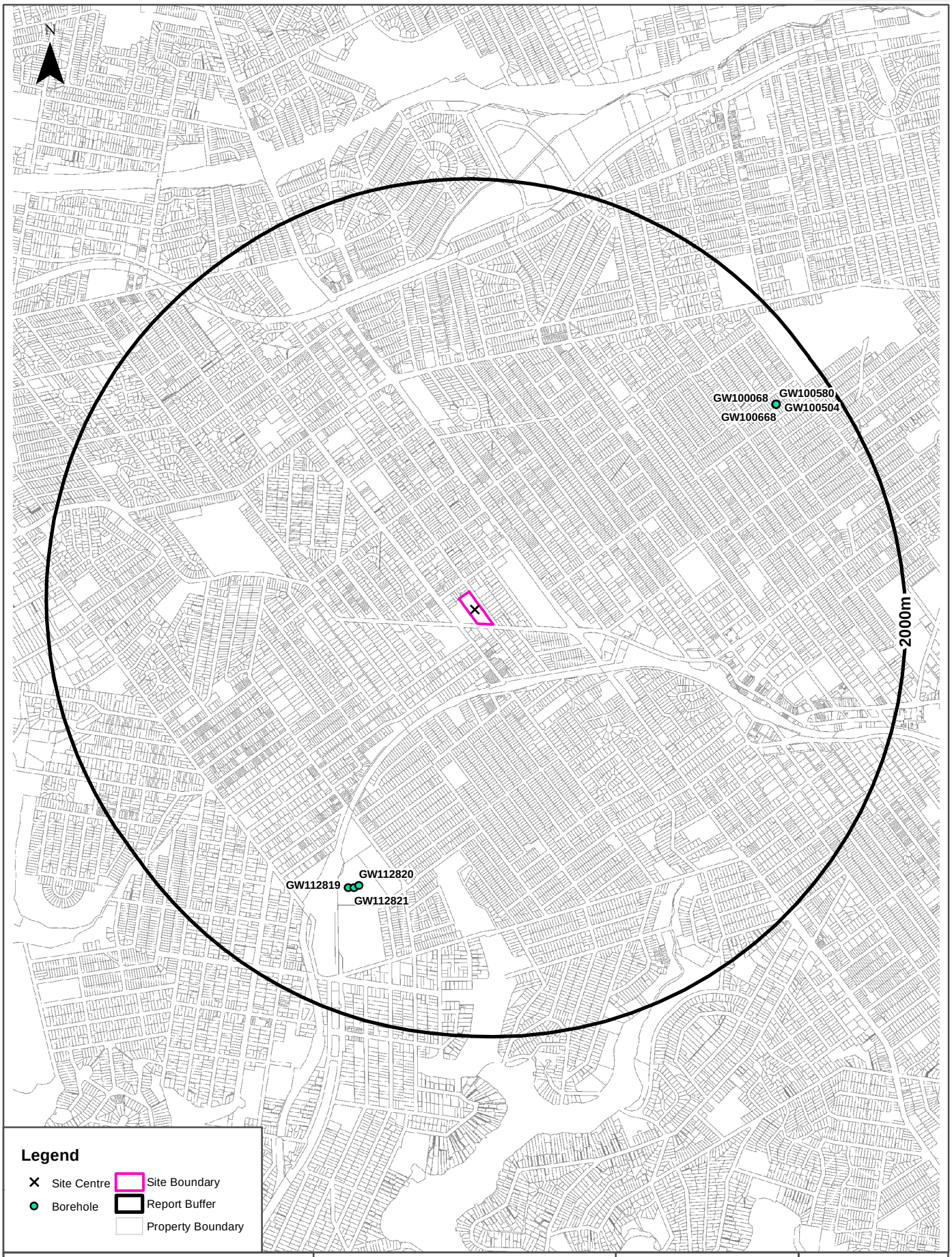
# Groundwater Boreholes

**510 Forest Road, Penshurst, NSW 2222**




Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2017

Coordinate System: GDA 1994 MGA Zone 56

Date: 11January 2017

# Hydrogeology & Groundwater

**510 Forest Road, Penshurst, NSW 2222**

## Hydrogeology

Description of aquifers on-site:

| Description |
|---|
| Porous, extensive aquifers of low to moderate productivity |

Description of aquifers within the report buffer:

| Description |
|---|
| Porous, extensive aquifers of low to moderate productivity |

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)
Creative Commons 3.0 © Commonwealth of Australia http://creativecommons.org/licenses/by/3.0/au/deed.en

## Groundwater Boreholes

Boreholes within 2km of the site:

| GW No. | Licence No | Work Type | Owner Type | Purpose | Contractor | Complete Date | Final Depth | Drilled Depth | Salinity | SWL | Yield | Elev | Dist | Dir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GW112820 | 10BL602924 | Bore | Private | Monitoring | | 10/02/2009 | 10.11 | 10.11 | | | | | 1395m | South West |
| GW112821 | 10BL602924 | Bore | Private | Monitoring | | 10/02/2009 | 10.25 | 10.25 | | 8.50 | | | 1414m | South West |
| GW112819 | 10BL602924 | Bore | Private | Monitoring | | 10/02/2009 | 10.23 | 10.23 | | 4.00 | | | 1427m | South West |
| GW100580 | 10BL157928, 10WA108399 | Spear | Private | Domestic | A Korkadis | 11/03/1997 | 9.15 | 9.15 | Good | | 1.000 | | 1737m | North East |
| GW100668 | 10BL157758, 10WA108384 | Spear | Private | Domestic | | 09/10/1996 | 7.95 | 7.95 | Good | 5.45 | 1.000 | | 1737m | North East |
| GW100068 | 10BL156735, 10WA108351 | Spear | Private | Domestic | A Korkadis | 20/06/1995 | 7.30 | 7.30 | Good | 4.27 | 1.000 | | 1737m | North East |
| GW100504 | 10BL157928, 10WA108399 | Bore | | | A Korkadis | 11/03/1997 | 9.15 | | | | | | 1737m | North East |
| GW100808 | 10BL156230, 10WA108335 | Spear | Private | Domestic | | 01/01/1991 | 3.66 | 6.10 | Other | 1.52 | | | 1737m | North 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

**510 Forest Road, Penshurst, NSW 2222**

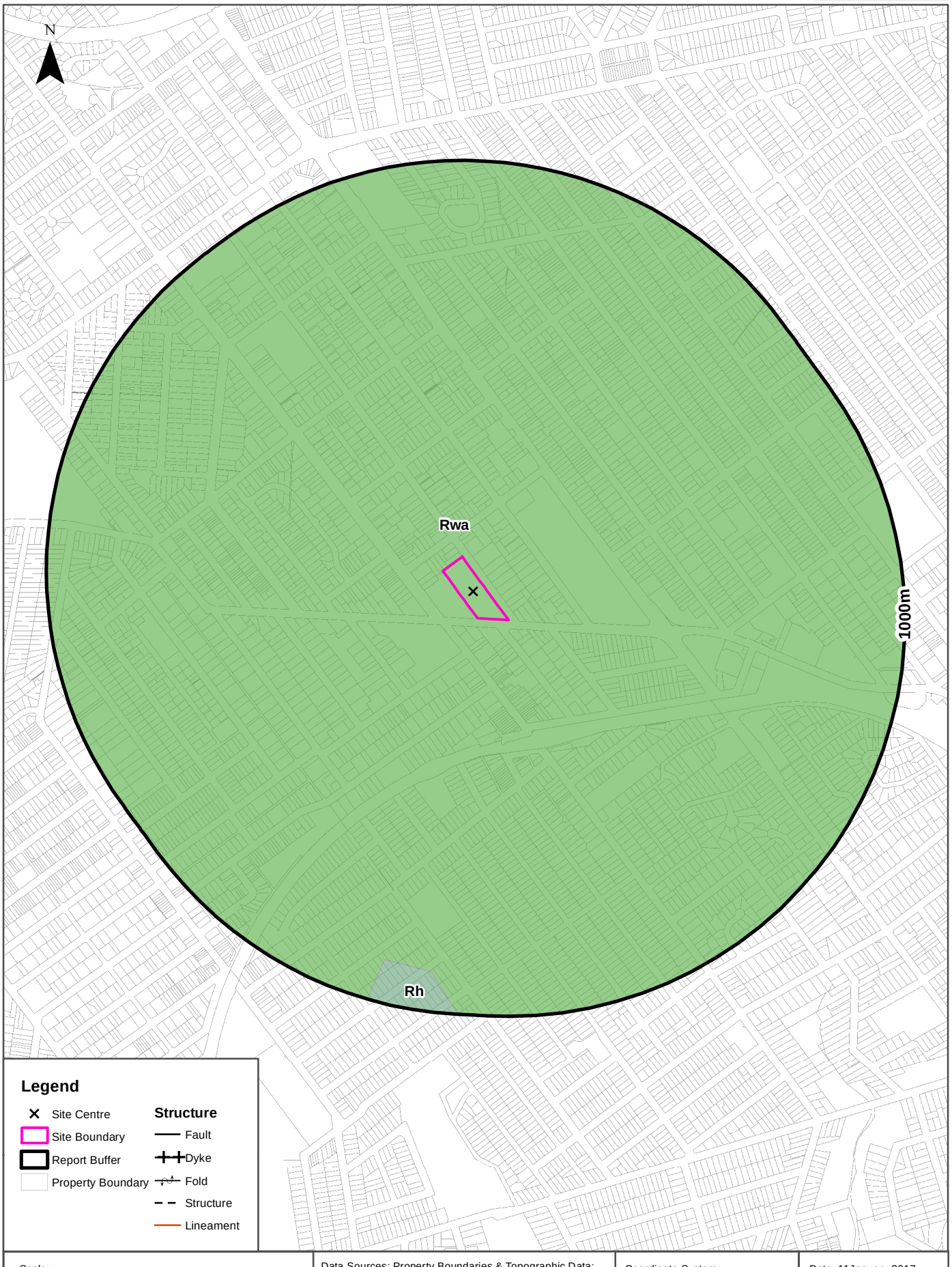
## Driller's Logs

Drill log data relevant to the boreholes within 2km of the site:

| Groundwater No | Drillers Log | Distance | Direction |
|---|---|---|---|
| GW100068 | 0.00m-7.30m ALL SAND UNCONSOLIDATED SAND WITH SMALL SEASHELLS | 1737m | North East |
| GW100580 | 0.00m-9.15m UNCONSOLIDATED ALL SAND WITH SMALL SEA SHELLS | 1737m | North East |
| GW100668 | 0.00m-7.95m Unconsolidated all Sand with Small Seashells | 1737m | North East |
| GW100808 | 0.00m-1.52m CLEAN YELLOW SAND<br>1.52m-1.72m SEA SHELL<br>1.72m-6.10m CLEAN YELLOW SAND, THEN GREYISH SMELLY MUD AT 6.10 metres | 1737m | North East |

# Geology 1:100,000

**510 Forest Road, Penshurst, NSW 2222**




Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2017

Coordinate System: GDA 1994 MGA Zone 56

Date: 11January 2017

# Geology

**510 Forest Road, Penshurst, NSW 2222**

## Geological Units

What are the Geological Units onsite?

| Symbol | Description | Unit Name | Group | Sub Group | Age | Dom Lith | Map Sheet | Dataset |
|---|---|---|---|---|---|---|---|---|
| Rwa | Black to dark grey shale and laminate | Ashfield Shale | Wianamatta Group | | Triassic | | Sydney | 1:100,000 |

What are the Geological Units within the report buffer?

| Symbol | Description | Unit Name | Group | Sub Group | Age | Dom Lith | Map Sheet | Dataset |
|---|---|---|---|---|---|---|---|---|
| Rh | Medium to coarse grained quartz sandstone, very minor shale and laminate lenses | | | | Triassic | | Sydney | 1:100,000 |
| Rwa | Black to dark grey shale and laminate | Ashfield Shale | Wianamatta Group | | Triassic | | Sydney | 1:100,000 |

## Geological Structures

What are the Geological Structures onsite?

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

What are the Geological Structures within the report buffer?

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

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

# Naturally Occurring Asbestos Potential

**510 Forest Road, Penshurst, NSW 2222**

## Naturally Occurring Asbestos Potential

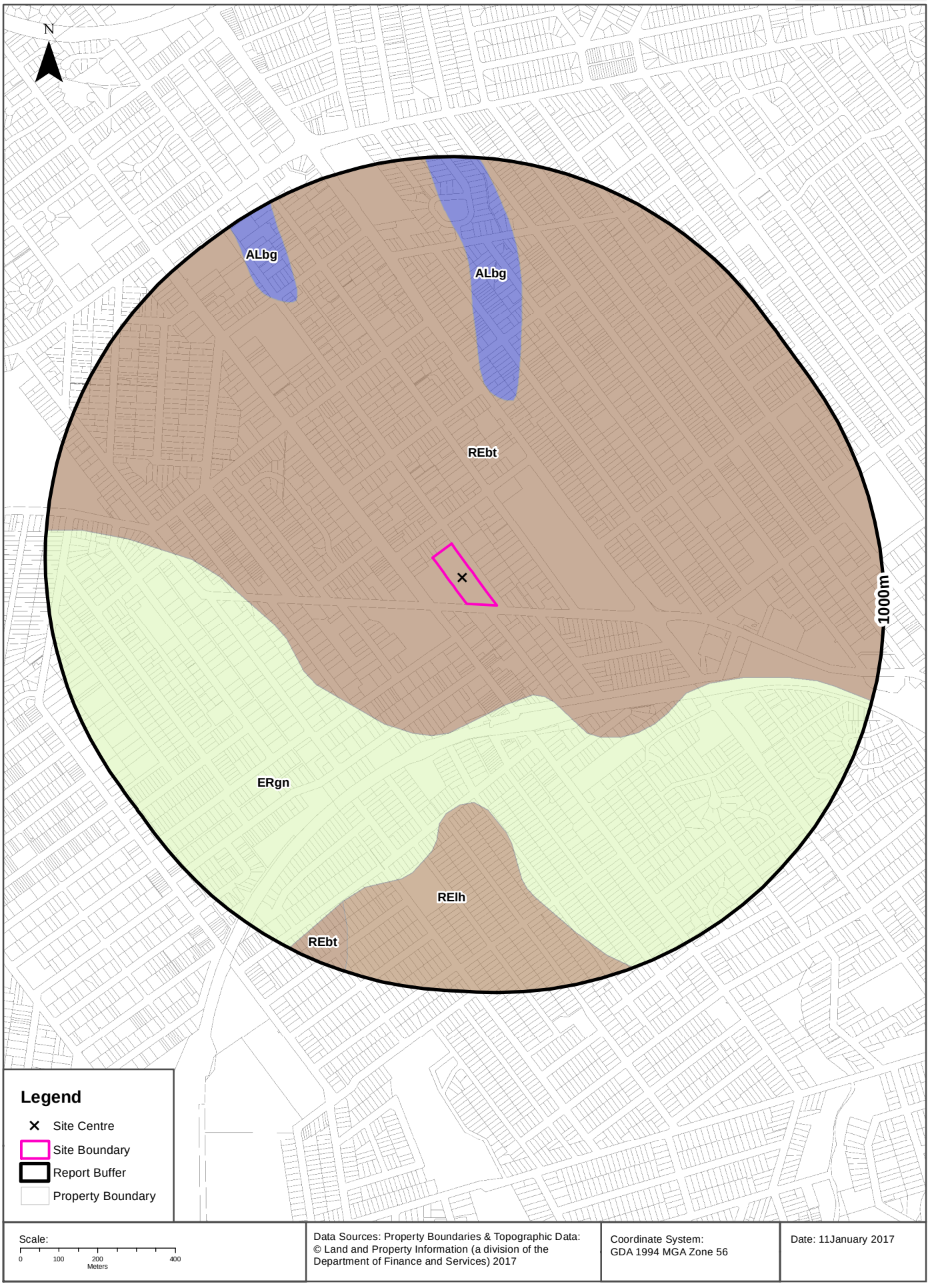
Naturally Occurring Asbestos Potential within the report buffer?

| 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

**510 Forest Road, Penshurst, NSW 2222**



# Soils

**510 Forest Road, Penshurst, NSW 2222**

## Soil Landscapes

What are the onsite Soil Landscapes?

| Soil Code | Name | Group | Process | Map Sheet | Scale |
|---|---|---|---|---|---|
| REbt | BLACKTOWN | | RESIDUAL | Sydney | 1:100,000 |

What are the Soil Landscapes within the report buffer?

| Soil Code | Name | Group | Process | Map Sheet | Scale |
|---|---|---|---|---|---|
| ALbg | BIRRONG | | ALLUVIAL | Sydney | 1:100,000 |
| ERgn | GLENORIE | | EROSIONAL | Sydney | 1:100,000 |
| REbt | BLACKTOWN | | RESIDUAL | Sydney | 1:100,000 |
| RElh | LUCAS HEIGHTS | | RESIDUAL | Sydney | 1:100,000 |

# Standard Local Environmental Plan Acid Sulfate Soils

**510 Forest Road, Penshurst, NSW 2222**

## Standard Local Environmental Plan Acid Sulfate Soils

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

| Soil Class | Description | LEP |
|---|---|---|
| N/A | | |

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

| Soil Class | Description | LEP | Distance | Direction |
|---|---|---|---|---|
| N/A | | | | |

# Dryland Salinity

**510 Forest Road, Penshurst, NSW 2222**

## Dryland Salinity

Is there Dryland Salinity data onsite?

**No**

Is there Dryland Salinity data within the report 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.

# Mining Subsidence Districts

**510 Forest Road, Penshurst, NSW 2222**

## Mining Subsidence Districts

Mining Subsidence Districts within the report buffer?

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

# Environmental Zoning

**510 Forest Road, Penshurst, NSW 2222**

## State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the report buffer?

| Dataset | Onsite | Within Site Buffer | Distance |
|---|---|---|---|
| SEPP14 - Coastal Wetlands | No | No | N/A |
| SEPP26 - Littoral Rainforests | No | No | N/A |
| SEPP71 - Coastal Protection Zone | No | No | N/A |

SEPP Protected Areas Data Source: NSW Department of Planning & Environment


## State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the report buffer?

| Map Id | Feature | Effective Date | Distance | Direction |
|---|---|---|---|---|
| N/A | No records within buffer | | | |

SEPP Major Development Data Source: NSW Department of Planning & Environment


## State Environmental Planning Policy Strategic Land Use Areas

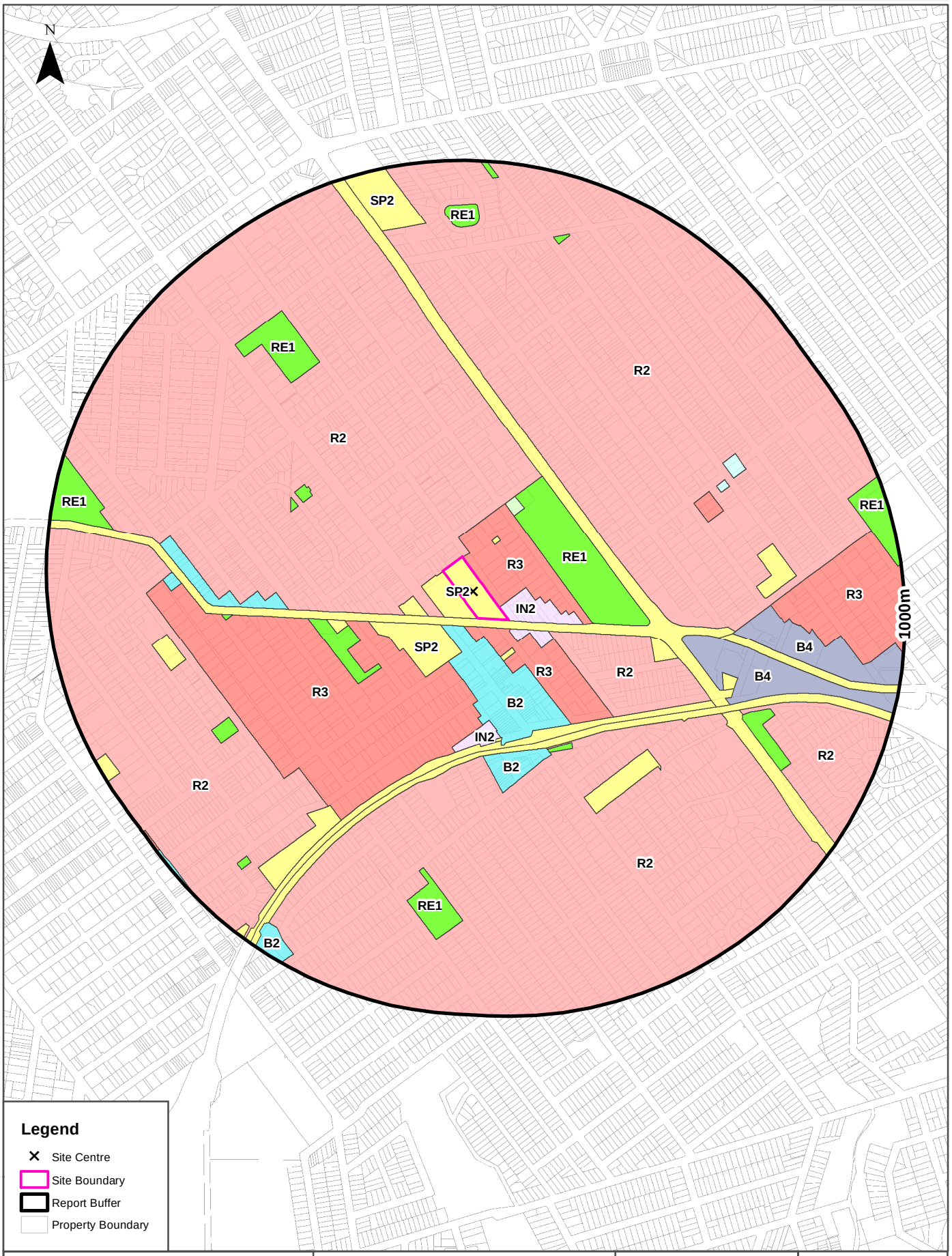
State Environmental Planning Policy Strategic Land Use Areas onsite or within the report buffer?

| Strategic Land Use | SEPPNo | Effective Date | Amendment | Amendment Year | Distance | Direction |
|---|---|---|---|---|---|---|
| No records within buffer | | | | | | |

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment

# LEP Planning Zones

**510 Forest Road, Penshurst, NSW 2222**




Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2017
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11January 2017

# Local Environmental Plan

**510 Forest Road, Penshurst, NSW 2222**

## Land Zoning

What Local Environmental Plan Land Zones exist within the report buffer?

| Zone | Description | Purpose | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| SP2 | Infrastructure | Church & Educational Est. | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 0m | Onsite |
| IN2 | Light Industrial | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 0m | East |
| R2 | Low Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 0m | North West |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 0m | North East |
| SP2 | Infrastructure | Classified Road | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 0m | North West |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 20m | South East |
| IN2 | Light Industrial | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 21m | South East |
| B2 | Local Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 40m | South |
| SP2 | Infrastructure | Car Park | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 70m | South East |
| SP2 | Infrastructure | Beacon | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 83m | North East |
| SP2 | Infrastructure | Educational Establishment | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 84m | South West |
| SP2 | Infrastructure | Church | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 96m | West |
| R2 | Low Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 102m | South East |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 131m | South West |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 166m | East |
| RE2 | Private Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 166m | North East |
| IN2 | Light Industrial | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 255m | South |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 270m | South West |
| SP2 | Infrastructure | Church | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 275m | West |
| SP2 | Infrastructure | Railway | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 285m | South |
| SP2 | Infrastructure | Electricity Transmission | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 296m | South |
| R2 | Low Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 312m | North East |
| SP2 | Infrastructure | Rail Infrastructure Facilities | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 316m | South |
| B2 | Local Centre | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 332m | South |
| R2 | Low Density Residential | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 336m | South East |
| RE1 | Public Recreation | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 340m | South East |
| SP2 | Infrastructure | Church | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 359m | East |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 382m | North West |
| B2 | Local Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 401m | West |

| Zone | Description | Purpose | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 401m | North West |
| B4 | Mixed Use | | Hurstville Local Environmental Plan 2012 | 10/07/2015 | 24/07/2015 | 24/07/2015 | Amendment No 3 | 439m | East |
| SP2 | Infrastructure | Water Supply System | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 470m | South East |
| SP2 | Infrastructure | Classified Road | Hurstville Local Environmental Plan 2012 | 10/07/2015 | 24/07/2015 | 24/07/2015 | Amendment No 3 | 530m | East |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 542m | West |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 552m | East |
| SP2 | Infrastructure | Telecommunications | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 553m | East |
| B4 | Mixed Use | | Hurstville Local Environmental Plan 2012 | 10/07/2015 | 24/07/2015 | 24/07/2015 | Amendment No 3 | 564m | East |
| SP2 | Infrastructure | Classified Road | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 585m | South East |
| R2 | Low Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 588m | South West |
| SP2 | Infrastructure | Educational Establishment | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 601m | South West |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 610m | North West |
| B1 | Neighbourhood Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 623m | North East |
| R2 | Low Density Residential | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 623m | South East |
| SP2 | Infrastructure | Hospital | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 629m | East |
| RE1 | Public Recreation | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 636m | South East |
| RE1 | Public Recreation | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 643m | South |
| SP2 | Infrastructure | Classified Road | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 652m | South East |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 654m | South West |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 660m | East |
| B2 | Local Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 661m | West |
| B1 | Neighbourhood Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 669m | North East |
| SP2 | Infrastructure | Aged Care Facility | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 686m | West |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 825m | North |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 831m | North |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 836m | South West |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 837m | West |
| SP2 | Infrastructure | Educational Establishment | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 844m | North |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 907m | East |
| B2 | Local Centre | | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | | 930m | South West |
| RE1 | Public Recreation | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 959m | North |
| SP2 | Infrastructure | Church | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 961m | South West |
| SP2 | Infrastructure | Car Park | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 966m | South West |
| B2 | Local Centre | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 990m | South West |
| R3 | Medium Density Residential | | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 992m | South West |

# Local Environmental Plan

**510 Forest Road, Penshurst, NSW 2222**

## Minimum Subdivision Lot Size

What are the onsite Local Environmental Plan Minimum Subdivision Lot Sizes?

| Symbol | Minimum Lot Size | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Percentage of Site Area |
|---|---|---|---|---|---|---|---|
| No Data | | | | | | | |

## Maximum Height of Building

What are the onsite Local Environmental Plan Maximum Height of Buildings?

| Symbol | Maximum Height of Building | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Percentage of Site Area |
|---|---|---|---|---|---|---|---|
| No Data | | | | | | | |

## Floor Space Ratio

What are the onsite Local Environmental Plan Floor Space Ratios?

| Symbol | Floor Space Ratio | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Percentage of Site Area |
|---|---|---|---|---|---|---|---|
| No Data | | | | | | | |

## Land Application

What are the onsite Local Environmental Plan Land Applications?

| Application Type | LEP or SEPP | Published Date | Commenced Date | Currency Date | Amendment | Percentage of Site Area |
|---|---|---|---|---|---|---|
| Included | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | | 100 |

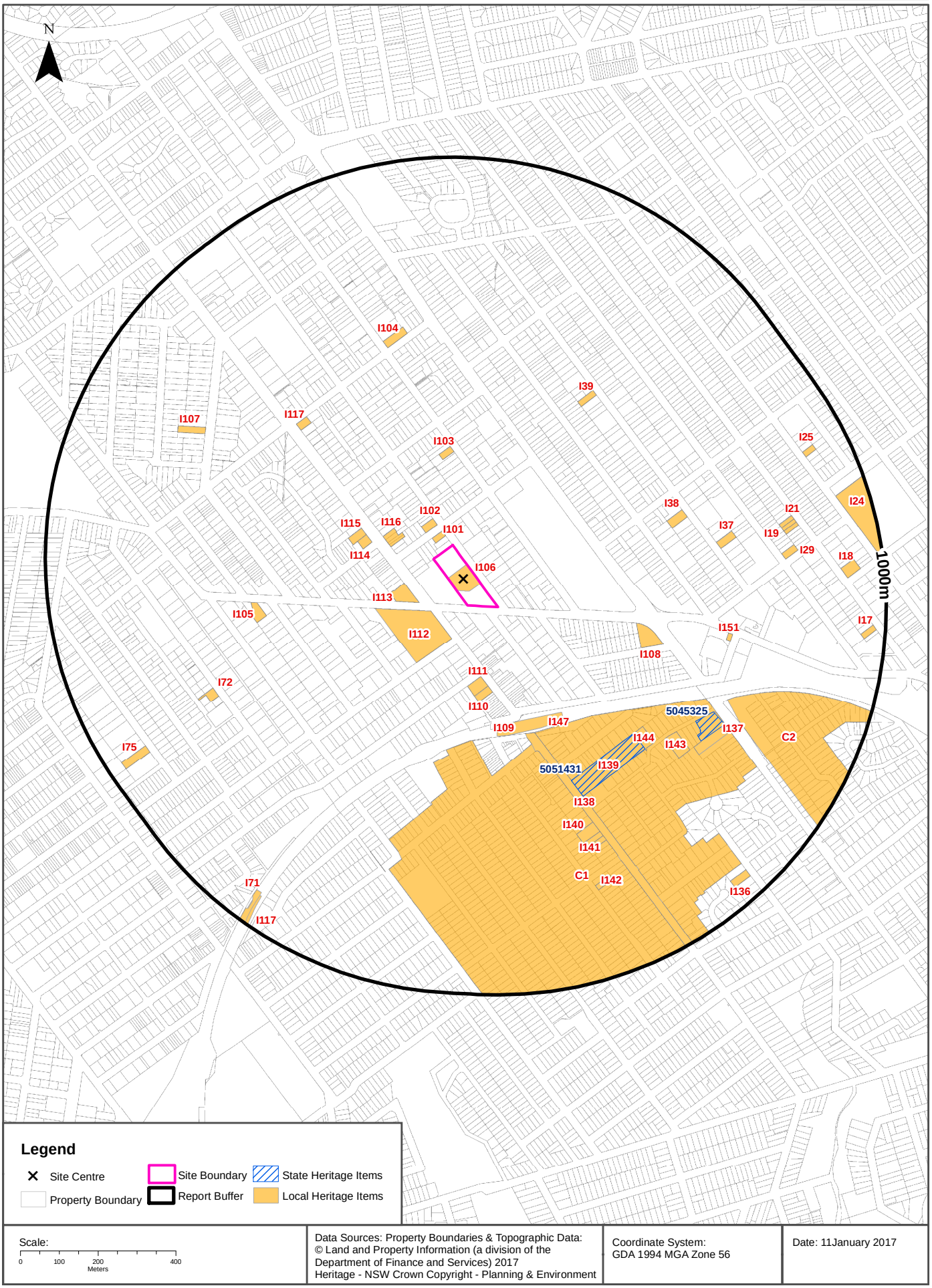
## Land Reservation Acquisition

What are the onsite Local Environmental Plan Land Reservation Acquisitions?

| Reservation | LEP | Published Date | Commenced Date | Currency Date | Amendment | Comments | Percentage of Site Area |
|---|---|---|---|---|---|---|---|
| No Data | | | | | | | |

# Heritage Items

**510 Forest Road, Penshurst, NSW 2222**



# Heritage

**510 Forest Road, Penshurst, NSW 2222**

## State Heritage Items

What are the State Heritage Items located within the report buffer?

| Map Id | Name | Address | LGA | Listing Date | Listing No | Plan No | Distance | Direction |
|---|---|---|---|---|---|---|---|---|
| 5051431 | Penshurst Reservoirs | | Kogarah | | 01330 | 2024 | 470m | South East |
| 5045325 | West Maling (Revival Life Centre) | 663-665 King Georges Road Penshurst | Kogarah | | 00269 | 654 | 588m | South East |



## Local Heritage Items

What are the Local Heritage Items located within the report buffer?

| Map Id | Name | Classification | Significance | LEP or Act | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I106 | Penshurst Public School | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 0m | Onsite |
| I101 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 30m | North West |
| I102 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 66m | North West |
| I112 | Georges River College - Penshurst | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 84m | South West |
| I116 | Semi-detached Federation cottages | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 94m | North West |
| I113 | Residence St Joseph's Convent | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 96m | West |
| I114 | Bungalow | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 164m | West |
| I111 | Penshurst Hotel | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 181m | South |
| I115 | 'Ferncliff' | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 184m | West |
| I110 | Former Penshurst Post Office | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 204m | South |
| I103 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 222m | North |
| I147 | Penshurst Railway Station | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 298m | South East |
| I109 | Penshurst Railway Station Group | Item - General | State | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 300m | South |
| I138 | Laycock Road street trees | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 333m | South East |
| C1 | Penshurst Heritage Conservation Area | Conservation Area - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 336m | South |

| Map Id | Name | Classification | Significance | LEP or Act | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I108 | St John the Evangelist's Anglican Church | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 359m | East |
| I105 | "Torino" | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 454m | West |
| I139 | Penshurst Reservoirs and Pumping Station | Item - General | State | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 470m | South East |
| I117 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 471m | North West |
| I144 | House and garden, 'Beverley' | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 477m | South East |
| I39 | Victorian cottage | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 487m | North East |
| I38 | "Alinda" | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 488m | East |
| I104 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 535m | North |
| I143 | House | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 547m | South East |
| I37 | "Erina" | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 586m | East |
| I137 | Revival Life Centre, 'West Maling' | Item - General | State | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 588m | South East |
| I151 | Centennial Bakery | Item - General | Local | Hurstville Local Environmental Plan 2012 | 10/07/2015 | 24/07/2015 | 24/07/2015 | 593m | East |
| I140 | House and garden, 'Kintail' | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 606m | South East |
| C2 | O'Briens Estate Heritage Conservation Area | Conservation Area - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 637m | South East |
| I141 | Stables, 'Kintail' | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 649m | South East |
| I72 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 655m | South West |
| I107 | "Ithiel" | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 671m | North West |
| I29 | 'Lilliesleaf' | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 743m | East |
| I142 | House | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 748m | South East |
| I21 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 754m | East |
| I20 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 758m | East |
| I19 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 762m | East |
| I25 | 'Busingny' | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 879m | East |
| I75 | "Longleat" | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 883m | South West |
| I18 | Semi-detached Federation cottages | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 888m | East |
| I71 | Mortdale Railway Station | Item - General | State | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 910m | South West |

| Map Id | Name | Classification | Significance | LEP or Act | Published Date | Commenced Date | Currency Date | Distance | Direction |
|---|---|---|---|---|---|---|---|---|---|
| I24 | Hurstville Oval and Velodrome | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 915m | East |
| I117 | Mortdale Railway Station and car sheds | Item - General | State | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 918m | South West |
| I136 | House and garden | Item - General | Local | Kogarah Local Environmental Plan 2012 | 25/01/2013 | 08/02/2013 | 15/08/2014 | 926m | South East |
| I17 | Federation house | Item - General | Local | Hurstville Local Environmental Plan 2012 | 07/12/2012 | 07/12/2012 | 24/07/2015 | 936m | East |

# Natural Hazards

**510 Forest Road, Penshurst, NSW 2222**

## Bushfire Prone Land

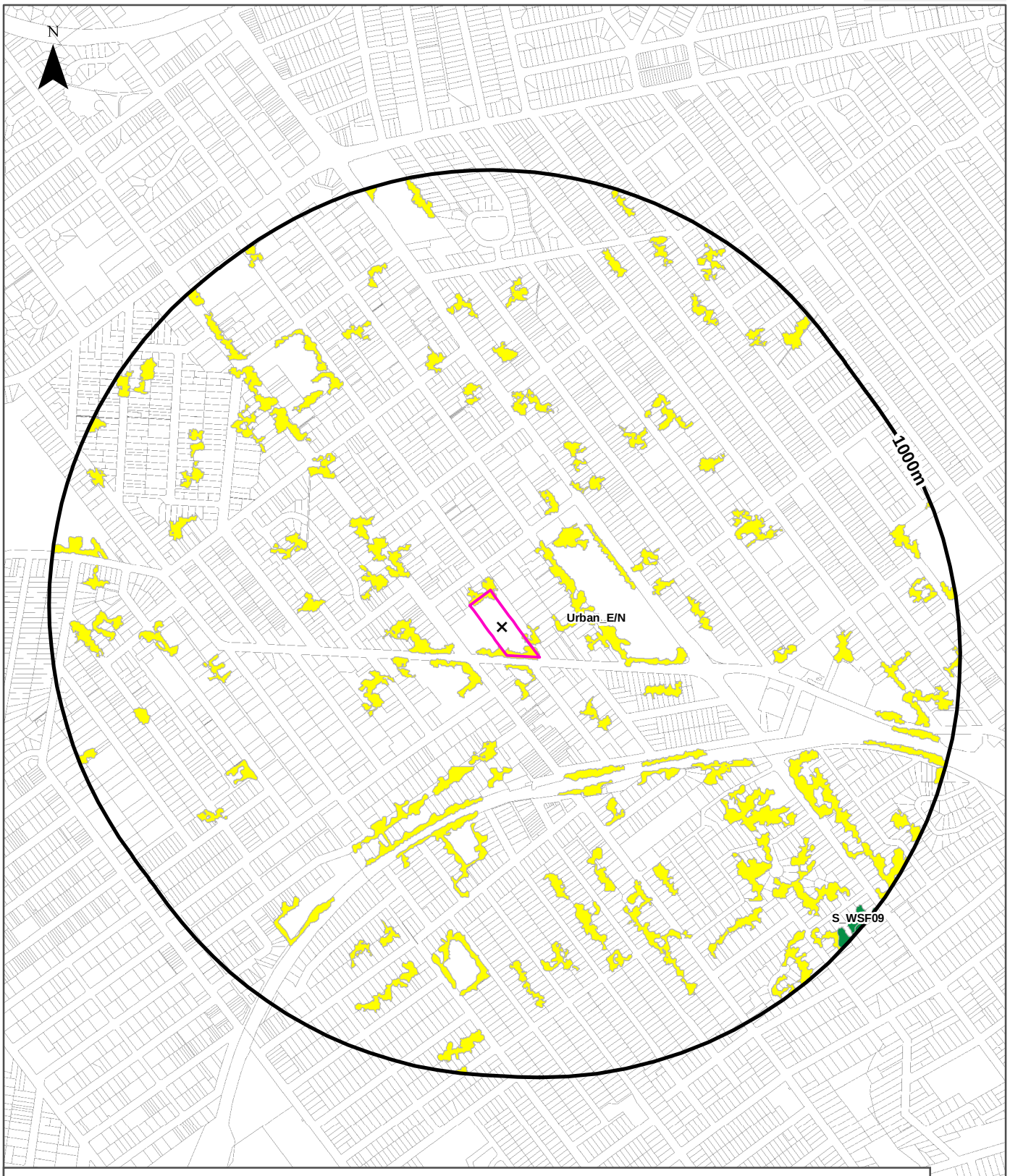
What are the nearest Bushfire Prone Land Categories that exist within the report buffer?

| Bushfire Prone Land Category | Distance | Direction |
|---|---|---|
| No records within buffer | | |

Bushfire Prone Land Data Reference - NSW RFS GIS Data Set

# Ecological Constraints - Native Vegetation & RAMSAR Wetlands

**510 Forest Road, Penshurst, NSW 2222**




**Legend**

- Site Centre
- Site Boundary
- Report Buffer
- Property Boundary
- Rainforest
- Wet Sclerophyll Forests
- Dry Sclerophyll Forests
- Forested Wetlands
- Grassy Woodlands
- Heathlands
- Grasslands
- Freshwater Wetlands
- Saline Wetlands
- Artificial Wetlands
- Water
- Other
- RAMSAR Wetlands

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2017

Coordinate System: GDA 1994 MGA Zone 56

Date: 11January 2017

# Ecological Constraints

**510 Forest Road, Penshurst, NSW 2222**

## Native Vegetation

What native vegetation exists within the report buffer?

| Map ID | Map Unit Name | Threatened Ecological Community NSW | Threatened Ecological Community EPBC Act | Understorey | Disturbance | Disturbance Index | Dominant Species | Dist | Direction |
|---|---|---|---|---|---|---|---|---|---|
| Urban_E/N | Urban_E/N: Urban Exotic/Native | | | 00: Not assessed | 00: Not assessed | 0: Not assessed | Urban Exotic/ Native | 0m | Onsite |
| S_WSF09 | S_WSF09: Sydney Turpentine-Ironbark Forest | Sydney Turpentine Ironbark Forest | Turpentine Ironbark Forest (possible) | 11: Semi sheltered dry/mesic | 13: Weeds | 3: High | S.glomulifera/ E.paniculata/ +/ - E.resinifera | 958m | South East |
| S_WSF09 | S_WSF09: Sydney Turpentine-Ironbark Forest | Sydney Turpentine Ironbark Forest | Turpentine Ironbark Forest (possible) | 24: Urban and hard surface | 24: Urban mixed use | 4: Very high | S.glomulifera/ E.paniculata/ +/ - E.resinifera | 958m | South East |



## RAMSAR Wetlands

What RAMSAR Wetland areas exist within the report buffer?

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

# Ecological Constraints

**510 Forest Road, Penshurst, NSW 2222**

## ATLAS of NSW Wildlife

Endangered &Vulnerable Species on the ATLAS of NSW Wildlife database, within 10km of the site?

| Class | Family | Scientific | Common | Exotic | NSW Status | Commonwealth Status |
|---|---|---|---|---|---|---|
| Amphibia | Hylidae | Litoria aurea | Green and Golden Bell Frog | No | Endangered, Protected | Vulnerable |
| Amphibia | Myobatrachidae | Crinia tinnula | Wallum Froglet | No | Vulnerable, Protected | |
| Amphibia | Myobatrachidae | Pseudophryne australis | Red-crowned Toadlet | No | Vulnerable, Protected | |
| Aves | Acanthizidae | Calamanthus fuliginosus | Striated Fieldwren | No | Endangered, Protected | |
| Aves | Accipitridae | Haliaeetus leucogaster | White-bellied Sea-Eagle | No | Vulnerable, Protected | CAMBA |
| Aves | Accipitridae | Hieraaetus morphnoides | Little Eagle | No | Vulnerable, Protected | |
| Aves | Accipitridae | Lophoictinia isura | Square-tailed Kite | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Accipitridae | Pandion cristatus | Eastern Osprey | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Ardeidae | Botaurus poiciloptilus | Australasian Bittern | No | Endangered, Protected | Endangered |
| Aves | Ardeidae | Ixobrychus flavicollis | Black Bittern | No | Vulnerable, Protected | |
| Aves | Artamidae | Artamus cyanopterus cyanopterus | Dusky Woodswallow | No | Vulnerable, Protected | |
| Aves | Burhinidae | Burhinus grallarius | Bush Stone-curlew | No | Endangered, Protected | |
| Aves | Burhinidae | Esacus magnirostris | Beach Stone-curlew | No | Critically Endangered Species, Protected | |
| Aves | Cacatuidae | Callocephalon fimbriatum | Gang-gang Cockatoo | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Cacatuidae | Calyptorhynchus lathami | Glossy Black-Cockatoo | No | Vulnerable, Protected, Category 2 Sensitive Species | |
| Aves | Cacatuidae | Lophochroa leadbeateri | Major Mitchell's Cockatoo | No | Vulnerable, Protected, Category 2 Sensitive Species | |
| Aves | Charadriidae | Charadrius leschenaultii | Greater Sand-plover | No | Vulnerable, Protected | V,C,J,K |
| Aves | Charadriidae | Charadrius mongolus | Lesser Sand-plover | No | Vulnerable, Protected | E,C,J,K |
| Aves | Ciconiidae | Ephippiorhynchus asiaticus | Black-necked Stork | No | Endangered, Protected | |
| Aves | Climacteridae | Climacteris picumnus victoriae | Brown Treecreeper (eastern subspecies) | No | Vulnerable, Protected | |
| Aves | Columbidae | Ptilinopus superbus | Superb Fruit-Dove | No | Vulnerable, Protected | |
| Aves | Diomedeidae | Diomedea exulans | Wandering Albatross | No | Endangered, Protected | E,J |
| Aves | Haematopodidae | Haematopus fuliginosus | Sooty Oystercatcher | No | Vulnerable, Protected | |
| Aves | Haematopodidae | Haematopus longirostris | Pied Oystercatcher | No | Endangered, Protected | |
| Aves | Laridae | Onychoprion fuscata | Sooty Tern | No | Vulnerable, Protected | |
| Aves | Laridae | Sternula albifrons | Little Tern | No | Endangered, Protected | CAMBA, JAMBA, ROKAMBA |
| Aves | Meliphagidae | Anthochaera phrygia | Regent Honeyeater | No | Critically Endangered Species, Protected | Critically Endangered |
| Aves | Meliphagidae | Epthianura albifrons | White-fronted Chat | No | Vulnerable, Protected | |
| Aves | Meliphagidae | Epthianura albifrons | White-fronted Chat population in the Sydney Metropolitan Catchment Management Area | No | Endangered Population, Vulnerable, Protected | |

| Class | Family | Scientific | Common | Exotic | NSW Status | Commonwealth Status |
|---|---|---|---|---|---|---|
| Aves | Meliphagidae | Melithreptus gularis gularis | Black-chinned Honeyeater (eastern subspecies) | No | Vulnerable, Protected | |
| Aves | Neosittidae | Daphoenositta chrysoptera | Varied Sittella | No | Vulnerable, Protected | |
| Aves | Petroicidae | Petroica boodang | Scarlet Robin | No | Vulnerable, Protected | |
| Aves | Petroicidae | Petroica phoenicea | Flame Robin | No | Vulnerable, Protected | |
| Aves | Petroicidae | Petroica rodinogaster | Pink Robin | No | Vulnerable, Protected | |
| Aves | Psittacidae | Glossopsitta porphyrocephala | Purple-crowned Lorikeet | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Psittacidae | Glossopsitta pusilla | Little Lorikeet | No | Vulnerable, Protected | |
| Aves | Psittacidae | Lathamus discolor | Swift Parrot | No | Endangered, Protected, Category 3 Sensitive Species | Critically Endangered |
| Aves | Psittacidae | Neophema pulchella | Turquoise Parrot | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Rostratulidae | Rostratula australis | Australian Painted Snipe | No | Endangered, Protected | Endangered |
| Aves | Scolopacidae | Calidris alba | Sanderling | No | Vulnerable, Protected | CAMBA, JAMBA, ROKAMBA |
| Aves | Scolopacidae | Calidris ferruginea | Curlew Sandpiper | No | Endangered, Protected | CE,C,J,K |
| Aves | Scolopacidae | Calidris tenuirostris | Great Knot | No | Vulnerable, Protected | CE,C,J,K |
| Aves | Scolopacidae | Limicola falcinellus | Broad-billed Sandpiper | No | Vulnerable, Protected | CAMBA, JAMBA, ROKAMBA |
| Aves | Scolopacidae | Limosa limosa | Black-tailed Godwit | No | Vulnerable, Protected | CAMBA, JAMBA, ROKAMBA |
| Aves | Scolopacidae | Xenus cinereus | Terek Sandpiper | No | Vulnerable, Protected | CAMBA, JAMBA, ROKAMBA |
| Aves | Strigidae | Ninox strenua | Powerful Owl | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Tytonidae | Tyto novaehollandiae | Masked Owl | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Aves | Tytonidae | Tyto tenebricosa | Sooty Owl | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Mammalia | Burramyidae | Cercartetus nanus | Eastern Pygmy-possum | No | Vulnerable, Protected | |
| Mammalia | Dasyuridae | Dasyurus maculatus | Spotted-tailed Quoll | No | Vulnerable, Protected | Endangered |
| Mammalia | Dugongidae | Dugong dugon | Dugong | No | Endangered, Protected | |
| Mammalia | Emballonuridae | Saccolaimus flaviventris | Yellow-bellied Sheathtail-bat | No | Vulnerable, Protected | |
| Mammalia | Molossidae | Mormopterus norfolkensis | Eastern Freetail-bat | No | Vulnerable, Protected | |
| Mammalia | Otariidae | Arctocephalus pusillus doriferus | Australian Fur-seal | No | Vulnerable, Protected | |
| Mammalia | Peramelidae | Perameles nasuta | Long-nosed Bandicoot population in inner western Sydney | No | Endangered Population, Protected | |
| Mammalia | Petauridae | Petaurus australis | Yellow-bellied Glider | No | Vulnerable, Protected | |
| Mammalia | Phascolarctidae | Phascolarctos cinereus | Koala | No | Vulnerable, Protected | Vulnerable |
| Mammalia | Pteropodidae | Pteropus poliocephalus | Grey-headed Flying-fox | No | Vulnerable, Protected | Vulnerable |
| Mammalia | Vespertilionidae | Chalinolobus dwyeri | Large-eared Pied Bat | No | Vulnerable, Protected | Vulnerable |
| Mammalia | Vespertilionidae | Falsistrellus tasmaniensis | Eastern False Pipistrelle | No | Vulnerable, Protected | |
| Mammalia | Vespertilionidae | Miniopterus australis | Little Bentwing-bat | No | Vulnerable, Protected | |
| Mammalia | Vespertilionidae | Miniopterus schreibersii oceanensis | Eastern Bentwing-bat | No | Vulnerable, Protected | |
| Mammalia | Vespertilionidae | Myotis macropus | Southern Myotis | No | Vulnerable, Protected | |
| Mammalia | Vespertilionidae | Scoteanax rueppellii | Greater Broad-nosed Bat | No | Vulnerable, Protected | |
| Reptilia | Cheloniidae | Chelonia mydas | Green Turtle | No | Vulnerable, Protected | Vulnerable |

| Class | Family | Scientific | Common | Exotic | NSW Status | Commonwealth Status |
|---|---|---|---|---|---|---|
| Reptilia | Varanidae | Varanus rosenbergi | Rosenberg's Goanna | No | Vulnerable, Protected | |
| Flora | Anthericaceae | Caesia parviflora var. minor | Small Pale Grass-lily | No | Endangered, Protected | |
| Flora | Apocynaceae | Marsdenia viridiflora subsp. viridiflora | Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas | No | Endangered Population | |
| Flora | Asteraceae | Senecio spathulatus | Coast Groundsel | No | Endangered, Protected | |
| Flora | Campanulaceae | Wahlenbergia multicaulis | Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield | No | Endangered Population | |
| Flora | Casuarinaceae | Allocasuarina diminuta subsp. mimica | Allocasuarina diminuta subsp. mimica L.A.S.Johnson population in the Sutherland and Liverpool local government areas | No | Endangered Population | |
| Flora | Convolvulaceae | Wilsonia backhousei | Narrow-leafed Wilsonia | No | Vulnerable, Protected | |
| Flora | Dilleniaceae | Hibbertia puberula | | No | Endangered, Protected | |
| Flora | Dilleniaceae | Hibbertia stricta subsp. furcatula | | No | Endangered, Protected | |
| Flora | Elaeocarpaceae | Tetratheca juncea | Black-eyed Susan | No | Vulnerable, Protected | Vulnerable |
| Flora | Ericaceae | Epacris purpurascens var. purpurascens | | No | Vulnerable, Protected | |
| Flora | Ericaceae | Leucopogon exolasius | Woronora Beard-heath | No | Vulnerable, Protected | Vulnerable |
| Flora | Fabaceae (Faboideae) | Pultenaea pedunculata | Matted Bush-pea | No | Endangered, Protected | |
| Flora | Fabaceae (Mimosoideae) | Acacia bynoeana | Bynoe's Wattle | No | Endangered, Protected | Vulnerable |
| Flora | Fabaceae (Mimosoideae) | Acacia prominens | Gosford Wattle, Hurstville and Kogarah Local Government Areas | No | Endangered Population | |
| Flora | Fabaceae (Mimosoideae) | Acacia pubescens | Downy Wattle | No | Vulnerable, Protected | Vulnerable |
| Flora | Fabaceae (Mimosoideae) | Acacia terminalis subsp. terminalis | Sunshine Wattle | No | Endangered, Protected | Endangered |
| Flora | Juncaginaceae | Maundia triglochinoides | | No | Vulnerable, Protected | |
| Flora | Lamiaceae | Prostanthera saxicola | Prostanthera saxicola population in Sutherland and Liverpool local government areas | No | Endangered Population | |
| Flora | Myrtaceae | Callistemon linearifolius | Netted Bottle Brush | No | Vulnerable, Protected, Category 3 Sensitive Species | |
| Flora | Myrtaceae | Eucalyptus camfieldii | Camfield's Stringybark | No | Vulnerable, Protected | Vulnerable |
| Flora | Myrtaceae | Eucalyptus nicholii | Narrow-leaved Black Peppermint | No | Vulnerable, Protected | Vulnerable |
| Flora | Myrtaceae | Melaleuca deanei | Deane's Paperbark | No | Vulnerable, Protected | Vulnerable |
| Flora | Myrtaceae | Syzygium paniculatum | Magenta Lilly Pilly | No | Endangered, Protected | Vulnerable |
| Flora | Orchidaceae | Caladenia tessellata | Thick Lip Spider Orchid | No | Endangered, Protected, Category 2 Sensitive Species | Vulnerable |
| Flora | Orchidaceae | Genoplesium baueri | Bauer's Midge Orchid | No | Endangered, Protected, Category 2 Sensitive Species | Endangered |
| Flora | Orchidaceae | Pterostylis gibbosa | Illawarra Greenhood | No | Endangered, Protected, Category 2 Sensitive Species | Endangered |
| Flora | Orchidaceae | Pterostylis saxicola | Sydney Plains Greenhood | No | Endangered, Protected, Category 2 Sensitive Species | Endangered |
| Flora | Poaceae | Deyeuxia appressa | | No | Endangered, Protected | Endangered |
| Flora | Proteaceae | Persoonia hirsuta | Hairy Geebung | No | Endangered, Protected, Category 3 Sensitive Species | Endangered |
| Flora | Proteaceae | Persoonia nutans | Nodding Geebung | No | Endangered, Protected | Endangered |

| Class | Family | Scientific | Common | Exotic | NSW Status | Commonwealth Status |
|---|---|---|---|---|---|---|
| Flora | Rhamnaceae | Pomaderris prunifolia | P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas | No | Endangered Population | |
| Flora | Thymelaeaceae | Pimelea spicata | Spiked Rice-flower | No | Endangered, Protected | Endangered |

Data does not include records not defined as either endangered or vulnerable, and category 1 sensitive species are also excluded. NSW Office of Environment and Heritage's Atlas of NSW Wildlife, which holds data from a number of custodians. Data obtained 06/01/2017

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# Appendix B: Borehole / Test pit Logs

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 1**
1 / 1

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~51.2 m
**Date:** 24/1/16 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | | | | | | 51 | | | - | ASPHALTIC CONCRETE: 50mm.t | | | | |
| | | | | | | | | | | FILL: Gravelly sand, fine to coarse grained, dark brown, fine to coarse grained igneous gravel, and trace of brick, tile and asphaltic concrete fragments. | D | | | ROADBASE |
| | | | | | N = 22 8,8,14 | | | | CH | | MC<PL | H | 460 520 480 | |
| | | | | | | | 1 | | | FILL: Clayey sand, fine to coarse grained, brown mottled light grey. | | | | |
| | | | | | | 50 | | | | SILTY CLAY: high plasticity, light grey, with fine to coarse grained ironstone gravel. | XW | EL | | |
| | | | | | | | | | | SHALE: grey. | | | | |
| | | | | | N=SPT 10/ 50mm REFUSAL | | 2 | | | | DW | VL | | VERY LOW 'TC' BIT RESISTANCE |
| | | | | | | 49 | | | | | | | | |
| | | | | | | | 3 | | | | | | | |
| | | | | | | 48 | | | | | | | | |
| | | | | | | | 4 | | | | | L | | LOW RESISTANCE |
| | | | | | | 47 | | | | END OF BOREHOLE AT 4.50 m | | | | |
| | | | | | | | 5 | | | | | | | |
| | | | | | | 46 | | | | | | | | |
| | | | | | | | 6 | | | | | | | |
| | | | | | | 45 | | | | | | | | |

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**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 2**
1 / 3

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD

**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL

**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~52.9 m

**Date:** 24/1/17 **Datum:** AHD

**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION OF AUGERING | | | | | | | | | - | ASPHALTIC CONCRETE: 50mm.t<br>FILL: Silty clay, medium plasticity, dark brown, with fine to medium grained igneous gravel, and trace of asphaltic concrete fragments. | MC<PL | | | |
| | | | | | N = 21<br>5,6,15 | 52 | 1 | | CL-CH | SILTY CLAY: medium to high plasticity, grey mottled orange brown. | MC<PL | VSt | 240<br>330<br>360 | |
| | | | | | N > 44<br>10,19,25/<br>100mm<br>REFUSAL | 51 | 2 | | | SHALE: grey, with iron indurated bands and clay seams. | XW | EL | | VERY LOW 'TC' BIT RESISTANCE BANDED |
| | | | | | | 50 | 3 | | | | DW | VL - L | | LOW RESISTANCE BANDED |
| | | | | | | 49 | 4 | | | | | | | |
| | | | | | | 48 | 5 | | | | | L - M | | |
| | | | | | | 47 | 6 | | | | | | | |
| | | | | | | 46 | | | | | | | | |

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**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 2**
2 / 3

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~52.9 m
**Date:** 24/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 45 | 8 | | | SHALE: grey. | DW | L - M | | LOW RESISTANCE BANDED |
| | | | | | | 44 | 9 | | | | | M | | MODERATE RESISTANCE |
| | | | | | | 43 | 10 | | | REFER TO CORED BOREHOLE LOG | | | | |
| | | | | | | 42 | 11 | | | | | | | |
| | | | | | | 41 | 12 | | | | | | | |
| | | | | | | 40 | 13 | | | | | | | |
| | | | | | | 39 | | | | | | | | |

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**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No.** 2
3 / 3

# CORED BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S | **Core Size:** NMLC | **R.L. Surface:** ~52.9 m
**Date:** 24/1/17 | **Inclination:** VERTICAL | **Datum:** AHD
**Plant Type:** JK305 | **Bearing:** N/A | **Logged/Checked By:** K.S./P.S.

| Water Loss\Level | Barrel Lift | RL (m AHD) | Depth (m) | Graphic Log | CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components. | Weathering | Strength | POINT LOAD STRENGTH INDEX $I_s(50)$ (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH) | DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10) | DEFECT DETAILS: DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | START CORING AT 9.87m | | | | | |
| | | 43 | 10 | | SHALE: dark grey, with light grey laminae at 0-10°. | DW | M | | | (9.96m) XWS, 0°, 4 mm.t<br>(10.06m) FRAGMENTED ZONE, 0°, 30 mm.t<br>(10.21m) J, 60°, P, S |
| | | 42 | 11 | | | | H | | | (11.19m) Be, 0°, P, S |
| | | 41 | 12 | | | | | | | (11.68m) Be, 0°, P, S<br>(11.69m) Be, 0°, P, S<br>(11.78m) Be, 0°, P, S<br>(11.95m) J, 60°, P, S |
| | | 40 | 13 | | END OF BOREHOLE AT 12.76 m | | | | | |
| | | 39 | 14 | | | | | | | |
| | | 38 | 15 | | | | | | | |
| | | 37 | | | | | | | | |

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 3**
1 / 2

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~49.2 m
**Date:** 24/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | | | | | | 49 | | | | FILL: Silty sand, fine to medium grained, dark brown, with fine to coarse grained shale gravel. | MC<PL | | | GRASS COVER |
| | | | | | N = 12 5,6,6 | | 1 | | | FILL: Silty clay, low to medium plasticity, brown mottled dark grey and orange brown. | | | | APPEARS MODERATELY TO WELL COMPACTED |
| | | | | | | 48 | | | CL-CH | SILTY CLAY: medium to high plasticity, light grey mottled red brown, with fine to coarse grained ironstone gravel. | MC<PL | H | | |
| | | | | | N = 15 5,7,8 | | 2 | | | | | | 410 490 440 | |
| | | | | | | 47 | | | | INTERBEDDED CLAY AND SHALE: high plasticity, light grey, with iron indurated bands. | MC<PL DW | H / VL | | VERY LOW 'TC' BIT RESISTANCE BANDED |
| | | | | | N = 25 8,10,15 | 46 | 3 | | | | | | 590 480 520 | |
| | | | | | | | 4 | | | | | | | |
| | | | | | | 45 | | | | SHALE: grey and brown. | DW | VL - L | | VERY LOW TO LOW RESISTANCE |
| | | | | | | | 5 | | | | | | | |
| | | | | | | 44 | | | | | | | | |
| | | | | | | | 6 | | | | | | | |
| | | | | | | 43 | | | | | | | | |

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 3**
2 / 2

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~49.2 m
**Date:** 24/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AFTER 2 HRS | | | | | | 42 | | | | SHALE: grey. | DW | VL - L | | VERY LOW TO LOW RESISTANCE |
| | | | | | | | | | | | | L - M | | LOW TO MODERATE RESISTANCE |
| | | | | | | | 8 | | | | | M | | MODERATE RESISTANCE |
| | | | | | | 41 | | | | | | | | |
| | | | | | | | 9 | | | | | M - H | | MODERATE TO HIGH RESISTANCE |
| | | | | | | 40 | | | | END OF BOREHOLE AT 9.20 m | | | | 'TC' BIT REFUSAL |
| | | | | | | | 10 | | | | | | | |
| | | | | | | 39 | | | | | | | | |
| | | | | | | | 11 | | | | | | | |
| | | | | | | 38 | | | | | | | | |
| | | | | | | | 12 | | | | | | | |
| | | | | | | 37 | | | | | | | | |
| | | | | | | | 13 | | | | | | | |
| | | | | | | 36 | | | | | | | | |

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**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 4**
1 / 3

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~50.2 m
**Date:** 23/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION OF AUGERING | | | | | | 50 | | | | FILL: Silty sand, fine to medium grained, dark brown, with roots. | | | | GRASS COVER |
| | | | | | | | | | | FILL: Silty clay, low to medium plasticity, dark brown mottled grey, with fine to medium grained ironstone and shale gravel. | MC<PL | | | APPEARS MODERATELY TO WELL COMPACTED |
| | | | | | N = 14 7,7,7 | 49 | 1 | | | | | | | |
| | | | | | N = 15 4,5,10 | 48 | 2 | | | SILTY CLAY: medium to high plasticity, grey mottled red brown. | MC~PL | VSt | 340 360 370 | |
| | | | | | N = 30 7,11,19 | 47 | 3 | | | SHALE: grey. | XW | EL | | |
| | | | | | | 46 | 4 | | | INTERBEDDED SHALE AND CLAY: grey mottled red brown, with iron indurated bands. | XW - DW | EL - VL | | VERY LOW 'TC' BIT RESISTANCE |
| | | | | | | 45 | 5 | | | SHALE: grey. | DW | VL - L | | VERY LOW RESISTANCE WITH LOW BANDS |
| | | | | | | 44 | 6 | | | | | | | |

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**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 4**
2 / 3

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~50.2 m
**Date:** 23/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 43 | | | | SHALE: grey. *(continued)* | DW | L - M | | LOW TO MODERATE RESISTANCE |
| | | | | | | 42 | 8 | | | | | | | |
| | | | | | | 41 | 9 | | | REFER TO CORED BOREHOLE LOG | | | | |
| | | | | | | 40 | 10 | | | | | | | |
| | | | | | | 39 | 11 | | | | | | | |
| | | | | | | 38 | 12 | | | | | | | |
| | | | | | | 37 | 13 | | | | | | | |

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No.** 4 3 / 3

# CORED BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Core Size:** NMLC **R.L. Surface:** ~50.2 m
**Date:** 23/1/17 **Inclination:** VERTICAL **Datum:** AHD
**Plant Type:** JK305 **Bearing:** N/A **Logged/Checked By:** K.S./P.S.

| Water Loss\Level | Barrel Lift | RL (m AHD) | Depth (m) | Graphic Log | CORE DESCRIPTION (Rock Type, grain characteristics, colour, structure, minor components.) | Weathering | Strength | POINT LOAD STRENGTH INDEX $I_s(50)$ (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH) | DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10) | DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 42 | | | START CORING AT 8.87m | | | | | |
| 100% RETURN | | 41 | 9 | | SHALE: dark grey, with light grey laminae, bedded at 0-5°. | DW | M | | | (8.96m) Be, 0°, P, S<br>(8.97m) Be, 0°, P, S<br>(9.07m) XWS, 0°, 5 mm.t<br>(9.20m) XWS, 0°, 0 mm.t<br>(9.23m) XWS, 0°, 3 mm.t<br>(9.26m) XWS, 0°, 2 mm.t<br>(9.28m) XWS, 0°, 6 mm.t<br>(9.33m) XWS, 0°, 8 mm.t<br>(9.37m) XWS, 0°, 5 mm.t<br>(9.40m) XWS, 0°, 20 mm.t<br>(9.47m - 9.5m) FRAGMENTED ZONE, 0°<br>(9.59m - 9.65m) FRAGMENTED ZONE, 0° |
| | | 40 | 10 | | | | L | | | |
| | | | | | | XW | EL | | | |
| | | | | | | DW | H | | | (10.06m - 10.08m) FRAGMENTED ZONE, 0°<br>(10.10m) J, 60°, 60 mm.t<br>(10.14m) XWS, 10°, 11 mm.t<br>(10.18m) J, 50°, P, R<br>(10.22m) XWS, 0°, 6 mm.t<br>(10.26m) XWS, 0°, 15 mm.t<br>(10.36m - 10.39m) FRAGMENTED ZONE<br>(10.52m) J, 50°, P, S<br>(10.65m) Be, 10°, P, S |
| | | 39 | 11 | | as above, but bedded at 10-15°. | | | | | (11.60m - 11.75m) FRAGMENTED ZONE, 0° |
| | | 38 | 12 | | END OF BOREHOLE AT 11.94 m | | | | | |
| | | 37 | 13 | | | | | | | |
| | | 36 | 14 | | | | | | | |

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 5**
1 / 2

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~48.3 m
**Date:** 23/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 48 | 0 | | | FILL: Silty sand, fine to medium grained, dark brown, with roots. | D | | | GRASS COVER<br>APPEARS MODERATELY TO WELL COMPACTED |
| | | | | | N = 14<br>7,7,7 | | | | | FILL: Silty clay, low to medium plasticity, brown mottled grey, with fine to medium grained igneous and ironstone gravel. | MC<PL | | | |
| | | | | | | 47 | 1 | | CH | SILTY CLAY: high plasticity, grey mottled red brown, with fine to coarse grained ironstone gravel. | MC<PL | H | | |
| | | | | | N = 14<br>7,6,8 | | | | | | | | 560<br>540<br>>600 | |
| | | | | | | 46 | 2 | | | | | | | |
| | | | | | N = 25<br>8,10,15 | 45 | 3 | | | | | | >600<br>>600<br>>600 | |
| | | | | | | | | | | SHALE: grey, with iron indurated bands and clay seams. | XW | EL | | VERY LOW 'TC' BIT RESISTANCE |
| | | | | | | 44 | 4 | | | | DW | VL | | VERY LOW TO LOW RESISTANCE |
| | | | | | | | | | | | | L | | LOW RESISTANCE |
| | | | | | | 43 | 5 | | | | | | | |
| | | | | | | 42 | 6 | | | | | | | |

**JK Geotechnics**
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

**Borehole No. 5**
2 / 2

# BOREHOLE LOG

**Client:** PERUMAL PEDAVOLI PTY LTD
**Project:** PROPOSED ALTERATIONS TO EXISTING SCHOOL
**Location:** CNR. FOREST WAY AND ARCADIA STREET, PENSHURST, NSW

**Job No.:** 30104S **Method:** SPIRAL AUGER **R.L. Surface:** ~48.3 m
**Date:** 23/1/17 **Datum:** AHD
**Plant Type:** JK305 **Logged/Checked By:** K.S./P.S.

| Groundwater Record | SAMPLES ES | SAMPLES U50 | SAMPLES DB | SAMPLES DS | Field Tests | RL (m AHD) | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel Density | Hand Penetrometer Readings (kPa) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AFTER 2 HRS | | | | | | 41 | | | | SHALE: grey. | DW | L | | LOW RESISTANCE |
| | | | | | | | 8 | | | | | L - M | | LOW TO MODERATE RESISTANCE |
| | | | | | | 40 | | | | | | | | |
| | | | | | | | 9 | | | | | M | | MODERATE RESISTANCE |
| | | | | | | 39 | | | | | | | | |
| | | | | | | | 10 | | | | | | | |
| | | | | | | 38 | | | | | | | | |
| | | | | | | | | | | END OF BOREHOLE AT 10.50 m | | | | |
| | | | | | | | 11 | | | | | | | |
| | | | | | | 37 | | | | | | | | |
| | | | | | | | 12 | | | | | | | |
| | | | | | | 36 | | | | | | | | |
| | | | | | | | 13 | | | | | | | |
| | | | | | | 35 | | | | | | | | |

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# ENVIRONMENTAL INVESTIGATION SERVICES

**CONSULTING ENVIRONMENTAL ENGINEERS**

# ENVIRONMENTAL LOG

**Test Pit No.** **101** **1/1**

*Environmental logs are not to be used for geotechnical purposes*

**Client:** PERUMAL PEDAVOLI PTY LTD

**Project:** PROPOSED ALTERATIONS AND ADDITIONS TO SCHOOL

**Location:** PENSHURST PUBLIC SCHOOL, 510 FOREST ROAD, PENSHURST, NSW

**Job No.** E30104KP **Method:** HAND EQUIPMENT **R.L. Surface:** N/A

**Date:** 23-1-17 **Datum:**

**Logged/Checked by:** H.L./B.P.

| Groundwater Record | SAMPLES ES | SAMPLES ASS | SAMPLES ASB | SAMPLES SAL | Field Tests | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel. Density | Hand Penetrometer Readings (kPa.) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | ■ | | ■ | | | 0 | | | WOODCHIP COVER: 50mm.t<br>FILL: Silty sand, fine to medium grained, brown, trace of fine to coarse grained igneous gravel, fine to coarse grained ironstone gravel and clay fines. | M | | | |
| | | | | | | 0.5 | | | END OF TEST PIT AT 0.3m | | | | REFUSAL |
| | | | | | | 1 | | | | | | | |
| | | | | | | 1.5 | | | | | | | |
| | | | | | | 2 | | | | | | | |
| | | | | | | 2.5 | | | | | | | |
| | | | | | | 3 | | | | | | | |
| | | | | | | 3.5 | | | | | | | |

# ENVIRONMENTAL INVESTIGATION SERVICES

**CONSULTING ENVIRONMENTAL ENGINEERS**

# ENVIRONMENTAL LOG

**Test Pit No.** **102** **1/1**

*Environmental logs are not to be used for geotechnical purposes*

**Client:** PERUMAL PEDAVOLI PTY LTD

**Project:** PROPOSED ALTERATIONS AND ADDITIONS TO SCHOOL

**Location:** PENSHURST PUBLIC SCHOOL, 510 FOREST ROAD, PENSHURST, NSW

**Job No.** E30104KP **Method:** HAND EQUIPMENT **R.L. Surface:** N/A

**Date:** 23-1-17 **Datum:**

**Logged/Checked by:** H.L./B.P.

| Groundwater Record | SAMPLES ES | SAMPLES ASS | SAMPLES ASB | SAMPLES SAL | Field Tests | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel. Density | Hand Penetrometer Readings (kPa.) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | ■ | | ■ | | | 0 | | | FILL: Silty sand, fine to medium grained, dark brown, trace of fine to coarse grained igneous gravel and root fibres. | M | | | |
| | | | | | | | | | END OF TEST PIT AT 0.2m | | | | REFUSAL |
| | | | | | | 0.5 | | | | | | | |
| | | | | | | 1 | | | | | | | |
| | | | | | | 1.5 | | | | | | | |
| | | | | | | 2 | | | | | | | |
| | | | | | | 2.5 | | | | | | | |
| | | | | | | 3 | | | | | | | |
| | | | | | | 3.5 | | | | | | | |

# ENVIRONMENTAL INVESTIGATION SERVICES

**CONSULTING ENVIRONMENTAL ENGINEERS**

# ENVIRONMENTAL LOG

**Test Pit No.** **103** **1/1**

*Environmental logs are not to be used for geotechnical purposes*

**Client:** PERUMAL PEDAVOLI PTY LTD

**Project:** PROPOSED ALTERATIONS AND ADDITIONS TO SCHOOL

**Location:** PENSHURST PUBLIC SCHOOL, 510 FOREST ROAD, PENSHURST, NSW

**Job No.** E30104KP **Method:** HAND EQUIPMENT **R.L. Surface:** N/A

**Date:** 23-1-17 **Datum:**

**Logged/Checked by:** H.L./B.P.

| Groundwater Record | SAMPLES ES | SAMPLES ASS | SAMPLES ASB | SAMPLES SAL | Field Tests | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel. Density | Hand Penetrometer Readings (kPa.) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | ■ | | ■ | | | 0 | | | FILL: Silty sand, fine to medium grained, brown, trace of fine to coarse grained igneous gravel, fine to coarse grained concrete and asphaltic concrete fragments, and root fibres. | M | | | |
| | | | | | | | | | END OF TEST PIT AT 0.2m | | | | REFUSAL |
| | | | | | | 0.5 | | | | | | | |
| | | | | | | 1 | | | | | | | |
| | | | | | | 1.5 | | | | | | | |
| | | | | | | 2 | | | | | | | |
| | | | | | | 2.5 | | | | | | | |
| | | | | | | 3 | | | | | | | |
| | | | | | | 3.5 | | | | | | | |

# ENVIRONMENTAL INVESTIGATION SERVICES

**CONSULTING ENVIRONMENTAL ENGINEERS**

# ENVIRONMENTAL LOG

**Test Pit No.** **104** **1/1**

*Environmental logs are not to be used for geotechnical purposes*

**Client:** PERUMAL PEDAVOLI PTY LTD

**Project:** PROPOSED ALTERATIONS AND ADDITIONS TO SCHOOL

**Location:** PENSHURST PUBLIC SCHOOL, 510 FOREST ROAD, PENSHURST, NSW

**Job No.** E30104KP **Method:** HAND EQUIPMENT **R.L. Surface:** N/A

**Date:** 23-1-17 **Datum:**

**Logged/Checked by:** H.L./B.P.

| Groundwater Record | SAMPLES ES | SAMPLES ASS | SAMPLES ASB | SAMPLES SAL | Field Tests | Depth (m) | Graphic Log | Unified Classification | DESCRIPTION | Moisture Condition/ Weathering | Strength/ Rel. Density | Hand Penetrometer Readings (kPa.) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRY ON COMPLETION | ■ | | ■ | | | 0 | | | FILL: Silty sand, fine to medium grained, brown, trace of fine to coarse grained igneous gravel, timber and glass fragments, clay fines and ash. | M | | | ONE FIBRE CEMENT FRAGMENT OBSERVED IN FILL |
| | ■ | | | ■ | | | | | FILL: Silty clay, low to medium plasticity, brown mottled orange brown, trace of fine to coarse grained sandstone and igneous gravel. | MC<PL | | | FCF1 SAMPLED |
| | | | | | | 0.5 | | | END OF TEST PIT AT 0.5m | | | | |
| | | | | | | 1 | | | | | | | |
| | | | | | | 1.5 | | | | | | | |
| | | | | | | 2 | | | | | | | |
| | | | | | | 2.5 | | | | | | | |
| | | | | | | 3 | | | | | | | |
| | | | | | | 3.5 | | | | | | | |

# EXPLANATORY NOTES – ENVIRONMENTAL LOGS

## INTRODUCTION

These notes have been provided to supplement the environmental report with regards to drilling and field logging. Not all notes are necessarily relevant to all reports. Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and manmade processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies involve gathering and assimilating limited facts about these characteristics and properties in order to understand the ground on a particular site under certain conditions. These conditions are directly relevant only to the ground at the place where, and time when, the investigation was carried out.

## DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below (note that unless stated in the report, the soil classification is based on a qualitative field assessment, not laboratory testing):

| Soil Classification | Particle Size |
|---|---|
| Clay | less than 0.002mm |
| Silt | 0.002 to 0.075mm |
| Sand | 0.075 to 2mm |
| Gravel | 2 to 60mm |

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

| Relative Density | SPT 'N' Value (blows/300mm) |
|---|---|
| Very loose | less than 4 |
| Loose | 4 – 10 |
| Medium dense | 10 – 30 |
| Dense | 30 – 50 |
| Very Dense | greater than 50 |

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as shown in the following table:

| Classification | Unconfined Compressive Strength kPa |
|---|---|
| Very Soft | less than 25 |
| Soft | 25 – 50 |
| Firm | 50 – 100 |
| Stiff | 100 – 200 |
| Very Stiff | 200 – 400 |
| Hard | Greater than 400 |
| Friable | Strength not attainable – soil crumbles |

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

**DRILLING OR EXCAVATION METHODS**

The following is a brief summary of drilling and excavation methods currently adopted by the Company, and some comments on their use and application. All except test pits and hand auger drilling require the use of a mechanical drilling rig.

**Test Pits:** These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descend into the pit. The depth of penetration is limited to approximately 3m for a backhoe and up to 6m for an excavator. Limitations of test pits include problems associated with disturbance and difficulty of reinstatement; and the consequent effects on nearby structures. Care must be taken if construction is to be carried out near test pit locations to either properly re-compact the backfill during construction, or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

**Hand Auger Drilling:** A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as fill, hard clay, gravel or ironstone, and does not necessarily indicate rock level.

**Continuous Spiral Flight Augers:** The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

**Rock Augering:** Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

**Wash Boring:** The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

**Mud Stabilised Drilling:** Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (e.g. from SPT and U50 samples) or from rock coring, etc.

**Continuous Core Drilling:** A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The locations of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

**Standard Penetration Tests:** Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as: N = 13 (4, 6, 7)
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as: N>30 (15, 30/40mm)

The results of the test can be related empirically to the engineering properties of the soil. Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60 tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "Nc" on the borehole logs, together with the number of blows per 150mm penetration.

**LOGS**

The borehole or test pit logs presented herein are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line"

variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

**GROUNDWATER**

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open;
- A localised perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

**FILL**

The presence of fill materials can often be determined only by the inclusion of foreign objects (e.g. bricks, concrete, plastic, slag/ash, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes

**LABORATORY TESTING**

Laboratory testing has not been undertaken to confirm the soil classifications and rocks strengths indicated on the environmental logs unless noted in the report.

**SITE ANOMALIES**

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, EIS should be notified immediately.

## GRAPHIC LOG SYMBOLS FOR SOIL AND ROCKS

### SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

### ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

### DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

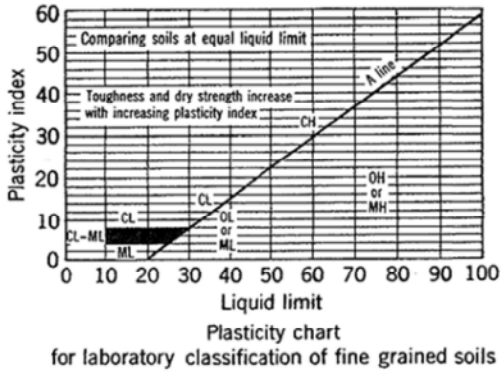
### OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

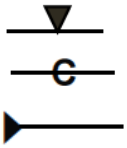
| Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights) | | | | | | Group Symbols [a] | Typical Names | Information Required for Describing Soils | Laboratory Classification Criteria |
|---|---|---|---|---|---|---|---|---|---|
| Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye) | Gravels More than half of coarse fraction is larger than 4 mm sieve size | Clean gravels (little or no fines) | Wide range in grain size and substantial amounts of all intermediate particle sizes | | | *GW* | Well graded gravels, gravel-sand mixtures, little or no fines | Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses<br>For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics<br>Example:<br>*Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*) | Use grain size curve in identifying the fractions as given under field identification<br>Determine percentages of gravel and sand from grain size curve<br>Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows:<br>Less than 5% *GW, GP, SW, SP*<br>More than 12% *GM, GC, SM, SC*<br>5% to 12% *Borderline* cases requiring use of dual symbols<br>$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4<br>$C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3<br>Not meeting all gradation requirements for *GW*<br>Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols<br>Atterberg limits above "A" line, with *PI* greater than 7 |
| | | | Predominantly one size or a range of sizes with some intermediate sizes missing | | | *GP* | Poorly graded gravels, gravel-sand mixtures, little or no fines | | |
| | | Gravels with fines (appreciable amount of fines) | Nonplastic fines (for identification procedures see *ML* below) | | | *GM* | Silty gravels, poorly graded gravel-sand-silt mixtures | | |
| | | | Plastic fines (for identification procedures, see *CL* below) | | | *GC* | Clayey gravels, poorly graded gravel-sand-clay mixtures | | |
| | Sands More than half of coarse fraction is smaller than 4 mm sieve size | Clean sands (little or no fines) | Wide range in grain sizes and substantial amounts of all intermediate particle sizes | | | *SW* | Well graded sands, gravelly sands, little or no fines | | $C_U = \frac{D_{60}}{D_{10}}$ Greater than 6<br>$C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3<br>Not meeting all gradation requirements for *SW*<br>Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols<br>Atterberg limits below "A" line with *PI* greater than 7 |
| | | | Predominantly one size or a range of sizes with some intermediate sizes missing | | | *SP* | Poorly graded sands, gravelly sands, little or no fines | | |
| | | Sands with fines (appreciable amount of fines) | Nonplastic fines (for identification procedures, see *ML* below) | | | *SM* | Silty sands, poorly graded sand-silt mixtures | | |
| | | | Plastic fines (for identification procedures, see *CL* below) | | | *SC* | Clayey sands, poorly graded sand-clay mixtures | | |
| Fine-grained soils More than half of material is *smaller* than 75 μm sieve size | Identification Procedures on Fraction Smaller than 380 μm Sieve Size | | Dry Strength (crushing characteristics) | Dilatancy (reaction to shaking) | Toughness (consistency near plastic limit) | | | | |
| | Silts and clays liquid limit less than 50 | | None to slight | Quick to slow | None | *ML* | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity | Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses<br>For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions<br>Example:<br>*Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*) | |
| | | | Medium to high | None to very slow | Medium | *CL* | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | | |
| | | | Slight to medium | Slow | Slight | *OL* | Organic silts and organic silt-clays of low plasticity | | |
| | Silts and clays liquid limit greater than 50 | | Slight to medium | Slow to none | Slight to medium | *MH* | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | | |
| | | | High to very high | None | High | *CH* | Inorganic clays of high plasticity, fat clays | | |
| | | | Medium to high | None to very slow | Slight to medium | *OH* | Organic clays of medium to high plasticity | | |
| Highly Organic Soils | | | Readily identified by colour, odour, spongy feel and frequently by fibrous texture | | | *Pt* | Peat and other highly organic soils | | |



Plasticity chart
for laboratory classification of fine grained soils

Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

# LOG SYMBOLS

| LOG COLUMN | SYMBOL | DEFINITION |
|---|---|---|
| Groundwater Record |  | Standing water level. Time delay following completion of drilling may be shown.<br>Extent of borehole collapse shortly after drilling.<br>Groundwater seepage into borehole or excavation noted during drilling or excavation. |
| Samples | ES<br>U50<br>DB<br>DS<br>ASB<br>ASS<br>SAL | Soil sample taken over depth indicated, for environmental analysis.<br>Undisturbed 50mm diameter tube sample taken over depth indicated.<br>Bulk disturbed sample taken over depth indicated.<br>Small disturbed bag sample taken over depth indicated.<br>Soil sample taken over depth indicated, for asbestos screening.<br>Soil sample taken over depth indicated, for acid sulfate soil analysis.<br>Soil sample taken over depth indicated, for salinity analysis. |
| Field Tests | N = 17<br>4, 7, 10 | Standard Penetration Test (SPT) performed between depths indicated by lines. Individual show blows per 150mm penetration. 'R' as noted below. |
| | $N_c$ = 5<br>7<br>3 R | Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment. |
| | VNS = 25<br>PID = 100 | Vane shear reading in kPa of Undrained Shear Strength.<br>Photoionisation detector reading in ppm (Soil sample heads pace test). |
| Moisture (Cohesive Soils)<br><br>(Cohesionless) | MC > PL<br>MC ≈ PL<br>MC < PL<br>D<br>M<br>W | Moisture content estimated to be greater than plastic limit.<br>Moisture content estimated to be approximately equal to plastic limit.<br>Moisture content estimated to be less than plastic limit.<br>DRY – Runs freely through fingers.<br>MOIST – Does not run freely but no free water visible on soil surface.<br>WET – Free water visible on soil surface. |
| Strength (Consistency) Cohesive Soils | VS<br>S<br>F<br>St<br>VSt<br>H<br>( ) | VERY SOFT – Unconfined compressive strength less than 25kPa<br>SOFT – Unconfined compressive strength 25-5 0kPa<br>FIRM – Unconfined compressive strength 50-1 00kPa<br>STIFF – Unconfined compressive strength 100- 200kPa<br>VERY STIFF – Unconfined compressive strength 200- 400kPa<br>HARD – Unconfined compressive strength greater than 400kPa<br>Bracketed symbol indicates estimated consistency based o n tactile examination or other tests. |
| Density Index/ Relative Density (Cohesionless Soils) | VL<br>L<br>MD<br>D<br>VD<br>( ) | **Density Index (ID) Range (%)** / **SPT ' N' Value Range (Blows/300mm )**<br>Very Loose <15 / 0-4<br>Loose 15-35 / 4-10<br>Medium Dense 35-65 / 10-30<br>Dense 65-85 / 30-50<br>Very Dense >85 / >50<br>Bracketed symbol indicates estimated density based on ease of drilling or other tests. |
| Hand Penetrometer Readings | 300<br>250 | Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise |
| Remarks | 'V' bit<br>'TC' bit<br>$T_{60}$ | Hardened steel 'V' shaped bit.<br>Tungsten carbide wing bit.<br>Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers. |

# LOG SYMBOLS CONTINUED

**ROCK STRENGTH**

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining and Geomechanics Abstract Volume 22, No 2, 1985.

| TERM | SYMBOL | Is (50) MPa | FIELD GUIDE |
|---|---|---|---|
| Extremely Low: | EL | 0.03 | Easily remoulded by hand to a material with soil properties. |
| Very Low: | VL | 0.1 | May be crumbled in the hand. Sandstone is "sugary" and friable. |
| Low: | L | 0.3 | A piece of core 150 mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling. |
| Medium Strength: | M | 1 | A piece of core 150 mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife. |
| High: | H | 3 | A piece of core 150 mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer. |
| Very High: | VH | 10 | A piece of core 150 mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer. |
| Extremely High: | EH | | A piece of core 150 mm long x 50mm dia. is very difficult to break with h and-held hammer . Rings when struck with a hammer. |

**ROCK STRENGTH**

| ABBREVIATION | DESCRIPTION | NOTES |
|---|---|---|
| Be | Bedding Plane Parting | Defect orientations measured relative to the normal to (i.e. relative to horizontal for vertical holes) |
| CS | Clay Seam | |
| J | Joint | |
| P | Planar | |
| Un | Undulating | |
| S | Smooth | |
| R | Rough | |
| IS | Iron stained | |
| XWS | Extremely Weathered Seam | |
| Cr | Crushed Seam | |
| 60t | Thickness of defect in millimetres | |

# Appendix C: Laboratory Reports & COC Documents

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tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

# CERTIFICATE OF ANALYSIS 160953

**Client:**

**Environmental Investigation Services**
PO Box 976
North Ryde BC
NSW 1670

**Attention:** Brendan Page

**Sample log in details:**

| | |
|---|---|
| Your Reference: | **E30104KP, Penshurst** |
| No. of samples: | 20 soils, 5 material |
| Date samples received / completed instructions received | 30/01/17 / 30/01/17 |

**Analysis Details:**

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
***Please refer to the last page of this report for any comments relating to the results.***

**Report Details:**

| | |
|---|---|
| Date results requested by: / Issue Date: | 6/02/17 / 2/02/17 |
| Date of Preliminary Report: | Not Issued |

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

**Results Approved By:**

David Springer
General Manager

| vTRH(C6-C10)/BTEXN in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-2 | 160953-4 | 160953-7 | 160953-9 | 160953-10 |
| Your Reference | ---------- - | BH1 | BH2 | BH3 | BH4 | BH4 |
| Depth | ---------- | 0.3-0.5 | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0.8-1.0 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| TRHC$_6$ - C$_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| TRHC$_6$ - C$_{10}$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| vTPHC$_6$ - C$_{10}$ less BTEX (F1) | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| Total +ve Xylenes | mg/kg | <1 | <1 | <1 | <1 | <1 |
| naphthalene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 87 | 86 | 85 | 87 | 84 |

| vTRH(C6-C10)/BTEXN in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-12 | 160953-13 | 160953-15 | 160953-16 | 160953-17 |
| Your Reference | ---------- - | BH5 | BH5 | TP101 | TP102 | TP103 |
| Depth | ---------- | 0-0.2 | 0.8-1.0 | 0.1-0.2 | 0-0.2 | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| TRHC$_6$ - C$_9$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| TRHC$_6$ - C$_{10}$ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| vTPHC$_6$ - C$_{10}$ less BTEX (F1) | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| m+p-xylene | mg/kg | <2 | <2 | <2 | <2 | <2 |
| o-Xylene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| Total +ve Xylenes | mg/kg | <1 | <1 | <1 | <1 | <1 |
| naphthalene | mg/kg | <1 | <1 | <1 | <1 | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 90 | 92 | 91 | 92 | 94 |

| vTRH(C6-C10)/BTEXN in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- - | TP104 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 01/02/2017 |
| TRHC$_6$ - C$_9$ | mg/kg | <25 |
| TRHC$_6$ - C$_{10}$ | mg/kg | <25 |
| vTPHC$_6$ - C$_{10}$ less BTEX (F1) | mg/kg | <25 |
| Benzene | mg/kg | <0.2 |
| Toluene | mg/kg | <0.5 |
| Ethylbenzene | mg/kg | <1 |
| m+p-xylene | mg/kg | <2 |
| o-Xylene | mg/kg | <1 |
| Total +ve Xylenes | mg/kg | <1 |
| naphthalene | mg/kg | <1 |
| *Surrogate* aaa-Trifluorotoluene | % | 91 |

| svTRH (C10-C40) in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-2 | 160953-4 | 160953-7 | 160953-9 | 160953-10 |
| Your Reference | ---------- - | BH1 | BH2 | BH3 | BH4 | BH4 |
| Depth | ---------- | 0.3-0.5 | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0.8-1.0 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRH>C$_{10}$-C$_{16}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2) | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRH>C$_{16}$-C$_{34}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| TRH>C$_{34}$-C$_{40}$ | mg/kg | <100 | <100 | <100 | <100 | <100 |
| Total +ve TRH (>C10-C40) | mg/kg | <50 | <50 | <50 | <50 | <50 |
| *Surrogate* o-Terphenyl | % | 117 | 118 | 95 | 108 | 110 |

| svTRH (C10-C40) in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-12 | 160953-13 | 160953-15 | 160953-16 | 160953-17 |
| Your Reference | ---------- - | BH5 | BH5 | TP101 | TP102 | TP103 |
| Depth | ---------- | 0-0.2 | 0.8-1.0 | 0.1-0.2 | 0-0.2 | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | <100 | <100 | <100 | <100 | 220 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 160 | <100 | <100 | <100 | 370 |
| TRH>C$_{10}$-C$_{16}$ | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2) | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TRH>C$_{16}$-C$_{34}$ | mg/kg | 180 | <100 | 120 | <100 | 510 |
| TRH>C$_{34}$-C$_{40}$ | mg/kg | <100 | <100 | <100 | <100 | 180 |
| Total +ve TRH (>C10-C40) | mg/kg | 180 | <50 | 120 | <50 | 700 |
| *Surrogate* o-Terphenyl | % | 109 | 106 | 108 | 107 | 114 |

| svTRH (C10-C40) in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- - | TP104 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 31/01/2017 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | <50 |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | 140 |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 280 |
| TRH>C$_{10}$-C$_{16}$ | mg/kg | <50 |
| TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2) | mg/kg | <50 |
| TRH>C$_{16}$-C$_{34}$ | mg/kg | 340 |
| TRH>C$_{34}$-C$_{40}$ | mg/kg | 180 |
| Total +ve TRH (>C10-C40) | mg/kg | 520 |
| *Surrogate* o-Terphenyl | % | 110 |

| PAHs in Soil<br>Our Reference:<br>Your Reference<br><br>Depth<br>Date Sampled<br>Type of sample | UNITS<br>----------<br>-<br>----------<br><br><br> | 160953-2<br>BH1<br><br>0.3-0.5<br>24/01/2017<br>soil | 160953-4<br>BH2<br><br>0.05-0.2<br>24/01/2017<br>soil | 160953-7<br>BH3<br><br>0.8-1.0<br>24/01/2017<br>soil | 160953-9<br>BH4<br><br>0-0.3<br>23/01/2017<br>soil | 160953-10<br>BH4<br><br>0.8-1.0<br>23/01/2017<br>soil |
|---|---|---|---|---|---|---|
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Naphthalene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | mg/kg | <0.1 | <0.1 | 0.3 | <0.1 | <0.1 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | 0.1 | <0.1 | <0.1 |
| Fluorene | mg/kg | <0.1 | <0.1 | 0.1 | <0.1 | <0.1 |
| Phenanthrene | mg/kg | 0.1 | <0.1 | 3.5 | <0.1 | 0.1 |
| Anthracene | mg/kg | <0.1 | <0.1 | 0.9 | <0.1 | <0.1 |
| Fluoranthene | mg/kg | 0.5 | <0.1 | 5.9 | 0.3 | 0.6 |
| Pyrene | mg/kg | 0.5 | <0.1 | 6.1 | 0.4 | 0.7 |
| Benzo(a)anthracene | mg/kg | 0.3 | <0.1 | 2.9 | 0.2 | 0.3 |
| Chrysene | mg/kg | 0.3 | <0.1 | 3.1 | 0.3 | 0.4 |
| Benzo(b,j+k)fluoranthene | mg/kg | 0.5 | <0.2 | 4.6 | 0.6 | 0.8 |
| Benzo(a)pyrene | mg/kg | 0.3 | <0.05 | 2.6 | 0.3 | 0.4 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.2 | <0.1 | 1.3 | 0.2 | 0.2 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 | <0.1 | 0.4 | <0.1 | <0.1 |
| Benzo(g,h,i)perylene | mg/kg | 0.2 | <0.1 | 1.6 | 0.2 | 0.3 |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | <0.5 | <0.5 | 3.9 | <0.5 | 0.5 |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | <0.5 | <0.5 | 3.9 | <0.5 | 0.5 |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | <0.5 | <0.5 | 3.9 | <0.5 | 0.5 |
| Total +ve PAH's | mg/kg | 2.9 | <0.05 | 33 | 2.6 | 3.9 |
| *Surrogate p*-Terphenyl-d14 | % | 108 | 105 | 104 | 101 | 101 |

| PAHs in Soil<br>Our Reference:<br>Your Reference<br><br>Depth<br>Date Sampled<br>Type of sample | UNITS<br>----------<br>-<br>----------<br><br><br> | 160953-12<br>BH5<br><br>0-0.2<br>23/01/2017<br>soil | 160953-13<br>BH5<br><br>0.8-1.0<br>23/01/2017<br>soil | 160953-15<br>TP101<br><br>0.1-0.2<br>23/01/2017<br>soil | 160953-16<br>TP102<br><br>0-0.2<br>23/01/2017<br>soil | 160953-17<br>TP103<br><br>0-0.2<br>23/01/2017<br>soil |
|---|---|---|---|---|---|---|
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Naphthalene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.6 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 |
| Fluorene | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 |
| Phenanthrene | mg/kg | 0.3 | 0.1 | 0.2 | 0.2 | 1.2 |
| Anthracene | mg/kg | 0.2 | <0.1 | <0.1 | 0.2 | 0.8 |
| Fluoranthene | mg/kg | 1.5 | 0.4 | 0.5 | 0.7 | 3.5 |
| Pyrene | mg/kg | 1.6 | 0.4 | 0.6 | 0.8 | 4.1 |
| Benzo(a)anthracene | mg/kg | 0.8 | 0.2 | 0.3 | 0.4 | 2.4 |
| Chrysene | mg/kg | 0.9 | 0.3 | 0.3 | 0.4 | 2.7 |
| Benzo(b,j+k)fluoranthene | mg/kg | 2 | 0.5 | 0.6 | 1 | 6.9 |
| Benzo(a)pyrene | mg/kg | 0.98 | 0.3 | 0.3 | 0.60 | 4.3 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.5 | 0.1 | 0.2 | 0.3 | 2.6 |
| Dibenzo(a,h)anthracene | mg/kg | 0.2 | <0.1 | <0.1 | <0.1 | 0.7 |
| Benzo(g,h,i)perylene | mg/kg | 0.7 | 0.2 | 0.2 | 0.4 | 3.4 |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | 1.5 | <0.5 | <0.5 | 0.8 | 6.2 |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | 1.5 | <0.5 | <0.5 | 0.8 | 6.2 |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | 1.5 | <0.5 | <0.5 | 0.8 | 6.2 |
| Total +ve PAH's | mg/kg | 9.4 | 2.5 | 3.3 | 5.1 | 33 |
| *Surrogate p*-Terphenyl-d14 | % | 99 | 105 | 91 | 98 | 107 |

| PAHs in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- | TP104 |
| | - | |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 01/02/2017 |
| Naphthalene | mg/kg | <0.1 |
| Acenaphthylene | mg/kg | 0.1 |
| Acenaphthene | mg/kg | <0.1 |
| Fluorene | mg/kg | <0.1 |
| Phenanthrene | mg/kg | 0.2 |
| Anthracene | mg/kg | 0.2 |
| Fluoranthene | mg/kg | 1.5 |
| Pyrene | mg/kg | 1.8 |
| Benzo(a)anthracene | mg/kg | 1.2 |
| Chrysene | mg/kg | 1.4 |
| Benzo(b,j+k)fluoranthene | mg/kg | 3.2 |
| Benzo(a)pyrene | mg/kg | 1.7 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 1.1 |
| Dibenzo(a,h)anthracene | mg/kg | 0.3 |
| Benzo(g,h,i)perylene | mg/kg | 1.3 |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | 2.6 |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | 2.6 |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | 2.6 |
| Total +ve PAH's | mg/kg | 14 |
| *Surrogate p*-Terphenyl-d14 | % | 102 |

| Organochlorine Pesticides in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-4 | 160953-7 | 160953-9 | 160953-12 | 160953-16 |
| Your Reference | ---------- | BH2 | BH3 | BH4 | BH5 | TP102 |
| | - | | | | | |
| Depth | ---------- | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0-0.2 | 0-0.2 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| HCB | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| alpha-BHC | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| gamma-BHC | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| beta-BHC | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| delta-BHC | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aldrin | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor Epoxide | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| gamma-Chlordane | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| alpha-chlordane | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan I | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| pp-DDE | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dieldrin | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| pp-DDD | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan II | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| pp-DDT | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin Aldehyde | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan Sulphate | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Methoxychlor | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Total +ve DDT+DDD+DDE | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCMX | % | 110 | 110 | 114 | 114 | 110 |

| Organochlorine Pesticides in soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- - | TP104 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 31/01/2017 |
| HCB | mg/kg | <0.1 |
| alpha-BHC | mg/kg | <0.1 |
| gamma-BHC | mg/kg | <0.1 |
| beta-BHC | mg/kg | <0.1 |
| Heptachlor | mg/kg | <0.1 |
| delta-BHC | mg/kg | <0.1 |
| Aldrin | mg/kg | <0.1 |
| Heptachlor Epoxide | mg/kg | <0.1 |
| gamma-Chlordane | mg/kg | 0.1 |
| alpha-chlordane | mg/kg | <0.1 |
| Endosulfan I | mg/kg | <0.1 |
| pp-DDE | mg/kg | <0.1 |
| Dieldrin | mg/kg | <0.1 |
| Endrin | mg/kg | <0.1 |
| pp-DDD | mg/kg | <0.1 |
| Endosulfan II | mg/kg | <0.1 |
| pp-DDT | mg/kg | <0.1 |
| Endrin Aldehyde | mg/kg | <0.1 |
| Endosulfan Sulphate | mg/kg | <0.1 |
| Methoxychlor | mg/kg | <0.1 |
| Total +ve DDT+DDD+DDE | mg/kg | <0.1 |
| *Surrogate* TCMX | % | 110 |

| Organophosphorus Pesticides<br>Our Reference:<br>Your Reference | UNITS<br>---------- | 160953-4<br>BH2 | 160953-7<br>BH3 | 160953-9<br>BH4 | 160953-12<br>BH5 | 160953-16<br>TP102 |
|---|---|---|---|---|---|---|
| | - | | | | | |
| Depth | ---------- | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0-0.2 | 0-0.2 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Azinphos-methyl (Guthion) | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bromophos-ethyl | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyriphos | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyriphos-methyl | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Diazinon | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dichlorvos | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dimethoate | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ethion | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fenitrothion | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Malathion | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Parathion | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ronnel | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCMX | % | 110 | 110 | 114 | 114 | 110 |

| Organophosphorus Pesticides<br>Our Reference:<br>Your Reference | UNITS<br>---------- | 160953-18<br>TP104 |
|---|---|---|
| | - | |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 31/01/2017 |
| Azinphos-methyl (Guthion) | mg/kg | <0.1 |
| Bromophos-ethyl | mg/kg | <0.1 |
| Chlorpyriphos | mg/kg | <0.1 |
| Chlorpyriphos-methyl | mg/kg | <0.1 |
| Diazinon | mg/kg | <0.1 |
| Dichlorvos | mg/kg | <0.1 |
| Dimethoate | mg/kg | <0.1 |
| Ethion | mg/kg | <0.1 |
| Fenitrothion | mg/kg | <0.1 |
| Malathion | mg/kg | <0.1 |
| Parathion | mg/kg | <0.1 |
| Ronnel | mg/kg | <0.1 |
| *Surrogate* TCMX | % | 110 |

| PCBs in Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-4 | 160953-7 | 160953-9 | 160953-12 | 160953-16 |
| Your Reference | ---------- - | BH2 | BH3 | BH4 | BH5 | TP102 |
| Depth | ---------- | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0-0.2 | 0-0.2 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date extracted | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Aroclor 1016 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1221 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1232 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1242 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1248 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1254 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Aroclor 1260 | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| Total +ve PCBs (1016-1260) | mg/kg | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 |
| *Surrogate* TCLMX | % | 110 | 110 | 114 | 114 | 110 |

| PCBs in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- - | TP104 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 31/01/2017 |
| Date analysed | - | 31/01/2017 |
| Aroclor 1016 | mg/kg | <0.1 |
| Aroclor 1221 | mg/kg | <0.1 |
| Aroclor 1232 | mg/kg | <0.1 |
| Aroclor 1242 | mg/kg | <0.1 |
| Aroclor 1248 | mg/kg | <0.1 |
| Aroclor 1254 | mg/kg | <0.1 |
| Aroclor 1260 | mg/kg | <0.1 |
| Total +ve PCBs (1016-1260) | mg/kg | <0.1 |
| *Surrogate* TCLMX | % | 110 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-2 | 160953-4 | 160953-7 | 160953-9 | 160953-10 |
| Your Reference | ---------- - | BH1 | BH2 | BH3 | BH4 | BH4 |
| Depth | ---------- | 0.3-0.5 | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0.8-1.0 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Arsenic | mg/kg | <4 | 4 | 4 | <4 | 7 |
| Cadmium | mg/kg | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| Chromium | mg/kg | 8 | 8 | 13 | 8 | 11 |
| Copper | mg/kg | 27 | 39 | 26 | 14 | 21 |
| Lead | mg/kg | 29 | 12 | 25 | 39 | 23 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 8 | 33 | 3 | 4 | 3 |
| Zinc | mg/kg | 48 | 110 | 24 | 65 | 19 |

| Acid Extractable metals in soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-12 | 160953-13 | 160953-15 | 160953-16 | 160953-17 |
| Your Reference | ---------- - | BH5 | BH5 | TP101 | TP102 | TP103 |
| Depth | ---------- | 0-0.2 | 0.8-1.0 | 0.1-0.2 | 0-0.2 | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Arsenic | mg/kg | <4 | 4 | 5 | 5 | <4 |
| Cadmium | mg/kg | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| Chromium | mg/kg | 10 | 12 | 17 | 14 | 13 |
| Copper | mg/kg | 18 | 23 | 27 | 27 | 84 |
| Lead | mg/kg | 28 | 20 | 57 | 39 | 45 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 3 | 3 | 10 | 16 | 12 |
| Zinc | mg/kg | 44 | 28 | 100 | 92 | 140 |

| Acid Extractable metals in soil | | | |
|---|---|---|---|
| Our Reference: | UNITS | 160953-18 | 160953-20 |
| Your Reference | ---------- | TP104 | DUPHL1 |
| | - | | |
| Depth | ---------- | 0-0.2 | - |
| Date Sampled | | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 |
| Arsenic | mg/kg | 6 | 4 |
| Cadmium | mg/kg | <0.4 | <0.4 |
| Chromium | mg/kg | 19 | 13 |
| Copper | mg/kg | 42 | 27 |
| Lead | mg/kg | 67 | 43 |
| Mercury | mg/kg | 0.2 | <0.1 |
| Nickel | mg/kg | 8 | 16 |
| Zinc | mg/kg | 200 | 94 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-2 | 160953-4 | 160953-7 | 160953-9 | 160953-10 |
| Your Reference | ---------- - | BH1 | BH2 | BH3 | BH4 | BH4 |
| Depth | ---------- | 0.3-0.5 | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0.8-1.0 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Moisture | % | 11 | 13 | 16 | 8.7 | 17 |

| Moisture | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-12 | 160953-13 | 160953-15 | 160953-16 | 160953-17 |
| Your Reference | ---------- - | BH5 | BH5 | TP101 | TP102 | TP103 |
| Depth | ---------- | 0-0.2 | 0.8-1.0 | 0.1-0.2 | 0-0.2 | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 | 01/02/2017 |
| Moisture | % | 8.9 | 17 | 16 | 11 | 7.3 |

| Moisture | | | |
|---|---|---|---|
| Our Reference: | UNITS | 160953-18 | 160953-20 |
| Your Reference | ---------- - | TP104 | DUPHL1 |
| Depth | ---------- | 0-0.2 | - |
| Date Sampled | | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil |
| Date prepared | - | 31/01/2017 | 31/01/2017 |
| Date analysed | - | 01/02/2017 | 01/02/2017 |
| Moisture | % | 13 | 10 |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-2 | 160953-4 | 160953-7 | 160953-9 | 160953-10 |
| Your Reference | ---------- - | BH1 | BH2 | BH3 | BH4 | BH4 |
| Depth | ---------- | 0.3-0.5 | 0.05-0.2 | 0.8-1.0 | 0-0.3 | 0.8-1.0 |
| Date Sampled | | 24/01/2017 | 24/01/2017 | 24/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date analysed | - | 2/02/2017 | 2/02/2017 | 2/02/2017 | 2/02/2017 | 2/02/2017 |
| Sample mass tested | g | Approx. 35g | Approx. 30g | Approx. 35g | Approx. 20g | Approx. 20g |
| Sample Description | - | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected |
| Trace Analysis | - | No asbestos detected | No asbestos detected | No asbestos detected | No asbestos detected | No asbestos detected |

| Asbestos ID - soils | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-12 | 160953-13 | 160953-15 | 160953-16 | 160953-17 |
| Your Reference | ---------- - | BH5 | BH5 | TP101 | TP102 | TP103 |
| Depth | ---------- | 0-0.2 | 0.8-1.0 | 0.1-0.2 | 0-0.2 | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | soil | soil | soil | soil | soil |
| Date analysed | - | 2/02/2017 | 2/02/2017 | 2/02/2017 | 2/02/2017 | 2/02/2017 |
| Sample mass tested | g | Approx. 25g | Approx. 30g | Approx. 30g | Approx. 20g | Approx. 25g |
| Sample Description | - | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks | Brown coarse-grained soil & rocks |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected |
| Trace Analysis | - | No asbestos detected | No asbestos detected | No asbestos detected | No asbestos detected | No asbestos detected |

| Asbestos ID - soils | | |
|---|---|---|
| Our Reference: | UNITS | 160953-18 |
| Your Reference | ---------- - | TP104 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 23/01/2017 |
| Type of sample | | soil |
| Date analysed | - | 2/02/2017 |
| Sample mass tested | g | Approx. 20g |
| Sample Description | - | Brown coarse-grained soil & rocks |
| Asbestos ID in soil | - | No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected |
| Trace Analysis | - | No asbestos detected |

| Asbestos ID - materials | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference: | UNITS | 160953-21 | 160953-22 | 160953-23 | 160953-24 | 160953-25 |
| Your Reference | ---------- - | HLF1 | HLF2 | HLF3 | HLF4 | FCF1 |
| Depth | ---------- | - | - | - | - | 0-0.2 |
| Date Sampled | | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 | 23/01/2017 |
| Type of sample | | material | material | material | material | material |
| Date analysed | - | 1/02/2017 | 1/02/2017 | 1/02/2017 | 1/02/2017 | 1/02/2017 |
| Mass / Dimension of Sample | - | 38x35x5mm | 44x38x5mm | 27x25x2mm | 73x45x9mm | 40x20x5mm |
| Sample Description | - | Beige fibre cement material | Beige fibre cement material | Beige fibrous matted material | Beige compressed fibre cement material | Beige layered fibre cement material |
| Asbestos ID in materials | - | No asbestos detected Organic fibres detected | No asbestos detected Organic fibres detected | Chrysotile asbestos detected | No asbestos detected Organic fibres detected | Chrysotile asbestos detected Crocidolite asbestos detected |

| Method ID | Methodology Summary |
|---|---|
| Org-016 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. |
| Org-016 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.<br>Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes. |
| Org-014 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. |
| Org-003 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.<br>F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. |
| Org-003 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.<br><br>F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.<br><br>Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40). |
| Org-012 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.<br>For soil results:-<br>1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present.<br>2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL.<br>3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above.<br>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs. |
| Org-005 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. |
| Org-005 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.<br>Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT. |
| Org-008 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. |
| Org-006 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. |
| Org-006 | Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.<br>Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs. |

| Method ID | Methodology Summary |
|---|---|
| Metals-020 | Determination of various metals by ICP-AES. |
| Metals-021 | Determination of Mercury by Cold Vapour AAS. |
| Inorg-008 | Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours. |
| ASB-001 | Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004. |

| QUALITY CONTROL<br>vTRH(C6-C10)/BTEXN in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 01/02/2017 | 160953-4 | 01/02/2017 \|\| 01/02/2017 | LCS-1 | 01/02/2017 |
| TRHC$_6$ - C$_9$ | mg/kg | 25 | Org-016 | <25 | 160953-4 | <25 \|\| <25 | LCS-1 | 108% |
| TRHC$_6$ - C$_{10}$ | mg/kg | 25 | Org-016 | <25 | 160953-4 | <25 \|\| <25 | LCS-1 | 108% |
| Benzene | mg/kg | 0.2 | Org-016 | <0.2 | 160953-4 | <0.2 \|\| <0.2 | LCS-1 | 99% |
| Toluene | mg/kg | 0.5 | Org-016 | <0.5 | 160953-4 | <0.5 \|\| <0.5 | LCS-1 | 100% |
| Ethylbenzene | mg/kg | 1 | Org-016 | <1 | 160953-4 | <1 \|\| <1 | LCS-1 | 113% |
| m+p-xylene | mg/kg | 2 | Org-016 | <2 | 160953-4 | <2 \|\| <2 | LCS-1 | 115% |
| o-Xylene | mg/kg | 1 | Org-016 | <1 | 160953-4 | <1 \|\| <1 | LCS-1 | 116% |
| naphthalene | mg/kg | 1 | Org-014 | <1 | 160953-4 | <1 \|\| <1 | [NR] | [NR] |
| *Surrogate* aaa-Trifluorotoluene | % | | Org-016 | 93 | 160953-4 | 86 \|\| 86 \|\| RPD: 0 | LCS-1 | 93% |

| QUALITY CONTROL<br>svTRH (C10-C40) in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | 50 | Org-003 | <50 | 160953-4 | <50 \|\| <50 | LCS-1 | 103% |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | 100 | Org-003 | <100 | 160953-4 | <100 \|\| <100 | LCS-1 | 108% |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 100 | Org-003 | <100 | 160953-4 | <100 \|\| <100 | LCS-1 | 136% |
| TRH>C$_{10}$-C$_{16}$ | mg/kg | 50 | Org-003 | <50 | 160953-4 | <50 \|\| <50 | LCS-1 | 103% |
| TRH>C$_{16}$-C$_{34}$ | mg/kg | 100 | Org-003 | <100 | 160953-4 | <100 \|\| <100 | LCS-1 | 108% |
| TRH>C$_{34}$-C$_{40}$ | mg/kg | 100 | Org-003 | <100 | 160953-4 | <100 \|\| <100 | LCS-1 | 136% |
| *Surrogate* o-Terphenyl | % | | Org-003 | 119 | 160953-4 | 118 \|\| 108 \|\| RPD: 9 | LCS-1 | 108% |

| QUALITY CONTROL<br>PAHs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 01/02/2017 | 160953-4 | 01/02/2017 \|\| 01/02/2017 | LCS-1 | 01/02/2017 |
| Naphthalene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 97% |
| Acenaphthylene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 101% |
| Phenanthrene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 106% |
| Anthracene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 102% |
| Pyrene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 102% |
| Benzo(a)anthracene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 102% |
| Benzo(b,j+k) fluoranthene | mg/kg | 0.2 | Org-012 | <0.2 | 160953-4 | <0.2 \|\| <0.2 | [NR] | [NR] |

| QUALITY CONTROL<br><br>PAHs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Benzo(a)pyrene | mg/kg | 0.05 | Org-012 | <0.05 | 160953-4 | <0.05 \|\| <0.05 | LCS-1 | 86% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | Org-012 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-d14 | % | | Org-012 | 105 | 160953-4 | 105 \|\| 94 \|\| RPD: 11 | LCS-1 | 126% |
| QUALITY CONTROL<br><br>Organochlorine Pesticides in soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| HCB | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| alpha-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 88% |
| gamma-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| beta-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 96% |
| Heptachlor | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 92% |
| delta-BHC | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aldrin | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 89% |
| Heptachlor Epoxide | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 94% |
| gamma-Chlordane | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| alpha-chlordane | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan I | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDE | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 96% |
| Dieldrin | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 100% |
| Endrin | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 121% |
| pp-DDD | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 82% |
| Endosulfan II | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDT | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endrin Aldehyde | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan Sulphate | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 93% |
| Methoxychlor | mg/kg | 0.1 | Org-005 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCMX | % | | Org-005 | 114 | 160953-4 | 110 \|\| 108 \|\| RPD: 2 | LCS-1 | 120% |

| QUALITY CONTROL<br><br>Organophosphorus Pesticides | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base II Duplicate II %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Azinphos-methyl (Guthion) | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Bromophos-ethyl | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chlorpyriphos | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 99% |
| Chlorpyriphos-methyl | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Diazinon | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dichlorvos | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 77% |
| Dimethoate | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Ethion | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 88% |
| Fenitrothion | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 95% |
| Malathion | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 103% |
| Parathion | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 109% |
| Ronnel | mg/kg | 0.1 | Org-008 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 118% |
| *Surrogate* TCMX | % | | Org-008 | 114 | 160953-4 | 110 \|\| 108 \|\| RPD: 2 | LCS-1 | 112% |
| QUALITY CONTROL<br><br>PCBs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base II Duplicate II %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Aroclor 1016 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1221 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1232 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1242 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1248 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1254 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 105% |
| Aroclor 1260 | mg/kg | 0.1 | Org-006 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCLMX | % | | Org-006 | 114 | 160953-4 | 110 \|\| 108 \|\| RPD: 2 | LCS-1 | 112% |

| QUALITY CONTROL<br><br>Acid Extractable metals in soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date prepared | - | | | 31/01/2017 | 160953-4 | 31/01/2017 \|\| 31/01/2017 | LCS-1 | 31/01/2017 |
| Date analysed | - | | | 01/02/2017 | 160953-4 | 01/02/2017 \|\| 01/02/2017 | LCS-1 | 01/02/2017 |
| Arsenic | mg/kg | 4 | Metals-020 | <4 | 160953-4 | 4 \|\| 5 \|\| RPD: 22 | LCS-1 | 113% |
| Cadmium | mg/kg | 0.4 | Metals-020 | <0.4 | 160953-4 | <0.4 \|\| <0.4 | LCS-1 | 98% |
| Chromium | mg/kg | 1 | Metals-020 | <1 | 160953-4 | 8 \|\| 8 \|\| RPD: 0 | LCS-1 | 108% |
| Copper | mg/kg | 1 | Metals-020 | <1 | 160953-4 | 39 \|\| 45 \|\| RPD: 14 | LCS-1 | 108% |
| Lead | mg/kg | 1 | Metals-020 | <1 | 160953-4 | 12 \|\| 13 \|\| RPD: 8 | LCS-1 | 104% |
| Mercury | mg/kg | 0.1 | Metals-021 | <0.1 | 160953-4 | <0.1 \|\| <0.1 | LCS-1 | 95% |
| Nickel | mg/kg | 1 | Metals-020 | <1 | 160953-4 | 33 \|\| 28 \|\| RPD: 16 | LCS-1 | 99% |
| Zinc | mg/kg | 1 | Metals-020 | <1 | 160953-4 | 110 \|\| 110 \|\| RPD: 0 | LCS-1 | 101% |

| QUALITY CONTROL<br>vTRH(C6-C10)/BTEXN in Soil | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 01/02/2017 \|\| 01/02/2017 | 160953-7 | 01/02/2017 |
| TRHC$_6$ - C$_9$ | mg/kg | 160953-18 | <25 \|\| <25 | 160953-7 | 98% |
| TRHC$_6$ - C$_{10}$ | mg/kg | 160953-18 | <25 \|\| <25 | 160953-7 | 98% |
| Benzene | mg/kg | 160953-18 | <0.2 \|\| <0.2 | 160953-7 | 89% |
| Toluene | mg/kg | 160953-18 | <0.5 \|\| <0.5 | 160953-7 | 90% |
| Ethylbenzene | mg/kg | 160953-18 | <1 \|\| <1 | 160953-7 | 101% |
| m+p-xylene | mg/kg | 160953-18 | <2 \|\| <2 | 160953-7 | 106% |
| o-Xylene | mg/kg | 160953-18 | <1 \|\| <1 | 160953-7 | 106% |
| naphthalene | mg/kg | 160953-18 | <1 \|\| <1 | [NR] | [NR] |
| *Surrogate* aaa-Trifluorotoluene | % | 160953-18 | 91 \|\| 90 \|\| RPD: 1 | 160953-7 | 83% |

| QUALITY CONTROL<br>svTRH (C10-C40) in Soil | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| TRHC$_{10}$ - C$_{14}$ | mg/kg | 160953-18 | <50 \|\| <50 | 160953-7 | 71% |
| TRHC$_{15}$ - C$_{28}$ | mg/kg | 160953-18 | 140 \|\| 130 \|\| RPD: 7 | 160953-7 | 68% |
| TRHC$_{29}$ - C$_{36}$ | mg/kg | 160953-18 | 280 \|\| 260 \|\| RPD: 7 | 160953-7 | 112% |
| TRH>C$_{10}$-C$_{16}$ | mg/kg | 160953-18 | <50 \|\| <50 | 160953-7 | 71% |
| TRH>C$_{16}$-C$_{34}$ | mg/kg | 160953-18 | 340 \|\| 320 \|\| RPD: 6 | 160953-7 | 68% |
| TRH>C$_{34}$-C$_{40}$ | mg/kg | 160953-18 | 180 \|\| 180 \|\| RPD: 0 | 160953-7 | 112% |
| *Surrogate* o-Terphenyl | % | 160953-18 | 110 \|\| 110 \|\| RPD: 0 | 160953-7 | 95% |

| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 01/02/2017 \|\| 01/02/2017 | 160953-7 | 01/02/2017 |
| Naphthalene | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 93% |
| Acenaphthylene | mg/kg | 160953-18 | 0.1 \|\| 0.2 \|\| RPD: 67 | [NR] | [NR] |
| Acenaphthene | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 96% |
| Phenanthrene | mg/kg | 160953-18 | 0.2 \|\| 0.2 \|\| RPD: 0 | 160953-7 | 130% |
| Anthracene | mg/kg | 160953-18 | 0.2 \|\| 0.2 \|\| RPD: 0 | [NR] | [NR] |
| Fluoranthene | mg/kg | 160953-18 | 1.5 \|\| 1.4 \|\| RPD: 7 | 160953-7 | # |
| Pyrene | mg/kg | 160953-18 | 1.8 \|\| 1.7 \|\| RPD: 6 | 160953-7 | # |
| Benzo(a)anthracene | mg/kg | 160953-18 | 1.2 \|\| 1.1 \|\| RPD: 9 | [NR] | [NR] |
| Chrysene | mg/kg | 160953-18 | 1.4 \|\| 1.3 \|\| RPD: 7 | 160953-7 | 128% |
| Benzo(b,j+k)fluoranthene | mg/kg | 160953-18 | 3.2 \|\| 3.2 \|\| RPD: 0 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 160953-18 | 1.7 \|\| 1.8 \|\| RPD: 6 | 160953-7 | 66% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 160953-18 | 1.1 \|\| 1.0 \|\| RPD: 10 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 160953-18 | 0.3 \|\| 0.3 \|\| RPD: 0 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 160953-18 | 1.3 \|\| 1.3 \|\| RPD: 0 | [NR] | [NR] |
| *Surrogate p*-Terphenyl-d14 | % | 160953-18 | 102 \|\| 100 \|\| RPD: 2 | 160953-7 | 122% |

| QUALITY CONTROL Organochlorine Pesticides in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| HCB | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| alpha-BHC | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 84% |
| gamma-BHC | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| beta-BHC | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 83% |
| Heptachlor | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 89% |
| delta-BHC | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aldrin | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 85% |
| Heptachlor Epoxide | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 89% |
| gamma-Chlordane | mg/kg | 160953-18 | 0.1 \|\| 0.1 \|\| RPD: 0 | [NR] | [NR] |
| alpha-chlordane | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan I | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDE | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 93% |
| Dieldrin | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 96% |
| Endrin | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 94% |
| pp-DDD | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 85% |
| Endosulfan II | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| pp-DDT | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endrin Aldehyde | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Endosulfan Sulphate | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 92% |

| QUALITY CONTROL Organochlorine Pesticides in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Methoxychlor | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCMX | % | 160953-18 | 110 \|\| 114 \|\| RPD: 4 | 160953-7 | 119% |
| QUALITY CONTROL Organophosphorus Pesticides | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Azinphos-methyl (Guthion) | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Bromophos-ethyl | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Chlorpyriphos | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 111% |
| Chlorpyriphos-methyl | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Diazinon | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Dichlorvos | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 114% |
| Dimethoate | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Ethion | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 115% |
| Fenitrothion | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 105% |
| Malathion | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 112% |
| Parathion | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 120% |
| Ronnel | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 127% |
| *Surrogate* TCMX | % | 160953-18 | 110 \|\| 114 \|\| RPD: 4 | 160953-7 | 107% |
| QUALITY CONTROL PCBs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Aroclor 1016 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1221 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1232 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1242 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1248 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| Aroclor 1254 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | 160953-7 | 104% |
| Aroclor 1260 | mg/kg | 160953-18 | <0.1 \|\| <0.1 | [NR] | [NR] |
| *Surrogate* TCLMX | % | 160953-18 | 110 \|\| 114 \|\| RPD: 4 | 160953-7 | 107% |

| QUALITY CONTROL<br>Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate<br>Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|
| Date prepared | - | 160953-18 | 31/01/2017 \|\| 31/01/2017 | 160953-7 | 31/01/2017 |
| Date analysed | - | 160953-18 | 01/02/2017 \|\| 01/02/2017 | 160953-7 | 01/02/2017 |
| Arsenic | mg/kg | 160953-18 | 6 \|\| 5 \|\| RPD: 18 | 160953-7 | 82% |
| Cadmium | mg/kg | 160953-18 | <0.4 \|\| <0.4 | 160953-7 | 82% |
| Chromium | mg/kg | 160953-18 | 19 \|\| 17 \|\| RPD: 11 | 160953-7 | 95% |
| Copper | mg/kg | 160953-18 | 42 \|\| 49 \|\| RPD: 15 | 160953-7 | 99% |
| Lead | mg/kg | 160953-18 | 67 \|\| 90 \|\| RPD: 29 | 160953-7 | 86% |
| Mercury | mg/kg | 160953-18 | 0.2 \|\| 0.3 \|\| RPD: 40 | 160953-7 | 112% |
| Nickel | mg/kg | 160953-18 | 8 \|\| 8 \|\| RPD: 0 | 160953-7 | 87% |
| Zinc | mg/kg | 160953-18 | 200 \|\| 220 \|\| RPD: 10 | 160953-7 | 89% |

**Report Comments:**

PCB in soil:
PQL has been raised due to interference from analytes(other than those being tested) in the sample/s.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Sample 160953-9 was sub-sampled from jar provided by the client.

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

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

## Quality Control Definitions

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

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

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

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

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

## Laboratory Acceptance Criteria

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Envirolab Services Pty Ltd
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# SAMPLE RECEIPT ADVICE

| Client Details | |
|---|---|
| **Client** | Environmental Investigation Services |
| **Attention** | Brendan Page |

| Sample Login Details | |
|---|---|
| **Your Reference** | E30104KP, Penshurst |
| **Envirolab Reference** | **160953** |
| **Date Sample Received** | 30/01/2017 |
| **Date Instructions Received** | 30/01/2017 |
| **Date Results Expected to be Reported** | **06/02/2017** |

| Sample Condition | |
|---|---|
| **Samples received in appropriate condition for analysis** | YES |
| **No. of Samples Provided** | 20 soils, 5 material |
| **Turnaround Time Requested** | Standard |
| **Temperature on receipt (°C)** | 18.2 |
| **Cooling Method** | Ice Pack |
| **Sampling Date Provided** | YES |

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

Please direct any queries to:

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

***Sample and Testing Details on following page***

**Envirolab Services Pty Ltd**
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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

| *Sample Id* | *vTRH(C6-C10)/BTEXN in Soil* | *svTRH (C10-C40) in Soil* | *PAHs in Soil* | *Organochlorine Pesticides in soil* | *Organophosphorus Pesticides* | *PCBs in Soil* | *Acid Extractable metals in soil* | *Asbestos ID - soils* | *Asbestos ID - materials* | *On Hold* |
|---|---|---|---|---|---|---|---|---|---|---|
| BH1-0.05-0.2 | | | | | | | | | | ✓ |
| BH1-0.3-0.5 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | |
| BH1-1.3-1.5 | | | | | | | | | | ✓ |
| BH2-0.05-0.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| BH2-1.3-1.5 | | | | | | | | | | ✓ |
| BH3-0-0.2 | | | | | | | | | | ✓ |
| BH3-0.8-1.0 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| BH3-1.3-1.5 | | | | | | | | | | ✓ |
| BH4-0-0.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| BH4-0.8-1.0 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | |
| BH4-2.7-3.0 | | | | | | | | | | ✓ |
| BH5-0-0.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| BH5-0.8-1.0 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | |
| BH5-2-2.2 | | | | | | | | | | ✓ |
| TP101-0.1-0.2 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | |
| TP102-0-0.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| TP103-0-0.2 | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | |
| TP104-0-0.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| TP104-0.3-0.4 | | | | | | | | | | ✓ |
| DUPHL1 | | | | | | | ✓ | | | |
| HLF1 | | | | | | | | | ✓ | |
| HLF2 | | | | | | | | | ✓ | |
| HLF3 | | | | | | | | | ✓ | |
| HLF4 | | | | | | | | | ✓ | |
| FCF1-0-0.2 | | | | | | | | | ✓ | |

# SAMPLE AND CHAIN OF CUSTODY FORM

| TO: | | FROM: |
|---|---|---|
| ENVIROLAB SERVICES PTY LTD<br>12 ASHLEY STREET<br>CHATSWOOD NSW 2067<br>P: (02) 99106200<br>F: (02) 99106201<br><br>Attention: Aileen | EIS Job Number: E30104KP<br>Date Results Required: STANDARD<br>Page: 1 of 1 | ENVIRONMENTAL INVESTIGATION SERVICES<br>REAR OF 115 WICKS ROAD<br>MACQUARIE PARK, NSW 2113<br>P: 02-9888 5000 F: 02-9888 5001<br>Attention: bpage@ejbgroup.net.au |

Location: Penshurst

Sampler: KS

Sample Preserved in Esky on Ice

Tests Required

| Date Sampled | Lab Ref: | Sample Number | Depth (m) | Sample Container | PID | Sample Description | Combo 2 | Combo 3a | Combo 6 | Combo 6a | 8 Metals | PAHs | TRH/BTEX | BTEX | Asbestos |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24/1/17 | 1 | BH1 | 0.05-0.2 | G, A | 0 | Soil | | | | | | | | | |
| | 2 | ↓ | 0.3-0.5 | ↓ | ↓ | ↓ | | X | | | | | | | |
| | 3 | ↓ | 1.3-1.5 | | | | | | | | | | | | |
| | 4 | BH2 | 0.05-0.2 | | | | | | | X | | | | | |
| | 5 | ↓ | 1.3-1.5 | | | | | | | | | | | | |
| | 6 | BH3 | 0-0.2 | | | | | | | | | | | | |
| | 7 | ↓ | 0.8-1.0 | | | | | | | X | | | | | |
| | 8 | ↓ | 1.3-1.5 | ↓ | | | | | | | | | | | |
| 23/1/17 | 9 | BH4 | 0-0.3 | G | | | | | | X | | | | | |
| | 10 | ↓ | 0.8-1.0 | G, A | | | | X | | | | | | | |
| | 11 | ↓ | 2.7-3.0 | ↓ | | | | | | | | | | | |
| | 12 | BH5 | 0-0.2 | | | | | | | X | | | | | |
| | 13 | ↓ | 0.8-1.0 | | | | | X | | | | | | | |
| | 14 | ↓ | 2-2.2 | ↓ | | | | | | | | | | | |
| 23/1/17 | 15 | TP101 | 0.1-0.2 | G, A | | | | X | | | | | | | |
| | 16 | TP102 | 0-0.2 | | | | | | | X | | | | | |
| | 17 | TP103 | 0-0.2 | | | | | X | | | | | | | |
| | 18 | TP104 | 0-0.2 | | | | | | | X | | | | | |
| | 19 | ↓ | 0.3-0.4 | ↓ | ↓ | ↓ | | | | | | | | | |
| | 20 | DUPHL1 | - | G | | | | | | | X | | | | |
| | 21 | HLF1 | - | A | - | PACM | | | | | | | | | X |
| | 22 | HLF2 | - | ↓ | - | ↓ | | | | | | | | | X |
| | 23 | HLF3 | - | | - | | | | | | | | | | X |
| | 24 | HLF4 | - | | - | | | | | | | | | | X |
| | 25 | FCF1 | 0-0.2 | ↓ | - | ↓ | | | | | | | | | X |

ENVIROLAB

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

Job No: 160953

Date Received: 30.1.17

Time Received: 11.30

Received by: JE

Temp: ~~Cool~~/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

| Relinquished By: | Date: | Time: | Received By: | Date: |
|---|---|---|---|---|
| | 30/1/17 | 9:45am | JE ELS | 30.1.17 |

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

# CERTIFICATE OF ANALYSIS 160953-A

**Client:**

**Environmental Investigation Services**
PO Box 976
North Ryde BC
NSW 1670

**Attention:** Brendan Page

**Sample log in details:**

| | |
|---|---|
| Your Reference: | **E30104KP, Penshurst** |
| No. of samples: | Additional Testing on 1 Soil |
| Date samples received / completed instructions received | 30/01/17 / 07/02/17 |

**Analysis Details:**

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
***Please refer to the last page of this report for any comments relating to the results.***

**Report Details:**

| | |
|---|---|
| Date results requested by: / Issue Date: | 8/02/17 / 8/02/17 |
| Date of Preliminary Report: | Not Issued |

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

**Results Approved By:**

David Springer
General Manager

| PAHs in Soil | | |
|---|---|---|
| Our Reference: | UNITS | 160953-A-6 |
| Your Reference | ---------- - | BH3 |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 24/01/2017 |
| Type of sample | | soil |
| Date extracted | - | 07/02/2017 |
| Date analysed | - | 07/02/2017 |
| Naphthalene | mg/kg | <0.1 |
| Acenaphthylene | mg/kg | <0.1 |
| Acenaphthene | mg/kg | <0.1 |
| Fluorene | mg/kg | <0.1 |
| Phenanthrene | mg/kg | 0.4 |
| Anthracene | mg/kg | 0.1 |
| Fluoranthene | mg/kg | 1.3 |
| Pyrene | mg/kg | 1.6 |
| Benzo(a)anthracene | mg/kg | 0.9 |
| Chrysene | mg/kg | 0.8 |
| Benzo(b,j+k)fluoranthene | mg/kg | 2 |
| Benzo(a)pyrene | mg/kg | 1.0 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.6 |
| Dibenzo(a,h)anthracene | mg/kg | 0.2 |
| Benzo(g,h,i)perylene | mg/kg | 0.7 |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | 1.5 |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | 1.5 |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | 1.5 |
| Total +ve PAH's | mg/kg | 9.3 |
| *Surrogate p*-Terphenyl-d14 | % | 91 |

| Moisture | | |
|---|---|---|
| Our Reference: | UNITS | 160953-A-6 |
| Your Reference | ---------- | BH3 |
| | - | |
| Depth | ---------- | 0-0.2 |
| Date Sampled | | 24/01/2017 |
| Type of sample | | soil |
| Date prepared | - | 07/02/2017 |
| Date analysed | - | 08/02/2017 |
| Moisture | % | 10 |

| Method ID | Methodology Summary |
|---|---|
| Org-012 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.<br>For soil results:-<br>1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present.<br>2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL.<br>3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above.<br>Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs. |
| Inorg-008 | Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours. |

| QUALITY CONTROL<br><br>PAHs in Soil | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results<br><br>Base ll Duplicate ll %RPD | Spike Sm# | Spike % Recovery |
|---|---|---|---|---|---|---|---|---|
| Date extracted | - | | | 07/02/2017 | [NT] | [NT] | LCS-5 | 07/02/2017 |
| Date analysed | - | | | 07/02/2017 | [NT] | [NT] | LCS-5 | 07/02/2017 |
| Naphthalene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 100% |
| Acenaphthylene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 115% |
| Phenanthrene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 124% |
| Anthracene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 110% |
| Pyrene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 109% |
| Benzo(a)anthracene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | LCS-5 | 103% |
| Benzo(b,j +k)fluoranthene | mg/kg | 0.2 | Org-012 | <0.2 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | Org-012 | <0.05 | [NT] | [NT] | LCS-5 | 101% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | Org-012 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| *Surrogate p*-Terphenyl-d14 | % | | Org-012 | 91 | [NT] | [NT] | LCS-5 | 113% |

**Report Comments:**

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

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

## Quality Control Definitions

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

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

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

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

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

## Laboratory Acceptance Criteria

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

## Aileen Hie

**From:** Brendan Page <BPage@jkgroup.net.au>
**Sent:** Tuesday, 7 February 2017 7:16 AM
**To:** Aileen Hie
**Subject:** RE: Results for Registration 160953 E30104KP, Penshurst

Hi Aileen,

Could you please arrange for sample 160953-6 (BH3, 0-0.2m) to be analysed for PAHs on a **24hr TAT**. Thanks ☺

Envirolab Ref: 160953A
Due: 8/2/17
1 day TIA.

Regards,

Brendan Page
Associate | Environmental Scientist

T: +612 9888 5000
F: +612 9888 5001
BPage@jkgroup.net.au
www.jkgroup.net.au

**ENVIRONMENTAL INVESTIGATION SERVICES**
CONSULTING ENVIRONMENTAL ENGINEERS AND SCIENTISTS
PO Box 976, North Ryde BC NSW 1670
115 Wicks Rd, Macquarie Park NSW 2113



**From:** Ken Nguyen [mailto:KNguyen@envirolab.com.au]
**Sent:** Thursday, 2 February 2017 9:52 PM
**To:** Brendan Page <BPage@jkgroup.net.au>
**Subject:** Results for Registration 160953 E30104KP, Penshurst

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC
an excel file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
customerservice@envirolab.com.au

Regards

Envirolab Services
12 Ashley St Chatswood NSW 2067

# Appendix D: Report Explanatory Notes

# STANDARD SAMPLING PROCEDURE (SSP)

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS.

The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

**Soil Sampling**

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[22].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

**Decontamination Procedures for Soil Sampling Equipment**

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.

[22] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

**Groundwater Sampling**

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
  - Filter paper for Micropore filtration system; Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/T meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;

- Low flow pump pack and associated tubing; and
- Groundwater sampling forms.

- If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.
- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
- Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

**Decontamination Procedures for Groundwater Sampling Equipment**

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

# QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994[23]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[24]).

**Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)**

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.

*"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" Keith 1991.

**Precision**

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

**Accuracy**

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

**Representativeness**

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

---

[23] US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[24] Keith., H, (1991), *Environmental Sampling and Analysis, A Practical Guide.*

**Completeness**

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms; Sample receipt form;
- All sample results reported; All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

**Comparability**

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

**Blanks**

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

**Matrix Spikes**

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

**Surrogate Spikes**

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

**Duplicates**

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$