | - | - | < LOR | - | - | - | < LOR | - | < LOR | - | < LOR | < LOR | - | < LOR | - | - | - | < LOR | - | - | - |
| **ASBESTOS** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Absence / Presence | ND | - | - | - | - | - | ND | - | - | - | - | - | ND | - | ND | - | - | ND | - | ND | ND | ND | - | ND | ND |

NOTES:

| | |
|---|---|
| **Bold** | Concentration exceeds the Health Investigation Levels (HIL) or Health Screen Levels (HSL) |
| **Bold** | Concentration exceeds Ecological Investigation Levels (EIL) or Ecological Screening Levels (ESL) |

1 Based on NEPM (1999) (amendment 2013).
2 CRC Care Technical Report No, 10 (Soil HSLs for direct contact)
3 CRC Care Technical Report No, 10 (Soil HSLs for Vapour Intrusion)
a Soil HSLs for vapour intrusion (for depth range between 0m to <1m, soil type: SAND)
b Soil HSLs for vapour intrusion (for depth range between 0m to <2m, soil type: SAND)
c Based on Chromium 6
d Interim soil – ecological indirect exposure
e DDT
- No result or guideline
ND Not detected
NL Not limiting
LOR Limit of reporting

**Table QAQC1: Relative Percentage Difference for Soil Samples**

| Batch | | | 666751 | | | 666751 | | | 666751 / ES1922956 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary Sample Conc. (mg/kg) | Intra-laboratory duplicate Sample Conc. (mg/Kg) | RPD (%) | Primary Sample Conc. (mg/kg) | Intra-laboratory duplicate Sample Conc. (mg/Kg) | RPD (%) | Primary Sample Conc. (mg/kg) | Inter-laboratory duplicate Sample Conc. (mg/Kg) | RPD (%) |
| Sample No. | Laboratory Reporting Limits (mg/kg) | | BH02 | QC2 | | BH04 | QC3 | | BH04 | QC3A | |
| Depth (m) | Eurofins | ALS | 0.0-0.2 | 0.0-0.2 | | 0.0-0.2 | 0.0-0.2 | | 0.0-0.2 | 0.0-0.2 | |
| **HEAVY METALS** | | | | | | | | | | | |
| Arsenic | 2 | 5 | 2.3 | < 2 | NC | < 2 | < 2 | ND | < 2 | <5 | ND |
| Cadmium | 0.4 | 1 | < 0.4 | < 0.4 | ND | < 0.4 | < 0.4 | ND | < 0.4 | <1 | ND |
| Chromium | 5 | 2 | 44 | 8.4 | 136 | 27 | 27 | 0 | 27 | 22 | 20 |
| Copper | 5 | 5 | 15 | 12 | 22 | 5.4 | 5.2 | 4 | 5.4 | 5.0 | 8 |
| Lead | 5 | 5 | 20 | 7.0 | 96 | 22 | 28 | 24 | 22 | 29 | 27 |
| Mercury | 0.1 | 0.1 | < 0.1 | < 0.1 | ND | < 0.1 | < 0.1 | ND | < 0.1 | <0.1 | ND |
| Nickel | 5 | 2 | 21 | 43 | 69 | 10 | 11 | 10 | 10 | 9 | 11 |
| Zinc | 5 | 5 | 80 | 20 | **120** | 48 | 47 | 2 | 48 | 51 | 6 |
| **TOTAL RECOVERABLE HYDROCARBONS** | | | | | | | | | | | |
| C6 - C10 Fraction | 20 | 10 | < 20 | < 20 | ND | < 20 | < 20 | ND | < 20 | <10 | ND |
| C6 - C10 Fraction minus BTEX (F1) | 20 | 10 | < 20 | < 20 | ND | < 20 | < 20 | ND | < 20 | <10 | ND |
| >C10 - C16 Fraction | 50 | 50 | < 50 | < 50 | ND | < 50 | < 50 | ND | < 50 | <50 | ND |
| >C10 - C16 Fraction minus Naphthalene (F2) | 50 | 50 | < 50 | < 50 | ND | < 50 | < 50 | ND | < 50 | <50 | ND |
| >C16 - C34 Fraction (F3) | 100 | 100 | < 100 | < 100 | ND | 100 | < 100 | ND | 100 | 110 | 10 |
| >C34 - C40 Fraction (F4) | 100 | 100 | < 100 | < 100 | ND | < 100 | < 100 | ND | < 100 | <100 | ND |
| **BTEX** | | | | | | | | | | | |
| Benzene | 0.1 | 0.2 | < 0.1 | < 0.1 | ND | < 0.1 | < 0.1 | ND | < 0.1 | <0.2 | ND |
| Toluene | 0.1 | 0.5 | < 0.1 | < 0.1 | ND | < 0.1 | < 0.1 | ND | < 0.1 | <0.5 | ND |
| Ethylbenzene | 0.1 | 0.5 | < 0.1 | < 0.1 | ND | < 0.1 | < 0.1 | ND | < 0.1 | <0.5 | ND |
| Total Xylene | 0.3 | 0.5 | < 0.3 | < 0.3 | ND | < 0.3 | < 0.3 | ND | < 0.3 | <0.5 | ND |
| **POLYCYCLIC AROMATIC HYDROCARBONS** | | | | | | | | | | | |
| Naphthalene | 0.5 | 0.5 | < 0.5 | < 0.5 | ND | < 0.5 | < 0.5 | ND | < 0.5 | <0.5 | ND |
| Carcenogenic PAHs (as BaP TEQ) | 0.5 | 0.5 | 0.6 | 0.6 | 0 | 0.9 | 1.0 | 11 | 0.9 | 0.6 | 40 |
| Benzo(a)pyrene | 0.5 | 0.5 | < 0.5 | < 0.5 | ND | 0.5 | 0.6 | 18 | 0.5 | <0.5 | NC |
| Total PAH | 0.5 | 0.5 | < 0.5 | < 0.5 | ND | 2.8 | 4.6 | 49 | 2.8 | 1.6 | 55 |
| **ORGANOCHLORINE PESTICIDES** | various | various | - | - | - | < LOR | < LOR | ND | < LOR | - | - |
| **ORGANOPHOSPHORUS PESTICIDES** | various | various | - | - | - | < LOR | < LOR | ND | < LOR | - | - |
| **POLYCHLORINATED BIPHENYLS** | various | various | - | - | - | < LOR | < LOR | ND | < LOR | - | - |

Notes:

| | |
|---|---|
| **Bold** | RPD exceeds control limit of 30% for soil if:<br>- Result < 10 times LOR then No Limit<br>- Result > 10 times LOR then control limit of 30% |
| RPD | Relative Percentage Difference |
| NA | Not Applicable |
| ND | Not Detected |
| NC | Contaminant is not detected in primary sample but is detected in duplicate sample, or vice versa |
| LOR | Limit of Reporting |
| - | No result or guideline |

**TABLE QAQC2**
**SUMMARY OF FIELD CONTROL SAMPLES LABORATORY RESULTS**

| **Sample ID** | Trip Spike | Trip Blank | WB1 |
|---|---|---|---|
| **QAQC Type** | Trip Spike | Trip Blank | Rinsate |
| **Units** | % | mg/kg | mg/L |
| **Batch** | 666751 | 666751 | 666751 |
| **Matrix** | Soil | Soil | Water |
| | | | |
| **HEAVY METALS (TOTAL)** | | | |
| Arsenic | - | - | < 0.001 |
| Cadmium | - | - | < 0.0002 |
| Chromium | - | - | < 0.001 |
| Copper | - | - | < 0.001 |
| Lead | - | - | < 0.001 |
| Mercury | - | - | < 0.0001 |
| Nickel | - | - | < 0.001 |
| Zinc | - | - | < 0.005 |
| | | | |
| **TOTAL PETROLEUM HYDROCARBONS** | | | |
| Naphthalene | - | < 0.5 | < 0.01 |
| C6 - C10 Fraction | - | < 20 | < 0.02 |
| C6 - C10 Fraction minus BTEX (F1) | - | < 20 | < 0.02 |
| >C10 - C16 Fraction | - | - | < 0.05 |
| >C10 - C16 Fraction minus Naphthalene (F2) | - | - | < 0.05 |
| >C16 - C34 Fraction (F3) | - | - | < 0.1 |
| >C34 - C40 Fraction (F4) | - | - | < 0.1 |
| | | | |
| **BTEX** | | | |
| Benzene | 82% | < 0.1 | < 0.1 |
| Toluene | 82% | < 0.1 | < 0.1 |
| Ethylbenzene | 86% | < 0.1 | < 0.1 |
| Total Xylene | 94% | < 0.3 | < 0.3 |
| | | | |
| **POLYCYCLIC AROMATIC HYDROCARBONS** | - | - | < LOR |
| | | | |

Notes:

**Bold** Concentration exceeds control limit

\- Not Analysed

ND Not Detected

**QAQC Control Ordinates**

Trip Spike Recovery concentrations to between 70% and 130%

Trip Blank Recovery concentrations to be ND

# **Appendix L** – CSIRO foundation maintenance and footing performance: a homeowner's guide

# Foundation Maintenance and Footing Performance:
# A Homeowner's Guide

CSIRO

**BTF 18**
**replaces**
**Information**
**Sheet 10/91**

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

## Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870, the Residential Slab and Footing Code.

## Causes of Movement

### Settlement due to construction

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

### Erosion

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

### Saturation

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume – particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

### Seasonal swelling and shrinkage of soil

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

### Shear failure

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.
- In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

**GENERAL DEFINITIONS OF SITE CLASSES**

| Class | Foundation |
|---|---|
| A | Most sand and rock sites with little or no ground movement from moisture changes |
| S | Slightly reactive clay sites with only slight ground movement from moisture changes |
| M | Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes |
| H | Highly reactive clay sites, which can experience high ground movement from moisture changes |
| E | Extremely reactive sites, which can experience extreme ground movement from moisture changes |
| A to P | Filled sites |
| P | Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise |

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

## Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

## Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

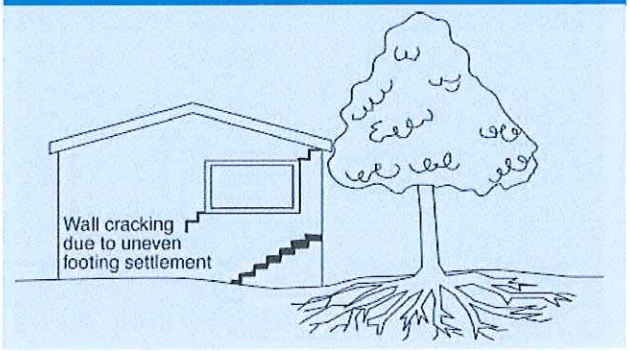
Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

Trees can cause shrinkage and damage




As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation cause a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

## Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem.
Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

## Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870.

AS 2870 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

## Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

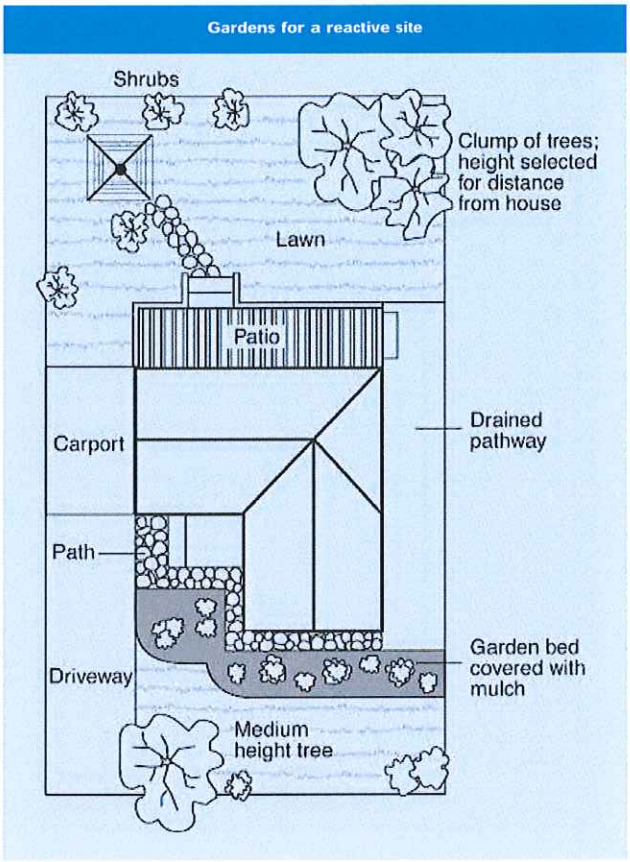
It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving

**CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS**

| Description of typical damage and required repair | Approximate crack width limit (see Note 3) | Damage category |
|---|---|---|
| Hairline cracks | <0.1 mm | 0 |
| Fine cracks which do not need repair | <1 mm | 1 |
| Cracks noticeable but easily filled. Doors and windows stick slightly | <5 mm | 2 |
| Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired | 5–15 mm (or a number of cracks 3 mm or more in one group) | 3 |
| Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted | 15–25 mm but also depend on number of cracks | 4 |




should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

### Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

*Warning:* Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

### The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

### Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

### Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

### Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

## Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

**This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.**

**The information in** this and other issues in the series was derived from various sources and was believed to be correct when published.

**The information is** advisory. It is provided in good faith and not claimed to be an exhaustive treatment of the relevant subject.

**Further professional advice** needs to be obtained before taking any action based on the information provided.

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# **Appendix M** – Australian Geomechanics 2007 Appendix C - Qualitative Terminology for use in Assessing Risk to Property

# PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

## APPENDIX C: LANDSLIDE RISK ASSESSMENT

## QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

### *QUALITATIVE MEASURES OF LIKELIHOOD*

| Approximate Annual Probability | | Implied Indicative Landslide Recurrence Interval | | Description | Descriptor | Level |
|---|---|---|---|---|---|---|
| Indicative Value | Notional Boundary | | | | | |
| $10^{-1}$ | $5x10^{-2}$ | 10 years | 20 years | The event is expected to occur over the design life. | ALMOST CERTAIN | A |
| $10^{-2}$ | $5x10^{-3}$ | 100 years | 200 years | The event will probably occur under adverse conditions over the design life. | LIKELY | B |
| $10^{-3}$ | $5x10^{-4}$ | 1000 years | 2000 years | The event could occur under adverse conditions over the design life. | POSSIBLE | C |
| $10^{-4}$ | $5x10^{-5}$ | 10,000 years | 20,000 years | The event might occur under very adverse circumstances over the design life. | UNLIKELY | D |
| $10^{-5}$ | $5x10^{-6}$ | 100,000 years | 200,000 years | The event is conceivable but only under exceptional circumstances over the design life. | RARE | E |
| $10^{-6}$ | | 1,000,000 years | | The event is inconceivable or fanciful over the design life. | BARELY CREDIBLE | F |

**Note:** (1) The table should be used from left to right; use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*.

### *QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY*

| Approximate Cost of Damage | | Description | Descriptor | Level |
|---|---|---|---|---|
| Indicative Value | Notional Boundary | | | |
| 200% | 100% | Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage. | CATASTROPHIC | 1 |
| 60% | 40% | Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage. | MAJOR | 2 |
| 20% | 10% | Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage. | MEDIUM | 3 |
| 5% | 1% | Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works. | MINOR | 4 |
| 0.5% | | Little damage. (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0.1%. See Risk Matrix.) | INSIGNIFICANT | 5 |

**Notes:** (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures.

(3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees, and consequential costs such as legal fees, temporary accommodation. It does not include additional stabilisation works to address other landslides which may affect the property.

(4) The table should be used from left to right; use Approximate Cost of Damage or Description to assign Descriptor, not vice versa

## APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)

### *QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY*

| LIKELIHOOD | | CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage) | | | | |
|---|---|---|---|---|---|---|
| | Indicative Value of Approximate Annual Probability | 1: CATASTROPHIC 200% | 2: MAJOR 60% | 3: MEDIUM 20% | 4: MINOR 5% | 5: INSIGNIFICANT 0.5% |
| A – ALMOST CERTAIN | $10^{-1}$ | VH | VH | VH | H | M or L (5) |
| B - LIKELY | $10^{-2}$ | VH | VH | H | M | L |
| C - POSSIBLE | $10^{-3}$ | VH | H | M | M | VL |
| D - UNLIKELY | $10^{-4}$ | H | M | L | L | VL |
| E - RARE | $10^{-5}$ | M | L | L | VL | VL |
| F - BARELY CREDIBLE | $10^{-6}$ | L | VL | VL | VL | VL |

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

### *RISK LEVEL IMPLICATIONS*

| Risk Level | | Example Implications (7) |
|---|---|---|
| VH | VERY HIGH RISK | Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property. |
| H | HIGH RISK | Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property. |
| M | MODERATE RISK | May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable. |
| L | LOW RISK | Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required. |
| VL | VERY LOW RISK | Acceptable. Manage by normal slope maintenance procedures. |

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

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