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Proposed Subdivision  
Brush Creek Estate -  
Precinct 2, Stage 6B  
Site Classification

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Watalong Way,  
Edgeworth

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NEW18P-0170C-AD  
1 September 2022

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**Qualitest**

LABORATORY (NSW) PTY LTD

1 September 2022

McCloy Edgeworth Pty Ltd  
Suite 2, Ground Floor, 317 Hunter Street  
NEWCASTLE NSW 2300

**Attention: Mr Bryson Cox**

Dear Sir

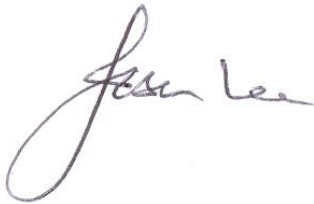
**RE: PROPOSED SUBDIVISION - BRUSH CREEK ESTATE – PRECINCT 2, STAGE 6B  
WATALONG WAY, EDGEWORTH  
SITE CLASSIFICATION TO AS2870-2011 (LOTS 617 TO 626)**

Please find enclosed our Geotechnical Assessment report for Lots 617 to 626 within Precinct 2, Stage 6B of the Brush Creek Estate, located off Watalong Way, Edgeworth.

The report includes recommendations on site classification in accordance with AS2870-2011, 'Residential Slabs and Footings' following the completion of site regrading earthworks.

If you have any questions regarding this report, please do not hesitate to contact Ben Bunting, Shannon Kelly or the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd



Jason Lee  
Principal Geotechnical Engineer

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## 1.0 Introduction

Qualtest Laboratory NSW Pty Ltd (Qualtest) is pleased to present this geotechnical report on behalf of McCloy Edgeworth Pty Ltd (McCloy), for Precinct 2, Stage 6B, of the Brush Creek Estate, located off Watalong Way, Edgeworth.

Based on the brief and drawings provided by the client, Stage 6B is understood to include ten residential allotments (Lots 617 to 626), as shown on the attached Figure AD1.

The scope of work for the geotechnical investigation included providing site classification with respect to reactive soils, in accordance with the requirements of AS2870-2011 '*Residential Slabs and Footings*', following completion of site regrade works.

This report presents the results of the field work investigations and laboratory testing, and provides recommendations for the scope outlined above.

## 2.0 Desktop Study

The scope of work has included a review of the following reports completed by Qualtest:

- Site Classification, 'Proposed Subdivision, Brush Creek Estate – Precinct 2, Stage 6A, Transfield Avenue, Edgeworth, (Report Reference: NEW18P-0170C-AB.Rev1, dated 10 March 2021);
- Level 1 Site Regrade Assessment Report, 'Proposed Subdivision of Brush Creek Estate – Stage 6A, Edgeworth, (Report Reference: NEW20P-0093A-AA, dated 4 December 2020);
- Geotechnical Assessment, 'Proposed Subdivision, Brush Creek Estate – Precinct 2, Transfield Avenue, Edgeworth, (Report Reference: NEW18P-0170A-AA.Rev1, dated 4 March 2020); and,
- Geotechnical Investigation, 'Proposed Edgeworth Gravity Sewer Main' – Patterson Street to Minmi Road, Edgeworth, (Report Reference: NEW18P-0076-AB, dated 19 June 2018).

This report includes a summary of selected results from the previous reports. Reference should be made to the reports outlined above for further details of site description, subsurface conditions, field work conducted, engineering logs of test pits / boreholes, laboratory testing results, site supervision and density testing carried out.

## 3.0 Field Work

Field work investigations was carried out on 12 August 2022 and comprised of:

- DBYD search, review of plans, and visual check of proposed test locations for the presence of underground services;
- Site walkover to make observations of surface features at the property and in the immediate surrounding area;
- Drilling of eleven (11 no.) boreholes (BH617B to BH625B, BH626B-A and BH626B-B) using a 2.7 tonne excavator equipped with a 300mm diameter auger attachment. Boreholes were terminated at depths of between 0.20m and 2.50m;
- Undisturbed samples (U50 tubes) were taken for subsequent laboratory testing; and,
- Boreholes were backfilled with the excavation spoil and compacted using the excavator auger and tracks.

Investigations were carried out by an experienced Geotechnical Engineer from Qualtest who located the boreholes, carried out the sampling and testing, produced field logs of the boreholes, and made observations of the site surface conditions.

Engineering logs of the boreholes are presented in Appendix A. Approximate borehole locations are shown on the attached Figure AD1. Boreholes were located in the field by handheld GPS and relative to existing site features including topographic features, lot boundaries, existing developments and trees.

## 4.0 Site Description

### 4.1 Site Regrade Works

Site re-grading for Stage 6A & 6B bulk earthworks was conducted between 8 October 2020 and 4 November 2020. Re-grading works consisted of the removal of unsuitable materials, blending of Colluvium materials with site won Residual and stockpiled materials, along with cutting and filling activities to bring proposed residential lots within Stage 6A & 6B to design finish levels.

Re-grade works performed during the Stage 6B bulk earthworks included filling within all or portions of Lot 623 (previously listed as Lot 617) and Lot 626. Regrade works within these lots consisted predominantly of the placement of fill to raise site levels for future home sites, current and future site service infrastructure, and proposed retaining wall structures.

Refer to attached Figure AD1 for the approximate extent of lot filling works for this stage of the development.

Prior to filling, re-grade areas were stripped of all topsoil and unsuitable material to expose the suitable natural foundation profile. Re-grade works then consisted of filling with approved site fill to design finish levels.

Filling was performed using site stockpiled material won from excavations cut and blended from around the site. The fill material could generally be described as mixtures of Residual (CI-CH) Gravelly Sandy CLAY and Extremely Weathered (EW) Siltstone / Sandstone, medium to high plasticity, brown / yellow / orange in colour, with fine to coarse grained sand and gravel, which was blended with a pale to dark brown Silty SAND (Colluvium).

The depth of fill placed ranged in the order of 0.1m to about 2.4m, with the following approximate maximum depths within each lot area outlined below:

- Lot 623 (previously lot 617) – 0.3m; and,
- Lot 626 – 2.4m.

The fill was compacted in maximum lifts of 0.3m thickness. Any unsuitable or deleterious material within the fill was removed by hand or mechanical means prior to final compaction of the material.

As the geotechnical testing authority engaged for the project, Qualtest state that the re-grading works performed within Stage 6B (as shown on attached Figure AD1), was carried out to Level 1 criteria as defined in Clause 8.2 – Section 8, of AS3798-2007, “*Guidelines on Earthworks for Commercial and Residential Developments*”.

The recommendations of this report are based on the understanding that any existing lot re-grade works are limited to the controlled earthworks supervised by Qualtest, and placement of low reactivity topsoil material such that total depth of topsoil and uncontrolled fill does not exceed 0.4m. Qualtest should be informed without delay if additional earthworks are known to have been carried out.

At the time of the field investigations on 12 August 2022, several small fill stockpiles were present on a number of lots, including Lots 620, 621, 623 and 625. It is understood and assumed that the fill stockpiles will be removed prior to development on the lots.

## 4.2 Surface Conditions

The site comprises Precinct 2, Stage 6B of the proposed residential subdivision known as Brush Creek Estate, located off Watalong Way, Edgeworth, as shown on Figure AD1 attached.

The site is bounded to the south by Stage 6A, to the north and east by an electrical easement and bushland, and by Keylkeyl Close to the west preceding dense bushland. Photographs of the site taken on the day of the site investigations are shown below.



**Photograph 1:** From near north-western corner of Lot 617, facing southeast.



**Photograph 2:** From near north-western corner of Lot 617, facing south.



**Photograph 3:** From near shared boundary of Lots 620 and 621, facing west.



**Photograph 4:** From near shared boundary of Lots 620 and 621, facing east.



**Photograph 5:** From eastern boundary of Lot 623, facing west.



**Photograph 6:** From eastern boundary of Lot 624, facing west.



**Photograph 7:** From north-eastern corner of Lot 625, facing west.



**Photograph 8:** From north-eastern corner of Lot 625, facing east. Lot 626 in background.

### 4.3 Subsurface Conditions

Reference to the 1:100,000 Newcastle Coalfield Regional Geology Series Sheet 9231 indicates the site to be underlain by the Adamstown Subgroup of the Newcastle Coal Measures, which are characterised by Conglomerate, Sandstone, Siltstone, Coal and Tuff rock types.

Table 1 presents a summary of the typical soil and rock types encountered at borehole locations during the field investigation, divided into representative geotechnical units.

Table 2 contains a summary of the distribution of the geotechnical units at the test locations.

**TABLE 1 – SUMMARY OF GEOTECHNICAL UNITS AND SOIL / ROCK TYPES**

Unit	Soil Type	Description
1A	FILL – MULCH AND TOPSOIL	Mixtures of Tree Mulch and Unit 1B: FILL-TOPSOIL materials, majority comprising of mulch.
1B	FILL – TOPSOIL	Sandy CLAY – generally low plasticity, dark brown, fine to coarse grained sand, trace fine to medium grained angular gravel, with some sticks.
1C	FILL – CONTROLLED	Gravelly Sandy CLAY – medium plasticity, pale grey and pale orange-brown to pale brown / brown, fine to coarse grained sand, fine to coarse grained (mostly fine to medium grained) rounded to sub-angular gravel.  Sandy CLAY – low to medium plasticity, grey to dark grey, fine to coarse grained sand.
2	SLOPEWASH / COLLUVIUM	Not encountered within the current investigation.
3	ALLUVIUM	Not encountered within the current investigation.
4	RESIDUAL SOIL	Sandy CLAY, Gravelly Sandy CLAY – medium to high plasticity, pale orange-brown and grey, fine to coarse grained sand, fine to medium grained sub-rounded to angular gravel.  Clayey Sandy GRAVEL – fine to medium grained, rounded to sub-rounded, pale grey-brown with some pale brown, fine to coarse grained sand, fines of medium plasticity.
5	EXTREMELY WEATHERED (XW) ROCK with soil properties	Pebbly Sandstone, Sandstone; breaks down into Clayey SAND – fine to coarse grained, pale orange-brown to pale brown with some pale grey to white, fines of low plasticity.  Sandstone; breaks down into Sandy CLAY – low to medium plasticity, pale orange-brown, fine to coarse grained sand.
6	HIGHLY WEATHERED (HW) ROCK	Pebbly SANDSTONE, CONGLOMERATE – fine to coarse grained sand matrix, fine to medium grained rounded to sub-angular clasts, pale brown to pale orange-brown, trace pale grey to white, estimated low to medium strength.

**TABLE 2 – SUMMARY OF GEOTECHNICAL UNITS ENCOUNTERED AT TEST LOCATIONS**

Location	Unit 1A	Unit 1B	Unit 1C	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
	Fill: Mulch and Topsoil	Fill: Topsoil	Fill: - Controlled	Slopewash / Colluvium	Alluvium	Residual Soil	XW Rock	HW Rock
Depth (m)								
Current Investigation (August 2022)								
BH617B	-	0.00 - 0.40	-	-	-	0.40 - 0.65	0.65 - 0.80	0.80 - 1.60*
BH618B	-	0.00 - 0.35	-	-	-	0.35 - 0.80	0.80 - 1.10	1.10 - 1.20*
BH619B	-	0.00 - 0.30	-	-	-	0.30 - 0.80	0.80 - 1.00	1.00 - 1.10*
BH620B	-	0.00 - 0.30	-	-	-	0.30 - 0.45	-	0.45 - 0.60*
BH621B	-	0.00 - 0.10	-	-	-	-	-	0.10 - 0.50*
BH622B	-	0.00 - 0.15	-	-	-	-	-	0.15 - 0.30*
BH623B	0.00 - 0.10	-	-	-	-	-	-	0.10 - 0.20*
BH624B	0.00 - 0.20	-	-	-	-	-	0.20 - 0.40	0.40 - 0.50*
BH625B	0.00 - 0.15	-	-	-	-	0.15 - 0.30	-	0.30 - 0.40*
BH626B-A	0.00 - 0.20	-	-	-	-	-	-	0.20 - 0.30*
BH626B-B	0.00 - 0.20	-	0.20 - 2.50	-	-	-	-	-
Previous Investigation (Ref: NEW18P-0170C-AB.Rev1, 10 March 2021)								
BH610	0.00 - 0.02	0.02 - 0.15	-	-	-	0.15 - 0.45	-	0.45 - 0.46*
BH611	0.00 - 0.10	0.10 - 0.30	-	-	-	0.30 - 0.55	-	0.55 - 0.56*
BH614	0.00 - 0.05	0.05 - 0.25	-	-	-	0.25 - 0.50	-	0.50 - 0.51*
BH615	0.00 - 0.05	0.05 - 0.25	-	-	-	0.25 - 0.55	-	0.55 - 0.56*



Location	Unit 1A Fill: Mulch and Topsoil	Unit 1B Fill: Topsoil	Unit 1C Fill: - Controlled	Unit 2 Slopewash / Colluvium	Unit 3 Alluvium	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW Rock
	Depth (m)							
BH616	-	0.00 - 0.20	-	-	-	0.20 - 0.55	-	0.55 - 0.56*
BH619	0.00 - 0.05	0.05 - 0.24	-	-	-	0.24 - 0.55	-	0.55 - 0.56*
BH622	-	0.00 - 0.20	-	-	-	0.20 - 0.50	-	0.50 - 0.60*
BH625	-	0.00 - 0.20	0.20 - 1.80	1.80 - 2.50	-	2.50 - 2.60	-	-
<b>Previous Investigation (Ref: NEW18P-0170AA-AA.Rev1, 4 March 2020) – Prior to site regrade works</b>								
TPP25	-	0.00 - 0.20	-	0.20 - 0.40	-	0.40 - 0.65	-	0.65 - 1.00#
TPP27	-	0.00 - 0.30	-	-	-	0.30 - 0.60	-	0.60 - 0.85#
TPP28	-	0.00 - 0.20	-	0.20 - 0.40	-	-	0.40 - 1.00	1.00 - 1.30#
<b>Previous Investigation (Ref: NEW18P-0076-AB, 19 June 2018) – Prior to site regrade works</b>								
BH23	-	0.00 - 0.25	-	0.25 - 0.45	0.45 - 0.80	0.80 - 0.90	-	0.90 - 1.00*
Notes:	* = Practical refusal to refusal of 2.7 tonne excavator with auger attachment met on weathered rock. # = Practical refusal or refusal of 20 tonne excavator bucket met on weathered rock.							

Groundwater levels or inflows were not encountered in boreholes during the limited time that they remained open on the day of the field investigations.

It should be noted that groundwater conditions can vary due to rainfall and other influences including regional groundwater flow, temperature, permeability, recharge areas, surface condition, and subsoil drainage.

## 5.0 Laboratory Testing

Samples collected during the field investigations were returned to our NATA accredited Newcastle Laboratory for testing which comprised of:

- (4 no.) Shrink / Swell tests.

Results of the laboratory testing are presented in Appendix B, with a summary of the Shrink/Swell and Atterberg Limits test results presented in Table 3 and Table 4, respectively, which also includes results from previous testing on adjacent lots.

**TABLE 3 – SUMMARY OF SHRINK/SWELL TESTING RESULTS**

Location	Depth (m)	Material Description	I <sub>ss</sub> (%)
<b>Current Investigation (August 2022)</b>			
BH617B	0.50 - 0.65	(CI) Gravelly Sandy CLAY	0.6
BH618B	0.45 - 0.60	(CH) Sandy CLAY	2.2
BH619B	0.35 - 0.50	(CH) Sandy CLAY	1.8
BH626B-B	0.50 - 0.80	FILL: (CI) Gravelly Sandy CLAY	0.6
<b>Previous Investigation (Ref: NEW18P-0170C-AB.Rev1, 10 March 2021)</b>			
BH614	0.30 – 0.45	(CI) Sandy CLAY	0.7
BH622	0.25 – 0.45	(CI) Gravelly Sandy CLAY	0.4
<b>Previous Investigation (Ref: NEW18P-0170AA-AA.Rev1, 4 March 2020)</b>			
TPP27	0.40 - 0.55	(CH) Sandy CLAY	2.9

**TABLE 4 – SUMMARY OF ATTERBERG LIMITS TESTING RESULTS**

Location	Depth (m)	Material Description	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)
<b>Previous Investigation (Ref: NEW18P-0170C-AB.Rev1, 10 March 2021)</b>						
BH625	0.50 – 0.65	FILL: (CL) Gravelly Sandy CLAY	29	16	13	5.5
<b>Previous Investigation (Ref: NEW18P-0170AA-AA.Rev1, 4 March 2020)</b>						
TPP28	0.60 - 0.70	(CI) Gravelly Sandy CLAY	36	19	17	7.0

The results of the Shrink/Swell and Atterberg Limits laboratory testing indicate that the residual soils tested from the site generally contain fines of medium plasticity.

## 6.0 Site Classification to AS2870-2011

Based on the results of the field work, laboratory testing and site regrade works conducted, residential lots located within Precinct 2, Stage 6B of the Brush Creek Estate residential subdivision, as shown on the attached Figure AD1, are classified in their current condition in accordance with AS2870-2011 '*Residential Slabs and Footings*', as shown in Table 5.

**TABLE 5 – SITE CLASSIFICATION TO AS2870-2011**

Lot Numbers	Site Classification
617 to 625	<b>M</b>
626	<b>H1</b>

A characteristic free surface movement of 20mm to 40mm is estimated for the lots classified as **Class 'M'** in their existing condition.

A characteristic free surface movement of 40mm to 60mm is estimated for the lots classified as **Class 'H1'** in their existing condition.

The effects of changes to the soil profile by additional cutting and filling and the effects of past and future trees should be considered in selection of the design value for differential movement.

If site re-grading works involving cutting or filling are performed after the date of this assessment, the classification may change and further advice should be sought.

Footings for the proposed development should be designed and constructed in accordance with the requirements of AS2870-2011.

The classification presented above assumes that:

- All footings are founded in controlled fill (if applicable) or in the residual clayey soils or rock below all non-controlled fill, topsoil material and root zones, and fill under slab panels meets the requirements of AS2870-2011, in particular, the root zone must be removed prior to the placement of fill materials beneath slabs;
- The performance expectations set out in Appendix B of AS2870-2011 are acceptable, and that site foundation maintenance is undertaken to avoid extremes of wetting and drying;
- Footings are to be founded outside of or below all zones of influence resulting from existing or future service trenches;
- The constructional and architectural requirements for reactive clay sites set out in AS2870-2011 are followed;
- Adherence to the detailing requirement outlined in Section 5 of AS2870-2011 '*Residential Slabs and Footings*' is essential, in particular Section 5.6, '*Additional requirements for Classes M, H1, H2 and E sites*' including architectural restrictions, plumbing and drainage requirements; and,
- Site maintenance complies with the provisions of CSIRO Sheet BTF 18, "*Foundation Maintenance and Footing Performance: A Homeowner's Guide*", a copy of which is attached in Appendix C.

All structural elements on all lots should be supported on footings founded beneath all uncontrolled fill, layers of inadequate bearing capacity, soft/loose, wet or other potentially deleterious material.

If any localised areas of uncontrolled fill of depths greater than 0.4m are encountered during construction, footings should be designed in accordance with engineering principles for Class 'P' sites.

## 7.0 Limitations

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical design practices and standards. To our knowledge, they represent a reasonable interpretation of the general conditions of the site.

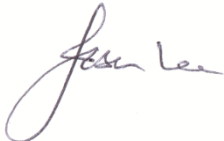
The extent of testing associated with this assessment is limited to discrete test locations. It should be noted that subsurface conditions between and away from the test locations may be different to those observed during the field work and used as the basis of the recommendations contained in this report.

If subsurface conditions encountered during construction differ from those given in this report, further advice should be sought without delay.

Data and opinions contained within the report may not be used in other contexts or for any other purposes without prior review and agreement by Qualtest. If this report is reproduced, it must be in full.

If you have any further questions regarding this report, please do not hesitate to contact Ben Bunting, Shannon Kelly or the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd.



Jason Lee  
Principal Geotechnical Engineer

## **FIGURE AD1:**

**Site Plan and Approximate Test Locations**

# **APPENDIX A:**

## **Results of Field Investigations**

## **APPENDIX B:**

### **Results of Laboratory Testing**

# **APPENDIX C:**

**CSIRO Sheet BTF 18**

**Foundation Maintenance and Footing  
Performance: A Homeowner's Guide**