Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

# Report on
# Lot Classification and Salinity Assessment

Proposed Residential Subdivision
531 Cobbitty Road, Cobbitty

Prepared for
Mirvac Homes NSW Pty Ltd

Project 92323.11
November 2023

Douglas Partners
Geotechnics / Environment / Groundwater

## Document History

Document details

| | | | |
|---|---|---|---|
| Project No. | 92323.11 | Document No. | R.001.Rev0 |
| Document title | Report on Lot Classification and Salinity Assessment<br>Proposed Residential Subdivision | | |
| Site address | 531 Cobbitty Road, Cobbitty | | |
| Report prepared for | Mirvac Homes NSW Pty Ltd | | |
| File name | 92323.11.R.001.Rev0 | | |

Document status and review

| Status | Prepared by | Reviewed by | Date issued |
|---|---|---|---|
| Revision 0 | Afham Syed | Konrad Schultz | 3 November 2023 |
| | | | |
| | | | |
| | | | |

Distribution of copies

| Status | Electronic | Paper | Issued to |
|---|---|---|---|
| Revision 0 | 1 | 0 | Jackson Perks, Mirvac Homes NSW Pty Ltd |
| | | | |
| | | | |
| | | | |

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

| | Signature | Date |
|---|---|---|
| Author |  | 3/11/23 |
| Reviewer |  | 3/11/23 |

bsi ISO 9001 Quality Management Systems CERTIFIED
FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
18 Waler Crescent
Smeaton Grange NSW 2567
Phone (02) 4647 0075

Douglas Partners
Geotechnics / Environment / Groundwater

# Table of Contents

**Page**

# Report on Lot Classification and Salinity Assessment
# Proposed Residential Subdivision
# 531 Cobbitty Road, Cobbitty

## 1. Introduction

This report presents the results of a lot classification and salinity assessment undertaken for a proposed residential subdivision at 531 Cobbitty Road, Cobbitty. The investigation was commissioned in by Jackson Perks of Mirvac Homes NSW Pty Ltd and was undertaken in accordance with Douglas Partners Pty Ltd (DP) proposal 92323.06 dated 8 December 2022.

It is understood that the proposed development of the site includes the creation of 120 residential lots (Lots 100 – 169, 200 – 231 and 300 – 317) in 531 Cobbitty Road, Cobbitty. The investigation was carried out to provide information on the subsurface conditions to allow for the classification of each lot in accordance with the requirements of AS 2870:2011 *Residential Slabs and Footings.*

The investigation comprised the excavation of 65 test pits and dynamic cone penetrometer (DCP) testing followed by laboratory testing of selected samples, engineering analysis and reporting. Details of the field work and laboratory test results are given in this report, together with comments relating to design and construction practice.

Site plans showing the subdivision layout and the works-as-executed (WAE) fill plans (included in Appendix D) which was prepared by Orion Consulting in 2023, were provided by the client.

This report should be read together with the Notes About This Report in Appendix A.

## 2. Background

Previous investigation within the site and its immediate surrounds was undertaken by DP in 2020 as part of a preliminary salinity investigation and management plan for Lot 2005 D.P. 1162239, Cobbitty, NSW. The details of this investigation are given in a report titled *"Report on Preliminary Salinity Assessment, Proposed Residential Subdivision, Lot 2005, D.P. 1162239, Cobbitty, NSW"* (Project 92323.01) dated February 2020 (DP 2020).

DP have also previously completed a land capability report for the larger Oran Park Precinct within which this site is located. The details of this investigation are given in a report titled *"Report on Land Capability and Contamination Assessment, Oran Park Precinct, Oran Park and Cobbitty"* (Project 40740) dated 28 February 2007 (the LCA).

In summary, results from DP 2020 investigation indicated that the underlying soils were generally non-saline to very saline, and non-aggressive to mildly aggressive to concrete and steel.

# 3. Site Description and Regional Geology

The site covers an irregular shaped area of approximately 82 ha with dimensions of approximately 1300 m by 1430 m respectively as shown in Drawing 1 (Appendix B). It is bounded to the north and west by grassed paddock and trees, to the east by existing residential development, and to the south by Cobbitty Road

Following the placement of controlled fill, site levels generally slope down in the south easterly direction with a grade of approximately 1 in 25. The overall difference in level is approximately 9.6 m from the lowest part of the site near Pit 3 (RL 75.5 relative to Australian Height Datum [m AHD]) to the highest part near Pit 44 (RL 85.1 m AHD).

Reference to the Wollongong 1:100 000 Geological Series Sheets indicates that the site is underlain by Bringelly Shale belonging to the Wianamatta Group of Triassic age. Bringelly Shale typically comprises shale, carbonaceous claystone, laminite, fine to medium-grained lithic sandstone, and some minor coaly bands which weather to form clays of high plasticity. The results of the investigation were consistent with the geological mapping.

# 4. Field Work

## 4.1 Methods

The field work comprised the excavation of 65 test pits (Pits 1 – 65) to a depth of 2.5 m, or prior refusal The excavation of the test pits was carried out using a Hyundai 60CR-9 6 tonne excavator fitted with a 450 mm bucket and a Yanmar ViO80 8 tonne excavator fitted with a 400 mm bucket. The test pits were logged on site by a geotechnical engineer who collected disturbed and 'undisturbed' samples (in 50 mm diameter thin-walled steel tubes) to assist in strata identification and for laboratory testing.

Dynamic cone penetrometer (DCP) tests were carried out to depths of up to 1.2 m adjacent to each borehole to assess the penetration resistance of the near-surface soils.

The test pit locations were nominated and located on site by DP and are shown on Drawing 1 . Surface levels relative to m AHD and coordinates (to MGA94 Zone 56) were determined using a differential GPS which has a nominal accuracy of ±0.1 m. It is important to note that DP is not a registered surveyor, hence the coordinates and elevations will be considered approximate. Surface levels and coordinates are given on the test pit logs.

### 4.2 Results

The test pit logs are presented in Appendix B and should be read in conjunction with the standard notes defining classification methods and descriptive terms in Appendix A.

| | |
|---|---|
| TOPSOIL/FILL: | Silty clay topsoil fill encountered to depths in the range 0.05 – 0.3 m in Pits 11, 12, 15 – 18, 23 – 44, 46, 48, 50, 53, 55 and 56; |
| FILL (CONTROLLED): | Silty clay fill encountered to depths in the range 0.1 – 2.5 m (limit of investigation) in Pits 1 – 10, 12 – 17, 19 – 22, 24 – 28, 32, 35 – 37, 41, 43, 45 – 47, 49, 51, 52, 54 and 57 – 65; |
| CLAY: | Stiff to hard silty clay encountered to depths in the range 0.3 – 2.5 m (limit of investigation) in Pits 2 – 5, 7 – 13, 16 – 38, 40 – 44, 46 – 60 and 62 – 65; |
| BEDROCK: | Very low to medium strength shale and very low to low strength sandstone encountered to depths in the range 0.7 – 2.5 m (limit of investigation) in Pits 4 – 10, 18 – 24, 32 – 34, 36 – 42, 44 – 52, 54, 57, 58 and 63. |

No free groundwater was observed in any of the test pits during the field work. It is noted that the test pits were immediately backfilled following excavation and sampling. Groundwater levels are affected by factors such as preceding climatic conditions and soil permeability and can therefore fluctuate with time. No signs of salt efflorescence were noted during the investigation.

## 5. Laboratory Testing

### 5.1 Shrink-Swell Testing

Selected samples from the boreholes were tested in the laboratory for measurement of field moisture content and Shrink-swell Index. The detailed laboratory test report sheets are presented in Appendix C, with the results summarised in Table 1.

**Table 1: Results of Laboratory Testing – Shrink-Swell Index and Plasticity**

| Pit No. | Depth (m) | FMC (%) | LL (%) | PL (%) | PI (%) | LS (%) | $I_{ss}$ (%/ΔpF) | Material |
|---|---|---|---|---|---|---|---|---|
| 6 | 0.5 – 0.66 | 13.2 | - | - | - | - | 1.5 | SHALE |
| 14 | 0.5 – 0.68 | 17.9 | - | - | - | - | 1.1 | Fill |
| 16 | 0.5 – 0.65 | 15.7 | - | - | - | - | 2.2 | Fill |
| 23 | 0.5 – 0.75 | 13.7 | - | - | - | - | 1.5 | Silty CLAY |
| 30 | 0.5 – 0.7 | 25.1 | - | - | - | - | 3.9 | Silty CLAY |
| 35 | 0.5 – 0.6 | 20.2 | - | - | - | - | 1.1 | Fill |
| 44 | 0.5 – 0.68 | 10.2 | 32 | 19 | 13 | 8.0 | - | Silty CLAY |

| Pit No. | Depth (m) | FMC (%) | LL (%) | PL (%) | PI (%) | LS (%) | $I_{ss}$ (%/ΔpF) | Material |
|---|---|---|---|---|---|---|---|---|
| 47 | 0.5 – 0.68 | 15.9 | - | - | - | - | 1.6 | Silty CLAY |
| 51 | 0.5 – 0.64 | 26.1 | - | - | - | - | 2.4 | Silty CLAY |
| 55 | 0.5 – 0.68 | 20.5 | - | - | - | - | 4.6 | Silty CLAY |
| 62 | 0.5 – 0.66 | 18.9 | - | - | - | - | 3.4 | Fill |
| 65 | 0.5 – 0.61 | 20.1 | 57 | 16 | 41 | 13.0 | - | Silty CLAY |

Where FMC = Field moisture content; LL = Liquid limit; LS = Linear shrinkage; PL = Plastic limit; PI = Plasticity Index; $I_{ss}$ = Shrink-swell index

The plasticity results indicate the soils tested are of low to high plasticity and would be susceptible to shrink-swell movements with changes in the soils moisture content. The Shrink-swell index ($I_{ss}$) result indicate that the soils are of low to high shrink-swell potential.

## 5.2 Salinity, Aggressivity, Sodicity and Dispersibility

Selected samples collected from the test pits were also submitted to the laboratory for determination of aggressivity to concrete and steel, sodicity (erosion potential), Emerson class number (dispersion potential), textural classification and salinity.

The detailed laboratory test report sheets along with Summary Table C1 presenting the individual test results are given in Appendix C. Table C1 also presents aggressivity and salinity classifications for each sample tested based on pH, chloride concentration, sulphate concentration, calculated resistivity and calculated ECe values.

The number of samples tested for each parameter and the range of test results obtained are summarised in Table 2.

**Table 2: Results of Laboratory Testing – Chemical**

| Parameter | | Units | Number of Tests | Range of Results |
|---|---|---|---|---|
| pH | | pH units | 84 | 4.4 – 9.9 |
| Chlorides | | (mg/kg) | 20 | 24 – 760 |
| Sulphates | | (mg/kg) | 20 | 10 – 310 |
| Aggressivity [AS 2159, Ref 4] | to Concrete | - | 84 | Non-Aggressive to Moderately Aggressive |
| | to Steel | - | 84 | Non-Aggressive to Mildly Aggressive |
| Exchangeable Sodium (Na) | | (meq/100g) | 10 | 1.1 – 7.5 |
| CEC (cation exchange capacity) | | (meq/100g) | 10 | 14 – 40 |

| Parameter | Units | Number of Tests | Range of Results |
|---|---|---|---|
| Sodicity [Na/CEC] | (ESP%) | 10 | 7 – 29 |
| Sodicity Class | [after DLWC] | 10 | Sodic to Highly Sodic |
| EC1:5 [Lab.] | (mS/cm) | 84 | 57 – 1000 |
| Resistivity | Ω.cm | 84 | 1000 – 17544 |
| ECe [M x EC1:5] [1] | (dS/m) | 84 | 0.4 – 9.0 |
| Salinity Class [after Richards, Ref 3] | - | 84 | Non-Saline to Very Saline |

Where M = soil textural factor

### 5.2.1 Salinity

Sample salinity classifications (refer Table C1, Appendix C) are based on calculated ECe values using the method of Richards "*Diagnosis of Saline and Alkaline Soils."* (Richards, Diagnosis of Saline and Alkaline Soils, 1954).

The results indicate that 40 soil samples were non-saline, 29 samples were slightly saline, 14 samples were moderately saline and one sample was very saline.

### 5.2.2 Aggressivity

Sample aggressivity classifications (refer Table C1, Appendix C) are based on pH, sulphate concentration, chloride concentration and calculated resistivity values, and are assessed in accordance with AS 2159 *"Piling Design and Installation"* (AS 2159, 2009). The inferred very low permeability of the sampled clay-rich soils indicate that soils at all boreholes in Condition "B" (AS 2159, 2009).

The results indicate that:

- 27 soil samples were non-aggressive, 55 samples were mildly aggressive, and two samples were moderately aggressive to concrete; and
- 67 soil samples were non-aggressive and 17 samples were mildly aggressive to steel.

### 5.2.3 Sodicity and Dispersibility

The sodicity test results (refer to Appendix C) indicate soils are sodic to highly sodic and would have potential for soil erosion if left exposed. Emerson class number testing undertaken on five samples at a depth of 0.5 m below ground level indicate shallow soils are Class 2, indicating high potential for dispersion.

# 6. Comments

## 6.1 General

The following comments are based on a review of all information provided to DP, the surface and subsurface profiles encountered at the time of the investigation and on the results of laboratory testing of selected samples from within the proposed development area.

## 6.2 Subsurface Conditions

The test pits indicate subsurface conditions underlying the site typically comprise controlled fill and residual clays followed by bedrock. Groundwater was not observed in any of the test pits for the short time they were left open.

## 6.3 Fill Placed on Allotments

To achieve design levels, fill greater than 3 m has been placed within the site. Reference should be made to the WAE fill plans prepared by Orion Consulting for the surveyed extent and depth of fill (Appendix D). It is noted that the WAE fill plan is based on the difference in levels of the stripped surface and finished level, excluding any placement of topsoil that occurred after the survey or this investigation.

Based on the survey information, the depth of fill placed on the individual lots is summarised in Table 3.

**Table 3: Controlled Fill Summary**

| Lot № | Depth of Controlled Fill (m) | Lot № | Depth of Controlled Fill (m) | Lot № | Depth of Controlled Fill (m) |
|---|---|---|---|---|---|
| 100 | 2.5 – >3.0 | 140 | 0 – 1.0 | 210 | 0.5 – 1.5 |
| 101 | 2.5 – 3.0 | 141 | 0.25 – 1.25 | 211 | 0.25 – 1.25 |
| 102 | 2.25 – 2.75 | 142 | 0 – 0.75 | 212 | 0.25 – 1.25 |
| 103 | 2.0 – 2.5 | 143 | 0 – 0.75 | 213 | 0 – 1.25 |
| 104 | 1.25 – 2.25 | 144 | 0.25 – 1.0 | 214 | 0 – 1.25 |
| 105 | 1.0 – 2.0 | 145 | 0.5 – 1.0 | 215 | 0 – 0.25 |
| 106 | 0.75 – 1.75 | 146 | 0.75 – 1.5 | 216 | 0 – 0.5 |
| 107 | 0.75 – 2.0 | 147 | 0.75 – 1.5 | 217 | 0 – 0.75 |
| 108 | 0.25 – 1.75 | 148 | 0.5 – 1.75 | 218 | 0 – 0.5 |
| 109 | 0 – 1.75 | 149 | 0.25 – 2.0 | 219 | 0 – 0.75 |
| 110 | 0 – 1.25 | 150 | 0.25 – 2.25 | 220 | 0 – 1.0 |
| 111 | 0 – 0.25 | 151 | 0.25 – 2.25 | 221 | 0.25 – 1.0 |
| 112 | 0 | 152 | 0.5 – 2.5 | 222 | 0 – 0.75 |
| 113 | 0 | 153 | 0 – 0.5 | 223 | 0 – 1.0 |
| 114 | 0 | 154 | 0 – 0.5 | 224 | 0.25 – 1.0 |

| Lot № | Depth of Controlled Fill (m) | Lot № | Depth of Controlled Fill (m) | Lot № | Depth of Controlled Fill (m) |
|---|---|---|---|---|---|
| 115 | 0 | 155 | 0 – 0.5 | 225 | 0 |
| 116 | 0 | 156 | 0 – 0.5 | 226 | 0 |
| 117 | 0 – 0.25 | 157 | 0 – 0.5 | 227 | 0 |
| 118 | 0 – 0.5 | 158 | 0 – 0.5 | 228 | 0 |
| 119 | 0 – 1.0 | 159 | 0 – 0.25 | 229 | 0 – 0.25 |
| 120 | 0.25 – 1.25 | 160 | 0 – 0.25 | 230 | 0 – 0.5 |
| 121 | 0.25 – 1.25 | 161 | 0 – 0.25 | 231 | 0 – 0.25 |
| 122 | 0.5 – 1.5 | 162 | 0 | 300 | 0 – 0.25 |
| 123 | 1.0 – 1.75 | 163 | 0 | 301 | 0 – 0.5 |
| 124 | 1.25 – 2.0 | 164 | 0 | 302 | 0 – 0.75 |
| 125 | 1.75 – 2.5 | 165 | 0 | 303 | 0 – 0.75 |
| 126 | 2.5 – >3.0 | 166 | 0 | 304 | 0.25 – 0.75 |
| 127 | 2.25 – 2.75 | 167 | 0 | 305 | 0 – 0.5 |
| 128 | 2.0 – 2.5 | 168 | 0 | 306 | 0 – 0.75 |
| 129 | 1.75 – 2.25 | 169 | 0 | 307 | 0 |
| 130 | 1.25 – 2.0 | 200 | 0 – 0.25 | 308 | 0 – 1.0 |
| 131 | 1.0 – 1.75 | 201 | 0 – 0.25 | 309 | 0 – 1.75 |
| 132 | 0.5 – 1.5 | 202 | 0 – 0.25 | 310 | 0.25 – 2.0 |
| 133 | 0.25 – 1.25 | 203 | 0 – 0.25 | 311 | 0.5 – 2.5 |
| 134 | 0 – 1.0 | 204 | 0 – 0.5 | 312 | 1.0 – >3.0 |
| 135 | 0 – 0.75 | 205 | 0 – 0.75 | 313 | 0.5 – 2.0 |
| 136 | 0 – 0.5 | 206 | 0 – 0.75 | 314 | 0.5 – 2.0 |
| 137 | 0 – 0.25 | 207 | 0 – 0.75 | 315 | 0.5 – 1.5 |
| 138 | 0 – 0.5 | 208 | 0 – 0.75 | 316 | 0.5 – 1.25 |
| 139 | 0 – 0.75 | 209 | 0 – 0.5 | 317 | 0.25 – 1.0 |

The results of Level 1 testing carried out by DP and the lot classification investigation indicate that Camden Council's specified minimum dry density ratio of 95% relative to Standard maximum dry density has been achieved. Moisture content of the fill was maintained within 2% of the optimum moisture content (OMC) of standard compaction. An Earthworks Quality Report (EQR) has been prepared (Project 220469.00) for fill works completed on 17 August 2023. The EQR is included in Appendix C and includes the test result summary sheets and test location plans.

## 6.4 Lot Classification

Lot classification has been carried out by estimation of characteristic surface movements ($y_s$) using the methods outlined in AS 2870:2011, taking account of the subsurface profiles determined from the test pits, laboratory measured shrink-swell Index values and a crack depth of zero.

Characteristic surface movements ($y_s$) of up to approximately 70 mm are predicted for the lots. Accordingly, the lot classifications have been determined and are summarised in Table 4.

**Table 4: Lot Classification Summary**

| Lot № | Lot Class. | Lot № | Lot Class. | Lot № | Lot Class. |
|---|---|---|---|---|---|
| 100 – 105 | M* | 162 – 163 | H1 | 229 – 230 | M* |
| 106 – 110 | H1* | 164 – 168 | H2 | 231 | H1* |
| 111 | M* | 169 | H1 | 300 – 303 | M* |
| 112 – 116 | M | 200 – 205 | H1* | 304 – 306 | H1* |
| 117 – 121 | H1* | 206 – 211 | M* | 307 | H1 |
| 122 – 131 | M* | 212 – 216 | H1* | 308 – 312 | H1* |
| 132 – 141 | H1* | 217 – 224 | M* | 313 – 315 | H1* |
| 142 – 152 | M* | 225 – 226 | H1 | 316 – 317 | H1* |
| 153 – 161 | H1* | 227 – 228 | M | | |

Where: M = Moderately reactive
H1 = Highly reactive
H2 = Highly reactive

Note: (*) Denotes a filled lot

It should be noted that the classifications given in Table 4 are appropriate for the undeveloped lots at the time of this report and as such, revision of the classifications may be required once development details and proposed site works for individual lots are known. AS 2870:2011 recommends that the classification of a site should be reconsidered if the depth of subsequent cutting exceeds 0.5 m or depth of subsequent fill exceeds 0.4 m.

## 6.5 Salinity and Aggressivity Classification

As there is potential for salts to be mobile, a “worst-case” scenario was adopted to determine the salinity and aggressivity classifications for each lot. This was achieved by comparing the worst-case salinity and aggressivity to concrete and steel classifications from this investigation (refer Table C1, Appendix C) with the results of DP’s previous investigation (DP, 2020). In summary, results from both this investigation and the previous investigation indicate that soils underlying the site are non-saline to very saline, non-aggressive to mildly aggressive to steel and mildly aggressive to moderately aggressive to concrete. The adopted aggressivity to concrete and steel and salinity classifications for each lot are summarised in Table 5.

**Table 5: Aggressivity and Salinity Classification Summary**

| Lot No. | Aggressivity to Concrete | Aggressivity to Steel | Salinity |
|---|---|---|---|
| 100 – 102 | Mildly Aggressive | Mildly Aggressive | Very Saline |
| 103 – 123 | Mildly Aggressive | Mildly Aggressive | Moderately saline |
| 124 - 126 | Mildly Aggressive | Mildly Aggressive | Very saline |
| 127 - 169 | Mildly Aggressive | Mildly Aggressive | Moderately saline |
| 200 – 205 | Moderately Aggressive | Mildly Aggressive | Moderately saline |
| 206 – 231 | Mildly Aggressive | Mildly Aggressive | Moderately saline |
| 300 – 310 | Moderately Aggressive | Mildly Aggressive | Moderately saline |
| 311 – 314 | Mildly Aggressive | Mildly Aggressive | Moderately saline |
| 315 - 317 | Moderately Aggressive | Mildly Aggressive | Moderately saline |

## 6.6 Site Preparations

Subject to site-specific design requirements, site preparation for the construction of residential structures will most likely include the removal of all vegetation, organic topsoils, and other deleterious materials from the building area. Allowance will need to be made for variability in topsoil thicknesses, particularly as additional topsoil may have been spread after the excavation of the test pits.

Where a level building platform is to be constructed by cut and fill methods, reference should be made to Section 6.4.2 of AS 2870:2011 which gives guidelines on fill placement methods and specification for compaction. The placement and compaction of fill should also be carried out in accordance with the requirements of Camden Council.

The requirements of Camden Council for controlled fill specify compaction of cohesive (clay) fill to a minimum dry density ratio of 95% relative to Standard compaction. Moisture content of the fill should be maintained near OMC measured in the Standard compaction test. Density testing would be required to confirm the placement of fill in the above controlled manner.

## 6.7 Footings

It is recommended that footing systems be designed and constructed in accordance with AS 2870:2011 for the nominated classification (refer Section 6.4) and the additional requirements given in this report.

Footing systems founded uniformly in natural stiff to very stiff clay or controlled fill could be designed using an allowable bearing pressure of 150 kPa. Footings founded in very low strength (or greater) rock could be designed using an allowable bearing pressure of 700 kPa.

Where footing systems are proposed adjacent to services or retaining walls or located through areas of uncontrolled fill (for example, following construction of a level building platform placed without

engineering control), local deepening of the footings or alternatively the inclusion of piers will most likely be required. Founding levels should also be constructed below the zone of influence of the service trenches and retaining walls, which is generally taken to be within a 45° (i.e.: 1 horizontal:1 vertical) line extending from the base of the trench or retaining wall to the ground surface and through fill to the residual (undisturbed) soils or weathered rock.

Where partial rock foundations result following construction of cut to fill platforms or where exposed conditions include controlled fill, residual soils/rock and/or large variations in controlled fill depth reference must be made to AS 2870:2011 regarding the provision of articulation within the structure and/or the construction of a foundation system that provides uniform bearing.

All footing systems should be designed and constructed in accordance with sound engineering principles, with care exercised to ensure that footing trenches/piers are inspected for design compliance prior to the placement of steel and pouring of concrete.

Where raft slabs are proposed, the raft stiffness should be designed in accordance with the designated lot classification and the requirements of AS 2870:2011. If a suspended raft is proposed, then it must take account of the likely range of swell movements of the construction platform for the relevant classification.

Masonry walls should be articulated in accordance with CCAA (2008).

### 6.8 Site Maintenance and Drainage

The site classifications in Section 6.4 are conditional on the developed lots being maintained in accordance with the CSIRO publication *Foundation Maintenance and Footing Performance: A Homeowners Guide*, a copy of which is included in Appendix E.

Whilst it must be accepted that some minor cracking in most structures is inevitable on reactive sites, the guide describes suggested site maintenance practices aimed at limiting foundation movements and at keeping cracking within acceptable limits.

Surface drainage should be installed and maintained at the site. All collected stormwater, groundwater and roof runoff should be discharged into the stormwater disposal system.

## 7. Salinity Management Plan

The current salinity investigation indicates that materials within the site are moderately saline to very saline. Testing of other parameters associated with aggressivity indicate that the materials are mildly aggressive to steel and mildly aggressive to moderately aggressive to concrete (AS 2159, 2009). In addition, shallow soil samples were sodic to highly sodic.

The following strategies are recommended for building construction (ie: residential developments on finished allotments). These strategies should be complementary to standard building practices. This Salinity Management Plan (SMP) is a post earthworks assessment only and as such, the management

strategies given within do not apply to services previously installed during the bulk earthworks and civil works phases of the development.

A. Results indicate that soils are mildly aggressive to moderately aggressive to concrete and moderately saline to very saline (refer Table 5). As such, the durability requirements provided in Tables 6 and 7 (below) should be considered by the designer.

**Table 6: Recommended Durability Requirements for Concrete Foundations**

| Salinity Classification | Soil Aggressivity | Recommended Durability Requirement (as per AS3600) | | |
|---|---|---|---|---|
| | | Minimum Concrete Strength (MPa) | Minimum Cover to Reinforcement (mm) | Minimum Cure Time (days) |
| Moderately Saline | Mildly Aggressive Soils | 25 | 45 | 3 |
| | Moderately Aggressive Soils | 32 | 45 | 7 |
| Very Saline | Mildly Aggressive Soils | 32 | 50 | 7 |

**Table 7: Recommended Durability Requirements for Concrete Piles**

| Concrete Aggressivity | Recommended Durability Requirement (as per AS2159) | |
|---|---|---|
| | Minimum Concrete Strength (MPa) | Minimum Cover to Reinforcement (mm) |
| Mildly Aggressive | 32 | 60 |
| Moderately Aggressive | 40 | 65 |

B. Wet cast concrete pipes and currently manufactured spun concrete pipes are understood to have estimated compressive strengths of 50 MPa and 60 – 70 MPa, respectively, in excess of the requirements for mass concrete in A above. Reference to the maximum and minimum test results of Table 2 (Section 5.2 of this report) and to Tables E1 and 3.1 of AS 4058 – 2007 “Precast concrete pipes” indicates that the site falls marginally outside the AS 4058 Clay/Stagnant (low sulphate) soil type (chlorides <=20,000 ppm and sulphates <=1,000 ppm) and (in the absence of tidal water flow) falls within the AS 4058 “Other” durability environment. The minimum site pH of 4.4 indicates a slightly more acidic environment than that within the Clay/Stagnant soil type definition (minimum pH 4.5) and reference to the Concrete Pipe Association of Australasia Engineering Guideline (“Designing Durable Concrete Pipelines”) indicates an increase of cover to reinforcement (to 20 mm)

or a protective (e.g. epoxy) coating or sleeve, or blended concrete, should be employed to maintain a design life in excess of 100 years. It is recommended that any concrete pipes installed within the site should employ AS 4058-compliant steel reinforced pipes of general purpose Portland cement, with minimum cover to reinforcement of 20 mm, or with an alternative durability provision as indicated above, or should be fibre reinforced.

C. Resistivity results indicate that materials are mildly aggressive to steel (refer Table 5). As such, the following corrosion allowance (as per AS 2159) should be taken into account by the designer:

   - Mildly aggressive: uniform corrosion allowance 0.01 – 0.02 mm/year.

   In instances where a coating is applied to the pile, if the design life of the pile is greater than the design life for the coating, consideration must be given to corrosion of the pile in accordance with the above list.

D. In all masonry buildings a brick damp course should be installed so that it cannot be bridged either internally or externally. This will prevent moisture moving into brickwork and up the wall. The use of a bedding layer of sand (50 mm thick), overlain by a membrane of thick plastic (damp proof as opposed to vapour proof), is recommended under concrete slabs to act as a moisture barrier and drainage layer and to restrict capillary rise under the slab.

It is considered that the management strategies described herein when incorporated into the design and construction works are appropriate to mitigate the levels of salinity, aggressivity and sodicity identified at the site.

This Salinity Management Plan supersedes the Preliminary Salinity Management Plan provided for residential development purposes at the above site in a previous report *"Report on Preliminary Salinity Assessment, Proposed Residential Subdivision, Lot 2005, D.P. 1162239, Cobbitty, NSW"* (Project 92323.01) dated February 2020 (DP 2020) prepared by DP.

## 8. References

AS 2159. (2009). *Piling Design and Installation.* Standards Australia.

Richards, L. A. (1954). *Diagnosis and Improvement of Saline and Alkaline Soils* (Vol. Handbook 60). Washington D.C.: US Department of Agriculture.

## 9. Limitations

Douglas Partners (DP) has prepared this report for this project at 531 Cobbitty Road, Cobbitty in accordance with DP's proposal dated 8 December 2022 and acceptance received from Jackson Perks. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Mirvac Homes NSW Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without

recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations.

The assessment of atypical safety hazards arising from this advice is restricted to the (geotechnical / environmental / groundwater) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

**Douglas Partners Pty Ltd**

# Appendix A

About This Report

# About this Report

Douglas Partners

## Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

## Copyright



## Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

## Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole 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. They may not be the same at the time of construction as are indicated in the report; 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 first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or 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 a perched water table.

## Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

# *About this 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, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

## Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

## Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

# Sampling Methods

Douglas Partners

## Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

## Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

## Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

## Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

## Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud 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 the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

## Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

## Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils 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 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm 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 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

### Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

## Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

## Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

| Type | Particle size (mm) |
|---|---|
| Boulder | >200 |
| Cobble | 63 - 200 |
| Gravel | 2.36 - 63 |
| Sand | 0.075 - 2.36 |
| Silt | 0.002 - 0.075 |
| Clay | <0.002 |

The sand and gravel sizes can be further subdivided as follows:

| Type | Particle size (mm) |
|---|---|
| Coarse gravel | 19 - 63 |
| Medium gravel | 6.7 - 19 |
| Fine gravel | 2.36 – 6.7 |
| Coarse sand | 0.6 - 2.36 |
| Medium sand | 0.21 - 0.6 |
| Fine sand | 0.075 - 0.21 |

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

| Term | Proportion of sand or gravel | Example |
|---|---|---|
| And | Specify | Clay (60%) and Sand (40%) |
| Adjective | >30% | Sandy Clay |
| With | 15 – 30% | Clay with sand |
| Trace | 0 - 15% | Clay with trace sand |

In coarse grained soils (>65% coarse)
- with clays or silts

| Term | Proportion of fines | Example |
|---|---|---|
| And | Specify | Sand (70%) and Clay (30%) |
| Adjective | >12% | Clayey Sand |
| With | 5 - 12% | Sand with clay |
| Trace | 0 - 5% | Sand with trace clay |

In coarse grained soils (>65% coarse)
- with coarser fraction

| Term | Proportion of coarser fraction | Example |
|---|---|---|
| And | Specify | Sand (60%) and Gravel (40%) |
| Adjective | >30% | Gravelly Sand |
| With | 15 - 30% | Sand with gravel |
| Trace | 0 - 15% | Sand with trace gravel |

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

# Soil Descriptions

## Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

| Description | Abbreviation | Undrained shear strength (kPa) |
|---|---|---|
| Very soft | VS | <12 |
| Soft | S | 12 - 25 |
| Firm | F | 25 - 50 |
| Stiff | St | 50 - 100 |
| Very stiff | VSt | 100 - 200 |
| Hard | H | >200 |
| Friable | Fr | - |

## Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

| Relative Density | Abbreviation | Density Index (%) |
|---|---|---|
| Very loose | VL | <15 |
| Loose | L | 15-35 |
| Medium dense | MD | 35-65 |
| Dense | D | 65-85 |
| Very dense | VD | >85 |

## Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

## Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

## Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

## Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

| Strength Term | Abbreviation | Unconfined Compressive Strength MPa | Point Load Index * $Is_{(50)}$ MPa |
|---|---|---|---|
| Very low | VL | 0.6 - 2 | 0.03 - 0.1 |
| Low | L | 2 - 6 | 0.1 - 0.3 |
| Medium | M | 6 - 20 | 0.3 - 1.0 |
| High | H | 20 - 60 | 1 - 3 |
| Very high | VH | 60 - 200 | 3 - 10 |
| Extremely high | EH | >200 | >10 |

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

## Degree of Weathering

The degree of weathering of rock is classified as follows:

| Term | Abbreviation | Description |
|---|---|---|
| Residual Soil | RS | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported. |
| Extremely weathered | XW | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible |
| Highly weathered | HW | The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. |
| Moderately weathered | MW | The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock. |
| Slightly weathered | SW | Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock. |
| Fresh | FR | No signs of decomposition or staining. |
| *Note: If HW and MW cannot be differentiated use DW (see below)* | | |
| Distinctly weathered | DW | Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores. |

# *Rock Descriptions*

## Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

| Term | Description |
|---|---|
| Fragmented | Fragments of <20 mm |
| Highly Fractured | Core lengths of 20-40 mm with occasional fragments |
| Fractured | Core lengths of 30-100 mm with occasional shorter and longer sections |
| Slightly Fractured | Core lengths of 300 mm or longer with occasional sections of 100-300 mm |
| Unbroken | Core contains very few fractures |

## Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

## Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

| Term | Separation of Stratification Planes |
|---|---|
| Thinly laminated | < 6 mm |
| Laminated | 6 mm to 20 mm |
| Very thinly bedded | 20 mm to 60 mm |
| Thinly bedded | 60 mm to 0.2 m |
| Medium bedded | 0.2 m to 0.6 m |
| Thickly bedded | 0.6 m to 2 m |
| Very thickly bedded | > 2 m |

# Symbols & Abbreviations

Douglas Partners

## Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

## Drilling or Excavation Methods

| | |
|---|---|
| C | Core drilling |
| R | Rotary drilling |
| SFA | Spiral flight augers |
| NMLC | Diamond core - 52 mm dia |
| NQ | Diamond core - 47 mm dia |
| HQ | Diamond core - 63 mm dia |
| PQ | Diamond core - 81 mm dia |

## Water

| | |
|---|---|
| ▷ | Water seep |
| ▽ | Water level |

## Sampling and Testing

| | |
|---|---|
| A | Auger sample |
| B | Bulk sample |
| D | Disturbed sample |
| E | Environmental sample |
| $U_{50}$ | Undisturbed tube sample (50mm) |
| W | Water sample |
| pp | Pocket penetrometer (kPa) |
| PID | Photo ionisation detector |
| PL | Point load strength Is(50) MPa |
| S | Standard Penetration Test |
| V | Shear vane (kPa) |

## Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

### Defect Type

| | |
|---|---|
| B | Bedding plane |
| Cs | Clay seam |
| Cv | Cleavage |
| Cz | Crushed zone |
| Ds | Decomposed seam |
| F | Fault |
| J | Joint |
| Lam | Lamination |
| Pt | Parting |
| Sz | Sheared Zone |
| V | Vein |

### Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

| | |
|---|---|
| h | horizontal |
| v | vertical |
| sh | sub-horizontal |
| sv | sub-vertical |

### Coating or Infilling Term

| | |
|---|---|
| cln | clean |
| co | coating |
| he | healed |
| inf | infilled |
| stn | stained |
| ti | tight |
| vn | veneer |

### Coating Descriptor

| | |
|---|---|
| ca | calcite |
| cbs | carbonaceous |
| cly | clay |
| fe | iron oxide |
| mn | manganese |
| slt | silty |

### Shape

| | |
|---|---|
| cu | curved |
| ir | irregular |
| pl | planar |
| st | stepped |
| un | undulating |

### Roughness

| | |
|---|---|
| po | polished |
| ro | rough |
| sl | slickensided |
| sm | smooth |
| vr | very rough |

### Other

| | |
|---|---|
| fg | fragmented |
| bnd | band |
| qtz | quartz |

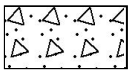
# *Symbols & Abbreviations*

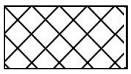
## Graphic Symbols for Soil and Rock

### General

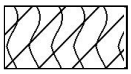

Asphalt

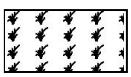

Road base

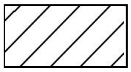

Concrete

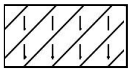

Filling

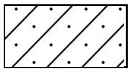
### Soils


Topsoil

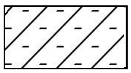

Peat

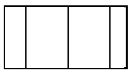

Clay

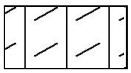

Silty clay

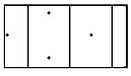

Sandy clay

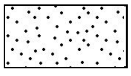

Gravelly clay

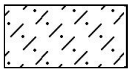

Shaly clay

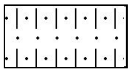

Silt


Clayey silt


Sandy silt

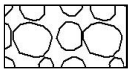

Sand

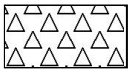

Clayey sand


Silty sand


Gravel

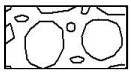

Sandy gravel


Cobbles, boulders

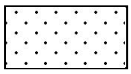

Talus

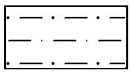
### Sedimentary Rocks

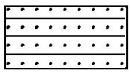

Boulder conglomerate

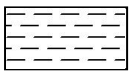

Conglomerate


Conglomeratic sandstone

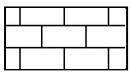

Sandstone


Siltstone

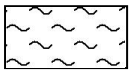

Laminite

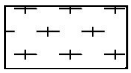

Mudstone, claystone, shale

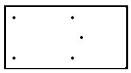

Coal


Limestone

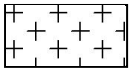
### Metamorphic Rocks

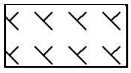

Slate, phyllite, schist

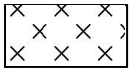

Gneiss

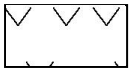

Quartzite

### Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

# Appendix B

Drawing 1
Test Pit Logs (1 – 65)


## Legend

- Site Boundary
- Test Pit Locations

**Douglas Partners**
Geotechnics / Environment / Groundwater

| | | |
|---|---|---|
| CLIENT: Mirvac Homes NSW Pty Ltd | | |
| OFFICE: Macarthur | DRAWN BY: AS | |
| SCALE: As shown | DATE: 1 November 2023 | |

TITLE: Test Pit Location Plan
Proposed Residential Subdivision
531 Cobbity Road, Cobbitty

MGA

| | |
|---|---|
| PROJ. #: | 92323.11 |
| DRAWING No: | 1 |
| REVISION: | 0 |

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 75.7 mAHD
**EASTING:** 288551
**NORTHING:** 6234131

**PIT No:** 1
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 75 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, red-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| 74 | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| 73 | 3 | | | | | | | | |
| 72 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.2 mAHD
**EASTING:** 288578
**NORTHING:** 6234130

**PIT No:** 2
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Below 0.5m: dark brown | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 75 | | Below 1.1m: pale brown | | | | | | | |
| | | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | 2 |
| 74 | 2.2 | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | | | | | | |
| | 2.5 | | | D | 2.5 | | pp = 330-410 | | |
| | | Pit discontinued at 2.5m - limit of investigation | | | | | | | |
| | 3 | | | | | | | | 3 |
| 73 | | | | | | | | | |

5 10 15 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 75.5 mAHD
**EASTING:** 288588
**NORTHING:** 6234156

**PIT No:** 3
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 75 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown and orange-brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 74 | | | | D | 1.5 | | | | |
| | 1.8 | Silty CLAY CI-CH: medium to high plasticity, pale brown and pale grey, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 2.0 | | pp = 370-410 | | 2 |
| | | Below 2.3m: with sand, highly weathered shale bands, very stiff | | | | | | | |
| 73 | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 220-280 | | |
| | 3 | | | | | | | | 3 |
| 72 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.3 mAHD
**EASTING:** 288618
**NORTHING:** 6234155

**PIT No:** 4
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.8 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| 75 | 1 | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 1.0 | | | | |
| | | Below 1.2m: pale brown and pale grey, very stiff | | D | 1.5 | | pp = 290-310 | | |
| 74 | 2 | Below 1.8m: with highly weathered shale gravel, trace ironstone gravel<br>Below 2.0m: becoming hard | | D | 2.0 | | pp >600 | | |
| | 2.4 | | | | | | | | |
| | 2.5 | SHALE: pale brown and grey, very low to low strength, highly weathered | | D | 2.5 | | | | |
| 73 | 3 | Pit discontinued at 2.5m<br>- limit of investigation | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.2 mAHD
**EASTING:** 288628
**NORTHING:** 6234178

**PIT No:** 5
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.0 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, with fine to coarse gravel and cobbles, w<PL | | D | 0.5 | | | | |
| | 0.8 | Silty CLAY CI-CH: medium to high plasticity, red-brown, trace fine gravel and rootlets, w<PL, very stiff, residual | | D | 1.0 | | | | |
| 75 | 1 | Below 1.1m: pale brown and pale grey | | D | 1.5 | | pp = 250-280 | | |
| | 1.8 | SHALE: pale brown and grey, with sand, very low to low strength, highly weathered | | D | 2.0 | | | | |
| 74 | 2 | | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| 73 | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.4 mAHD
**EASTING:** 288655
**NORTHING:** 6234176

**PIT No:** 6
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | | SHALE: pale grey and pale brown, clay bands, very low to low strength, highly weathered | | $U_{50}$ | 0.66 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 75 | | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | 2 |
| 74 | | Below 2.3m: dark grey, no clay bands | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |
| 73 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.2 mAHD
**EASTING:** 288665
**NORTHING:** 6234204

**PIT No:** 7
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, pale brown and pale grey, with sand, trace fine gravel and rootlets, w<PL, stiff to hard, residual | | D | 0.5 | | | | |
| | 0.7 | SHALE: pale grey and pale brown, with sand, very low to low strength, highly weathered | | | | | | | |
| 75 | 1 | | | D | 1.0 | | | | 1 |
| | 1.5 | Pit discontinued at 1.5m - limit of investigation | | D | 1.5 | | | | |
| 74 | 2 | | | | | | | | 2 |
| 73 | 3 | | | | | | | | 3 |

5 10 15 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.2 mAHD
**EASTING:** 288680
**NORTHING:** 6234179

**PIT No:** 8
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, pale brown and pale grey, with sand, trace fine gravel and rootlets, w<PL, very stiff, residual | | | | | | | |
| | 0.5 | SHALE: pale grey and pale brown, clay bands and extremely weathered shale bands, very low to low strength, highly weathered | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | |
| 76 | | Below 1.5m: low to medium strength | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | |
| 75 | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |
| 74 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.3 mAHD
**EASTING:** 288671
**NORTHING:** 6234155

**PIT No:** 9
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, pale brown and pale grey, with sand, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | 0.7 | SHALE: pale brown and grey, clay bands, very low to low strength, highly weathered | | | | | | | |
| 76 | 1 | | | D | 1.0 | | | | |
| | 1.5 | Pit discontinued at 1.5m - refusal on medium strength shale | | D | 1.5 | | | | |
| 75 | 2 | | | | | | | | |
| | 3 | | | | | | | | |
| 74 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.9 mAHD
**EASTING:** 288643
**NORTHING:** 6234157

**PIT No:** 10
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.2 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | | Below 0.6m: pale brown and pale grey, clay bands, with sand, very stiff | | D | 1.0 | | | | |
| 75 | 1.3 | SHALE: pale brown and grey, very low to low strength, highly weathered | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.5 | | | D | 2.5 | | | | |
| 74 | | Pit discontinued at 2.5m - limit of investigation | | | | | | | |
| 73 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; depth 1, 2, 3

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288636
**NORTHING:** 6234133

**PIT No:** 11
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 1.1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, residual | | D | 0.5 | | | | |
| | | | | D | 1.0 | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, residual | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:** Test pit moved due to services

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288609
**NORTHING:** 6234134

**PIT No:** 12
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, very stiff to hard | | D | 0.5 | | pp >600 | | |
| | 1 | | | D | 1.0 | | pp = 300-350 | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL | | D | 1.5 | | pp = 300-350 | | |
| | 1.9 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL | | D | 2.0 | | pp = 350-400 | | |
| | 2.2 | Pit discontinued at 2.2m<br>- refusal on very stiff clay | | D | 2.2 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288600
**NORTHING:** 6234111

**PIT No:** 13
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown and pale brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | 1.8 | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff, residual | | D | 2.0 | | pp = 300-330 | | |
| | 2 | Below 2.3m: red-brown mottled pale grey, with ironstone gravel | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 270-350 | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288573
**NORTHING:** 6234114

**PIT No:** 14
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, with fine to coarse gravel, trace cobbles and sand, w<PL | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.68 | | | | |
| | 0.8 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown and dark brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, with fine to coarse gravel, trace sand and cobbles, w<PL | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |

5 10 15 20

1 2 3

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288611
**NORTHING:** 6234062

**PIT No:** 15
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.15 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL, hard | | D | 0.5 | | pp = 300-350 | | |
| | 0.6 | FILL/Silty CLAY CI: medium plasticity, brown and grey, trace gravel, w<PL, hard | | D | 1.0 | | pp = 400-500 | | |
| | 1.3 | FILL/Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL | | D | 1.5 | | pp >600 | | |
| | | | | D | 2.0 | | pp = 450-550 | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288621
**NORTHING:** 6234090

**PIT No:** 16
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, trace gravel, w<PL, hard | | D | 0.5 | | pp >600 | | |
| | | | | $U_{50}$ | 0.65 | | | | |
| 1 | | | | D | 1.0 | | pp = 300-350 | | 1 |
| | | | | D | 1.5 | | pp = 300-350 | | |
| | 1.8 | Silty CLAY CL-CI: low to medium plasticity, brown and grey, trace gravel, w<PL | | | | | | | |
| 2 | | | | D | 2.0 | | pp = 300-350 | | 2 |
| | 2.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 350-400 | | |
| 3 | | | | | | | | | 3 |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288647
**NORTHING:** 6234084

**PIT No:** 17
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets | | | | | | | |
| | | FILL/Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel,w<PL, very stiff to hard | | D | 0.5 | | pp = 300-350 | | |
| | 1 | | | D | 1.0 | | pp = 300-350 | | 1 |
| | 1.3 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w~PL | | D | 1.5 | | pp = 300-350 | | |
| | 2 | | | D | 2.0 | | pp = 400-450 | | 2 |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 300-350 | | |
| | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288657
**NORTHING:** 6234112

**PIT No:** 18
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL, very stiff to hard | | D | 0.5 | | pp >600 | | |
| | 0.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff to hard | | | | | | | |
| | 1 | | | D | 1.0 | | pp = 250-350 | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel. w<PL | | | | | | | |
| | | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.4 | SHALE: brown and pale grey, very low to low strength, | | | | | | | |
| | 2.5 | extremely weathered | | D | 2.5 | | | | |
| | | Pit discontinued at 2.5m - limit of investigation | | | | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.8 mAHD
**EASTING:** 288674
**NORTHING:** 6234124

**PIT No:** 19
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, highly weathered shale bands, with sand and highly weathered shale gravel, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | 0.9 | SHALE: pale brown and pale grey, clay bands, with sand, very low to low strength, highly weathered | | D | 1.0 | | | | |
| | 1.4 | SHALE: grey and brown, very low to low strength, highly weathered | | D | 1.5 | | | | |
| 76 | 1.6 | Pit discontinued at 1.6m - limit of investigation | | D | 1.6 | | | | |
| 75 | | | | | | | | | |
| 74 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 78.4 mAHD
**EASTING:** 288693
**NORTHING:** 6234111

**PIT No:** 20
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 78 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, pale brown and pale grey, with sand and highly weathered shale gravel, trace fine gravel and rootlets, w<PL, hard, residual | | | | | | | |
| | 0.5 | SHALE: grey and brown, very low to low strength, highly weathered | | D | 0.5 | | | | |
| 77 | 1.0 | Pit discontinued at 1.0m<br>- refusal on very low to low strength shale | | D | 1.0 | | | | |
| 76 | | | | | | | | | |
| 75 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 79.2 mAHD
**EASTING:** 288703
**NORTHING:** 6234126

**PIT No:** 21
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.2 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | 0.6 | SHALE: brown and pale grey, clay bands, trace sand, very low to low strength, highly weathered | | | | | | | |
| 78 | 1 | | | D | 1.0 | | | | 1 |
| | | | | D | 1.5 | | | | |
| | 1.6 | | | D | 1.6 | | | | |
| | 1.7 | SHALE: pale brown and grey, very low to low strength, highly weathered | | | | | | | |
| | | Pit discontinued at 1.7m - limit of investigation | | | | | | | |
| 77 | 2 | | | | | | | | 2 |
| 76 | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 80.4 mAHD
**EASTING:** 288730
**NORTHING:** 6234113

**PIT No:** 22
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 0.3 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, hard, residual | | D | 0.5 | | | | |
| 79 | 1.0 | SHALE: pale brown and pale grey, clay bands, very low to low strength, highly weathered | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | 1.6 | SHALE: dark grey and grey-brown, very low to low strength, highly weathered | | | | | | | |
| 78 | 1.7 | Pit discontinued at 1.7m - limit of investigation | | D | 1.7 | | | | |
| 77 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288709
**NORTHING:** 6234084

**PIT No:** 23
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace gravel, w<PL | | D | 0.5 | | pp = 500-550 | | |
| | | | | $U_{50}$ | 0.75 | | | | |
| | 0.8 | SANDSTONE: brown, very low strength, extremely to moderately weathered | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | 1.7 | SHALE: dark grey, low strength, slightly weathered | | | | | | | |
| | 2.0 | Pit discontinued at 2.0m - refusal on low strength shale | | D | 2.0 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288690
**NORTHING:** 6234099

**PIT No:** 24
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.5 | FILL/Silty CLAY CL-CI: low to medium plasticity, orange-brown, trace gravel, w<PL, very stiff | | D | 0.5 | | pp = 350-460 | | |
| | 1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | D | 1.0 | | pp = 360-400 | | |
| | | | | D | 1.5 | | pp = 200-250 | | |
| | 1.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL | | | | | | | |
| | 2 2.0 | SHALE: dark grey, very low strength, extremely weathered, w<PL | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288672
**NORTHING:** 6234087

**PIT No:** 25
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL, very stiff | | D | 0.5 | | | | |
| | 0.8 | Silty CLAY CL-CI: low to medium plasticity, brown and pale grey, trace gravel, w<PL, friable | | D | 1.0 | | | | |
| | 1 | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288663
**NORTHING:** 6234057

**PIT No:** 26
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL, very stiff to hard | | D | 0.5 | | pp = 400-450 | | |
| | 0.7 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, friable | | D | 1.0 | | pp = 400-450 | | |
| | 1 | | | D | 1.5 | | pp = 400-450 | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288636
**NORTHING:** 6234064

**PIT No:** 27
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL, hard | | D | 0.5 | | pp >600 | | |
| | 1 | | | D | 1.0 | | pp = 500-550 | | |
| | 1.4 | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL | | D | 1.5 | | pp = 500-550 | | |
| | 1.8 | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel and cobbles, w<PL | | | | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288628
**NORTHING:** 6234035

**PIT No:** 28
**PROJECT No:** 92323.11
**DATE:** 28/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.15 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | D | 0.5 | | pp >600 | | |
| | 1 | | | D | 1.0 | | pp >600 | | 1 |
| | 1.1 | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL | | D | 1.5 | | pp = 350-400 | | |
| | 2 | | | D | 2.0 | | pp = 300-350 | | 2 |
| | 2.1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288657
**NORTHING:** 6234000

**PIT No:** 29
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.7 | Silty CLAY CL-CI: low to medium plasticity, brown and pale grey, trace gravel, w~PL, very stiff to hard | | D | 0.5 | | pp = 450-500 | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey, yellow and brown, with gravel band, w~PL, firm to stiff | | D | 1.0 | | pp = 250-300 | | |
| | 2.5 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | D | 1.5 | | pp = 350-400 | | |
| | | | | D | 2.0 | | pp = 300-350 | | |
| | | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 300-350 | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288665
**NORTHING:** 6234028

**PIT No:** 30
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown, orange-brown and pale grey, trace gravel, w~PL, stiff to very stiff | | D | 0.5 | | pp = 200-250 | | |
| | 0.6 | | | $U_{50}$ | 0.7 | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, friable | | | | | | | |
| 1 | | | | D | 1.0 | | pp = 200-250 | | 1 |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, friable | | | | | | | |
| | | | | D | 1.5 | | pp = 250-300 | | |
| 2 | | | | D | 2.0 | | | | 2 |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| 3 | | | | | | | | | 3 |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288695
**NORTHING:** 6234024

**PIT No:** 31
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, hard | | D | 0.5 | | pp = 400-450 | | |
| | 0.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, hard | | D | 1.0 | | pp = 300-350 | | |
| | 1 | | | D | 1.5 | | pp = 350-400 | | |
| | 1.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, friable | | | | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288694
**NORTHING:** 6234046

**PIT No:** 32
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.5 | FILL/Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL, very stiff, potential fill | | D | 0.5 | | | | |
| | 1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff | | D | 1.0 | | | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL | | D | 1.5 | | | | |
| | 1.6 | SHALE: brown and pale grey, very low to low strength | | D | 2.0 | | | | |
| | 2 | | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288722
**NORTHING:** 6234041

**PIT No:** 33
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, very stiff to hard | | | | | | | |
| | 0.9 | SHALE: brown and pale grey, very low to low strength | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m<br>- limit of investigation | | | | | | | |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288720
**NORTHING:** 6234062

**PIT No:** 34
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff | | D | 0.5 | | pp = 400-450 | | |
| | | Below 0.6m: grading to pale brown, trace cobbles | | | | | | | |
| | 0.9 | SHALE: dark grey, very low to low strength | | D | 1.0 | | | | |
| 1 | | | | D | 1.5 | | | | 1 |
| | | | | D | 2.0 | | | | |
| 2 | 2.1 | Pit discontinued at 2.1m<br>- refusal on very low to low strength shale | | | | | | | 2 |
| 3 | | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288738
**NORTHING:** 6234060

**PIT No:** 35
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL | | D<br>$U_{50}$ | 0.5<br>0.6 | | pp >600 | | |
| | 1 | | | D | 1.0 | | pp = 450-550 | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff to hard, residual | | D | 1.5 | | pp = 250 | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m<br>- limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288763
**NORTHING:** 6234052

**PIT No:** 36
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.05 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL | | D | 0.5 | | pp = 400-500 | | |
| | 0.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff | | D | 1.0 | | pp = 300-350 | | |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.1 | SHALE: dark grey, very low to low strength, extremely weathered | | | | | | | |
| | 2.3 | Pit discontinued at 2.3m<br>- refusal on very low to low strength shale | | D | 2.3 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288754
**NORTHING:** 6234032

**PIT No:** 37
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL | | D | 0.5 | | | | |
| | 0.7 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, very stiff | | D | 1.0 | | | | |
| | 1.4 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.3 | SHALE: dark grey, very low to low strength, extremely weathered | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288735
**NORTHING:** 6234037

**PIT No:** 38
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown and pale grey, trace gravel, w<PL | | D | 0.5 | | pp >600 | | |
| | 0.9 | SHALE: brown, very low strength, extremely weathered | | D | 1.0 | | | | |
| | | Below 1.3m: grading to dark grey | | | | | | | |
| | 1.5 | Pit discontinued at 1.5m<br>- refusal on very low strength shale | | D | 1.5 | | | | |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288738
**NORTHING:** 6234014

**PIT No:** 39
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL, residual | | D | 0.5 | | pp >600 | | |
| | 0.8 | SHALE: brown, very low strength, extremely weathered | | | | | | | |
| | 1 | | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | | Below 1.6m: grading to dark grey, low strength | | | | | | | |
| | 1.8 | Pit discontinued at 1.8m<br>- refusal on low strength shale | | D | 1.8 | | | | |
| | 2 | | | | | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288709
**NORTHING:** 6234022

**PIT No:** 40
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, hard | | D | 0.5 | | pp = 450 | | |
| | 1 | | | D | 1.0 | | | | |
| | 1.2 | SHALE: pale grey, very low strength, extremely weathered | | D | 1.5 | | | | |
| | | Below 1.7m: grading to brown-grey | | | | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - refusal on very low strength shale | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288710
**NORTHING:** 6233999

**PIT No:** 41
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.3 | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w<PL | | D | 0.5 | | pp >600 | | |
| | 0.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, hard | | D | 1.0 | | pp = 450-500 | | |
| | 1 | | | D | 1.5 | | | | |
| | 1.8 | SHALE: brown, very low strength, extremely weathered | | D | 2.0 | | | | |
| | 2 | Below 2.3m: grading to dark grey | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288680
**NORTHING:** 6234003

**PIT No:** 42
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w~PL, very stiff to hard, residual | | D | 0.5 | | pp = 400 | | |
| | 1 | | | D | 1.0 | | pp = 400 | | 1 |
| | | | | D | 1.5 | | pp = 400 | | |
| | 1.7 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, residual | | | | | | | |
| | 2 | | | D | 2.0 | | pp = 350-400 | | 2 |
| | 2.3 | SHALE: brown, very low strength, extremely weathered | | | | | | | |
| | 2.4 | Pit discontinued at 2.4m<br>- refusal on very low strength shale | | D | 2.4 | | | | |
| | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288671
**NORTHING:** 6233975

**PIT No:** 43
**PROJECT No:** 92323.11
**DATE:** 24/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.6 | FILL/Silty CLAY CI: medium plasticity, brown, trace gravel, w~PL | | D | 0.5 | | pp = 350-400 | | |
| 1 | | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w~PL, very stiff | | D | 1.0 | | pp = 350 | | 1 |
| | 1.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w~PL | | D | 1.5 | | pp = 200-250 | | |
| | 1.7 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with gravel, trace cobbles, w~PL | | | | | | | |
| 2 | | | | D | 2.0 | | pp = 350-400 | | 2 |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 400-450 | | |
| 3 | | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288800
**NORTHING:** 6234043

**PIT No:** 44
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown and dark grey, trace gravel and cobbles, w~PL, very stiff, potential fill | | | | | | | |
| | 0.4 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, friable | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.65 | | | | |
| | 1 | | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | 1.6 | SHALE: brown and dark grey, very low to low strength, extremely weathered | | | | | | | |
| | 1.7 | Pit discontinued at 1.7m<br>- refusal on very low to low strength shale | | D | 1.7 | | | | |
| | 2 | | | | | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 83.6 mAHD
**EASTING:** 288806
**NORTHING:** 6234070

**PIT No:** 45
**PROJECT No:** 92323.11
**DATE:** 14/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 83 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | SHALE: brown, sandstone bands, very low to low strength, highly weathered | | D | 0.5 | | | | |
| | 0.7 | Pit discontinued at 0.7m<br>- refusal on medium strength shale | | | | | | | |
| 82 | 1 | | | | | | | | |
| 81 | 2 | | | | | | | | |
| 80 | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288779
**NORTHING:** 6234079

**PIT No:** 46
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | FILL/TOPSOIL: Silty CLAY CL, low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.6 | FILL/Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, very stiff | | D | 0.5 | | | | |
| | 0.8 | Silty CLAY CL-CI: low to medium plasticity, grey, trace gravel, w<PL, very stiff to hard, residual | | | | | | | |
| | 1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, very stiff to hard | | D | 1.0 | | pp = 300-320 | | |
| | | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | |
| | 2.2 | SHALE: grey and dark grey, very low to low strength | | D | 2.2 | | | | |
| | 2.3 | Pit discontinued at 2.3m<br>- refusal on very low to low strength shale | | | | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 82.3 mAHD
**EASTING:** 288783
**NORTHING:** 6234111

**PIT No:** 47
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 82 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown and pale grey, trace fine gravel and rootlets, w<PL, stiff to very stiff, residual | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.68 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 81 | 1.3 | SHALE: brown, very low to low strength, highly weathered | | | | | | | |
| | | | | D | 1.5 | | | | |
| | 1.7 | Below 1.6m: dark grey, medium strength | | D | 1.7 | | | | |
| | | Pit discontinued at 1.7m<br>- refusal on medium strength shale | | | | | | | |
| | 2 | | | | | | | | 2 |
| 80 | | | | | | | | | |
| | 3 | | | | | | | | 3 |
| 79 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288757
**NORTHING:** 6234117

**PIT No:** 48
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, hard, friable | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | |
| | | | | D | 1.5 | | | | |
| | 1.9 | SHALE: dark grey, very low to low strength | | | | | | | |
| | 2 2.0 | Pit discontinued at 2.0m<br>- refusal on very low to low strength shale | | D | 2.0 | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 80.7 mAHD
**EASTING:** 288762
**NORTHING:** 6234145

**PIT No:** 49
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 80 | 0.2 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, very stiff, residual | | D | 0.5 | | | | |
| | | Below 0.7m: pale grey and orange-brown | | D | 1.0 | | | | |
| 79 | 1.2 | SHALE: brown, pale grey clay bands, very low to low strength, highly weathered | | D | 1.5 | | | | |
| 78 | 2.0 | Pit discontinued at 2.0m<br>- refusal on medium strength shale | | D | 2.0 | | | | |
| 77 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; depth 1 m, 2 m, 3 m

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288733
**NORTHING:** 6234156

**PIT No:** 50
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff to hard | | D | 0.5 | | pp = 250-300 | | |
| | 1 | | | D | 1.0 | | pp = 250-300 | | 1 |
| | 1.3 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, friable | | | | | | | |
| | 1.5 | SANDSTONE: brown, very low to low strength slightly weathered | | D | 1.5 | | | | |
| | | | | D | 1.6 | | | | |
| | 1.7 | Pit discontinued at 1.7m<br>- refusal on very low to low strength sandstone | | | | | | | |
| | 2 | | | | | | | | 2 |
| | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 79.1 mAHD
**EASTING:** 288741
**NORTHING:** 6234185

**PIT No:** 51
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff, residual | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.64 | | | | |
| 78 | 1 | Below 0.9m: pale grey and red-brown, with highly weathered shale gravel, very stiff to hard | | D | 1.0 | | | | 1 |
| | 1.4 | SHALE: brown, with pale grey clay bands, very low to low strength, highly weathered | | D | 1.5 | | | | |
| 77 | 2 2.0 | Pit discontinued at 2.0m<br>- refusal on medium strength shale | | D | 2.0 | | | | 2 |
| 76 | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.5 mAHD
**EASTING:** 288711
**NORTHING:** 6234193

**PIT No:** 52
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, pale grey and red-brown, highly weathered shale bands, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | 0.6 | SHALE: brown, pale grey clay bands, very low to low strength, highly weathered | | | | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 76 | | | | D | 1.5 | | | | |
| | 1.7 | Pit discontinued at 1.7m - refusal on medium strength shale | | D | 1.7 | | | | |
| | 2 | | | | | | | | 2 |
| 75 | | | | | | | | | |
| | 3 | | | | | | | | 3 |
| 74 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288701
**NORTHING:** 6234226

**PIT No:** 53
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w<PL, very stiff to hard, friable | | D | 0.5 | | | | |
| | 0.6 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, very stiff to hard, friable | | D | 1.0 | | pp = 300-350 | | |
| | 1 | | | D | 1.5 | | | | |
| | | | | D | 2.0 | | | | |
| | 2.1 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL, friable | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - refusal on very low to low strength sandstone | | D | 2.5 | | | | |
| | 2 | | | | | | | | |
| | 3 | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.0 mAHD
**EASTING:** 288730
**NORTHING:** 6234221

**PIT No:** 54
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | 0.3 | Silty CLAY CI-CH: medium to high plasticity, red-brown and pale grey, highly weathered shale bands, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | | | | | | |
| | | SHALE: brown, pale grey clay bands, very low to low strength, highly weathered | | D | 0.5 | | | | |
| 76 | 1 | | | D | 1.0 | | | | 1 |
| | | | | D | 1.5 | | | | |
| 75 | 2 2.0 | Pit discontinued at 2.0m - refusal on medium strength shale | | D | 2.0 | | | | 2 |
| 74 | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288729
**NORTHING:** 6234243

**PIT No:** 55
**PROJECT No:** 92323.11
**DATE:** 21/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | FILL/TOPSOIL: Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | 0.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel, w~PL, hard | | D | 0.5 | | pp = 270-350 | | |
| | | | | $U_{50}$ | 0.68 | | | | |
| | 1 | | | D | 1.0 | | pp = 400-450 | | 1 |
| | | | | D | 1.5 | | pp = 450-500 | | |
| | 1.7 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL, friable | | | | | | | |
| | 2 | | | D | 2.0 | | | | 2 |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** --
**EASTING:** 288736
**NORTHING:** 6234209

**PIT No:** 56
**PROJECT No:** 92323.11
**DATE:** 22/8/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.3 | TOPSOIL/Silty CLAY CL: low plasticity, brown, trace gravel and rootlets, w<PL | | | | | | | |
| | | Silty CLAY CL-CI: low to medium plasticity, brown, trace gravel, w<PL, very stiff | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| | 1.3 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, trace gravel and cobbles, w<PL | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | 2 |
| | 2.2 | Silty CLAY CL-CI: low to medium plasticity, pale grey and brown, with cobbles, trace gravel, w<PL | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m<br>- limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Yanmar ViO80 excavator - 400mm bucket

**LOGGED:** EJ

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 79.2 mAHD
**EASTING:** 288764
**NORTHING:** 6234203

**PIT No:** 57
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 79 | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, hard, residual | | D | 0.5 | | | | |
| | 0.6 | SHALE: brown, pale grey clay bands, trace sand, very low to low strength, highly weathered | | | | | | | |
| 78 | 1 | | | D | 1.0 | | | | 1 |
| | | | | D | 1.5 | | | | |
| | 2 | | | | | | | | 2 |
| 77 | 2.0 | SHALE: pale grey, clay bands, very low to low strength, highly weathered | | D | 2.0 | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |
| 76 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.9 mAHD
**EASTING:** 288777
**NORTHING:** 6234249

**PIT No:** 58
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, red-brown and pale grey, trace fine gravel and rootlets, w<PL, stiff to very stiff, residual | | D | 0.5 | | | | |
| 76 | 1 | | | D | 1.0 | | | | 1 |
| | | Below 1.5m: very stiff | | D | 1.5 | | pp = 320-410 | | |
| | | Below 1.7m: highly weathered shale bands | | | | | | | |
| 75 | 2 | | | D | 2.0 | | pp = 320-350 | | 2 |
| | 2.4 | SHALE: brown, pale grey clay bands, very low to low strength, highly weathered | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| 74 | 3 | | | | | | | | 3 |
| 73 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 76.7 mAHD
**EASTING:** 288794
**NORTHING:** 6234281

**PIT No:** 59
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 76 | 0.0 | FILL/Silty CLAY CI-CH: medium to high plasticity, brown, orange-brown and pale brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 1.0 | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, very stiff, residual | | D | 1.0 | | | | |
| | | | | D | 1.5 | | pp = 250 | | |
| 75 | | Below 1.8m: pale brown, very stiff | | | 2.0 | | pp = 310 | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 250 | | |
| 74 | | | | | | | | | |
| 73 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.2 mAHD
**EASTING:** 288822
**NORTHING:** 6234270

**PIT No:** 60
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 0.7 | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, hard, residual | | D | 1.0 | | | | |
| 76 | 1 | | | | | | | | |
| | | Below 1.4m: pale grey and pale brown, very stiff | | D | 1.5 | | pp = 250 | | |
| | 2 | | | D | 2.0 | | pp = 350 | | |
| 75 | | | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 230 | | |
| 74 | 3 | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.2 mAHD
**EASTING:** 288819
**NORTHING:** 6234296

**PIT No:** 61
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, brown and pale brown, with fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| 76 | | | | D | 1.5 | | | | |
| | 2 | | | D | 2.0 | | | | 2 |
| 75 | | | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| | 3 | | | | | | | | 3 |
| 74 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 77.9 mAHD
**EASTING:** 288834
**NORTHING:** 6234268

**PIT No:** 62
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 77 | 0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.66 | | | | |
| | 1 | | | D | 1.0 | | | | 1 |
| | 1.5 | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, hard, residual | | D | 1.5 | | pp >600 | | |
| 76 | 2 | | | D | 2.0 | | pp = 500 | | 2 |
| | | Below 2.3m: with fine ironstone gravel | | | | | | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 450 | | |
| 75 | 3 | | | | | | | | 3 |
| 74 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 78.5 mAHD
**EASTING:** 288830
**NORTHING:** 6234238

**PIT No:** 63
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 78 | 0.0 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine to coarse gravel, trace cobbles, w<PL | | D | 0.5 | | | | |
| | 0.6 | Silty CLAY CI-CH: medium to high plasticity, orange-brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 1.0 | | | | |
| 77 | | Below 1.5m: pale grey and red-brown, highly weathered shale bands, very stiff | | D | 1.5 | | pp = 330-390 | | |
| | | Below 2.0m: hard | | D | 2.0 | | pp = 470-510 | | |
| | 2.1 | SHALE: brown, pale grey clay bands, very low to low strength, highly weathered | | | | | | | |
| 76 | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | | | |
| 75 | | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 78.6 mAHD
**EASTING:** 288808
**NORTHING:** 6234226

**PIT No:** 64
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 78 | 0.2 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | 1 | Below 1.0m: pale grey and red-brown, highly weathered shale bands, trace ironstone gravel | | D | 1.0 | | | | |
| 77 | | | | D | 1.5 | | pp = 290 | | |
| | 2 | | | D | 2.0 | | pp = 450-540 | | |
| | 2.5 | | | D | 2.5 | | pp = 450-540 | | |
| 76 | | Pit discontinued at 2.5m - limit of investigation | | | | | | | |
| | 3 | | | | | | | | |
| 75 | | | | | | | | | |

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# TEST PIT LOG

**CLIENT:** Mirvac Homes NSW Pty Ltd
**PROJECT:** Proposed Residential Subdivision
**LOCATION:** 531 Cobbitty Road, Cobbitty

**SURFACE LEVEL:** 78.3 mAHD
**EASTING:** 288775
**NORTHING:** 6234230

**PIT No:** 65
**PROJECT No:** 92323.11
**DATE:** 15/6/2023
**SHEET** 1 OF 1

| RL | Depth (m) | Description of Strata | Graphic Log | Sampling & In Situ Testing: Type | Depth | Sample | Results & Comments | Water | Dynamic Penetrometer Test (blows per 150mm) |
|---|---|---|---|---|---|---|---|---|---|
| 78 | 0.2 | FILL/Silty CLAY CI-CH: medium to high plasticity, orange-brown and brown, with fine to coarse gravel, trace cobbles, w<PL | | | | | | | |
| | | Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale brown, trace fine gravel and rootlets, w<PL, very stiff to hard, residual | | D | 0.5 | | | | |
| | | | | $U_{50}$ | 0.61 | | | | |
| | | Below 0.75m: stiff | | | | | | | |
| 77 | 1 | Below 1.0m: pale grey, trace ironstone gravel, stiff to very stiff | | D | 1.0 | | | | |
| | | | | D | 1.5 | | pp = 250 | | |
| | | Below 1.8m: highly weathered shale bands, very stiff to hard | | | | | | | |
| 76 | 2 | | | D | 2.0 | | pp = 290 | | |
| | 2.5 | Pit discontinued at 2.5m - limit of investigation | | D | 2.5 | | pp = 450 | | |
| 75 | 3 | | | | | | | | |

**RIG:** Hyundai R 60CR-9 - 6t excavator - 450mm bucket

**LOGGED:** AS

**SURVEY DATUM:** MGA94 Zone 56

**WATER OBSERVATIONS:** No free groundwater observed

**REMARKS:**

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

**SAMPLING & IN SITU TESTING LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| A | Auger sample | G | Gas sample | PID | Photo ionisation detector (ppm) |
| B | Bulk sample | P | Piston sample | PL(A) | Point load axial test Is(50) (MPa) |
| BLK | Block sample | $U_x$ | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C | Core drilling | W | Water sample | pp | Pocket penetrometer (kPa) |
| D | Disturbed sample | ▷ | Water seep | S | Standard penetration test |
| E | Environmental sample | ▼ | Water level | V | Shear vane (kPa) |

Douglas Partners
Geotechnics / Environment / Groundwater

# Appendix C

Laboratory Test Results
Salinity Summary Table C1
Earthworks Quality Report (Project 220469.00)

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au

**Mirvac Homes NSW Pty Ltd**
**PO Box 787**
**Parramatta NSW 2124**

220469.00
31 October 2023
R.003.Rev0
AS

Attention: Jackson Perks

Email: jackson.perks@mirvac.com

**Earthworks Quality Report**
**Proposed Residential Development**
**531 Cobbitty Road, Cobbitty**

## 1. Introduction

This report presents a summary of earthworks testing operations undertaken by Douglas Partners Pty Ltd (DP) for the fill placed by TRN Group (TRN) between 30 January 2023 and 17 August 2023 (the period) within the proposed residential subdivision at 531 Cobbitty Road, Cobbitty.

## 2. Fill Standard and Specification

The scope of works for earthworks testing and inspection for the project provided by DP included Level 1 control as defined in AS 3798 *"Guidelines on Earthworks for Commercial and Residential Developments"* (AS 3798, 2007) along with compliance to the minimum testing requirements of Camden Council. These standards and the specification adopted for the placement of bulk fill for the project include:

- Strip inspections of fill areas prior to the placement of fill to ensure that stripped natural subgrade or previously placed controlled fill is exposed and comprises suitable material free from uncontrolled fill, weak or soft subgrade, vegetation and highly organic topsoil;
- Compaction within the range 98% to 104% Standard maximum dry density; and
- Moisture content within the range -2% (dry) to +2% (wet) of Standard optimum.

## 3. Stripping Inspections

Stripped areas were inspected then test rolled by DP's earthworks superintendent or senior technician prior to the placement of fill. Inspections for the site have been progressively carried out from 24 January 2023 to 12 October 2023, with the inspections undertaken for the job to period end summarised in Table 1.

**Table 1: Summary of Stripping Inspections**

| Date | Proving Method/Equipment | Details of Inspection |
|---|---|---|
| 24/01/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed with soft spots removed |
| 06/02/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 15/02/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 17/02/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 22/03/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 26/06/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 29/06/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 08/08/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 09/08/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |
| 29/09/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed with soft spots removed |
| 12/10/2023 | Test roll with dump truck | Suitable – none to minimal deflection observed |

The stripped subgrade generally comprised stiff or stronger natural clay, free from vegetation and highly organic topsoil. The subgrade areas were stripped to what was considered an appropriate surface to support the placement of controlled fill. The approximate locations of stripped areas inspected for the job to date are shown on Drawing 1 attached.

## 4. Placement and Testing of Fill

A total of 285 density tests were carried out in the fill with 14 failed tests recorded during the period. Tests 222 and 223 were not retested as the area of fill was removed during the process of boxing of roads. The locations of density tests are shown on Drawing 1. The results of the density tests for the period are given on the attached Project Summary Report and are summarised in Table 2.

**Table 2: Summary of Field Density Test Results**

| | Density Ratio | Moisture Content Variance |
|---|---|---|
| Range (passed tests) | 98.0% to 104.0% | 1.0% wet to 2.0% dry |
| Mean (passed tests) | 100.6% | 0.5% dry |
| Median (passed tests) | 100.5% | 0.5% |
| Standard deviation | 1.4% | 0.8% |
| No. of passed tests | 271 | |
| No. of failed tests | 14 | |
| No. of retests | 12 | |

## 5. Conclusion

The results of density testing and inspection of fill placed during the period are in accordance with the required Standard maximum dry density within the range 98 – 104%, and moisture contents within the range ±2% of Standard optimum.

It should be noted that DP does not guarantee the work of TRN or other contractors, nor relieve their responsibility to produce a completed product conforming to the requirements of the specification.

For building on the filled areas, consideration should be given by the user/designer to the following:

- Possible disruption of the compacted fill by installation of services;
- The possibility that additional fill has been placed after the date of the last field density test;
- Adequate containment of the filled area;
- The suitability of the filled land to support structures of various types without excessive deflection. In particular, the shrink/swell properties of the filling and natural soils must be considered in foundation/footing slab design and in detailing structures;
- Variation in fill depth.

## 6. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 531 Cobbitty Road, Cobbitty in accordance with DP's proposal 92323.06.P.001.Rev0 dated 23 August 2022 and acceptance received from Jackson Perks. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Mirvac Homes NSW Pty Ltd for this project only and for the purposes as described in the report. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

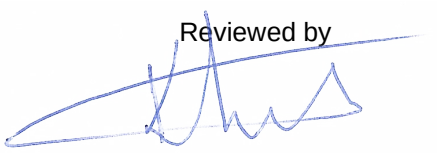
This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

We trust that the above information is in accordance with your present requirements. Please do not hesitate to contact the undersigned should you require anything further.

Yours faithfully
**Douglas Partners Pty Ltd**

**Afham Syed**
Geotechnical Engineer

Reviewed by



**Konrad Schultz**
Principal

Attachments: Notes About this Report
Summary Report
Drawing 1 – Strip Inspection and Density Test Plan

# About this Inspection Report



## Introduction

These notes are provided to amplify DP's inspection report in regard to the limitations of carrying out inspection work. Not all notes are necessarily relevant to this report.

### Standards

This inspection report has been prepared by qualified personnel to current engineering standards of interpretation and analysis.

### Copyright and Limits of Use

This inspection report is the property of DP and is provided for the exclusive use of the client for the specific project and purpose as described in the report. It should not be used by a third party for any purpose other than to confirm that the construction works addressed in the report have been inspected as described. Use of the inspection report is limited in accordance with the Conditions of Engagement for the commission.

DP does not undertake to guarantee the works of the contractors or relieve them of their responsibility to produce a completed product conforming to the design.

### Reports

This inspection report may include advice or opinion that is based on engineering and/or geological interpretation, information provided by the client or the client's agent, and information gained from:

- an investigation report for the project (if available to DP);
- inspection of the work, exposed ground conditions, excavation spoil and performance of excavating equipment while DP was on site;
- investigation and testing that was carried out during the site inspection;
- anecdotal information provided by authoritative site personnel; and
- DP's experience and knowledge of local geology.

Such information may be limited by the frequency of any inspection or testing that was able to be practically carried out, including possible site or cost constraints imposed by the client/ contractor(s). For these reasons, the reliability of this inspection report is limited by the scope of information on which it relies.

Every care is taken with the inspection report as it relates to interpretation of subsurface conditions and any recommendations or suggestions for construction or design. However, DP cannot anticipate or assume responsibility for:

- unexpected variations in subsurface conditions that are not evident from the inspection; and
- the actions of contractors responding to commercial pressures.

Should these issues occur, then additional advice should be sought from DP and, if required, amendments made.

This inspection report must be read in conjunction with any attached information. This inspection report should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions from review by others of this inspection report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this inspection report.

# Project Summary Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: Tim.white@douglaspartners.com.au

**Report Date:** 22/08/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 220469.00
**Project Name:** COBBITTY, 531 Cobbitty Rd Lv 1
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Specification:**
**Test Methods:** AS 1289 5.7.1 STD & 5.8.1

| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-9486A | 1 | 30/01/2023 | ** | 288842 | 6234279 | 76.62 | ** | Standard | 101.5 | 1.0 | ** | 1.98 |
| ** | MA-9486B | 2 | 30/01/2023 | ** | 288838 | 6234260 | 77.19 | ** | Standard | 102.5 | 3.5 | ** | 1.98 |
| ** | MA-9486C | 3 | 30/01/2023 | Retest of #2 | 288846 | 6234264 | 77.25 | ** | Standard | 100.0 | 0.0 | ** | 1.97 |
| ** | MA-9486D | 4 | 30/01/2023 | ** | 288846 | 6234248 | 77.96 | ** | Standard | 100.0 | 0.5 | ** | 1.97 |
| ** | MA-9486E | 5 | 30/01/2023 | ** | 288817 | 6234255 | 77.75 | ** | Standard | 103.5 | 0.0 | ** | 2.10 |
| ** | MA-9486F | 6 | 30/01/2023 | ** | 288827 | 6234237 | 78.11 | ** | Standard | 101.5 | 0.0 | ** | 2.07 |
| ** | MA-9502A | 7 | 01/02/2023 | See map | 288833 | 6234273 | 78.090 | ** | Standard | 100.5 | -0.5 | ** | 2.10 |
| ** | MA-9502B | 8 | 01/02/2023 | See map | 288822 | 6234264 | 78.130 | ** | Standard | 100.5 | -0.5 | ** | 2.10 |
| ** | MA-9502C | 9 | 01/02/2023 | See map | 288806 | 6234254 | 78.202 | ** | Standard | 100.5 | -0.5 | ** | 2.10 |
| ** | MA-9502D | 10 | 01/02/2023 | See map | 288786 | 6234242 | 78.225 | ** | Standard | 99.5 | 0.0 | ** | 2.09 |
| ** | MA-9502E | 11 | 01/02/2023 | See Plan | 0288843 | 6234288 | 77.250 | ** | Standard | 100.0 | 0.0 | ** | 2.06 |
| ** | MA-9502F | 12 | 01/02/2023 | See Plan | 0288826 | 6234289 | 77.059 | ** | Standard | 102.0 | -0.5 | ** | 2.07 |
| ** | MA-9502G | 13 | 01/02/2023 | See Plan | 0288822 | 6234282 | 77.176 | ** | Standard | 101.0 | 0.5 | ** | 2.04 |
| ** | MA-9502H | 14 | 01/02/2023 | See Plan | 0288815 | 6234300 | 75.574 | ** | Standard | 101.0 | 1.5 | ** | 2.06 |
| ** | MA-9514A | 15 | 02/02/2023 | See Plan | 0288834 | 6234303 | 76.172 | ** | Standard | 102.5 | 1.0 | ** | 2.10 |
| ** | MA-9514B | 16 | 02/02/2023 | See Plan | 0288821 | 6234298 | 75.955 | ** | Standard | 99.0 | 0.0 | ** | 2.03 |
| ** | MA-9514C | 17 | 02/02/2023 | See Plan | 0288805 | 6234290 | 76.345 | ** | Standard | 98.5 | 0.5 | ** | 2.06 |
| ** | MA-9514D | 18 | 02/02/2023 | See Plan | 0288838 | 6234302 | 76.887 | ** | Standard | 97.0 | 0.5 | ** | 2.03 |
| ** | MA-9514E | 19 | 02/02/2023 | See Plan | 0288817 | 6234288 | 76.712 | ** | Standard | 101.0 | 2.0 | ** | 2.08 |
| ** | MA-9514F | 20 | 02/02/2023 | See Plan | 0288807 | 6234286 | 76.945 | ** | Standard | 101.0 | -1.0 | ** | 2.13 |
| ** | MA-9514G | 21 RT#18 | 02/02/2023 | See Plan | 0288836 | 6234303 | 76.858 | ** | Standard | 100.5 | -1.0 | ** | 2.09 |
| ** | MA-9538A | 22 | 04/02/2023 | See map | 288579 | 6234105 | 74.585 | ** | Standard | 101.0 | -0.5 | ** | 2.10 |
| ** | MA-9538B | 23 | 04/02/2023 | See map | 288608 | 6234124 | 75.301 | ** | Standard | 100.5 | 0.0 | ** | 2.11 |
| ** | MA-9538C | 24 | 04/02/2023 | See map | 288621 | 6234093 | 75.825 | ** | Standard | 100.5 | 0.0 | ** | 2.10 |
| ** | MA-9538D | 25 | 04/02/2023 | See map | 288614 | 6234069 | 74.670 | ** | Standard | 101.0 | -0.5 | ** | 2.10 |
| ** | MA-9538E | 26 | 04/02/2023 | See map | 288649 | 6234054 | 76.070 | ** | Standard | 100.5 | 0.0 | ** | 2.10 |
| ** | MA-9538F | 27 | 04/02/2023 | See map | 288618 | 6234030 | 74.481 | ** | Standard | 101.5 | -0.5 | ** | 2.12 |
| ** | MA-9546A | 28 | 06/02/2023 | see map | 288589 | 6234070 | 74.139 | ** | Standard | 100.0 | 1.5 | ** | 2.04 |
| ** | MA-9546B | 29 | 06/02/2023 | see map | 288624 | 6234085 | 75.881 | ** | Standard | 99.0 | 0.0 | ** | 2.04 |
| ** | MA-9546C | 30 | 06/02/2023 | see map | 288640 | 6234105 | 76.770 | ** | Standard | 99.5 | 0.5 | ** | 2.09 |
| ** | MA-9546D | 31 | 06/02/2023 | see map | 288608 | 6234090 | 75.110 | ** | Standard | 99.5 | 1.5 | ** | 2.02 |
| ** | MA-9562A | 32 | 07/02/2023 | see map | 288614 | 6234107 | 75.392 | ** | Standard | 99.0 | -1.0 | ** | 2.00 |
| ** | MA-9562B | 33 | 07/02/2023 | see map | 288630 | 6234091 | 76.306 | ** | Standard | 99.5 | 1.5 | ** | 2.06 |
| ** | MA-9562C | 34 | 07/02/2023 | see map | 288584 | 6234094 | 75.399 | ** | Standard | 99.0 | -0.5 | ** | 1.99 |
| ** | MA-9571A | 35 | 08/02/2023 | see map | 288549 | 6234135 | 75.061 | ** | Standard | 102.5 | -0.5 | ** | 2.12 |
| ** | MA-9571B | 36 | 08/02/2023 | see map | 288546 | 6234089 | 77.705 | ** | Standard | 100.5 | 1.5 | ** | 2.08 |
| ** | MA-9571C | 37 | 08/02/2023 | see map | 288629 | 6234099 | 76.910 | ** | Standard | 104.0 | 0.5 | ** | 2.07 |
| ** | MA-9571D | 38 | 08/02/2023 | see map | 288608 | 6234079 | 75.302 | ** | Standard | 101.5 | 0.5 | ** | 2.08 |
| ** | MA-9600A | 39 | 13/02/2023 | ** | 288566 | 6234055 | 72.61 | ** | Standard | 101.5 | 0.5 | ** | 2.07 |
| ** | MA-9600B | 40 | 13/02/2023 | ** | 288588 | 6234031 | 72.66 | ** | Standard | 99.0 | 0.0 | ** | 1.96 |
| ** | MA-9612A | 41 | 14/02/2023 | See map | 288622 | 6234036 | 75.477 | ** | Standard | 101.0 | 1.0 | ** | 2.13 |
| ** | MA-9612B | 42 | 14/02/2023 | See map | 288598 | 6234066 | 74.770 | ** | Standard | 99.0 | 0.0 | ** | 2.09 |
| ** | MA-9612C | 43 | 14/02/2023 | See map | 288572 | 6234048 | 72.883 | ** | Standard | 101.5 | 0.5 | ** | 2.13 |
| ** | MA-9618A | 44 | 15/02/2023 | ** | 288605 | 6234052 | 74.91 | ** | Standard | 98.5 | 0.5 | ** | 2.04 |
| ** | MA-9618B | 45 | 15/02/2023 | ** | 288629 | 6234054 | 76.02 | ** | Standard | 99.5 | 0.0 | ** | 2.08 |
| ** | MA-9628A | 46 | 16/02/2023 | ** | 288610 | 6234100 | 75.83 | ** | Standard | 101.0 | 1.5 | ** | 2.15 |
| ** | MA-9628B | 47 | 16/02/2023 | ** | 288624 | 6234110 | 76.54 | ** | Standard | 101.0 | 1.5 | ** | 2.13 |
| ** | MA-9638A | 48 | 17/02/2023 | ** | 288594 | 6234142 | 75.51 | ** | Standard | 100.5 | 0.0 | ** | 2.14 |
| ** | MA-9638B | 49 | 17/02/2023 | ** | 288577 | 6234131 | 74.92 | ** | Standard | 100.0 | 0.5 | ** | 2.11 |
| ** | MA-9654A | 50 | 20/02/2023 | ** | 288574 | 6234123 | 74.98 | ** | Standard | 100.0 | 0.0 | ** | 2.12 |
| ** | MA-9654B | 51 | 20/02/2023 | ** | 288590 | 6234140 | 75.84 | ** | Standard | 100.0 | 0.5 | ** | 2.10 |
| ** | MA-9701A | 52 | 25/02/2023 | See Plan | 288592 | 6234141 | 75.754 | ** | Standard | 98.0 | 0.0 | ** | 2.17 |
| ** | MA-9701B | 53 | 25/02/2023 | See Plan | 288565 | 6234124 | 74.81 | ** | Standard | 101.5 | -0.5 | ** | 2.24 |
| ** | MA-9710A | 54 | 27/02/2023 | See Plan | 0288585 | 6234146 | 75.580 | ** | Standard | 99.5 | 0.0 | ** | 2.13 |
| ** | MA-9710B | 55 | 27/02/2023 | See Plan | 0288554 | 6234118 | 74.908 | ** | Standard | 103.0 | 1.0 | ** | 2.21 |
| ** | MA-9716A | 56 | 28/02/2023 | ** | 288590 | 6234140 | 75.67 | ** | Standard | 98.0 | 1.0 | ** | 2.09 |
| ** | MA-9716B | 57 | 28/02/2023 | ** | 288554 | 6234108 | 74.30 | ** | Standard | 100.0 | 1.5 | ** | 2.10 |
| ** | MA-9758A | 60 | 04/03/2023 | ** | 288687 | 6234074 | 78.35 | ** | Standard | 98.5 | 0.5 | ** | 2.09 |
| ** | MA-9758B | 61 | 04/03/2023 | ** | 288667 | 6234064 | 77.61 | ** | Standard | 100.5 | 0.5 | ** | 2.14 |

| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-9793A | 64 | 07/03/2023 | ** | 288655 | 6234108 | 76.780 | ** | Standard | 98.5 | 0.5 | ** | 2.01 |
| ** | MA-9793B | 65 | 07/03/2023 | ** | 288635 | 6234090 | 76.250 | ** | Standard | 100.0 | 0.5 | ** | 2.12 |
| ** | MA-9800A | 62 | 08/03/2023 | ** | 288603 | 6234060 | 75.37 | ** | Standard | 99.5 | -1.0 | ** | 2.06 |
| ** | MA-9800B | 63 | 08/03/2023 | ** | 288615 | 6234043 | 75.74 | ** | Standard | 99.5 | -0.5 | ** | 2.04 |
| ** | MA-9856A | 66 | 15/03/2023 | ** | 288600 | 6234130 | 76.20 | ** | Standard | 100.5 | 1.0 | ** | 2.10 |
| ** | MA-9856B | 67 | 15/03/2023 | ** | 288571 | 6234122 | 75.53 | ** | Standard | 102.0 | 0.0 | ** | 2.13 |
| ** | MA-9856C | 68 | 15/03/2023 | ** | 288555 | 6234116 | 74.78 | ** | Standard | 99.0 | 0.0 | ** | 2.08 |
| ** | MA-9866A | 69 | 16/03/2023 | ** | 288634 | 6234075 | 77.07 | ** | Standard | 99.0 | -0.5 | ** | 2.07 |
| ** | MA-9866B | 70 | 16/03/2023 | ** | 288608 | 6234060 | 75.90 | ** | Standard | 99.0 | 0.5 | ** | 2.06 |
| ** | MA-9866C | 71 | 16/03/2023 | ** | 288797 | 6234080 | 74.64 | ** | Standard | 100.5 | 1.5 | ** | 2.12 |
| ** | MA-9879A | 72 | 17/03/2023 | ** | 288646 | 6234059 | 77.27 | ** | Standard | 99.5 | 0.0 | ** | 2.10 |
| ** | MA-9879B | 73 | 17/03/2023 | ** | 288625 | 6234050 | 76.42 | ** | Standard | 100.5 | 0.0 | ** | 2.12 |
| ** | MA-9879C | 74 | 17/03/2023 | ** | 288627 | 6234058 | 76.91 | ** | Standard | 99.0 | 0.5 | ** | 2.10 |
| ** | MA-9886A | 75 | 18/03/2023 | ** | 288807 | 6234307 | 75.56 | ** | Standard | 98.5 | 0.5 | ** | 2.04 |
| ** | MA-9886B | 76 | 18/03/2023 | ** | 288810 | 6234305 | 75.19 | ** | Standard | 99.0 | 0.5 | ** | 2.06 |
| ** | MA-9892B | 78 | 20/03/2023 | ** | 288800 | 6234313 | 76.12 | ** | Standard | 98.5 | 0.0 | ** | 2.05 |
| ** | MA-9892C | 79 | 20/03/2023 | ** | 288813 | 6234314 | 75.58 | ** | Standard | 99.5 | 0.0 | ** | 2.06 |
| ** | MA-9892D | 80 | 20/03/2023 | ** | 288823 | 6234325 | 76.40 | ** | Standard | 101.0 | 0.0 | ** | 2.12 |
| ** | MA-9892A | 77 | 20/03/2023 | ** | 288795 | 6234305 | 75.93 | ** | Standard | 101.0 | 0.0 | ** | 2.10 |
| ** | MA-9899A | 81 | 21/03/2023 | ** | 288608 | 6234082 | 76.64 | ** | Standard | 98.0 | 0.0 | ** | 2.02 |
| ** | MA-9899B | 82 | 21/03/2023 | ** | 288633 | 6234096 | 77.33 | ** | Standard | 101.0 | 0.0 | ** | 2.08 |
| ** | MA-9899C | 83 | 21/03/2023 | ** | 288614 | 6234043 | 76.31 | ** | Standard | 98.5 | 0.0 | ** | 2.04 |
| ** | MA-9899D | 84 | 21/03/2023 | ** | 288604 | 6234045 | 76.42 | ** | Standard | 99.5 | 0.5 | ** | 2.05 |
| ** | MA-9913D | 88 | 22/03/2023 | ** | 288607 | 6234169 | 75.28 | ** | Standard | 98.5 | 0.5 | ** | 2.04 |
| ** | MA-9913A | 85 | 22/03/2023 | ** | 288596 | 6234090 | 76.73 | ** | Standard | 101.0 | 0.0 | ** | 2.09 |
| ** | MA-9913B | 86 | 22/03/2023 | ** | 288589 | 6234084 | 76.29 | ** | Standard | 99.0 | 0.5 | ** | 2.05 |
| ** | MA-9913C | 87 | 22/03/2023 | ** | 288600 | 6234174 | 74.95 | ** | Standard | 100.0 | 0.0 | ** | 2.04 |
| ** | MA-9926B | 90 | 23/03/2023 | ** | 288600 | 6234181 | 75.37 | ** | Standard | 100.0 | 0.5 | ** | 2.07 |
| ** | MA-9926A | 89 | 23/03/2023 | ** | 288609 | 6234190 | 75.39 | ** | Standard | 99.0 | 0.5 | ** | 2.05 |
| ** | MA-9953A | 91 | 28/03/2023 | ** | 288593 | 6234142 | 76.26 | ** | Standard | 101.5 | 1.0 | ** | 2.13 |
| ** | MA-9953B | 92 | 28/03/2023 | ** | 288578 | 6234127 | 75.48 | ** | Standard | 98.5 | 0.5 | ** | 2.06 |
| ** | MA-9953C | 93 | 28/03/2023 | ** | 288604 | 6234123 | 76.61 | ** | Standard | 98.5 | 1.0 | ** | 2.03 |
| ** | MA-9962A | 94 | 29/03/2023 | ** | 288590 | 6234183 | 75.18 | ** | Standard | 99.5 | 0.0 | ** | 2.06 |
| ** | MA-9962B | 95 | 29/03/2023 | ** | 288598 | 6234191 | 75.70 | ** | Standard | 100.5 | 0.0 | ** | 2.10 |
| ** | MA-9962C | 96 | 29/03/2023 | ** | 288579 | 6234183 | 74.61 | ** | Standard | 100.5 | 0.5 | ** | 2.07 |
| ** | MA-9966A | 97 | 30/03/2023 | ** | 288555 | 6234209 | 73.30 | ** | Standard | 101.5 | 0.0 | ** | 2.09 |
| ** | MA-9966B | 98 | 30/03/2023 | ** | 288560 | 6234200 | 72.92 | ** | Standard | 100.5 | 0.5 | ** | 2.07 |
| ** | MA-9966C | 99 | 30/03/2023 | ** | 288575 | 6234125 | 76.00 | ** | Standard | 101.0 | 0.0 | ** | 2.11 |
| ** | MA-9974A | 100 | 31/03/2023 | ** | 288533 | 6234086 | 74.39 | ** | Standard | 101.0 | 0.5 | ** | 2.11 |
| ** | MA-9974B | 101 | 31/03/2023 | ** | 288550 | 6234081 | 72.52 | ** | Standard | 98.5 | 0.0 | ** | 2.02 |
| ** | MA-9974C | 102 | 31/03/2023 | ** | 288548 | 6234120 | 75.87 | ** | Standard | 102.0 | 0.0 | ** | 2.12 |
| ** | MA-9974D | 103 | 31/03/2023 | ** | 288576 | 6234134 | 74.28 | ** | Standard | 99.0 | 0.0 | ** | 2.05 |
| ** | MA-9987A | 104 | 01/04/2023 | ** | 288568 | 6234082 | 75.971 | ** | Standard | 102.0 | 2.0 | ** | 2.13 |
| ** | MA-9987B | 105 | 01/04/2023 | ** | 288555 | 6234107 | 75.342 | ** | Standard | 101.0 | 2.0 | ** | 2.14 |
| ** | MA-10003A | 106 | 04/04/2023 | ** | 288568 | 6234040 | 74.30 | ** | Standard | 100.5 | -0.5 | ** | 2.03 |
| ** | MA-10003B | 107 | 04/04/2023 | ** | 288593 | 6234008 | 73.80 | ** | Standard | 101.0 | -1.0 | ** | 2.05 |
| ** | MA-10003C | 108 | 04/04/2023 | ** | 288594 | 6234012 | 74.57 | ** | Standard | 98.5 | 2.5 | ** | 1.95 |
| ** | MA-10003D | 109 | 04/04/2023 | Retest of #108 | 288594 | 6234012 | 74.57 | ** | Standard | 99.0 | 1.0 | ** | 1.96 |
| ** | MA-10014A | 110 | 05/04/2023 | ** | 288638 | 6234150 | 77.09 | ** | Standard | 100.0 | -0.5 | ** | 2.01 |
| ** | MA-10014B | 111 | 05/04/2023 | ** | 288617 | 6234164 | 76.86 | ** | Standard | 101.0 | -0.5 | ** | 2.02 |
| ** | MA-10014C | 112 | 05/04/2023 | ** | 288555 | 6234124 | 75.27 | ** | Standard | 101.0 | -0.5 | ** | 2.05 |
| ** | MA-10014D | 113 | 05/04/2023 | ** | 288563 | 6234115 | 75.99 | ** | Standard | 100.0 | 0.0 | ** | 2.02 |
| ** | MA-10023A | 114 | 06/04/2023 | ** | 288577 | 6234130 | 76.56 | ** | Standard | 102.0 | 0.0 | ** | 2.10 |
| ** | MA-10023B | 115 | 06/04/2023 | ** | 288552 | 6234126 | 75.71 | ** | Standard | 101.0 | 0.0 | ** | 2.07 |
| ** | MA-10023C | 116 | 06/04/2023 | ** | 288597 | 6234112 | 76.76 | ** | Standard | 99.5 | 0.0 | ** | 2.04 |
| ** | MA-10036A | 117 | 11/04/2023 | ** | 288544 | 6234125 | 75.41 | ** | Standard | 102.0 | 0.5 | ** | 2.12 |
| ** | MA-10036B | 118 | 11/04/2023 | ** | 288559 | 6234133 | 76.30 | ** | Standard | 99.0 | 0.0 | ** | 2.04 |
| ** | MA-10036C | 119 | 11/04/2023 | ** | 288552 | 6234111 | 75.82 | ** | Standard | 101.0 | 0.0 | ** | 2.10 |
| ** | MA-10038A | 120 | 12/04/2023 | see map | 288551 | 6234134 | 75.858 | ** | Standard | 100.0 | 1.0 | ** | 2.07 |
| ** | MA-10038B | 121 | 12/04/2023 | see map | 288530 | 6234148 | 72.291 | ** | Standard | 98.0 | -1.0 | ** | 1.97 |
| ** | MA-10038C | 122 | 12/04/2023 | see map | 288769 | 6234036 | 82.271 | ** | Standard | 101.0 | 1.0 | ** | 2.00 |
| ** | MA-10038D | 123 | 12/04/2023 | see map | 288762 | 6234041 | 81.879 | ** | Standard | 100.5 | 1.5 | ** | 2.00 |
| ** | MA-10038E | 124 | 12/04/2023 | see map | 288557 | 6234135 | 76.082 | ** | Standard | 104.0 | 0.5 | ** | 2.13 |

| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-10046A | 126 | 13/04/2023 | see map | 288580 | 6234151 | 76.430 | ** | Standard | 104.0 | 0.0 | ** | 2.16 |
| ** | MA-10046B | 127 | 13/04/2023 | see map | 288564 | 6234166 | 74.350 | ** | Standard | 104.0 | 0.5 | ** | 2.18 |
| ** | MA-10046C | 128 | 13/04/2023 | see map | 288568 | 6234172 | 74.490 | ** | Standard | 101.5 | -0.5 | ** | 2.13 |
| ** | MA-10046D | 129 | 13/04/2023 | see map | 288549 | 6234159 | 73.120 | ** | Standard | 104.0 | 0.0 | ** | 2.20 |
| ** | MA-10081A | 136 | 18/04/2023 | ** | 288575 | 6234111 | 74.04 | ** | Standard | 100.0 | 0.5 | ** | 2.14 |
| ** | MA-10098A | 134 | 19/04/2023 | ** | 288546 | 6234122 | 74.32 | ** | Standard | 100.5 | 0.5 | ** | 2.10 |
| ** | MA-10098B | 135 | 19/04/2023 | ** | 288549 | 6234156 | 73.84 | ** | Standard | 99.5 | 0.5 | ** | 2.11 |
| ** | MA-10114A | 130 | 21/04/2023 | See Plan | 288557.125 | 6234154.421 | 75.434 | ** | Standard | 100.5 | 0.0 | ** | 2.23 |
| ** | MA-10114B | 131 | 21/04/2023 | See Plan | 288534.199 | 6234127.974 | 75.417 | ** | Standard | 100.0 | 0.0 | ** | 2.19 |
| ** | MA-10139A | 132 | 26/04/2023 | ** | 288532 | 6234142 | 74.55 | ** | Standard | 101.5 | 0.0 | ** | 2.18 |
| ** | MA-10139B | 133 | 26/04/2023 | ** | 288539 | 6234140 | 75.07 | ** | Standard | 101.0 | 0.5 | ** | 2.18 |
| ** | MA-10188A | 137 | 02/05/2023 | ** | 288532 | 6234143 | 75.04 | ** | Standard | 100.5 | 0.5 | ** | 2.12 |
| ** | MA-10188B | 138 | 02/05/2023 | ** | 288555 | 6234158 | 74.87 | ** | Standard | 101.5 | 0.5 | ** | 2.18 |
| ** | MA-10192A | 140 | 03/05/2023 | ** | 288548 | 6234122 | 75.19 | ** | Standard | 100.5 | 0.0 | ** | 2.11 |
| ** | MA-10192B | 141 | 03/05/2023 | ** | 288545 | 6234154 | 75.59 | ** | Standard | 100.5 | 0.5 | ** | 2.14 |
| ** | MA-10219A | 142 | 05/05/2023 | ** | 288429 | 6234128 | 70.35 | ** | Standard | 100.0 | 0.5 | ** | 2.11 |
| ** | MA-10219B | 143 | 05/05/2023 | ** | 288433 | 6234134 | 70.24 | ** | Standard | 99.0 | 0.5 | ** | 2.01 |
| ** | MA-10219C | 144 | 05/05/2023 | ** | 288427 | 6234129 | 69.87 | ** | Standard | 102.0 | 1.0 | ** | 2.15 |
| ** | MA-10228A | 145 | 08/05/2023 | ** | 288421 | 6234133 | 70.02 | ** | Standard | 100.0 | 0.5 | ** | 2.02 |
| ** | MA-10228B | 146 | 08/05/2023 | ** | 288417 | 6234130 | 70.10 | ** | Standard | 100.0 | -1.0 | ** | 2.01 |
| ** | MA-10228C | 147 | 08/05/2023 | ** | 288427 | 6234128 | 70.07 | ** | Standard | 103.5 | 0.0 | ** | 2.15 |
| ** | MA-10264A | 150 | 12/05/2023 | ** | 288424 | 6234121 | 70.00 | ** | Standard | 102.5 | -1.0 | ** | 2.21 |
| ** | MA-10264B | 151 | 12/05/2023 | ** | 288431 | 6234123 | 71.07 | ** | Standard | 102.0 | -1.0 | ** | 2.19 |
| ** | MA-10264C | 152 | 12/05/2023 | ** | 288429 | 6234134 | 70.73 | ** | Standard | 103.0 | 0.0 | ** | 2.22 |
| ** | MA-10289A | 148 | 17/05/2023 | ** | 288420 | 6234132 | 75.12 | ** | Standard | 100.5 | 0.5 | ** | 2.11 |
| ** | MA-10289B | 149 | 17/05/2023 | ** | 288542 | 6234100 | 70.69 | ** | Standard | 100.0 | 0.5 | ** | 2.10 |
| ** | MA-10297A | 153 | 18/05/2023 | ** | 288457 | 6234150 | 70.52 | ** | Standard | 103.0 | 1.0 | ** | 2.19 |
| ** | MA-10297B | 154 | 18/05/2023 | ** | 288464 | 6234140 | 71.17 | ** | Standard | 99.5 | 0.5 | ** | 2.15 |
| ** | MA-10311A | 155 | 19/05/2023 | ** | 288444 | 6234140 | 71.51 | ** | Standard | 101.5 | 1.0 | ** | 2.20 |
| ** | MA-10311B | 156 | 19/05/2023 | ** | 288473 | 6234070 | 71.20 | ** | Standard | 101.0 | -0.5 | ** | 2.11 |
| ** | MA-10311C | 157 | 19/05/2023 | ** | 288480 | 6234069 | 71.64 | ** | Standard | 99.0 | -1.0 | ** | 2.02 |
| ** | MA-10332A | 158 | 22/05/2023 | Refer to Map | 288460 | 6234153 | 71.142 | ** | Standard | 101.0 | 0.0 | ** | 2.14 |
| ** | MA-10332B | 159 | 22/05/2023 | Refer to Map | 288476 | 6234083 | 71.749 | ** | Standard | 101.5 | 0.5 | ** | 2.17 |
| ** | MA-10337A | 160 | 23/05/2023 | ** | 288555 | 6234027 | 71.76 | ** | Standard | 100.5 | 1.5 | ** | 2.03 |
| ** | MA-10337B | 161 | 23/05/2023 | ** | 288605 | 6233939 | 72.99 | ** | Standard | 99.5 | 0.5 | ** | 2.02 |
| ** | MA-10337C | 162 | 23/05/2023 | ** | 288435 | 6234150 | 71.59 | ** | Standard | 100.5 | 1.5 | ** | 2.10 |
| ** | MA-10349A | 163 | 24/05/2023 | ** | 288468 | 6234094 | 72.24 | ** | Standard | 101.5 | 1.5 | ** | 2.08 |
| ** | MA-10349B | 164 | 24/05/2023 | ** | 288550 | 6234030 | 73.15 | ** | Standard | 101.5 | 0.5 | ** | 2.16 |
| ** | MA-10349C | 165 | 24/05/2023 | ** | 288600 | 6233941 | 71.94 | ** | Standard | 102.0 | 0.5 | ** | 2.17 |
| ** | MA-10360A | 166 | 25/05/2023 | ** | 288460 | 6234100 | 73.10 | ** | Standard | 94.0 | 2.5 | ** | 1.96 |
| ** | MA-10360B | 167 | 25/05/2023 | ** | 288538 | 6234050 | 73.56 | ** | Standard | 100.0 | 0.0 | ** | 2.13 |
| ** | MA-10360C | 168 | 25/05/2023 | Retest of #166 | 288460 | 6234100 | 73.10 | ** | Standard | 99.5 | 0.5 | ** | 2.11 |
| ** | MA-10159A | 139 | 27/05/2023 | ** | 288540 | 6234154 | 73.28 | ** | Standard | 99.0 | 0.0 | ** | 2.12 |
| ** | MA-10396A | 169 | 29/05/2023 | ** | 288568 | 6233998 | 72.31 | ** | Standard | 98.5 | 1.0 | ** | 2.03 |
| ** | MA-10396B | 170 | 29/05/2023 | ** | 288625 | 6233944 | 73.45 | ** | Standard | 101.5 | 1.5 | ** | 2.08 |
| ** | MA-10396C | 171 | 29/05/2023 | ** | 288445 | 6234130 | 73.98 | ** | Standard | 99.0 | 0.5 | ** | 2.07 |

| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-10411A | 172 | 30/05/2023 | ** | 288446 | 6234130 | 72.18 | ** | Standard | 100.5 | 1.0 | ** | 2.08 |
| ** | MA-10411B | 173 | 30/05/2023 | ** | 288455 | 6234135 | 71.96 | ** | Standard | 101.0 | 1.0 | ** | 2.10 |
| ** | MA-10411D | 175 | 30/05/2023 | ** | 288455 | 6234096 | 72.35 | ** | Standard | 101.0 | 1.0 | ** | 2.07 |
| ** | MA-10411C | 174 | 30/05/2023 | ** | 288458 | 6234125 | 72.53 | ** | Standard | 98.5 | 1.0 | ** | 2.04 |
| ** | MA-10422A | 176 | 31/05/2023 | ** | 288533 | 6234066 | 73.51 | ** | Standard | 103.0 | 1.5 | ** | 2.10 |
| ** | MA-10422B | 177 | 31/05/2023 | ** | 288497 | 6234099 | 72.20 | ** | Standard | 101.5 | 0.5 | ** | 2.14 |
| ** | MA-10422C | 178 | 31/05/2023 | ** | 288498 | 6234130 | 72.38 | ** | Standard | 98.0 | 0.5 | ** | 2.03 |
| ** | MA-10430A | 179 | 01/06/2023 | See map | 288505 | 6234150 | 72.351 | ** | Standard | 100.5 | 1.0 | ** | 2.10 |
| ** | MA-10430B | 180 | 01/06/2023 | See map | 288463 | 6234147 | 72.060 | ** | Standard | 101.0 | 1.0 | ** | 2.11 |
| ** | MA-10430C | 181 | 01/06/2023 | See map | 288450 | 6234109 | 72.499 | ** | Standard | 100.5 | 1.5 | ** | 2.10 |
| ** | MA-10438A | 182 | 02/06/2023 | ** | 288437 | 6234150 | 72.62 | ** | Standard | 101.0 | 0.0 | ** | 2.16 |
| ** | MA-10438B | 183 | 02/06/2023 | ** | 288470 | 6234147 | 72.93 | ** | Standard | 98.5 | 0.0 | ** | 2.09 |
| ** | MA-10438C | 184 | 02/06/2023 | ** | 288505 | 6234130 | 72.75 | ** | Standard | 100.5 | 0.5 | ** | 2.13 |
| ** | MA-10464A | 185 | 06/06/2023 | ** | 288506 | 6234130 | 73.30 | ** | Standard | 98.5 | 0.5 | ** | 2.03 |
| ** | MA-10464B | 186 | 06/06/2023 | ** | 288493 | 6234116 | 73.23 | ** | Standard | 100.0 | 1.0 | ** | 2.09 |
| ** | MA-10464C | 187 | 06/06/2023 | ** | 288475 | 6234109 | 72.97 | ** | Standard | 98.0 | 1.0 | ** | 2.05 |
| ** | MA-10476A | 188 | 07/06/2023 | ** | 288420 | 6234120 | 71.24 | ** | Standard | 100.5 | 1.5 | ** | 2.12 |
| ** | MA-10476B | 189 | 07/06/2023 | ** | 288437 | 6234087 | 72.06 | ** | Standard | 99.0 | 1.5 | ** | 2.06 |
| ** | MA-10476C | 190 | 07/06/2023 | ** | 288434 | 6234123 | 72.59 | ** | Standard | 100.5 | 1.0 | ** | 2.08 |
| ** | MA-10494A | 191 | 09/06/2023 | ** | 288470 | 6234108 | 72.74 | ** | Standard | 100.5 | 0.5 | ** | 2.09 |
| ** | MA-10494B | 192 | 09/06/2023 | ** | 288445 | 6234111 | 72.56 | ** | Standard | 99.0 | 1.5 | ** | 2.07 |
| ** | MA-10494C | 193 | 09/06/2023 | ** | 288450 | 6234127 | 73.06 | ** | Standard | 100.0 | 0.5 | ** | 2.06 |
| ** | MA-10504A | 194 | 14/06/2023 | ** | 288445 | 6234141 | 73.34 | ** | Standard | 101.5 | 2.5 | ** | 2.19 |
| ** | MA-10504B | 195 | 14/06/2023 | ** | 288446 | 6234089 | 72.62 | ** | Standard | 108.0 | 3.5 | ** | 2.25 |
| ** | MA-10514A | 196 | 15/06/2023 | See plan | 288519 | 6234140 | 74.450 | Fill | Standard | 106.5 | 2.0 | ** | 2.33 |
| ** | MA-10514B | 197 | 15/06/2023 | retest #194 | 288445 | 6234141 | 73.340 | Fill | Standard | 102.0 | 2.0 | ** | 2.23 |
| ** | MA-10514C | 198 | 15/06/2023 | retest #195 | 288446 | 6234089 | 72.620 | Fill | Standard | 103.5 | 1.5 | ** | 2.23 |
| ** | MA-10524B | 200 | 16/06/2023 | see plan | 288478 | 6234137 | 73.740 | fill | Standard | 112.5 | 1.0 | ** | 2.34 |
| ** | MA-10524A | 199 | 16/06/2023 | Retest #196 | 288519 | 6234140 | 74.210 | fill | Standard | 106.5 | 2.0 | ** | 2.32 |
| ** | MA-10524C | 201 | 16/06/2023 | see plan | 288514 | 6234136 | 74.290 | fill | Standard | 109.0 | 3.5 | ** | 2.18 |
| ** | MA-10524D | 202 | 16/06/2023 | see plan | 288480 | 6234131 | 73.845 | fill | Standard | 100.5 | 2.0 | ** | 2.20 |
| ** | MA-10545A | 203 retest #199 | 17/06/2023 | Retest #199 | 288519 | 6234140 | 73.74 | ** | Standard | 99.0 | 2.0 | ** | 2.18 |
| ** | MA-10545B | 204 retest #200 | 17/06/2023 | Retest# 200 | 288478 | 6234137 | 74.21 | ** | Standard | 99.5 | 1.0 | ** | 2.20 |
| ** | MA-10550A | 205 retest #201 | 19/06/2023 | retest 201 | 288514 | 6234136 | 74.29 | ** | Standard | 102.5 | 0.5 | ** | 2.20 |
| ** | MA-10550B | 206 | 19/06/2023 | ** | 288454 | 6234088 | 73.110 | ** | Standard | 103.0 | 0.5 | ** | 2.22 |
| ** | MA-10550C | 207 | 19/06/2023 | ** | 288457 | 6234094 | 72.988 | ** | Standard | 103.0 | 1.0 | ** | 2.19 |
| ** | MA-10550D | 208 | 19/06/2023 | ** | 288445 | 6234111 | 72.514 | ** | Standard | 103.5 | 0.0 | ** | 2.16 |
| ** | MA-10550E | 209 | 19/06/2023 | ** | 288440 | 6234146 | 72.088 | ** | Standard | 101.0 | 0.5 | ** | 2.12 |
| ** | MA-10569A | 213 | 21/06/2023 | ** | 288455 | 6234131 | 74.170 | ** | Standard | 108.5 | 0.5 | ** | 2.27 |
| ** | MA-10569B | 214 | 21/06/2023 | ** | 288452 | 6234128 | 74.005 | ** | Standard | 100.5 | 0.5 | ** | 2.12 |
| ** | MA-10569C | 215 | 21/06/2023 | ** | 288447 | 6234109 | 73.544 | ** | Standard | 104.0 | 0.5 | ** | 2.16 |
| ** | MA-10569D | 216 | 21/06/2023 | ** | 288443 | 6234080 | 73.020 | ** | Standard | 102.0 | 0.0 | ** | 2.12 |
| ** | MA-10569E | 217 | 21/06/2023 | Retest #213 | 288455 | 6234131 | 74.170 | ** | Standard | 103.0 | 0.5 | ** | 2.16 |
| ** | MA-10570A | 218 | 22/06/2023 | See plan | 288438 | 6234131 | 74.330 | ** | Standard | 103.5 | 2.0 | ** | 2.12 |
| ** | MA-10570B | 219 | 22/06/2023 | See plan | 288449 | 6234103 | 74.730 | ** | Standard | 103.5 | 2.0 | ** | 2.11 |

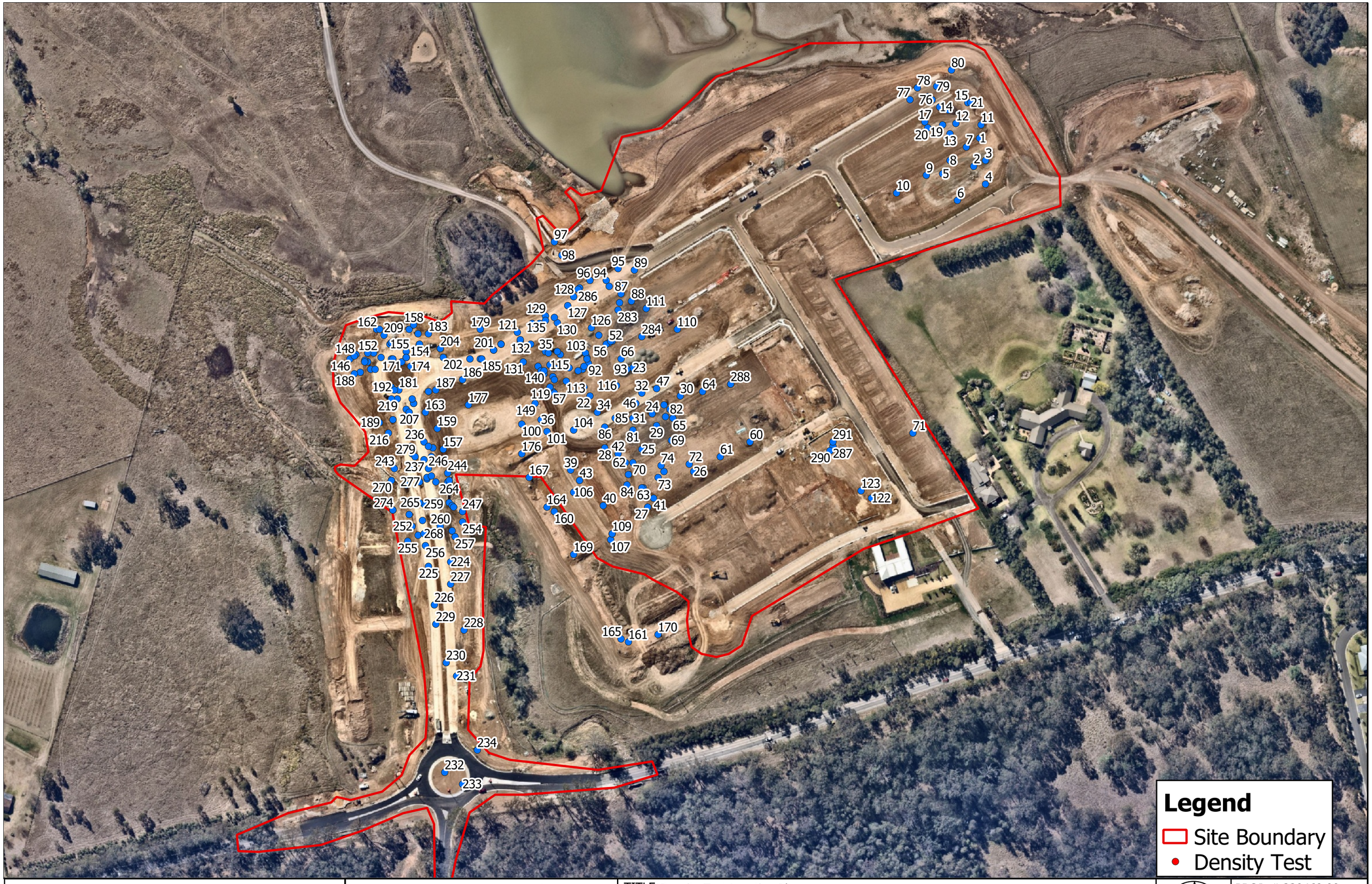
| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-10570C | 220 | 22/06/2023 | See plan | 288459 | 6234061 | 73.600 | ** | Standard | 102.5 | 4.0 | ** | 2.07 |
| ** | MA-10590A | 221 | 26/06/2023 | Re test #220 | 288459 | 6234061 | 73.660 | ** | Standard | 104.0 | 1.0 | ** | 2.11 |
| ** | MA-10590B | 222 | 26/06/2023 | on Road off roundabout (subgrade) | 288445 | 6234103 | 74.590 | ** | Standard | 110.0 | 1.5 | ** | 2.24 |
| ** | MA-10590C | 223 | 26/06/2023 | on road off roundabout (subgrade) | 288455 | 6234131 | 74.480 | ** | Standard | 105.5 | 2.0 | ** | 2.20 |
| ** | MA-10600A | 224 | 27/06/2023 | See plan | 288485 | 6233993 | 73.480 | ** | Standard | 99.0 | 1.5 | ** | 1.99 |
| ** | MA-10600B | 225 | 27/06/2023 | See plan | 288470 | 6233990 | 73.530 | ** | Standard | 102.0 | 2.0 | ** | 2.05 |
| ** | MA-10600C | 226 | 27/06/2023 | See plan | 288474 | 6233964 | 73.200 | ** | Standard | 100.0 | 1.5 | ** | 2.17 |
| ** | MA-10624A | 227 | 30/06/2023 | see plan | 288485 | 6233978 | 73.380 | fill | Standard | 101.0 | 2.0 | ** | 2.16 |
| ** | MA-10624B | 228 | 30/06/2023 | see plan | 288494 | 6233947 | 73.500 | fill | Standard | 98.5 | 1.5 | ** | 2.10 |
| ** | MA-10624C | 229 | 30/06/2023 | see plan | 288475 | 6233951 | 73.630 | fill | Standard | 100.5 | 2.0 | ** | 2.12 |
| ** | MA-10624D | 230 | 30/06/2023 | see plan | 288482 | 6233925 | 73.710 | fill | Standard | 98.0 | 2.0 | ** | 1.94 |
| ** | MA-10624E | 231 | 30/06/2023 | see plan | 288489 | 6233916 | 73.610 | fill | Standard | 99.0 | 2.0 | ** | 2.11 |
| ** | MA-10638A | 232 | 03/07/2023 | See plan | 288481 | 6233851 | 75.090 | fill | Standard | 98.0 | 2.0 | ** | 1.93 |
| ** | MA-10638B | 233 | 03/07/2023 | See plan | 288493 | 6233843 | 75.000 | fill | Standard | 101.5 | 1.5 | ** | 2.18 |
| ** | MA-10638C | 234 | 03/07/2023 | See plan | 288503 | 6233866 | 75.030 | fill | Standard | 100.0 | 1.5 | ** | 2.10 |
| ** | MA-10681A | 235 | 10/07/2023 | see plan | 288458 | 6234071 | 73.400 | fill | Standard | 100.0 | 1.5 | ** | 2.22 |
| ** | MA-10681B | 236 | 10/07/2023 | see plan | 288467 | 6234074 | 73.340 | fill | Standard | 101.5 | 2.0 | ** | 2.18 |
| ** | MA-10691A | 237 | 11/07/2023 | See plan | 288467 | 6234062 | 73.556 | Fill | Standard | 100.0 | 1.5 | ** | 2.10 |
| ** | MA-10691B | 238 | 11/07/2023 | See plan | 288470 | 6234071 | 73.688 | Fill | Standard | 101.0 | 1.5 | ** | 2.14 |
| ** | MA-10691C | 239 | 11/07/2023 | See plan | 288472 | 6234064 | 73.623 | Fill | Standard | 101.0 | 1.5 | ** | 2.09 |
| ** | MA-10691D | 240 | 11/07/2023 | See plan | 288478 | 6234061 | 72.168 | Fill | Standard | 103.5 | 1.0 | ** | 2.15 |
| ** | MA-10705A | 241 | 12/07/2023 | Culvert | 288475 | 6234047 | 71.810 | ** | Standard | 101.5 | -0.5 | ** | 2.23 |
| ** | MA-10705B | 242 | 12/07/2023 | Culvert | 288469 | 6234049 | 72.250 | ** | Standard | 100.5 | 0.0 | ** | 2.21 |
| ** | MA-10699A | 243 | 12/07/2023 | see plan | 288447 | 6234056 | 72.271 | ** | Standard | 102.0 | 1.5 | ** | 2.08 |
| ** | MA-10699B | 244 | 12/07/2023 | see plan | 288483 | 6234053 | 72.534 | ** | Standard | 102.5 | 1.5 | ** | 2.13 |
| ** | MA-10711A | 245 | 13/07/2023 | see plan | 288459 | 6234056 | 73.600 | fill | Standard | 103.0 | 2.0 | ** | 2.16 |
| ** | MA-10711B | 246 | 13/07/2023 | see plan | 288470 | 6234056 | 72.910 | fill | Standard | 102.0 | 1.5 | ** | 2.17 |
| ** | MA-10719D | 250 | 14/07/2023 | See plan | 288469 | 6234050 | 72.600 | Fill | Standard | 100.0 | -1.0 | ** | 2.22 |
| ** | MA-10719A | 247 | 14/07/2023 | See plan | 288493 | 6234027 | 71.730 | Fill | Standard | 102.0 | 2.0 | ** | 2.20 |
| ** | MA-10719B | 248 | 14/07/2023 | See plan | 288476 | 6234020 | 71.630 | Fill | Standard | 100.0 | 1.5 | ** | 2.17 |
| ** | MA-10719C | 249 | 14/07/2023 | See plan | 288457 | 6234025 | 71.710 | Fill | Standard | 101.5 | 1.5 | ** | 2.18 |
| ** | MA-10719E | 251 | 14/07/2023 | See plan | 288472 | 6234051 | 72.950 | Fill | Standard | 100.0 | -0.5 | ** | 2.24 |
| ** | MA-10735A | 252 | 17/07/2023 | see plan | 288459 | 6234017 | 72.080 | fill | Standard | 103.0 | 2.0 | ** | 2.20 |
| ** | MA-10735B | 253 | 17/07/2023 | see plan | 288486 | 6234014 | 72.110 | fill | Standard | 102.5 | 1.5 | ** | 2.25 |
| ** | MA-10735C | 254 | 17/07/2023 | see plan | 288493 | 6234020 | 71.990 | fill | Standard | 102.0 | 2.0 | ** | 2.19 |
| ** | MA-10750D | 258 | 18/07/2023 | see plan | 288484 | 6234033 | 71.770 | culvert fill | Standard | 102.0 | -0.5 | ** | 2.23 |
| ** | MA-10750A | 255 | 18/07/2023 | see plan | 288456 | 6234007 | 72.390 | fill | Standard | 101.5 | 1.0 | ** | 2.20 |
| ** | MA-10750B | 256 | 18/07/2023 | see plan | 288468 | 6234004 | 72.410 | fill | Standard | 100.5 | 1.5 | ** | 2.19 |
| ** | MA-10750C | 257 | 18/07/2023 | see plan | 288488 | 6234010 | 72.360 | fill | Standard | 101.5 | 1.5 | ** | 2.21 |
| ** | MA-10750E | 259 | 18/07/2023 | see plan | 288467 | 6234032 | 72.100 | culvert fill | Standard | 99.0 | -0.5 | ** | 2.19 |
| ** | MA-10757A | 260 | 19/07/2023 | see plan | 288478 | 6234017 | 72.730 | Fill | Standard | 101.5 | 0.0 | ** | 2.18 |
| ** | MA-10757B | 261 | 19/07/2023 | see plan | 288463 | 6234011 | 72.785 | Fill | Standard | 101.0 | 0.0 | ** | 2.19 |
| ** | MA-10757C | 262 | 19/07/2023 | see plan | 288466 | 6234021 | 73.010 | Fill | Standard | 101.0 | 1.5 | ** | 2.15 |
| ** | MA-10757D | 263 | 19/07/2023 | see plan | 288478 | 6234013 | 73.130 | Fill | Standard | 101.5 | 1.5 | ** | 2.17 |
| ** | MA-10768A | 264 | 20/07/2023 | See plan | 288484 | 6234047 | 69.990 | Collective | Standard | 99.0 | 0.0 | ** | 2.20 |

| Lot # | Sample # | Test # | Date Sampled | Location | Easting | Northing | Elevation (m) | Layer | Compaction Method | Relative Compaction (%) | Moisture Variation (%) | Moisture Content (%) | Field Wet Density (t/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ** | MA-10768B | 265 | 20/07/2023 | See plan | 288464 | 6234033 | 72.504 | Culvert fill | Standard | 100.5 | 0.0 | ** | 2.25 |
| ** | MA-10768C | 266 | 20/07/2023 | See plan | 288483 | 6234047 | 70.332 | Collective | Standard | 100.5 | 0.0 | ** | 2.27 |
| ** | MA-10768D | 267 | 20/07/2023 | See plan | 288477 | 6234023 | 73.319 | pad fill | Standard | 101.5 | 1.5 | ** | 2.18 |
| ** | MA-10768E | 268 | 20/07/2023 | See plan | 288467 | 6234012 | 73.118 | pad fill | Standard | 100.5 | 1.5 | ** | 2.16 |
| ** | MA-10768F | 269 | 20/07/2023 | See plan | 288484 | 6234048 | 70.626 | Collective | Standard | 99.0 | -0.5 | ** | 2.20 |
| ** | MA-10776A | 270 | 21/07/2023 | see plan | 288445 | 6234048 | 70.135 | collective | Standard | 100.0 | 0.0 | ** | 2.23 |
| ** | MA-10776B | 271 | 21/07/2023 | See plan | 288445 | 6234048 | 70.475 | collective | Standard | 100.5 | 0.0 | ** | 2.25 |
| ** | MA-10776C | 272 | 21/07/2023 | See plan | 288475 | 6234034 | 73.550 | culvert top | Standard | 100.0 | 0.0 | ** | 2.22 |
| ** | MA-10802A | 273 | 26/07/2023 | See plan | 288446 | 6234028 | 69.995 | collective | Standard | 101.0 | 0.0 | ** | 2.20 |
| ** | MA-10802B | 274 | 26/07/2023 | See plan | 288446 | 6234028 | 70.332 | collective | Standard | 100.0 | 0.0 | ** | 2.19 |
| ** | MA-10802C | 275 | 26/07/2023 | See plan | 288464 | 6234047 | 73.333 | TRN | Standard | 103.0 | 0.0 | ** | 2.24 |
| ** | MA-10802D | 276 | 26/07/2023 | See plan | 288486 | 6234031 | 70.310 | collective | Standard | 101.5 | 0.0 | ** | 2.22 |
| ** | MA-10802E | 277 | 26/07/2023 | See plan | 288464 | 6234047 | 73.642 | TRN | Standard | 100.5 | 0.0 | ** | 2.21 |
| ** | MA-10818A | 278 | 27/07/2023 | see plan | 288487 | 6234030 | 70.580 | Collective | Standard | 99.0 | 0.0 | ** | 2.20 |
| ** | MA-10818B | 279 | 27/07/2023 | see plan | 288461 | 6234064 | 74.068 | TRN | Standard | 101.5 | 0.5 | ** | 2.12 |
| ** | MA-10818C | 280 | 27/07/2023 | see plan | 288455 | 6234045 | 73.850 | trn | Standard | 99.5 | 1.5 | ** | 2.08 |
| ** | MA-10900A | 281 | 08/08/2023 | see plan | 288599 | 6234168 | 75.710 | Fill | Standard | 98.5 | 0.5 | ** | 2.06 |
| ** | MA-10900B | 282 | 08/08/2023 | see plan | 288592 | 6234179 | 76.050 | Fill | Standard | 100.0 | 0.0 | ** | 2.08 |
| ** | MA-10900C | 283 | 08/08/2023 | see plan | 288598 | 6234163 | 76.420 | Fill | Standard | 99.0 | 0.0 | ** | 2.04 |
| ** | MA-10900D | 284 | 08/08/2023 | see plan | 288614 | 6234145 | 76.855 | Fill | Standard | 99.5 | 0.0 | ** | 2.07 |
| ** | MA-10910A | 285 | 09/08/2023 | See plan | 288572 | 6234178 | 75.735 | Fill | Standard | 100.5 | 1.5 | ** | 2.10 |
| ** | MA-10910B | 286 | 09/08/2023 | See plan | 288571 | 6234177 | 76.050 | Fill | Standard | 101.0 | 0.5 | ** | 2.12 |
| ** | MA-10920A | 287 | 10/08/2023 | See plan | 288743 | 6234071 | 81.110 | Fill | Standard | 102.5 | 1.5 | ** | 2.17 |
| ** | MA-10920B | 288 | 10/08/2023 | See plan | 288674 | 6234113 | 81.530 | Fill | Standard | 101.5 | 1.5 | ** | 2.17 |
| ** | MA-10920C | 289 | 10/08/2023 | See plan | 288674 | 6234113 | 78.260 | Fill | Standard | 101.0 | 1.5 | ** | 2.14 |
| ** | MA-10920D | 290 | 10/08/2023 | See plan | 288741 | 6234068 | 79.129 | Fill | Standard | 100.5 | 1.5 | ** | 2.13 |
| ** | MA-10953A | 291 | 17/08/2023 | See map | 288743 | 6234074 | 81.630 | ** | Standard | 99.5 | 1.5 | ** | 2.11 |

**Moisture Variation Note:**

Positive values = test is dry of OMC

Negative values = test is wet of OMC




Douglas Partners
Geotechnics / Environment / Groundwater

| | | |
|---|---|---|
| CLIENT: Mirvac Homes NSW Pty Ltd | | |
| OFFICE: Macarthur | DRAWN BY: AS | |
| SCALE: As shown | DATE: 1.11.2023 | |

TITLE: Density Test Location Plan
Proposed Residential Subdivision
Tranche 3, 531 Cobbity Road, Cobbitty

MGA

| | |
|---|---|
| PROJ. #: | 220469.00 |
| DRAWING No: | 1 |
| REVISION: | 0 |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

| | |
|---|---|
| **Report Number:** | **92323.11-2** |
| **Issue Number:** | 1 |
| **Date Issued:** | 14/09/2023 |
| **Client:** | Mirvac Homes NSW Pty Ltd |
| | PO Box 787, Parramatta NSW 2124 |
| **Contact:** | Jackson Perks |
| **Project Number:** | 92323.11 |
| **Project Name:** | Proposed Residential Subdivision |
| **Project Location:** | 531 Cobbitty Road, Cobbitty NSW |
| **Work Request:** | 11087 |
| **Sample Number:** | MA-11087B |
| **Date Sampled:** | 21/08/2023 |
| **Dates Tested:** | 06/09/2023 - 13/09/2023 |
| **Sampling Method:** | Sampled by Engineering Department |
| | *The results apply to the sample as received* |
| **Preparation Method:** | AS 1289.1.1 - Sampling and preparation of soils |
| **Sample Location:** | **35 (0.5 - 0.6 m)** |
| **Material:** | FILL: Silty CLAY, brown |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **2** | | |
| Soil Description | As above | | |
| Nature of Water | Distilled water | | |
| Temperature of Water ($^{o}$C) | 25 | | |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Sample Number:** MA-11087C
**Date Sampled:** 21/08/2023
**Dates Tested:** 06/09/2023 - 13/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Preparation Method:** AS 1289.1.1 - Sampling and preparation of soils
**Sample Location:** **44 (0.5 - 0.68 m)**
**Material:** Silty CLAY, pale grey/ brown

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **2** | | |
| Soil Description | As above | | |
| Nature of Water | Distilled water | | |
| Temperature of Water ($^{o}$C) | 25 | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Dry Sieve | | |
| Liquid Limit (%) | 32 | | |
| Plastic Limit (%) | 19 | | |
| **Plasticity Index (%)** | **13** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **8.0** | | |
| Cracking Crumbling Curling | None | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 10.2 | | |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Sample Number:** MA-11087D
**Date Sampled:** 21/08/2023
**Dates Tested:** 06/09/2023 - 13/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Preparation Method:** AS 1289.1.1 - Sampling and preparation of soils
**Sample Location:** **55 (0.5 - 0.68 m)**
**Material:** Silty CLAY, brown

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **2** | | |
| Soil Description | As above | | |
| Nature of Water | Distilled water | | |
| Temperature of Water ($^{o}$C) | 25 | | |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Sample Number:** MA-11087E
**Date Sampled:** 21/08/2023
**Dates Tested:** 06/09/2023 - 13/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Preparation Method:** AS 1289.1.1 - Sampling and preparation of soils
**Sample Location:** **30 (0.5 - 0.7 m)**
**Material:** Silty CLAY, orange brown, brown, pale grey

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **2** | | |
| Soil Description | As above | | |
| Nature of Water | Distilled water | | |
| Temperature of Water ($^{o}$C) | 25 | | |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Sample Number:** MA-11087F
**Date Sampled:** 21/08/2023
**Dates Tested:** 06/09/2023 - 12/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Preparation Method:** AS 1289.1.1 - Sampling and preparation of soils
**Sample Location:** **23 (0.5 - 0.75 m)**
**Material:** Silty CLAY, orange brown

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **2** | | |
| Soil Description | As above | | |
| Nature of Water | Distilled water | | |
| Temperature of Water ($^{o}$C) | 25 | | |

# Material Test Report

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Dates Tested:** 06/09/2023 - 06/09/2023
**Location:** 531 Cobbitty Rd, Cobbitty

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

| Moisture Content AS 1289 2.1.1 | | | | | |
|---|---|---|---|---|---|
| Sample Number | Sample Location | Moisture Content (%) | Min | Max | Material |
| MA-11087C | 44 (0.5 - 0.68 m) | 10.2 % | ** | ** | Silty CLAY, pale grey/ brown |

# Material Test Report

**Report Number:** **92323.11-2**
**Issue Number:** 1
**Date Issued:** 14/09/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 11087
**Dates Tested:** 06/09/2023 - 06/09/2023
**Location:** 531 Cobbitty Rd, Cobbitty

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
Senior Technician
Laboratory Accreditation Number: 828

| Shrink Swell Index AS 1289 7.1.1 & 2.1.1 | | | | | |
|---|---|---|---|---|---|
| Sample Number | MA-11087A | MA-11087B | MA-11087D | MA-11087E | MA-11087F |
| Date Sampled | 21/08/2023 | 21/08/2023 | 21/08/2023 | 21/08/2023 | 21/08/2023 |
| Date Tested | 06/09/2023 | 06/09/2023 | 06/09/2023 | 06/09/2023 | 06/09/2023 |
| Material Source | ** | ** | ** | ** | ** |
| Sample Location | 16 (0.5 - 0.65 m) | 35 (0.5 - 0.6 m) | 55 (0.5 - 0.68 m) | 30 (0.5 - 0.7 m) | 23 (0.5 - 0.75 m) |
| Inert Material Estimate (%) | 0 | 11 | 0 | 0 | 29 |
| Pocket Penetrometer before (kPa) | 600 | 460 | 340 | 240 | 600 |
| Pocket Penetrometer after (kPa) | 360 | 260 | 220 | 120 | 540 |
| Shrinkage Moisture Content (%) | 15.4 | 11.8 | 17.2 | 21.3 | 14.2 |
| Shrinkage (%) | **2.0** | **0.7** | **7.7** | **6.0** | **1.1** |
| Swell Moisture Content Before (%) | 15.7 | 20.2 | 20.5 | 25.1 | 13.7 |
| Swell Moisture Content After (%) | 19.9 | 25.0 | 21.8 | 27.4 | 17.5 |
| Swell (%) | **3.9** | **2.7** | **1.1** | **1.9** | **3.1** |
| Shrink Swell Index Iss (%) | **2.2** | **1.1** | **4.6** | **3.9** | **1.5** |
| Visual Description | FILL: Silty CLAY, brown | FILL: Silty CLAY, brown | Silty CLAY, brown | Silty CLAY, orange brown, brown, pale grey | Silty CLAY, orange brown |
| Cracking | SC | MC | SC | SC | SC |
| Crumbling | No | No | No | No | No |
| Remarks | ** | ** | ** | ** | ** |

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
clean lab
Laboratory Accreditation Number: 828

| | |
|---|---|
| **Report Number:** | **92323.11-1** |
| **Issue Number:** | 1 |
| **Date Issued:** | 06/07/2023 |
| **Client:** | Mirvac Homes NSW Pty Ltd |
| | PO Box 787, Parramatta NSW 2124 |
| **Contact:** | Jackson Perks |
| **Project Number:** | 92323.11 |
| **Project Name:** | Proposed Residential Subdivision |
| **Project Location:** | 531 Cobbitty Road, Cobbitty NSW |
| **Work Request:** | 10629 |
| **Sample Number:** | MA-10629F |
| **Date Sampled:** | 14/06/2023 |
| **Dates Tested:** | 30/06/2023 - 06/07/2023 |
| **Sampling Method:** | Sampled by Engineering Department |
| | *The results apply to the sample as received* |
| **Preparation Method:** | AS 1289.1.1 - Sampling and preparation of soils |
| **Sample Location:** | **65 , Depth: 0.5 - 0.61 m** |
| **Material:** | Silty CLAY, orange brown mottled pale brown |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Dry Sieve | | |
| Liquid Limit (%) | 57 | | |
| Plastic Limit (%) | 16 | | |
| **Plasticity Index (%)** | **41** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **13.0** | | |
| Cracking Crumbling Curling | Curling | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 20.1 | | |

# Material Test Report

**Report Number:** **92323.11-1**
**Issue Number:** 1
**Date Issued:** 06/07/2023
**Client:** Mirvac Homes NSW Pty Ltd
PO Box 787, Parramatta NSW 2124
**Contact:** Jackson Perks
**Project Number:** 92323.11
**Project Name:** Proposed Residential Subdivision
**Project Location:** 531 Cobbitty Road, Cobbitty NSW
**Work Request:** 10629
**Dates Tested:** 30/06/2023 - 05/07/2023
**Location:** Cobbitty

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Macarthur Laboratory
18 Waler Crescent Smeaton Grange NSW 2567
Phone: (02) 4647 0075
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Nilusha Arachchi
clean lab
Laboratory Accreditation Number: 828

| Shrink Swell Index AS 1289 7.1.1 & 2.1.1 | | | | | |
|---|---|---|---|---|---|
| Sample Number | MA-10629A | MA-10629B | MA-10629C | MA-10629D | MA-10629E |
| Date Sampled | 14/06/2023 | 14/06/2023 | 14/06/2023 | 14/06/2023 | 14/06/2023 |
| Date Tested | 30/06/2023 | 30/06/2023 | 05/07/2023 | 30/06/2023 | 30/06/2023 |
| Material Source | ** | ** | ** | ** | ** |
| Sample Location | 6 (0.5 - 0.66 m) | 14 (0.5 - 0.68 m) | 47 (0.5 - 0.68 m) | 51 (0.5 - 0.64 m) | 62 (0.5 - 0.66 m) |
| Inert Material Estimate (%) | 1 | 3 | 3 | 28 | 1 |
| Pocket Penetrometer before (kPa) | 600 | 400 | 590 | 180 | 490 |
| Pocket Penetrometer after (kPa) | 220 | 170 | 300 | 110 | 240 |
| Shrinkage Moisture Content (%) | 14.5 | 15.9 | 15.7 | 20.2 | 20.2 |
| Shrinkage (%) | **1.2** | **1.9** | **1.3** | **3.7** | **5.1** |
| Swell Moisture Content Before (%) | 13.2 | 17.9 | 15.9 | 26.1 | 18.9 |
| Swell Moisture Content After (%) | 22.6 | 21.6 | 20.3 | 31.5 | 23.1 |
| Swell (%) | **2.9** | **0.0** | **3.0** | **1.2** | **2.2** |
| Shrink Swell Index Iss (%) | **1.5** | **1.1** | **1.6** | **2.4** | **3.4** |
| Visual Description | SHALE, with clay bands | FILL: Silty CLAY | Silty CLAY, orange brown and pale grey | Silty CLAY, orange brown mottled pale brown | FILL: Silty CLAY |
| Cracking | MC | SC | MC | HC | SC |
| Crumbling | No | No | No | No | No |
| Remarks | ** | ** | ** | ** | ** |

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

**Envirolab Services Pty Ltd**
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

# CERTIFICATE OF ANALYSIS 331548

## Client Details

| | |
|---|---|
| **Client** | Douglas Partners Pty Ltd Smeaton Grange |
| **Attention** | Eric Riggle |
| **Address** | 18 Waler Crescent, Smeaton Grange, NSW, 2567 |

## Sample Details

| | |
|---|---|
| **Your Reference** | **92323.11, Cobbitty, 531 Cobbitty Rd, Tr 3 Lot** |
| **Number of Samples** | 84 Soil, 1 Rock |
| **Date samples received** | 28/08/2023 |
| **Date completed instructions received** | 29/08/2023 |

## 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** | 05/09/2023 |
| **Date of Issue** | 04/09/2023 |

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

**Results Approved By**
Loren Bardwell, Development Chemist
Priya Samarawickrama, Senior Chemist

**Authorised By**
Nancy Zhang, Laboratory Manager

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-1 | 331548-2 | 331548-3 | 331548-4 | 331548-5 |
| Your Reference | UNITS | 1/0.5 | 2/0.5 | 3/0.5 | 4/0.5 | 5/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 5.4 | 5.3 | 6.4 | 5.7 | 5.7 |
| Chloride, Cl 1:5 soil:water | mg/kg | 250 | [NA] | [NA] | [NA] | 24 |
| Sulphate, SO4 1:5 soil:water | mg/kg | 160 | [NA] | [NA] | [NA] | 10 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-6 | 331548-7 | 331548-8 | 331548-9 | 331548-10 |
| Your Reference | UNITS | 6/0.5 | 7/0.5 | 8/0.5 | 9/0.5 | 10/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 4.8 | 5.0 | 5.3 | 5.1 | 5.5 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | [NA] | 280 | [NA] | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | [NA] | 140 | [NA] | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-11 | 331548-12 | 331548-13 | 331548-14 | 331548-15 |
| Your Reference | UNITS | 11/0.5 | 12/0.5 | 13/0.5 | 14/0.5 | 15/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 6.5 | 6.1 | 5.4 | 5.3 | 5.4 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | 600 | [NA] | [NA] | 550 |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | 310 | [NA] | [NA] | 110 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-16 | 331548-17 | 331548-18 | 331548-19 | 331548-20 |
| Your Reference | UNITS | 16/0.5 | 17/0.5 | 18/0.5 | 19/0.5 | 20/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 4.9 | 5.2 | 5.4 | 5.3 | 5.3 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | 350 | [NA] | 180 | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | 170 | [NA] | 51 | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-21 | 331548-22 | 331548-23 | 331548-24 | 331548-25 |
| Your Reference | UNITS | 21/0.5 | 22/0.5 | 23/0.5 | 24/0.5 | 25/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 5.4 | 5.3 | 5.6 | 5.5 | 5.4 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | [NA] | 84 | [NA] | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | [NA] | 46 | [NA] | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-26 | 331548-27 | 331548-28 | 331548-29 | 331548-30 |
| Your Reference | UNITS | 26/0.5 | 27/0.5 | 28/0.5 | 29/0.5 | 30/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 5.5 | 6.4 | 6.5 | 5.1 | 5.2 |
| Chloride, Cl 1:5 soil:water | mg/kg | 150 | [NA] | [NA] | [NA] | 110 |
| Sulphate, SO4 1:5 soil:water | mg/kg | 110 | [NA] | [NA] | [NA] | 96 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-31 | 331548-32 | 331548-33 | 331548-34 | 331548-35 |
| Your Reference | UNITS | 32/0.5 | 33/0.5 | 34/0.5 | 35/0.5 | 36/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 5.6 | 5.3 | 5.6 | 7.4 | 6.3 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | 150 | [NA] | [NA] | 140 |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | 99 | [NA] | [NA] | 73 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-36 | 331548-37 | 331548-38 | 331548-39 | 331548-40 |
| Your Reference | UNITS | 37/0.5 | 38/0.5 | 39/0.5 | 41/0.5 | 42/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 6.2 | 5.6 | 5.7 | 6.1 | 5.4 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | [NA] | [NA] | 130 | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | [NA] | [NA] | 10 | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-41 | 331548-42 | 331548-43 | 331548-44 | 331548-45 |
| Your Reference | UNITS | 43/0.5 | 44/0.5 | 45/0.5 | 46/0.5 | 47/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 6.1 | 9.0 | 9.5 | 9.9 | 6.2 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | 40 | [NA] | [NA] | 80 |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | 25 | [NA] | [NA] | 27 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-46 | 331548-47 | 331548-48 | 331548-49 | 331548-50 |
| Your Reference | UNITS | 48/0.5 | 49/0.5 | 50/0.5 | 51/0.5 | 52/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| pH 1:5 soil:water | pH Units | 5.4 | 7.9 | 5.0 | 5.0 | 4.8 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | [NA] | [NA] | 310 | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | [NA] | [NA] | 160 | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-51 | 331548-52 | 331548-53 | 331548-54 | 331548-55 |
| Your Reference | UNITS | 53/0.5 | 54/0.5 | 55/0.5 | 56/0.5 | 57/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 31/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 5.1 | 4.9 | 4.6 | 5.2 | 4.9 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | [NA] | 760 | [NA] | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | [NA] | 230 | [NA] | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-56 | 331548-57 | 331548-58 | 331548-59 | 331548-60 |
| Your Reference | UNITS | 58/0.5 | 59/0.5 | 60/0.5 | 61/0.5 | 62/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 4.6 | 5.4 | 5.1 | 4.8 | 5.0 |
| Chloride, Cl 1:5 soil:water | mg/kg | [NA] | 78 | [NA] | [NA] | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | [NA] | 20 | [NA] | [NA] | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-61 | 331548-62 | 331548-63 | 331548-64 | 331548-65 |
| Your Reference | UNITS | 63/0.5 | 64/0.5 | 65/0.5 | 6/1.5 | 6/2.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 5.2 | 5.2 | 4.8 | 4.8 | 5.0 |
| Chloride, Cl 1:5 soil:water | mg/kg | 110 | [NA] | 63 | [NA] | [NA] |
| Sulphate, SO4 1:5 soil:water | mg/kg | 35 | [NA] | 130 | [NA] | [NA] |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-66 | 331548-67 | 331548-68 | 331548-69 | 331548-70 |
| Your Reference | UNITS | 14/1.5 | 16/1.5 | 16/2.5 | 23/1.5 | 23/2.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 8.3 | 5.1 | 5.3 | 6.2 | 6.3 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-71 | 331548-72 | 331548-73 | 331548-74 | 331548-75 |
| Your Reference | UNITS | 30/1.5 | 30/2.5 | 35/1.5 | 35/2.5 | 44/1.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 4.4 | 4.6 | 5.3 | 5.1 | 9.0 |

| Misc Inorg - Soil | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-76 | 331548-77 | 331548-78 | 331548-79 | 331548-80 |
| Your Reference | UNITS | 47/1.5 | 51/2 | 55/1.5 | 55/2.5 | 62/1.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 5.3 | 4.8 | 4.7 | 4.8 | 5.2 |

| Misc Inorg - Soil | | | | | |
|---|---|---|---|---|---|
| Our Reference | | 331548-81 | 331548-82 | 331548-83 | 331548-85 |
| Your Reference | UNITS | 62/2.5 | 65/1.5 | 65/2.5 | 40/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date prepared | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| Date analysed | - | 31/08/2023 | 31/08/2023 | 31/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | 5.0 | 4.8 | 4.5 | 7.3 |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-1 | 331548-2 | 331548-3 | 331548-4 | 331548-5 |
| Your Reference | UNITS | 1/0.5 | 2/0.5 | 3/0.5 | 4/0.5 | 5/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 280 | 560 | 320 | 230 | 70 |
| Texture Value | - | 7.0 | 7.0 | 9.0 | 9.0 | 7.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | CLAY LOAM | CLAY LOAM | MEDIUM CLAY |
| ECe | dS/m | <2 | 3.9 | 2.9 | 2.0 | <2 |
| Class | - | NON SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-6 | 331548-7 | 331548-8 | 331548-9 | 331548-10 |
| Your Reference | UNITS | 6/0.5 | 7/0.5 | 8/0.5 | 9/0.5 | 10/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 630 | 310 | 330 | 490 | 120 |
| Texture Value | - | 7.0 | 8.0 | 8.0 | 7.0 | 7.0 |
| Texture | - | MEDIUM CLAY | LIGHT MEDIUM CLAY | LIGHT MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 4.4 | 2.5 | 2.6 | 3.4 | <2 |
| Class | - | MODERATELY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-11 | 331548-12 | 331548-13 | 331548-14 | 331548-15 |
| Your Reference | UNITS | 11/0.5 | 12/0.5 | 13/0.5 | 14/0.5 | 15/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 270 | 610 | 400 | 510 | 430 |
| Texture Value | - | 9.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | CLAY LOAM | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 2.4 | 4.2 | 2.8 | 3.6 | 3.0 |
| Class | - | SLIGHTLY SALINE | MODERATELY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-16 | 331548-17 | 331548-18 | 331548-19 | 331548-20 |
| Your Reference | UNITS | 16/0.5 | 17/0.5 | 18/0.5 | 19/0.5 | 20/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 720 | 380 | 170 | 200 | 460 |
| Texture Value | - | 9.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | CLAY LOAM | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 6.5 | 2.6 | <2 | <2 | 3.2 |
| Class | - | MODERATELY SALINE | SLIGHTLY SALINE | NON SALINE | NON SALINE | SLIGHTLY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-21 | 331548-22 | 331548-23 | 331548-24 | 331548-25 |
| Your Reference | UNITS | 21/0.5 | 22/0.5 | 23/0.5 | 24/0.5 | 25/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 93 | 120 | 120 | 190 | 200 |
| Texture Value | - | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | <2 | <2 | <2 | <2 | <2 |
| Class | - | NON SALINE | NON SALINE | NON SALINE | NON SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-26 | 331548-27 | 331548-28 | 331548-29 | 331548-30 |
| Your Reference | UNITS | 26/0.5 | 27/0.5 | 28/0.5 | 29/0.5 | 30/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 190 | 130 | 570 | 160 | 180 |
| Texture Value | - | 7.0 | 9.0 | 9.0 | 7.0 | 8.0 |
| Texture | - | MEDIUM CLAY | CLAY LOAM | CLAY LOAM | MEDIUM CLAY | LIGHT MEDIUM CLAY |
| ECe | dS/m | <2 | <2 | 5.1 | <2 | <2 |
| Class | - | NON SALINE | NON SALINE | MODERATELY SALINE | NON SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-31 | 331548-32 | 331548-33 | 331548-34 | 331548-35 |
| Your Reference | UNITS | 32/0.5 | 33/0.5 | 34/0.5 | 35/0.5 | 36/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 79 | 200 | 83 | 470 | 200 |
| Texture Value | - | 7.0 | 7.0 | 7.0 | 9.0 | 9.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | CLAY LOAM | CLAY LOAM |
| ECe | dS/m | <2 | <2 | <2 | 4.3 | <2 |
| Class | - | NON SALINE | NON SALINE | NON SALINE | MODERATELY SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-36 | 331548-37 | 331548-38 | 331548-39 | 331548-40 |
| Your Reference | UNITS | 37/0.5 | 38/0.5 | 39/0.5 | 41/0.5 | 42/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 280 | 130 | 94 | 120 | 57 |
| Texture Value | - | 9.0 | 7.0 | 7.0 | 9.0 | 7.0 |
| Texture | - | CLAY LOAM | MEDIUM CLAY | MEDIUM CLAY | CLAY LOAM | MEDIUM CLAY |
| ECe | dS/m | 2.5 | <2 | <2 | <2 | <2 |
| Class | - | SLIGHTLY SALINE | NON SALINE | NON SALINE | NON SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-41 | 331548-42 | 331548-43 | 331548-44 | 331548-45 |
| Your Reference | UNITS | 43/0.5 | 44/0.5 | 45/0.5 | 46/0.5 | 47/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 270 | 180 | 580 | 390 | 150 |
| Texture Value | - | 7.0 | 9.0 | 7.0 | 9.0 | 7.0 |
| Texture | - | MEDIUM CLAY | CLAY LOAM | MEDIUM CLAY | CLAY LOAM | MEDIUM CLAY |
| ECe | dS/m | <2 | <2 | 4.0 | 3.5 | <2 |
| Class | - | NON SALINE | NON SALINE | MODERATELY SALINE | SLIGHTLY SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-46 | 331548-47 | 331548-48 | 331548-49 | 331548-50 |
| Your Reference | UNITS | 48/0.5 | 49/0.5 | 50/0.5 | 51/0.5 | 52/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 190 | 320 | 320 | 310 | 710 |
| Texture Value | - | 6.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | HEAVY CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | <2 | 2.2 | 2.3 | 2.2 | 4.9 |
| Class | - | NON SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | MODERATELY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-51 | 331548-52 | 331548-53 | 331548-54 | 331548-55 |
| Your Reference | UNITS | 53/0.5 | 54/0.5 | 55/0.5 | 56/0.5 | 57/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 340 | 380 | 670 | 240 | 290 |
| Texture Value | - | 7.0 | 7.0 | 8.0 | 7.0 | 7.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | LIGHT MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 2.4 | 2.7 | 5.4 | <2 | 2.0 |
| Class | - | SLIGHTLY SALINE | SLIGHTLY SALINE | MODERATELY SALINE | NON SALINE | SLIGHTLY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-56 | 331548-57 | 331548-58 | 331548-59 | 331548-60 |
| Your Reference | UNITS | 58/0.5 | 59/0.5 | 60/0.5 | 61/0.5 | 62/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 770 | 96 | 140 | 420 | 310 |
| Texture Value | - | 8.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | LIGHT MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 6.2 | <2 | <2 | 3.0 | 2.2 |
| Class | - | MODERATELY SALINE | NON SALINE | NON SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-61 | 331548-62 | 331548-63 | 331548-64 | 331548-65 |
| Your Reference | UNITS | 63/0.5 | 64/0.5 | 65/0.5 | 6/1.5 | 6/2.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 130 | 120 | 140 | 410 | 570 |
| Texture Value | - | 7.0 | 7.0 | 7.0 | 7.0 | 9.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | CLAY LOAM |
| ECe | dS/m | <2 | <2 | <2 | 2.9 | 5.1 |
| Class | - | NON SALINE | NON SALINE | NON SALINE | SLIGHTLY SALINE | MODERATELY SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-66 | 331548-67 | 331548-68 | 331548-69 | 331548-70 |
| Your Reference | UNITS | 14/1.5 | 16/1.5 | 16/2.5 | 23/1.5 | 23/2.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1,000 | 270 | 140 | 240 | 170 |
| Texture Value | - | 9.0 | 7.0 | 7.0 | 6.0 | 6.0 |
| Texture | - | CLAY LOAM | MEDIUM CLAY | MEDIUM CLAY | HEAVY CLAY | HEAVY CLAY |
| ECe | dS/m | 9.1 | <2 | <2 | <2 | <2 |
| Class | - | VERY SALINE | NON SALINE | NON SALINE | NON SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-71 | 331548-72 | 331548-73 | 331548-74 | 331548-75 |
| Your Reference | UNITS | 30/1.5 | 30/2.5 | 35/1.5 | 35/2.5 | 44/1.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 770 | 460 | 300 | 480 | 190 |
| Texture Value | - | 7.0 | 7.0 | 7.0 | 7.0 | 9.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | CLAY LOAM |
| ECe | dS/m | 5.4 | 3.2 | 2.1 | 3.3 | <2 |
| Class | - | MODERATELY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | SLIGHTLY SALINE | NON SALINE |

| Texture and Salinity* | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-76 | 331548-77 | 331548-78 | 331548-79 | 331548-80 |
| Your Reference | UNITS | 47/1.5 | 51/2 | 55/1.5 | 55/2.5 | 62/1.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 330 | 610 | 850 | 510 | 78 |
| Texture Value | - | 6.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | HEAVY CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | <2 | 4.2 | 6.0 | 3.6 | <2 |
| Class | - | NON SALINE | MODERATELY SALINE | MODERATELY SALINE | SLIGHTLY SALINE | NON SALINE |

| Texture and Salinity* | | | | | |
|---|---|---|---|---|---|
| Our Reference | | 331548-81 | 331548-82 | 331548-83 | 331548-85 |
| Your Reference | UNITS | 62/2.5 | 65/1.5 | 65/2.5 | 40/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date prepared | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Date analysed | - | 30/08/2023 | 30/08/2023 | 30/08/2023 | 30/08/2023 |
| Electrical Conductivity 1:5 soil:water | µS/cm | 450 | 480 | 770 | 140 |
| Texture Value | - | 7.0 | 7.0 | 7.0 | 7.0 |
| Texture | - | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY | MEDIUM CLAY |
| ECe | dS/m | 3.2 | 3.4 | 5.4 | <2 |
| Class | - | SLIGHTLY SALINE | SLIGHTLY SALINE | MODERATELY SALINE | NON SALINE |

| ESP/CEC | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-2 | 331548-10 | 331548-22 | 331548-27 | 331548-31 |
| Your Reference | UNITS | 2/0.5 | 10/0.5 | 22/0.5 | 27/0.5 | 32/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 |
| Date analysed | - | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 |
| Exchangeable Ca | meq/100g | 1.3 | 1.4 | 5.4 | 6.1 | 4.1 |
| Exchangeable K | meq/100g | 0.2 | 0.2 | 0.2 | 0.2 | 0.7 |
| Exchangeable Mg | meq/100g | 9.4 | 12 | 9.9 | 6.8 | 11 |
| Exchangeable Na | meq/100g | 4.4 | 2.3 | 1.5 | 1.1 | 1.2 |
| Cation Exchange Capacity | meq/100g | 15 | 16 | 17 | 14 | 17 |
| ESP | % | 29 | 15 | 9 | 8 | 7 |

| ESP/CEC | | | | | | |
|---|---|---|---|---|---|---|
| Our Reference | | 331548-41 | 331548-43 | 331548-54 | 331548-59 | 331548-62 |
| Your Reference | UNITS | 43/0.5 | 45/0.5 | 56/0.5 | 61/0.5 | 64/0.5 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 |
| Date analysed | - | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 | 01/09/2023 |
| Exchangeable Ca | meq/100g | 2.6 | 21 | 2.4 | 0.6 | 2.7 |
| Exchangeable K | meq/100g | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 |
| Exchangeable Mg | meq/100g | 11 | 11 | 13 | 10 | 8.9 |
| Exchangeable Na | meq/100g | 3.1 | 7.5 | 3.5 | 4.7 | 1.9 |
| Cation Exchange Capacity | meq/100g | 17 | 40 | 19 | 16 | 14 |
| ESP | % | 18 | 19 | 18 | 30 | 14 |

| Method ID | Methodology Summary |
|---|---|
| **Inorg-001** | pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times. |
| **Inorg-002** | Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons. |
| **Inorg-081** | Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis.<br>Alternatively determined by colourimetry/turbidity using Discrete Analyser. |
| **INORG-123** | Determined using a "Texture by Feel" method. |
| **Metals-020** | Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish. |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-1 | 331548-5 |
| Date prepared | - | | | 30/08/2023 | 1 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| Date analysed | - | | | 30/08/2023 | 1 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 1 | 5.4 | 5.5 | 2 | 102 | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | <10 | 1 | 250 | 210 | 17 | 115 | 113 |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | <10 | 1 | 160 | 170 | 6 | 108 | 94 |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-2 | 331548-53 |
| Date prepared | - | | | [NT] | 12 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| Date analysed | - | | | [NT] | 12 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 12 | 6.1 | 6.1 | 0 | 101 | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 12 | 600 | [NT] | | 115 | # |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 12 | 310 | [NT] | | 108 | # |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-3 | 331548-61 |
| Date prepared | - | | | [NT] | 19 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| Date analysed | - | | | [NT] | 19 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | 31/08/2023 |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 19 | 5.3 | 5.3 | 0 | 100 | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 19 | 180 | [NT] | | [NT] | # |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 19 | 51 | [NT] | | [NT] | 113 |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-4 | [NT] |
| Date prepared | - | | | [NT] | 30 | 30/08/2023 | 30/08/2023 | | 31/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 30 | 30/08/2023 | 30/08/2023 | | 31/08/2023 | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 30 | 5.2 | 5.2 | 0 | 101 | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 30 | 110 | 110 | 0 | [NT] | [NT] |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 30 | 96 | 86 | 11 | [NT] | [NT] |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-5 | [NT] |
| Date prepared | - | | | [NT] | 39 | 30/08/2023 | 30/08/2023 | | 31/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 39 | 30/08/2023 | 30/08/2023 | | 31/08/2023 | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 39 | 6.1 | 6.1 | 0 | 99 | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 39 | 130 | [NT] | | [NT] | [NT] |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 39 | 10 | [NT] | | [NT] | [NT] |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 49 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 49 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 49 | 5.0 | 5.0 | 0 | [NT] | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 49 | 310 | [NT] | | [NT] | [NT] |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 49 | 160 | [NT] | | [NT] | [NT] |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 57 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 57 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 57 | 5.4 | 5.4 | 0 | [NT] | [NT] |
| Chloride, Cl 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 57 | 78 | 80 | 3 | [NT] | [NT] |
| Sulphate, SO4 1:5 soil:water | mg/kg | 10 | Inorg-081 | [NT] | 57 | 20 | 20 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 67 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 67 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 67 | 5.1 | 5.1 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Misc Inorg - Soil | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 77 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 77 | 31/08/2023 | 31/08/2023 | | [NT] | [NT] |
| pH 1:5 soil:water | pH Units | | Inorg-001 | [NT] | 77 | 4.8 | 4.8 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-1 | [NT] |
| Date prepared | - | | | 30/08/2023 | 1 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Date analysed | - | | | 30/08/2023 | 1 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | <1 | 1 | 280 | 250 | 11 | 103 | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 1 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-2 | [NT] |
| Date prepared | - | | | [NT] | 12 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 12 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 12 | 610 | 630 | 3 | 103 | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 12 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-3 | [NT] |
| Date prepared | - | | | [NT] | 19 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 19 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 19 | 200 | 240 | 18 | 102 | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 19 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-4 | [NT] |
| Date prepared | - | | | [NT] | 30 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 30 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 30 | 180 | 180 | 0 | 103 | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 30 | 8.0 | 8.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-5 | [NT] |
| Date prepared | - | | | [NT] | 39 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Date analysed | - | | | [NT] | 39 | 30/08/2023 | 30/08/2023 | | 30/08/2023 | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 39 | 120 | 110 | 9 | 102 | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 39 | 9.0 | 9.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 49 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 49 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 49 | 310 | 360 | 15 | [NT] | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 49 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | Duplicate | | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 57 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 57 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 57 | 96 | 98 | 2 | [NT] | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 57 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | Duplicate | | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 67 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 67 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 67 | 270 | 270 | 0 | [NT] | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 67 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: Texture and Salinity* | | | | | Duplicate | | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | [NT] | [NT] |
| Date prepared | - | | | [NT] | 77 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Date analysed | - | | | [NT] | 77 | 30/08/2023 | 30/08/2023 | | [NT] | [NT] |
| Electrical Conductivity 1:5 soil:water | µS/cm | 1 | Inorg-002 | [NT] | 77 | 610 | 600 | 2 | [NT] | [NT] |
| Texture Value | - | | INORG-123 | [NT] | 77 | 7.0 | 7.0 | 0 | [NT] | [NT] |

| QUALITY CONTROL: ESP/CEC | | | | | | Duplicate | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-1 | [NT] |
| Date prepared | - | | | 01/09/2023 | 59 | 01/09/2023 | 01/09/2023 | | 01/09/2023 | [NT] |
| Date analysed | - | | | 01/09/2023 | 59 | 01/09/2023 | 01/09/2023 | | 01/09/2023 | [NT] |
| Exchangeable Ca | meq/100g | 0.1 | Metals-020 | <0.1 | 59 | 0.6 | 0.6 | 0 | 104 | [NT] |
| Exchangeable K | meq/100g | 0.1 | Metals-020 | <0.1 | 59 | 0.2 | 0.2 | 0 | 108 | [NT] |
| Exchangeable Mg | meq/100g | 0.1 | Metals-020 | <0.1 | 59 | 10 | 12 | 18 | 103 | [NT] |
| Exchangeable Na | meq/100g | 0.1 | Metals-020 | <0.1 | 59 | 4.7 | 5.2 | 10 | 118 | [NT] |
| ESP | % | 1 | Metals-020 | [NT] | 59 | 30 | 29 | 3 | [NT] | [NT] |

## Result Definitions

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

## Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

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

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

## Report Comments

MISC_INORG_DRY: # Percent recovery is not applicable due to the high concentration of the analyte/s in the sample/s. However an acceptable recovery was obtained for the LCS.

**Table C1: Summary Table - Laboratory Tests and Assessments**

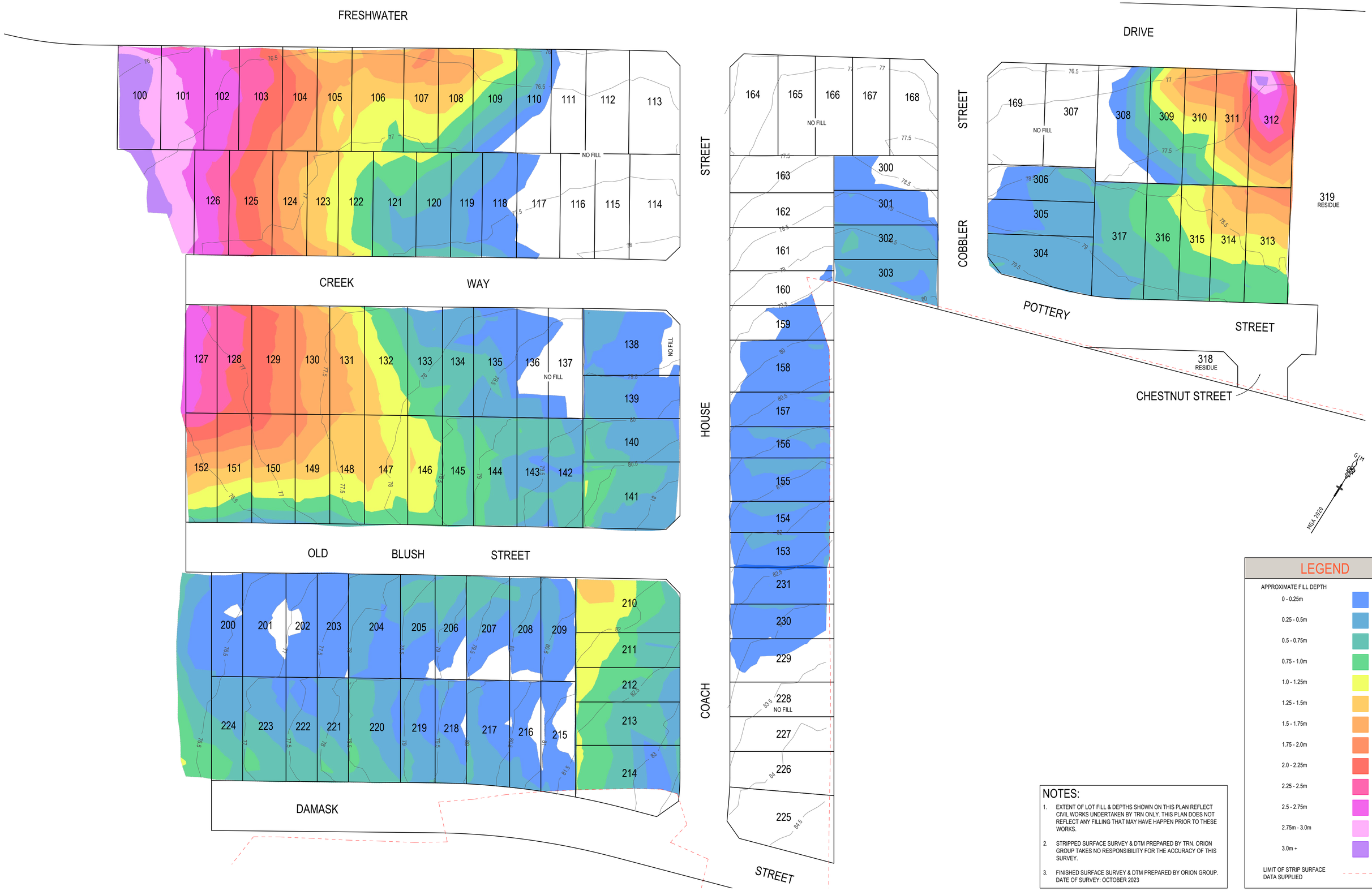
| Test | Sample Depth | pH | Chloride Concentration | Sulphate Concentration | Resistivity | Soil Condition | Sample Aggressivity Class | | | | | Exchangeable Sodium (Na) Concentration | Cation Exchange Capacity | Sodicity | Sodicity Class | Emerson Crumb Class Number | Dispersion? | Soil Texture Group | Textural Factor (M) | $EC_{1:5}$ | $EC_e$ | Sample Salinity Class |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | By inversion of EC1:5 | | Aggr. to Concrete - from sample pH | Aggr. to Concrete - from Sulphate conc. | Aggr. to Steel - from sample pH | Aggr. to Steel - from Chloride conc. | Aggr. to Steel - from sample Resistivity | | | [Na/CEC] | | | (from Emerson Class) | (for detailed soil logs see Report Appendix) | | [Lab.] | [M x $EC_{1:5}$] | (Based on sample ECe) |
| | (m bgl) | (pH units) | (mg/kg) | (mg/kg) | Ω.cm | [AS2159-2009] | [AS2159-2009] | | | | | (meq/100g) | (meq/100g) | (%) | [after DLWC] | | [AS1289.3.8.1] | [after DLWC] | [after DLWC] | (microS/cm) | (deciS/m) | [Richards 1954] |
| 1 | 0.5 | 5.4 | 250 | 160 | 3571 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 280 | 2.0 | Non-Saline |
| 2 | 0.5 | 5.3 | | | 1786 | B | Mild | | Non-Aggressive | | Mild | 4.4 | 15 | 29 | Highly Sodic | | | Medium clay | 7 | 560 | 3.9 | Slightly Saline |
| 3 | 0.5 | 6.4 | | | 3125 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 320 | 2.9 | Slightly Saline |
| 4 | 0.5 | 5.7 | | | 4348 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 230 | 2.1 | Slightly Saline |
| 5 | 0.5 | 5.7 | 24 | 10 | 14286 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 70 | 0.5 | Non-Saline |
| 6 | 0.5 | 4.8 | | | 1587 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 630 | 4.4 | Moderately Saline |
| 7 | 0.5 | 5 | | | 3226 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Light medium clay | 8 | 310 | 2.5 | Slightly Saline |
| 8 | 0.5 | 5.3 | 280 | 140 | 3030 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Light medium clay | 8 | 330 | 2.6 | Slightly Saline |
| 9 | 0.5 | 5.1 | | | 2041 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 490 | 3.4 | Slightly Saline |
| 10 | 0.5 | 5.5 | | | 8333 | B | Mild | | Non-Aggressive | | Non-Aggressive | 2.3 | 16 | 14 | Sodic | | | Medium clay | 7 | 120 | 0.8 | Non-Saline |
| 11 | 0.5 | 6.5 | | | 3704 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 270 | 2.4 | Slightly Saline |
| 12 | 0.5 | 6.1 | 600 | 310 | 1639 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Mild | | | | | | | Medium clay | 7 | 610 | 4.3 | Moderately Saline |
| 13 | 0.5 | 5.4 | | | 2500 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 400 | 2.8 | Slightly Saline |
| 14 | 0.5 | 5.3 | | | 1961 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 510 | 3.6 | Slightly Saline |
| 15 | 0.5 | 5.4 | 550 | 110 | 2326 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 430 | 3.0 | Slightly Saline |
| 16 | 0.5 | 4.9 | | | 1389 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Clay loam | 9 | 720 | 6.5 | Moderately Saline |
| 17 | 0.5 | 5.2 | 350 | 170 | 2632 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 380 | 2.7 | Slightly Saline |
| 18 | 0.5 | 5.4 | | | 5882 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 170 | 1.2 | Non-Saline |
| 19 | 0.5 | 5.3 | 180 | 51 | 5000 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 200 | 1.4 | Non-Saline |
| 20 | 0.5 | 5.3 | | | 2174 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 460 | 3.2 | Slightly Saline |
| 21 | 0.5 | 5.4 | | | 10753 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 93 | 0.7 | Non-Saline |
| 22 | 0.5 | 5.3 | | | 8333 | B | Mild | | Non-Aggressive | | Non-Aggressive | 1.5 | 17 | 9 | Sodic | | | Medium clay | 7 | 120 | 0.8 | Non-Saline |
| 23 | 0.5 | 5.6 | 84 | 46 | 8333 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | 2 | Some | Medium clay | 7 | 120 | 0.8 | Non-Saline |
| 24 | 0.5 | 5.5 | | | 5263 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 190 | 1.3 | Non-Saline |
| 25 | 0.5 | 5.4 | | | 5000 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 200 | 1.4 | Non-Saline |
| 26 | 0.5 | 5.5 | 150 | 110 | 5263 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 190 | 1.3 | Non-Saline |
| 27 | 0.5 | 6.4 | | | 7692 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | 1.1 | 14 | 8 | Sodic | | | Clay loam | 9 | 130 | 1.2 | Non-Saline |
| 28 | 0.5 | 6.5 | | | 1754 | B | Non-Aggressive | | Non-Aggressive | | Mild | | | | | | | Clay loam | 9 | 570 | 5.1 | Moderately Saline |
| 29 | 0.5 | 5.1 | | | 6250 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 160 | 1.1 | Non-Saline |
| 30 | 0.5 | 5.2 | 110 | 96 | 5556 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | 2 | Some | Light medium clay | 8 | 180 | 1.4 | Non-Saline |
| 32 | 0.5 | 5.6 | | | 12658 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | 1.2 | 17 | 7 | Sodic | | | Medium clay | 7 | 79 | 0.6 | Non-Saline |
| 33 | 0.5 | 5.3 | 150 | 99 | 5000 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 200 | 1.4 | Non-Saline |
| 34 | 0.5 | 5.6 | | | 12048 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 83 | 0.6 | Non-Saline |
| 35 | 0.5 | 7.4 | | | 2128 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | 2 | Some | Clay loam | 9 | 470 | 4.2 | Moderately Saline |
| 36 | 0.5 | 6.3 | 140 | 73 | 5000 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Clay loam | 9 | 200 | 1.8 | Non-Saline |
| 37 | 0.5 | 6.2 | | | 3571 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 280 | 2.5 | Slightly Saline |
| 38 | 0.5 | 5.6 | | | 7692 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 130 | 0.9 | Non-Saline |
| 39 | 0.5 | 5.7 | | | 10638 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 94 | 0.7 | Non-Saline |
| 41 | 0.5 | 6.1 | 130 | 10 | 8333 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Clay loam | 9 | 120 | 1.1 | Non-Saline |
| 42 | 0.5 | 5.4 | | | 17544 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 57 | 0.4 | Non-Saline |
| 43 | 0.5 | 6.1 | | | 3704 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | 3.1 | 17 | 18 | Highly Sodic | | | Medium clay | 7 | 270 | 1.9 | Non-Saline |
| 44 | 0.5 | 9 | 40 | 25 | 5556 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | 2 | Some | Clay loam | 9 | 180 | 1.6 | Non-Saline |
| 45 | 0.5 | 9.5 | | | 1724 | B | Non-Aggressive | | Non-Aggressive | | Mild | 7.5 | 40 | 19 | Highly Sodic | | | Medium clay | 7 | 580 | 4.1 | Moderately Saline |
| 46 | 0.5 | 9.9 | | | 2564 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 390 | 3.5 | Slightly Saline |
| 47 | 0.5 | 6.2 | 80 | 27 | 6667 | B | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 150 | 1.1 | Non-Saline |
| 48 | 0.5 | 5.4 | | | 5263 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Heavy clay | 6 | 190 | 1.1 | Non-Saline |
| 49 | 0.5 | 7.9 | | | 3125 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 320 | 2.2 | Slightly Saline |
| 50 | 0.5 | 5 | | | 3125 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 320 | 2.2 | Slightly Saline |
| 51 | 0.5 | 5 | 310 | 160 | 3226 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 310 | 2.2 | Slightly Saline |
| 52 | 0.5 | 4.8 | | | 1408 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 710 | 5.0 | Moderately Saline |
| 53 | 0.5 | 5.1 | | | 2941 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 340 | 2.4 | Slightly Saline |
| 54 | 0.5 | 4.9 | | | 2632 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 380 | 2.7 | Slightly Saline |

**Table C1: Summary Table - Laboratory Tests and Assessments**

| Test | Sample Depth | pH | Chloride Concentration | Sulphate Concentration | Resistivity | Soil Condition | Sample Aggressivity Class | | | | | Exchangeable Sodium (Na) Concentration | Cation Exchange Capacity | Sodicity | Sodicity Class | Emerson Crumb Class Number | Dispersion? | Soil Texture Group | Textural Factor (M) | $EC_{1:5}$ | $EC_e$ | Sample Salinity Class |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | By inversion of EC1:5 | | Aggr. to Concrete - from sample pH | Aggr. to Concrete - from Sulphate conc. | Aggr. to Steel - from sample pH | Aggr. to Steel - from Chloride conc. | Aggr. to Steel - from sample Resistivity | | | [Na/CEC] | | | (from Emerson Class) | (for detailed soil logs see Report Appendix) | | [Lab.] | [M x $EC_{1:5}$] | (Based on sample ECe) |
| | (m bgl) | (pH units) | (mg/kg) | (mg/kg) | Ω.cm | [AS2159-2009] | [AS2159-2009] | | | | | (meq/100g) | (meq/100g) | (%) | [after DLWC] | | [AS1289.3.8.1] | [after DLWC] | [after DLWC] | (microS/cm) | (deciS/m) | [Richards 1954] |
| 55 | 0.5 | 4.6 | 760 | 230 | 1493 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Mild | | | | | 2 | Some | Light medium clay | 8 | 670 | 5.4 | Moderately Saline |
| 56 | 0.5 | 5.2 | | | 4167 | B | Mild | | Non-Aggressive | | Non-Aggressive | 3.5 | 19 | 18 | Highly Sodic | | | Medium clay | 7 | 240 | 1.7 | Non-Saline |
| 57 | 0.5 | 4.9 | | | 3448 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 290 | 2.0 | Slightly Saline |
| 58 | 0.5 | 4.6 | | | 1299 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Light medium clay | 8 | 770 | 6.2 | Moderately Saline |
| 59 | 0.5 | 5.4 | 78 | 20 | 10417 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 96 | 0.7 | Non-Saline |
| 60 | 0.5 | 5.1 | | | 7143 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 140 | 1.0 | Non-Saline |
| 61 | 0.5 | 4.8 | | | 2381 | B | Mild | | Non-Aggressive | | Non-Aggressive | 4.7 | 16 | 29 | Highly Sodic | | | Medium clay | 7 | 420 | 2.9 | Slightly Saline |
| 62 | 0.5 | 5 | | | 3226 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 310 | 2.2 | Slightly Saline |
| 63 | 0.5 | 5.2 | 110 | 35 | 7692 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 130 | 0.9 | Non-Saline |
| 64 | 0.5 | 5.2 | | | 8333 | B | Mild | | Non-Aggressive | | Non-Aggressive | 1.9 | 14 | 14 | Sodic | | | Medium clay | 7 | 120 | 0.8 | Non-Saline |
| 65 | 0.5 | 4.8 | 63 | 130 | 7143 | B | Mild | Non-Aggressive | Non-Aggressive | Non-Aggressive | Non-Aggressive | | | | | | | Medium clay | 7 | 140 | 1.0 | Non-Saline |
| 6 | 1.5 | 4.8 | | | 2439 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 410 | 2.9 | Slightly Saline |
| 6 | 2.5 | 5 | | | 1754 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Clay loam | 9 | 570 | 5.1 | Moderately Saline |
| 14 | 1.5 | 8.3 | | | 1000 | B | Non-Aggressive | | Non-Aggressive | | Mild | | | | | | | Clay loam | 9 | 1000 | 9.0 | Very Saline |
| 16 | 1.5 | 5.1 | | | 3704 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 270 | 1.9 | Non-Saline |
| 16 | 2.5 | 5.3 | | | 7143 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 140 | 1.0 | Non-Saline |
| 23 | 1.5 | 6.2 | | | 4167 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Heavy clay | 6 | 240 | 1.4 | Non-Saline |
| 23 | 2.5 | 6.3 | | | 5882 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Heavy clay | 6 | 170 | 1.0 | Non-Saline |
| 30 | 1.5 | 4.4 | | | 1299 | B | Moderate | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 770 | 5.4 | Moderately Saline |
| 30 | 2.5 | 4.6 | | | 2174 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 460 | 3.2 | Slightly Saline |
| 35 | 1.5 | 5.3 | | | 3333 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 300 | 2.1 | Slightly Saline |
| 35 | 2.5 | 5.1 | | | 2083 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 480 | 3.4 | Slightly Saline |
| 44 | 1.5 | 9 | | | 5263 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Clay loam | 9 | 190 | 1.7 | Non-Saline |
| 47 | 1.5 | 5.3 | | | 3030 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Heavy clay | 6 | 330 | 2.0 | Non-Saline |
| 51 | 2 | 4.8 | | | 1639 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 610 | 4.3 | Moderately Saline |
| 55 | 1.5 | 4.7 | | | 1176 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 850 | 6.0 | Moderately Saline |
| 55 | 2.5 | 4.8 | | | 1961 | B | Mild | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 510 | 3.6 | Slightly Saline |
| 62 | 1.5 | 5.2 | | | 12821 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 78 | 0.5 | Non-Saline |
| 62 | 2.5 | 5 | | | 2222 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 450 | 3.2 | Slightly Saline |
| 65 | 1.5 | 4.8 | | | 2083 | B | Mild | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 480 | 3.4 | Slightly Saline |
| 65 | 2.5 | 4.5 | | | 1299 | B | Moderate | | Non-Aggressive | | Mild | | | | | | | Medium clay | 7 | 770 | 5.4 | Moderately Saline |
| 47 | 1.7 | | | | | B | | | | | | | | | | | | | | | | |
| 40 | 0.5 | 7.3 | | | 7143 | B | Non-Aggressive | | Non-Aggressive | | Non-Aggressive | | | | | | | Medium clay | 7 | 140 | 1.0 | Non-Saline |

# Appendix D

Work-As-Executed Fill Plan (Prepared by Orion Consulting)




## LEGEND

APPROXIMATE FILL DEPTH

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 0.75m
- 0.75 - 1.0m
- 1.0 - 1.25m
- 1.25 - 1.5m
- 1.5 - 1.75m
- 1.75 - 2.0m
- 2.0 - 2.25m
- 2.25 - 2.5m
- 2.5 - 2.75m
- 2.75m - 3.0m
- 3.0m +

LIMIT OF STRIP SURFACE DATA SUPPLIED

## NOTES:

1. EXTENT OF LOT FILL & DEPTHS SHOWN ON THIS PLAN REFLECT CIVIL WORKS UNDERTAKEN BY TRN ONLY. THIS PLAN DOES NOT REFLECT ANY FILLING THAT MAY HAVE HAPPEN PRIOR TO THESE WORKS.
2. STRIPPED SURFACE SURVEY & DTM PREPARED BY TRN. ORION GROUP TAKES NO RESPONSIBILITY FOR THE ACCURACY OF THIS SURVEY.
3. FINISHED SURFACE SURVEY & DTM PREPARED BY ORION GROUP. DATE OF SURVEY: OCTOBER 2023

| Rev | Drawn | Check | Appd. | Date | Revision Description |
|---|---|---|---|---|---|
| 02 | AM | AM | AM | 30/10/2023 | CONTOURS ADDED |
| 01 | AM | AM | AM | 30/10/2023 | STAGE 2 & 3 ADDED |
| 00 | NAI | AM | AM | 27/10/2023 | INITIAL ISSUE |



Scale: 0 5 10 15 20 25 30 35 40 45 50
SCALE 1:500 (A1) SCALE 1:1000 (A3)

| | | | |
|---|---|---|---|
| Surveyor | NAI & JH | Date of Survey | OCTOBER 2023 |
| Height Datum | AHD | Horizontal Datum | MGA2020 |
| Origin | SSM18303 RL75.154 (SCIMS - 06/06/22) | Origin | SSM18303 - SSM23117 349°34'35" (SCIMS - 06/06/22) |

For: mirvac

By: ORION
ABN:25 604 069 981 PO Box:7936, BAULKHAM HILLS NSW 2153 T:(02) 8660 0035 E: info@theoriongroup.au

Project: COBBITY BY MIRVAC

Title: LOT FILL PLAN
TRANCHE 3 DA01
STAGE 1, 2 & 3

| Project No. | Drawing No. | Sheet | Revision |
|---|---|---|---|
| KF113748 | SV-20-001 | 01 of 01 | 02 |

# Appendix E

CSIRO Publication

# Foundation Maintenance and Footing Performance:
## A Homeowner's Guide

CSIRO

**BTF 18 replaces Information Sheet 10/91**

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

### Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870, the Residential Slab and Footing Code.

### Causes of Movement

**Settlement due to construction**
There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

**Erosion**
All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

**Saturation**
This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume – particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

**Seasonal swelling and shrinkage of soil**
All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

**Shear failure**
This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.
- In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

**GENERAL DEFINITIONS OF SITE CLASSES**

| Class | Foundation |
|---|---|
| A | Most sand and rock sites with little or no ground movement from moisture changes |
| S | Slightly reactive clay sites with only slight ground movement from moisture changes |
| M | Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes |
| H | Highly reactive clay sites, which can experience high ground movement from moisture changes |
| E | Extremely reactive sites, which can experience extreme ground movement from moisture changes |
| A to P | Filled sites |
| P | Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise |

**Tree root growth**
**Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:**

- **Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.**
- **Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.**

## Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

## Effects of Uneven Soil Movement on Structures

**Erosion and saturation**
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

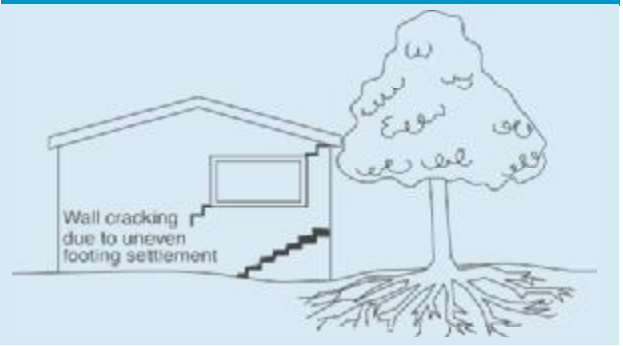
Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

**Seasonal swelling/shrinkage in clay**
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

**Trees can cause shrinkage and damage**




As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

**Movement caused by tree roots**
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

**Complications caused by the structure itself**
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

**Effects on full masonry structures**
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

**Effects on framed structures**
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation cause a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

**Effects on brick veneer structures**
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

## Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem.
Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

## Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870.

AS 2870 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

## Prevention/Cure

**Plumbing**
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

**Ground drainage**
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

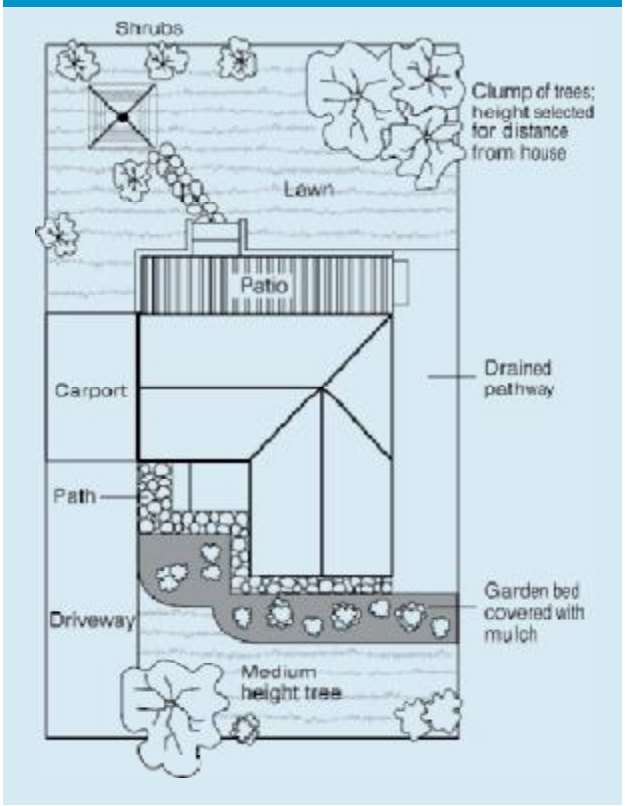
**Protection of the building perimeter**
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving

**CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS**

| Description of typical damage and required repair | Approximate crack width limit (see Note 3) | Damage category |
|---|---|---|
| Hairline cracks | <0.1 mm | 0 |
| Fine cracks which do not need repair | <1 mm | 1 |
| Cracks noticeable but easily filled. Doors and windows stick slightly | <5 mm | 2 |
| Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired | 5–15 mm (or a number of cracks 3 mm or more in one group) | 3 |
| Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted | 15–25 mm but also depend on number of cracks | 4 |

Gardens for a reactive site




should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

### Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

***Warning:*** Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

### The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

### Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

### Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

### Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

## Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

**This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.**



*Distributed by*

**CSIRO** PUBLISHING PO Box 1139, Collingwood 3066, Australia

Freecall 1800 645 051 Tel (03) 9662 7666 Fax (03) 9662 7555 www.publish.csiro.au

Email: publishing.sales@csiro.au