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LEVEL 1 INSPECTION & TESTING HARRIOTT ESTATE STAGE 13 ARMSTRONG CREEK

Prepared for BILD Group Pty Ltd

Report Reference: GSSW1859.1 AA

Date: 27 July 2023

ABN: 51 612 825 313

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PROJECT DETAILS

Project Reference	GSSW1859.1	Rev	AA
Project Title	Harriott Estate Stage 13		
Project Location	Armstrong Creek	State	VIC
Date	27 July 2023		

CLIENT DETAILS

Prepared For (Client)	BILD Group Pty Ltd
Client Address	133 Metrolink Cct, Campbellfield VIC 3061

DISTRIBUTION

Original Held By	Ground Science South West Pty Ltd
One (1) Electronic Copy	BILD Group Pty Ltd

This document presents the results of the Level 1 Inspection and Testing performed by Ground Science South West for the aforementioned project, as the nominated project Geotechnical Inspection & Testing Authority (GITA). This report is detailed for the sole use of the intended recipient(s). Should you have any questions related to this report please do not hesitate to contact the undersigned.

AUTHOR:



Michael Knez
Geotechnical Engineer

REVIEWED:



Gee Singh, RPEng
Senior Geotechnical Engineer

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FIGURE 1 HARRIOTT AT ARMSTRONG CREEK STAGE 13 - LAYOUT PLAN 1 [0352-13-R02 REV 2]

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1. INTRODUCTION

This report presents the results of the inspection activities, compaction control and laboratory testing services performed by Ground Science South West Pty Ltd for the Harriott Estate Stage 13 project, located within Armstrong Creek, Victoria (the site).

2. PROJECT UNDERSTANDING

It is understood that the project involves the placement of fill as part of the bulk earthworks phase for Harriott Estate Stage 13. Ground Science was engaged to provide Level 1 Inspection and Testing services for the construction of these areas. Authorisation to proceed was provided by BILD Group Pty Ltd (the 'Client'). GPR Consulting Pty Ltd prepared the civil drawings for the project.

Level 1 Inspection & Testing, as defined in AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments' provides for full time inspection of the construction of controlled fill and compaction testing in accordance with AS1289 'Methods of Testing Soils for Engineering Purposes' and AS1726 (2017) 'Geotechnical Site Investigations'. Ground Science performed the role of the project Geotechnical Inspection & Testing Authority (GITA) with all Level 1 Inspection and Testing services described in this report undertaken by an experienced GITA site representative.

3. SCOPE OF WORK

3.1 AREAS OF WORK

Ground Science provided Level 1 Inspection and Testing services for the construction of fill in areas requiring greater than 200mm of fill to achieve finished levels. The areas requiring Level 1 Inspection & Testing are shown on the supplied construction drawing, on Figure 1, prepared by GPR Consulting Pty Ltd (Harriott at Armstrong Creek Stage 13 - Layout Plan 1 [0352-12-R02 Rev 2]).

This report details the Level 1 earthworks process performed on site which commenced on 21 April 2023 and was completed on 17 May 2023, requiring 5 full days of inspection and testing works.

3.2 PLACEMENT METHODOLOGY

A technical specification for the fill operations was not provided. The placement of controlled fill on the above-mentioned areas was carried out in accordance with Level 1 fill procedures as detailed in AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments'. The following fill placement guideline was adopted for the works:

- All existing loose surficial fill, topsoil, soft material, vegetation and materials containing significant organic matter were removed to expose the natural soil subgrade;
- Suitable fill material, sourced by the contractor and approved by Ground Science, was placed in loose horizontal layers not exceeding 300mm in thickness;
- The controlled fill material was compacted to achieve a target Dry Density Ratio of at least 95% Standard Compaction (AS 1289: 5.1.1, 5.4.1 or 5.7.1), based on our understanding that future building loads would be similar to residential type structures (i.e. non-commercial structural loading);
- The fill was moisture conditioned to within +/- 3% of the standard optimum moisture content;
- The fill material was sorted and mixed to eliminate particles greater than 20% by volume, particles coarser than 37.5mm and no particle over 200mm in any dimension;
- The frequency of field density testing adopted for the project was generally in line with the requirements for large scale developments (Type 1), as detailed in AS3798 (2007), which nominates a frequency of not less than:

- 1 test per layer or 200mm per 2500m²;
- 1 test per 500m³ distributed reasonably evenly throughout the full depth and area; or
- 3 tests per site visit; whichever requires the most tests.

4. INSPECTION AND TESTING

4.1 SUBGRADE PREPARATION

Site stripping was carried out prior to Ground Science South West's involvement in the project. It is understood that BILD Group removed all organics, topsoil and compressible (soft) soils between 17 April and 21 April 2023. Inspection of the newly prepared subgrade surface was carried out on 21 April 2023 by the representative geotechnician from Ground Science South West. A proof roll with a 16 tonne padfoot compactor was performed and was noted to show minimum deflection. At the time of the inspection, the prepared subgrade was observed to be generally close of optimum moisture content. The prepared subgrade surface was then inspected and deemed suitable for subsequent works to proceed.

The above stripped subgrade was visually assessed using tactile methods described in AS1726 (2017) and approved by the GITA representative throughout the project.

4.2 CONSTRUCTION MATERIALS

The fill material used in this project was nominated by the on-site contractor. All the materials used for the project was sourced from on site. The material was carted across site in dump trucks and stockpiled adjacent to the fill zones. Ground Science performed an assessment of the fill source to identify the following material characteristics:

- Material suitability as an engineering property;
- Cohesiveness;
- Free of building debris and vegetative matter;
- Free of oversize rock particles.

Visual assessments on the above-mentioned properties were conducted on-site and the fill material used was considered acceptable for use on this project. The nominated fill products were visually assessed to comprise of CLAY, with sand, trace gravel, medium to high plasticity, brown, sand fine to coarse grained, gravel fine, moist. Ground Science did not perform any quality assurance, quality control, chemical or environmental analysis on the above fill material.

The fill source was assessed to range from dry to close of the optimum moisture content. Portions of the fill material that were found to be dry were moisture conditioned using a water cart prior to compaction. All fill materials were generally considered suitable for use as engineered fill.

4.3 FILL CONSTRUCTION

The contractor had the following plant available on site during the construction period for use in the fill placement;

- Bulldozer;
- Scraper;
- Water Cart;
- Padfoot Compactor.

During fill placement, the weather conditions varied, ranging from sunny to rainy and with temperatures typically ranging from 5 to 25 degrees Celsius.

The filling process was generally consistent throughout the project and involved the approved fill stockpiled adjacent to the fill placement zones. The material was spread using a scraper or bulldozer into thin loose layers. These layers were then moisture conditioned by a water cart, applying a minimum of 1-2 passes to bring the placed material close to optimum moisture content. Each layer was compacted using a padfoot roller applying a minimum of 5-8 passes, per layer observed. The thin layers of fill were compacted to form a composite layer, measuring 300mm thick, prior to undertaking the field density testing. This process was adopted for the fill placement works.

Rain was forecasted multiple times over the course of the works. A sacrificial layer of material was placed by the compactor to protect the previously placed and tested layers from rain. This material was removed when works recommenced during periods of favourable weather and blended with the stockpile for moisture control and reuse.

4.4 RESULTS OF COMPACTION CONTROL TESTING

Level 1 Inspection and Testing was undertaken by experienced technicians from Ground Science who attended the site for the duration of the construction phase and nominated the location of the in-situ density tests. Testing comprised a total of 14 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 14 "Rapid HILF" Compaction tests (AS1289 5.7.1).

Field density and compaction control testing report sheets are presented in Appendix A. It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed. No test areas failed to meet the required target density ratio or the required moisture condition.

4.5 FINAL SURFACE LEVELS

Observations were made by a Ground Science staff member that filling had been complete up to the nominated finished levels designated on Figure 1 as per confirmation provided from the contractor's site foreman. We understand that the observed final levels are the constructed finished surface levels of the controlled fill. The overall fill depths are estimated using onsite visual tactile methods and may not be a true representation of fill depths given that conditions on site may change over time. True fill depths should be obtained from the contractor's survey data.

5. COMPLIANCE

Ground Science Staff have undertaken Level 1 Inspection and Testing services of the construction of the controlled fill in the areas designated on Figure 1. Ground Science field staff have also observed that the prepared subgrade provided an adequate base for the subsequent placement of controlled fill.

Based on observations made by Ground Science staff and the results of density tests, we consider that the controlled fill placed has been constructed in accordance with the guidelines provided in AS3798 (2007) and AS2870 (2011).

It should be noted that the final fill layers may be subjected to adverse weather conditions resulting in either surface softening or drying and cracking over time; regardless of the compactive efforts and moisture conditioning applied during the works. The integrity of the top 200mm to 300mm of the fill will deteriorate with time and should be taken into account by the foundation engineer prior to the construction of dwellings or buildings. The levels nominated in this report are a guide to amounts of fill placed and do not necessarily reflect an accurate survey of the fill levels.

6. UNDERSTANDING LEVEL 1 INSPECTION & TESTING

The purpose of performing Level 1 Inspection and Testing is to ensure compliance of the fill with the specification. The engagement of a Geotechnical Inspection Testing Authority (GITA) allows the contractor to perform their role in the construction of the filling operation while the GITA monitors the quality control process of the fill placement. The visual observations of thorough processes and work practices by the contractor allows the GITA to approve the subsequent placement of fill without having to wait for the completion of testing and the extended time it takes to get a test result back. The GITA will however, carry out random spot checks of the filling operations throughout



the day's production as confirmation that the placement procedures and the fill moisture content is appropriate. At the end of a day's production the GITA will sign off the completed works as satisfactory. Any failed tests will result in that particular area of operation requiring rectification in the following mornings activities. This may be as simple as extra rolling with compaction plant if moisture conditioning is suitable. Sometimes these areas may be retested if the GITA feels it is necessary.

While AS3798 (2007) is a guideline on the minimum requirements of filling on commercial and residential developments, some projects require a more detailed project specification to deal with site specific issues. While moisture conditioning of fill sources aids in the ease with which compaction is achieved, it is not necessarily a physical characteristic that determines if the placed fill is acceptable. In some situations, the moisture requirement is an extremely important function of the final constructed product. In these situations, a specific project specification should apply to the project as detailed by the designing geotechnical engineer. These are typical of clay liners for wetlands, dams, landfill liners and caps and an array of other engineering situations. Creating a consolidated platform of which is similar to equivalent surrounding natural conditions is the primary aim of level one processes, preventing the occurrence of differential ground movements to footing structures.

Level 1 Inspection & Testing requires full time inspection and testing of the fill placement undertaken on a site. Ground Science (project GITA), are notified daily (or at the completion of each day's work) by the project foreman where subsequent days of fill placement under Level 1 is to occur. On projects that rely upon the importation of a fill source, there can be delays in the receipt of sufficient materials to warrant fill placement works which may result in periods of time where a GITA representative is not required on site. It is the contractor's responsibility to notify the GITA when works proceed and their attendance on site is required again. A GITA relies upon the integrity of the contractor to advise when site attendance is required and makes all reasonable visual attempts to assess if the works are the same as the previous days attendance.

**For & on behalf of
Ground Science Pty Ltd**

AUTHOR:

**Michael Knez
Geotechnical Engineer**

REVIEWED:

**Gee Singh, RPEng
Senior Geotechnical Engineer**

7. LIMITATIONS

This type of investigation (as per our commission) is not designed or capable of locating all soil conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall soil conditions. However, it should be noted that actual conditions in some parts of the Site might differ from those found. If further sampling reveals soil conditions significantly different from those shown in our findings, Ground Science must be consulted. Maintenance and upkeep of finished fill placement must be regularly monitored as exposure to extended weather periods/other elements may cause surface drying which may lead to cracking. Conversely, excessive exposure to moisture may cause heaving/softening in the soils.

It is recognised that the passage of time affects the information and assessment provided in this document. Ground Science's assessment is based on information that existed at the time of the preparation of this document. It is understood that the services provided allowed Ground Science to form no more than an opinion of the actual site conditions observed during sampling and observations of the site visit and cannot be used to assess the effects of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

The scope and the period of Ground Science services are described in the proposal and are subject to restrictions and limitations. Ground Science did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Science in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Science for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

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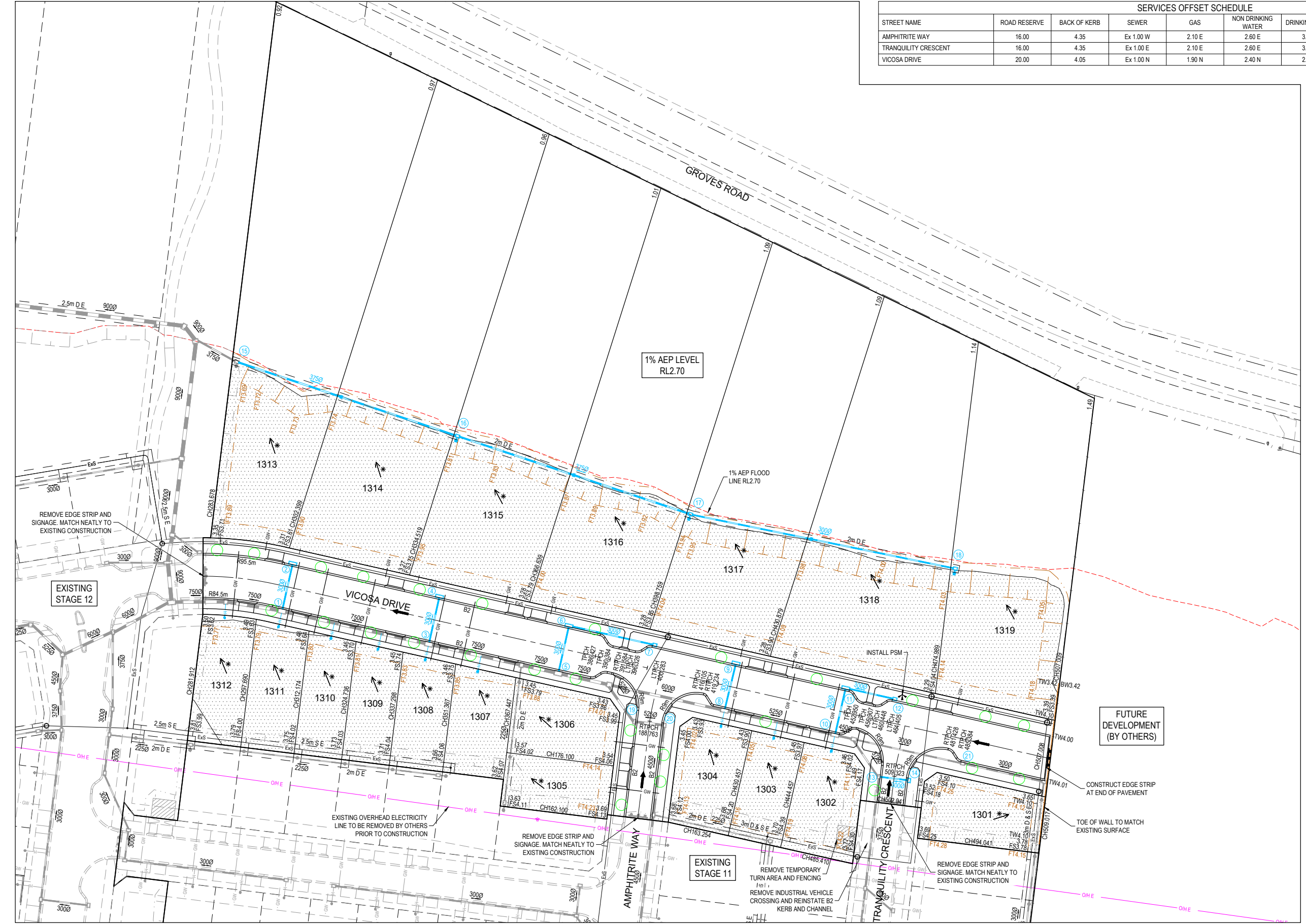
8. REFERENCES

- AS3798 (2007) Guidelines on Earthworks for Residential and Commercial Developments.
- AS2870 (2011) Residential Slabs and Footings.
- AS1289 Methods of Testing Soils for Engineering Purposes.
- AS1726 (2017): Geotechnical Site Investigations

FIGURE 1

Harriott at Armstrong Creek Stage 13 - Layout Plan [0352-13-R02 Rev 2]

SERVICES OFFSET SCHEDULE									
STREET NAME	ROAD RESERVE	BACK OF KERB	SEWER	GAS	NON DRINKING WATER	DRINKING WATER	COMMUNICATIONS	ELECTRICITY	LIGHT POLES
AMPHITRITE WAY	16.00	4.35	Ex 1.00 W	2.10 E	2.60 E	3.10 E	1.85 W	2.60 W	3.45 W
TRANQUILITY CRESCENT	16.00	4.35	Ex 1.00 E	2.10 E	2.60 E	3.10 E	1.85 W	2.60 W	3.45 W
VICOSA DRIVE	20.00	4.05	Ex 1.00 N	1.90 N	2.40 N	2.90 N	1.85 S	2.60 S	3.15 S



NOTE: VEHICLE CROSSINGS
ALL VEHICLE CROSSINGS ARE TO BE 4.0m WIDE OFFSET 1.0m FROM THE SIDE BOUNDARY.

NOTE: HOUSE DRAINS
HOUSE DRAINS TO LOTS 1302 TO 1304 AND 1307 TO 1312 ARE TO BE CONNECTED TO THE EXISTING DRAIN.

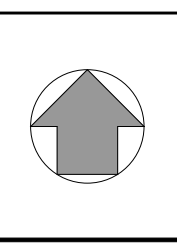
NOTE: FENCING
EXISTING FARM FENCES WITHIN THE WORKS AREA ARE TO BE REMOVED AND DISPOSED OFFSITE.

NOTE: STREET TREES
INDICATIVE STREET TREE LOCATION. ULTIMATE LOCATION TO BE PROVIDED BY THE LANDSCAPE ARCHITECTS.

WARNING
BEWARE OF UNDERGROUND SERVICES
The locations of underground services are approximate only and their exact position should be proven on site. No guarantee is given that all existing services are shown. Locate all underground services before commencement of works.
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Rev	Amendment	Des/Dt	App'd	Date
A	Initial Issue	GP/DP	MG	06/12/22
1	Approved for construction	GP	MG	22/02/23
2	Gas and water conduits amended	GP	MG	25/02/23

Legend		Existing Surface Level at Title	135.12
Existing Drainage	— H —	Finished Surface at Title	FS135.12
Existing Sewer	— Ex S —	Level at Top/Toe of Batter/Ridge	FT135.12
Existing Gas	— Ex G —	Centreline Chaining	CH50.370
Existing Electricity UG	— Ex E —	Gas & Water Conduits	GW
Existing Electricity OH	— OH E —	Sleeper Retaining Wall	SRW
Existing Communications	— Ex T —	Rock Retaining Wall	RRW
Existing Drinking Water	— Ex DW —	Direction of Overland Flow	OF
Existing Non Drinking Water	— Ex NDW —	Allotment to be Evenly Graded	*
Existing Swale Drain	— Ex SD —	Vehicle Crossings	VC
		Concrete Infill	CI



Principal
HARRIOTT
 AT ARMSTRONG CREEK
 Jinding Australia
 Level 53, 525 Collins Street
 Melbourne Vic 3000

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 GPR Consulting Pty Ltd
 ABN 98 140 136 205
 Suite 217, 202 Jellis Road
 Wheelers Hill Vic 3150
 Telephone 0456 634 727
 © GPR Consulting Pty Ltd

Council City of Greater Geelong
 Project **Harriott at Armstrong Creek Stage 13**
 Title **Layout Plan**
 Designed: G.Pratt
 Drafted: D.Pratt
 Authorised: M.Graham
 Date: December 2022

Scale @ A1: 1:500

 Drawing No. **0352-13-R02**
 Sheet 02 of 21
 Rev **2**

APPENDIX A

Field Density Test Report Summary Sheet

Project Summary Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Date: 05/07/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Test Methods: AS 1289 5.7.1 STD & 5.8.1 & 2.1.1

Lot #	Sample #	Date Sampled	Location	Location		Elevation (m)	Layer	Relative Compaction (%)	Moisture Variation (%)	Moisture Content (%)	Field Wet Density (t/m3)
**	1859-S1	24/04/2023	Refer to markup (Lot 1314)	**	**	**	Layer 1	104.0	-0.5	22.6	1.96
**	1859-S2	24/04/2023	Refer to markup (Lot 1318)	**	**	**	Layer 1	95.0	0.0	17.4	1.93
**	1859-S3	24/04/2023	Refer to markup (Lot 1316)	**	**	**	Layer 1	99.5	2.0	21.5	1.92
**	1859-S4	27/04/2023	Lot 1313 refer to markup	**	**	**	2	104.5	2.5	29.2	1.92
**	1859-S5	27/04/2023	Lot 1315 refer to markup	**	**	**	2	103.0	1.5	22.8	1.93
**	1859-S6	27/04/2023	Lot 1319 refer to markup	**	**	**	3	105.5	2.0	19.4	2.00
**	1859-S7	28/04/2023	Lot 1314 refer to markup	**	**	**	Layer 3	102.0	0.0	28.1	1.98
**	1859-S8	28/04/2023	Lot 1316 refer to markup	**	**	**	Layer 4	100.5	-1.5	20.7	1.94
**	1859-S9	28/04/2023	Lot 1319 refer to markup	**	**	**	Layer 4	102.0	0.0	23.0	1.98
**	1859-S10	15/05/2023	Lot 1309	**	**	**	1	102.0	0.0	27.6	1.96
**	1859-S11	15/05/2023	Lot 1303	**	**	**	2	105.5	-0.5	30.1	1.98
**	1859-S12	15/05/2023	Lot 1302	**	**	**	1	104.5	2.5	21.9	1.95
**	1859-S13	17/05/2023	Lot 1306	**	**	**	FSL	100.5	-0.5	20.4	1.96
**	1859-S14	17/05/2023	Lot 1301	**	**	**	FSL	105.0	0.0	18.2	2.12

Moisture Variation Note:

Positive values = test is dry of OMC

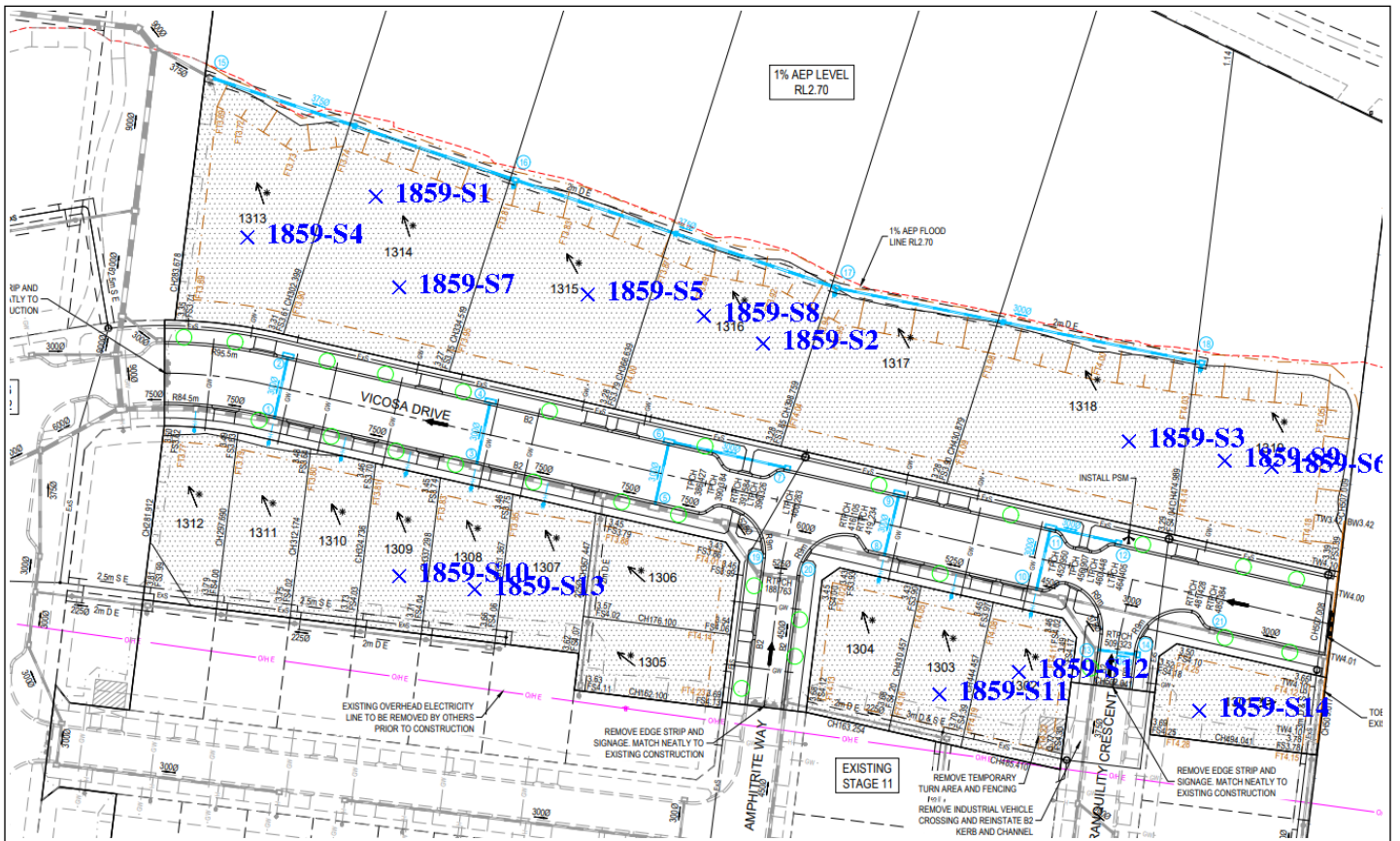
Negative values = test is wet of OMC

Sample Locations Plan

x - approximate test location



Ground Science South West
Geotechnical & Environmental Consultants



APPENDIX B

Field Density Test Report Sheets & Test Locations

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1859-1
Issue Number: 1
Date Issued: 27/04/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Work Request: 15444
Date Sampled: 24/04/2023
Dates Tested: 24/04/2023 - 26/04/2023
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Location: Report 27/4
Material: sandy CLAY, trace gravel, high plasticity
Material Source: Site Won Fill

Accredited for compliance with ISO/IEC 17025 - Testing



B Elliott

Approved Signatory: Brent Elliott
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	1859-S1	1859-S2	1859-S3
Date Tested	24/04/2023	24/04/2023	24/04/2023
Time Tested	10:30	10:42	11:03
Test Request #/Location	Refer to markup (Lot 1314)	Refer to markup (Lot 1318)	Refer to markup (Lot 1316)
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	300	300	300
Soil Description	sandy CLAY, trace gravel, medium-high plasticity	sandy CLAY, trace gravel, medium-high plasticity	sandy CLAY, trace gravel, medium-high plasticity
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Field Wet Density (FWD) t/m ³	1.96	1.93	1.92
Field Moisture Content %	22.6	17.4	21.5
Field Dry Density (FDD) t/m ³	1.60	1.64	1.58
Peak Converted Wet Density t/m ³	1.89	2.03	1.93
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	-0.5	0.0	2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	104.0	95.0	99.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

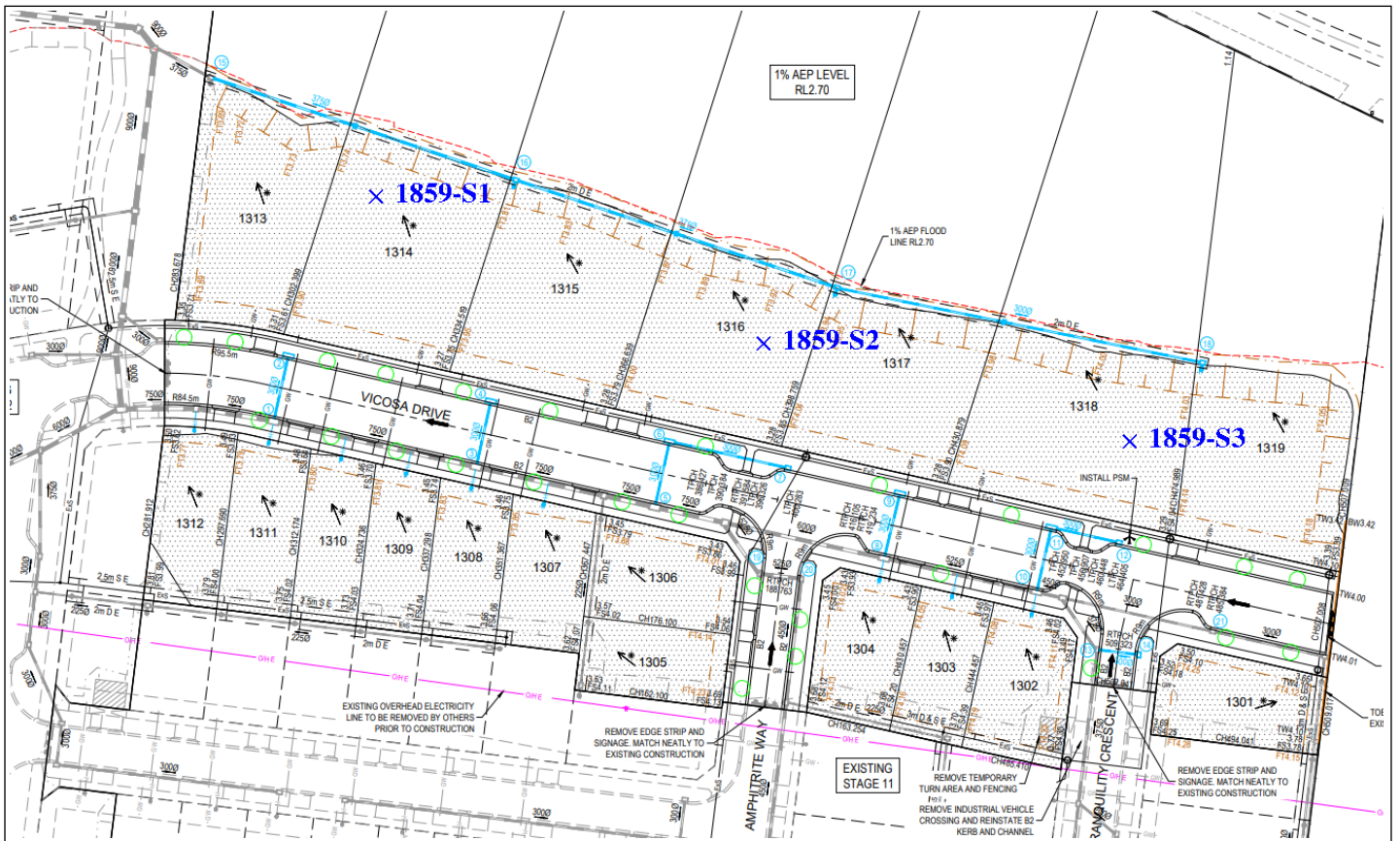
Sample Locations Plan

x - approximate test location



Ground Science South West

Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1859-2
Issue Number: 1
Date Issued: 28/04/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Work Request: 15478
Dates Tested: 27/04/2023 - 28/04/2023
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Location: Lots 1313, 1315 & 1319
Material: clayey GRAVEL, with sand, fine to coarse, medium plasticity
Material Source: Site Won Fill

Accredited for compliance with ISO/IEC 17025 - Testing



B Elliott

Approved Signatory: Brent Elliott
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

	1859-S4	1859-S5	1859-S6
Sample Number	1859-S4	1859-S5	1859-S6
Date Tested	27/04/2023	27/04/2023	27/04/2023
Time Tested	13:00	13:10	13:20
Test Request #/Location	Lot 1313 refer to markup	Lot 1315 refer to markup	Lot 1319 refer to markup
Layer / Reduced Level	2	2	3
Thickness of Layer (mm)	300	300	300
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Field Wet Density (FWD) t/m ³	1.92	1.93	2.00
Field Moisture Content %	29.2	22.8	19.4
Field Dry Density (FDD) t/m ³	1.48	1.57	1.67
Peak Converted Wet Density t/m ³	1.83	1.88	1.90
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	2.5	1.5	2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	104.5	103.0	105.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

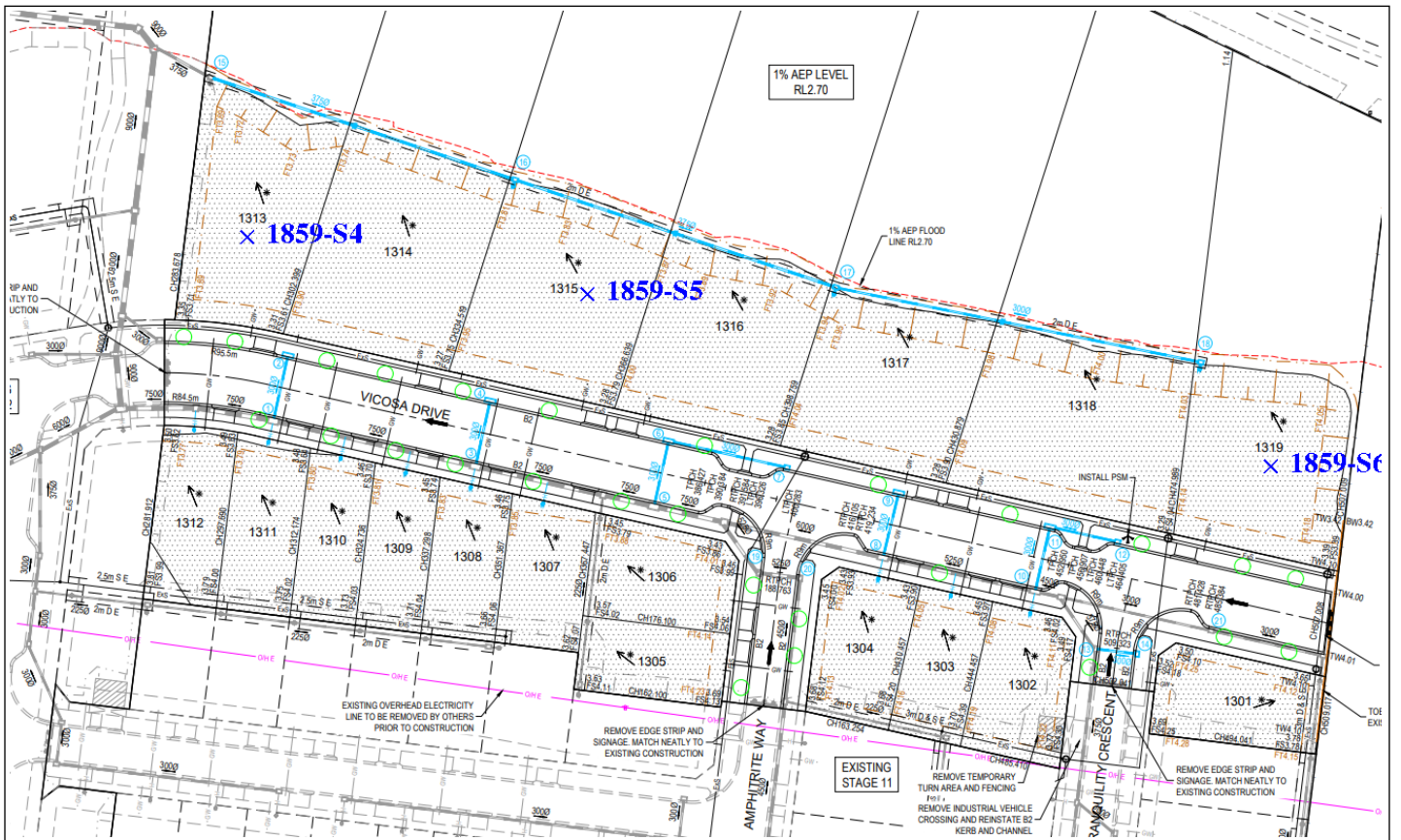
Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Sample Locations Plan

x - approximate test location



Ground Science South West
Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1859-3
Issue Number: 1
Date Issued: 03/05/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Work Request: 15509
Date Sampled: 28/04/2023
Dates Tested: 28/04/2023 - 03/05/2023
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Location: Lots 1314, 1316 & 1319
Material: clayey GRAVEL, with sand, fine to coarse, medium plasticity
Material Source: Site Won Fill

Accredited for compliance with ISO/IEC 17025 - Testing



B Elliott

Approved Signatory: Brent Elliott
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

	1859-S7	1859-S8	1859-S9
Sample Number	1859-S7	1859-S8	1859-S9
Date Tested	28/04/2023	28/04/2023	28/04/2023
Time Tested	15:16	15:26	15:34
Test Request #/Location	Lot 1314 refer to markup	Lot 1316 refer to markup	Lot 1319 refer to markup
Layer / Reduced Level	Layer 3	Layer 4	Layer 4
Thickness of Layer (mm)	300	300	300
Soil Description	clayey GRAVEL, with sand, fine to coarse, medium plasticity	clayey GRAVEL, with sand, fine to coarse, medium plasticity	clayey GRAVEL, with sand, fine to coarse, medium plasticity
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Field Wet Density (FWD) t/m ³	1.98	1.94	1.98
Field Moisture Content %	28.1	20.7	23.0
Field Dry Density (FDD) t/m ³	1.55	1.61	1.61
Peak Converted Wet Density t/m ³	1.94	1.94	1.94
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	0.0	-1.5	0.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	102.0	100.5	102.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC
 Negative values = test is wet of OMC

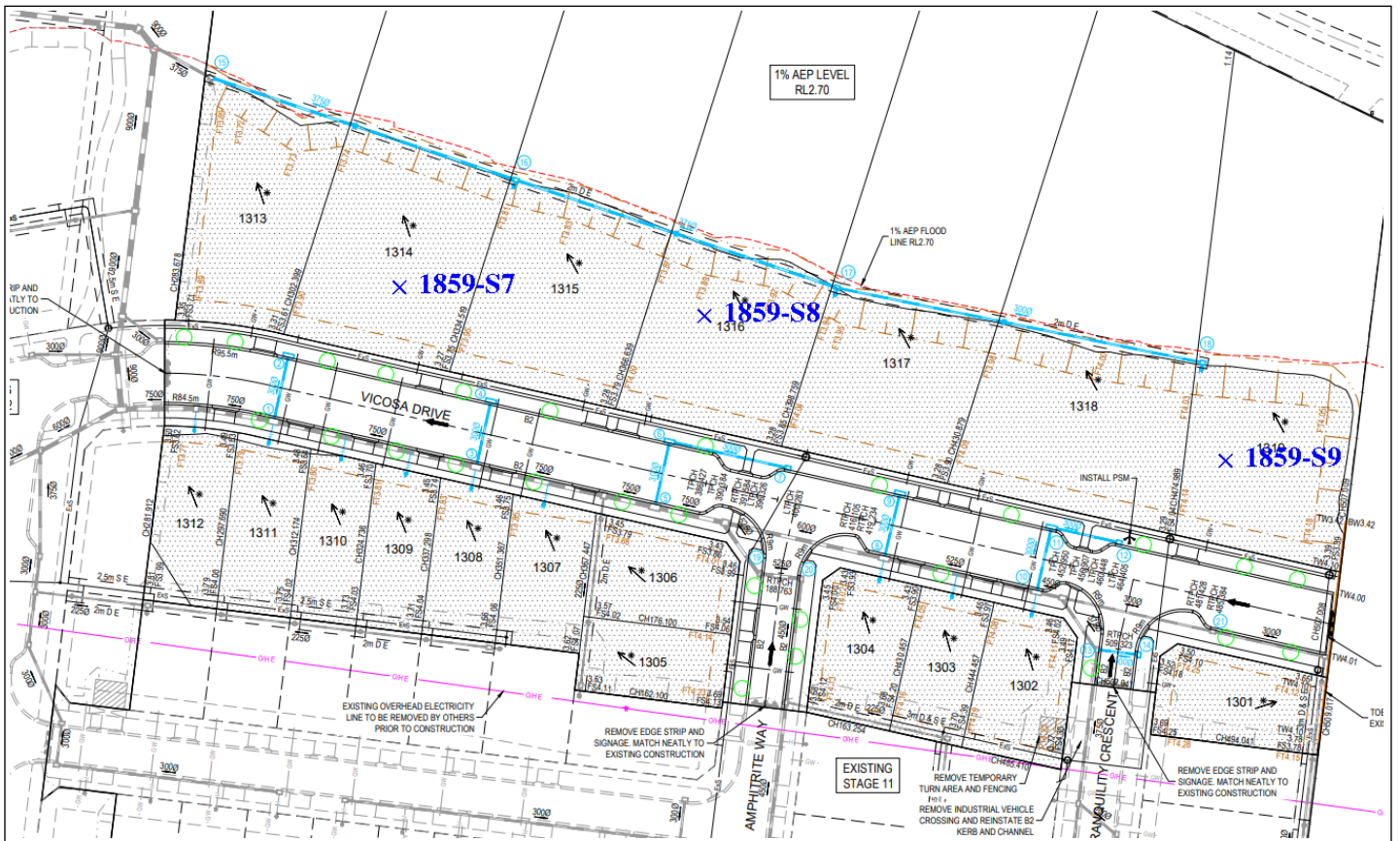
Sample Locations Plan

x - approximate test location



Ground Science South West

Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1859-4
Issue Number: 1
Date Issued: 18/05/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
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 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Work Request: 15694
Date Sampled: 15/05/2023
Dates Tested: 15/05/2023 - 16/05/2023
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Material: CLAY, with sand & gravel, high plasticity
Material Source: Site Won Fill

Accredited for compliance with ISO/IEC 17025 - Testing



Chris Mamalis

Approved Signatory: Chris Mamalis
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	1859-S10	1859-S11	1859-S12
Date Tested	15/05/2023	15/05/2023	15/05/2023
Time Tested	15:31	15:43	15:54
Test Request #/Location	Lot 1309	Lot 1303	Lot 1302
Layer / Reduced Level	1	2	1
Thickness of Layer (mm)	300	300	300
Soil Description	CLAY, with sand & gravel, high plasticity	clayey GRAVEL, with sand, fine to coarse, medium plasticity	clayey GRAVEL, with sand, fine to coarse, medium plasticity
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Field Wet Density (FWD) t/m ³	1.96	1.98	1.95
Field Moisture Content %	27.6	30.1	21.9
Field Dry Density (FDD) t/m ³	1.54	1.52	1.60
Peak Converted Wet Density t/m ³	1.92	1.88	1.87
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	0.0	-0.5	2.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	102.0	105.5	104.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

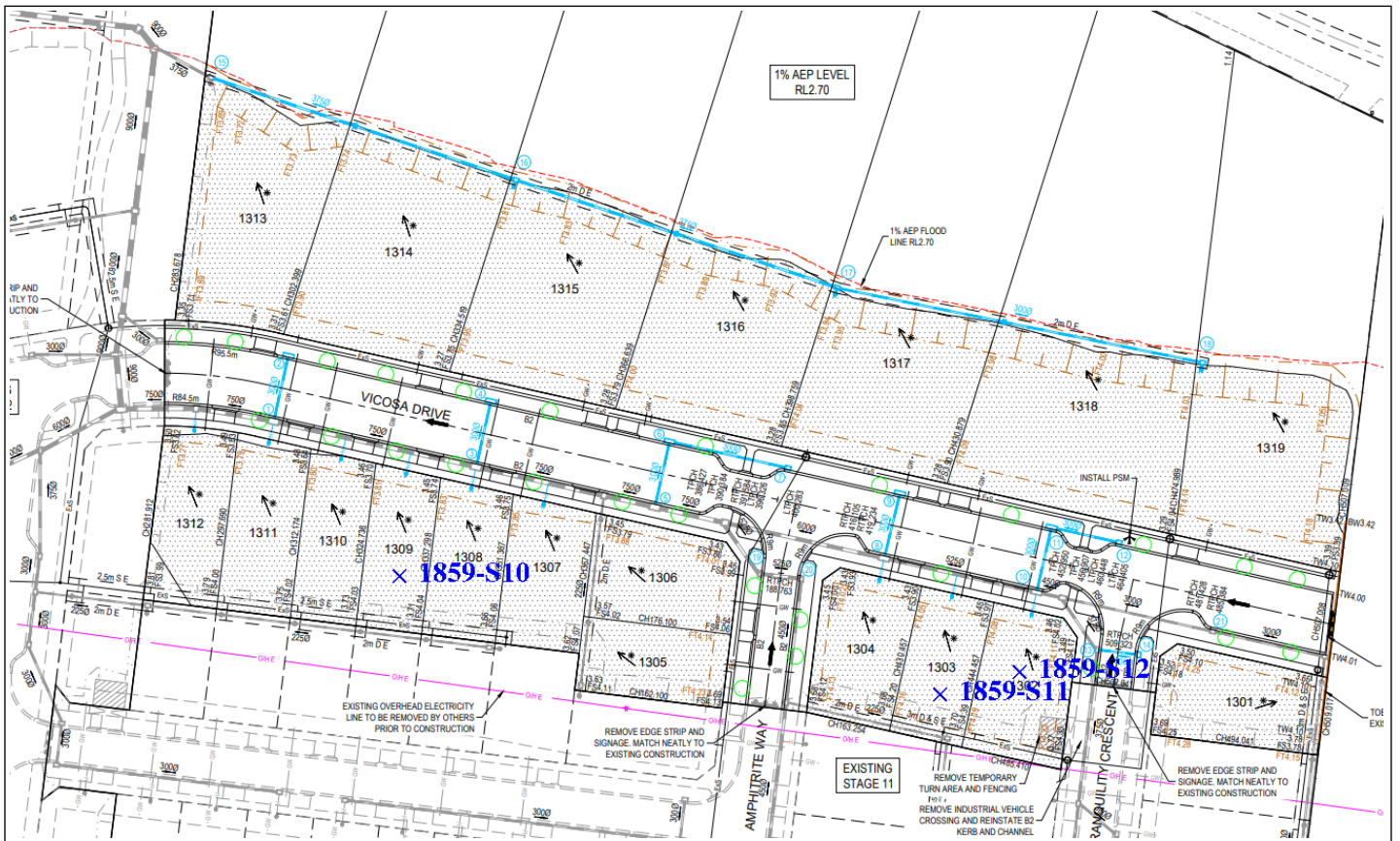
Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Sample Locations Plan

x - approximate test location



Ground Science South West
Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1859-5
Issue Number: 1
Date Issued: 19/05/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au

Project Number: GSSW1859
Project Name: HARRIOTT ESTATE STAGE 13
Project Location: ARMSTRONG CREEK
Work Request: 15723
Date Sampled: 17/05/2023
Dates Tested: 17/05/2023 - 18/05/2023
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Material: CLAY, with sand, trace gravel, medium - high plasticity
Material Source: Site Won Fill

Accredited for compliance with ISO/IEC 17025 - Testing



Chris Mamalis

Approved Signatory: Chris Mamalis
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

	1859-S13	1859-S14	
Sample Number	1859-S13	1859-S14	
Date Tested	17/05/2023	17/05/2023	
Time Tested	14:20	14:38	
Test Request #/Location	Lot 1306	Lot 1301	
Layer / Reduced Level	FSL	FSL	
Thickness of Layer (mm)	300	300	
Soil Description	CLAY, with sand, trace gravel, m-h PI	CLAY, with sand, trace gravel, m-h PI	
Test Depth (mm)	275	275	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Field Wet Density (FWD) t/m ³	1.96	2.12	
Field Moisture Content %	20.4	18.2	
Field Dry Density (FDD) t/m ³	1.63	1.79	
Peak Converted Wet Density t/m ³	1.95	2.01	
Adjusted Peak Converted Wet Density t/m ³	**	**	
Moisture Variation (Wv) %	-0.5	0.0	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	100.5	105.0	
Compaction Method	Standard	Standard	
Report Remarks	**	**	

Moisture Variation Note:

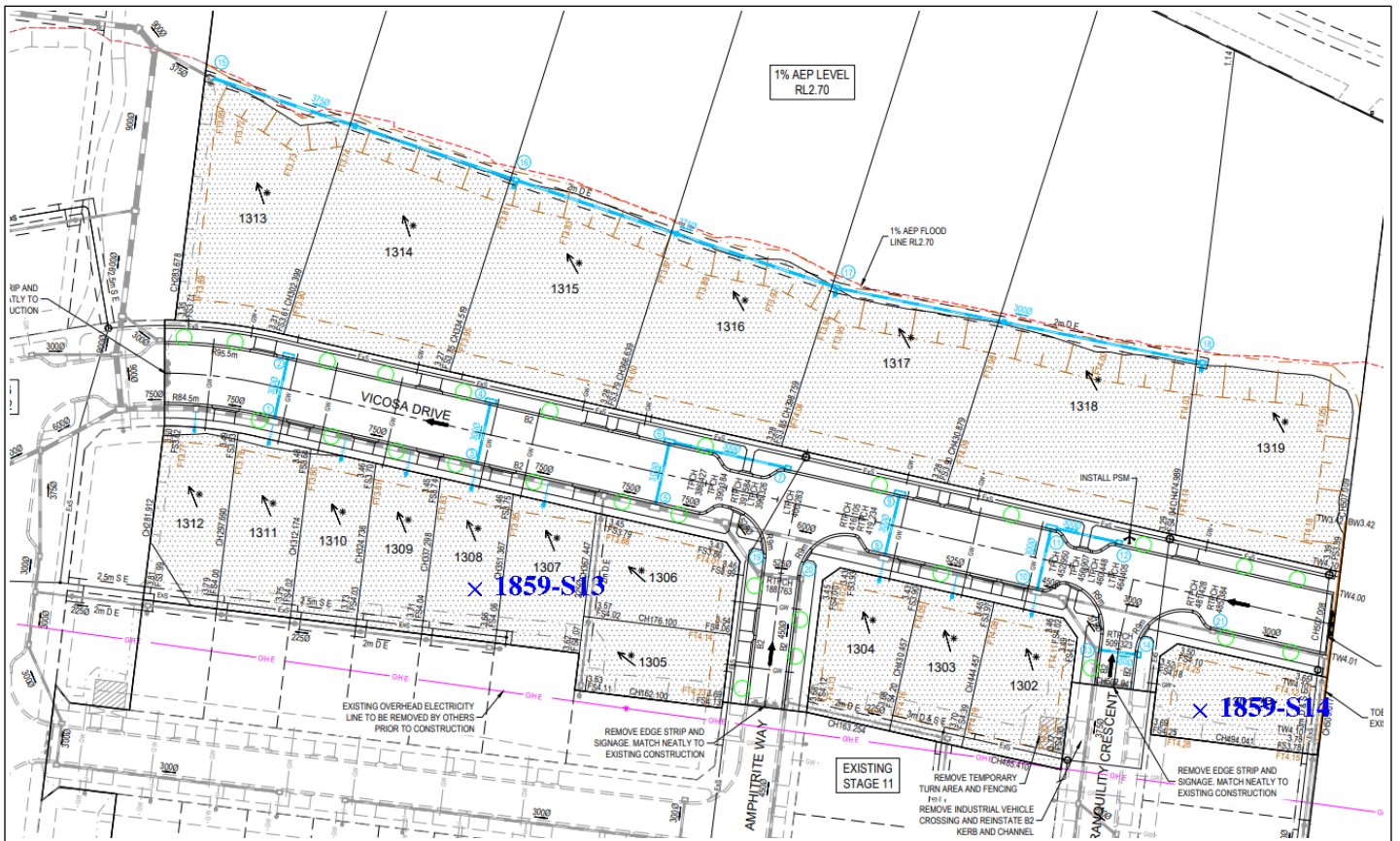
Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Sample Locations Plan

x - approximate test location



Ground Science South West
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APPENDIX C

Site Photographs

Armstrong Creek VIC 3217

Australia

-38.223411,+144.376990

98° E

21 April 2023 at 08:10:07 AEST



Armstrong Creek VIC 3217

Australia

-38.223472,+144.376601

269° W

21 April 2023 at 08:25:12 AEST



Armstrong Creek VIC 3217

Australia

-38.223472,+144.376601

98° E

21 April 2023 at 08:25:18 AEST



Harriott Rd
Armstrong Creek VIC 3217
Australia
-38.223918,+144.375667
16° N
21 April 2023 at 08:42:42 AEST





