

ABN: 51 612 825 313

10 Dowsett Street

South Geelong, Vic, 3220

(P) +61 3 5282 1566



10 November 2023

GSSW1689-1 AQ

**BILD Group Pty Ltd
133 Metrolink Circuit,
CAMPBELLFIELD, VIC, 3061**

**RE: CONTROLLED FILL CERTIFICATE
LOT 839 HARRIOTT ESTATE, STAGE 8B, ARMSTRONG CREEK, VICTORIA**

Ground Science South West Pty Ltd wishes to advise the prospective owner/builder that the construction of Lot 839 located at the Harriott Estate in Armstrong Creek involved the placement and compaction of controlled fill through Level 1 procedures on nominated areas. We were engaged by BILD Group to perform Level 1 Inspection and Testing for the controlled fill placement in accordance with AS3798 'Guidelines on Earthworks for Commercial and Residential Developments' (2007) on this property. The depth and location of the controlled fill and results of compaction control testing are detailed in the Ground Science South West Level 1 report (ref: GSSW1689.1 AA) dated 10/11/2023. We certify that all fill placement completed on this lot as detailed in our report complies with the requirements of AS3798 (2007).

The purpose of performing Level 1 Inspection and Testing is to ensure the quality of the filling process and to minimise the costs of extensive testing. The engagement of a Geotechnical Inspection & Testing Authority (GITA) allows the contractor to perform his role in the construction of the filling operation while the GITA monitors the quality control process of the operation. The visual observations of thorough processors and work practises 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 receive a test result. The GITA will however, carry out random spot checks of the filling operations throughout the days production as confirmation that the placement procedures and the fill moisture content is appropriate. At the end of a days production, the GITA will sign off the completed works as satisfactory.

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. Ground Science South West adopts a best practice policy with stripped base soils and all fill placements to be suitably moisture conditioned. This aids in creating a homogenous soil moisture and limits abnormal moisture changes for footing systems constructed on the fill platform. Creating a consolidated platform of which is similar to surrounding natural conditions is the primary aim of the Level 1 processes and assists in minimising the occurrence of differential ground movements to footing structures. The full report may be viewed or obtained from the estate developer's sales office should the need arise.

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

A handwritten signature in black ink, appearing to read 'Michael Knez', is written over a horizontal line.

**Michael Knez
Geotechnical Engineer**

ABN: 51 612 825 313

10 Dowsett Street

South Geelong, Vic, 3220

(P) +61 3 5282 1566



LEVEL 1 INSPECTION & TESTING HARRIOTT ESTATE STAGE 8B ARMSTRONG CREEK

Prepared for BILD Group Pty Ltd

Report Reference: GSSW1689.1 AA

Date: 10 November 2023

ABN: 51 612 825 313

10 Dowsett Street

South Geelong, Vic, 3220

(P) +61 3 5282 1566



PROJECT DETAILS

Project Reference	GSSW1689.1	Rev	AA
Project Title	Harriott Estate Stage 8B		
Project Location	Armstrong Creek	State	VIC
Date	10 November 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

Table of Contents

- 1. INTRODUCTION 1
- 2. PROJECT UNDERSTANDING 1
- 3. SCOPE OF WORK 1
 - 3.1 AREAS OF WORK..... 1
 - 3.2 PLACEMENT METHODOLOGY 1
- 4. INSPECTION AND TESTING 2
 - 4.1 SUBGRADE PREPARATION..... 2
 - 4.2 CONSTRUCTION MATERIALS 2
 - 4.3 FILL CONSTRUCTION 2
 - 4.4 RESULTS OF COMPACTION CONTROL TESTING..... 3
 - 4.5 FINAL SURFACE LEVELS 3
- 5. COMPLIANCE 3
- 6. UNDERSTANDING LEVEL 1 INSPECTION & TESTING 3
- 7. LIMITATIONS..... 5
- 8. REFERENCES 6

FIGURES

FIGURE 1 HARRIOTT AT ARMSTRONG CREEK STAGE 8B - LAYOUT PLAN [0352-08B-R02 REV B]

APPENDICES

- APPENDIX A FIELD DENSITY TEST REPORT SUMMARY SHEET
- APPENDIX B FIELD DENSITY TEST REPORT SHEETS & TEST LOCATIONS
- APPENDIX C SITE PHOTOGRAPHS



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 8B 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 8B. Ground Science was engaged to provide Level 1 Inspection and Testing services for the construction of fill platforms to support residential buildings. 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 8B - Layout Plan [0352-08B-R02 Rev B]).

This report details the Level 1 earthworks process performed on site which commenced on 14 February 2023 and was completed on 17 May 2023, requiring 2 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 a layer of fill was placed on lots 824 to 846 prior to Ground Science South West's attendance. This layer was instructed to be fully removed to enable a subgrade inspection to take place. The fill materials were removed on 13 February 2023 and an inspection of the stripped subgrade carried out on 14 February 2023.

The subgrade materials comprised CLAY, with sand, trace gravel, medium to high plasticity, brown, sand fine to coarse grained, gravel fine, and were generally close to the inferred optimum moisture content. A proof roll was carried out using a fully loaded dump truck, which did not show deflections or springing / rutting. The subgrade was deemed suitable to proceed.

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 were sunny with temperatures typically ranging from 11 to 22 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 200mm thick, prior to undertaking the field density testing. This process was adopted for the fill placement works.

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 21 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 21 "Rapid HILF" Compaction tests (AS1289 5.7.1).

A summary of the field density and compaction control testing is presented in Appendix A. Field density and compaction control testing report sheets are presented in Appendix B. It should be noted that the tests are a representation of the fill placed and support the visual assessment of the works completed.

Five test areas (#30, #34, #37, #38 & #39) failed to meet the required moisture condition. When these retests returned non-compliant test results, the whole layer was reworked, recompacted and retested (#47, #48, #49, #50 & #51) with compliant test results achieved. All test areas achieved the required target density ratio.

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 by the technical specification 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.

This document is COPYRIGHT- all rights reserved. No part of this document may be reproduced or copied in any form or by means without written permission by Ground Science Pty Ltd. All other property in this submission shall not pass until all fees for preparation have been settled. This submission is for the use only of the party to whom it is addressed and for no other purpose. No responsibility is accepted to any third party who may use or rely on the whole or any part of the content of this submission. No responsibility will be taken for this report if it is altered in any way, or not reproduced in full. This document remains the property of Ground Science Pty Ltd until all fees and monies have been paid in full.



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

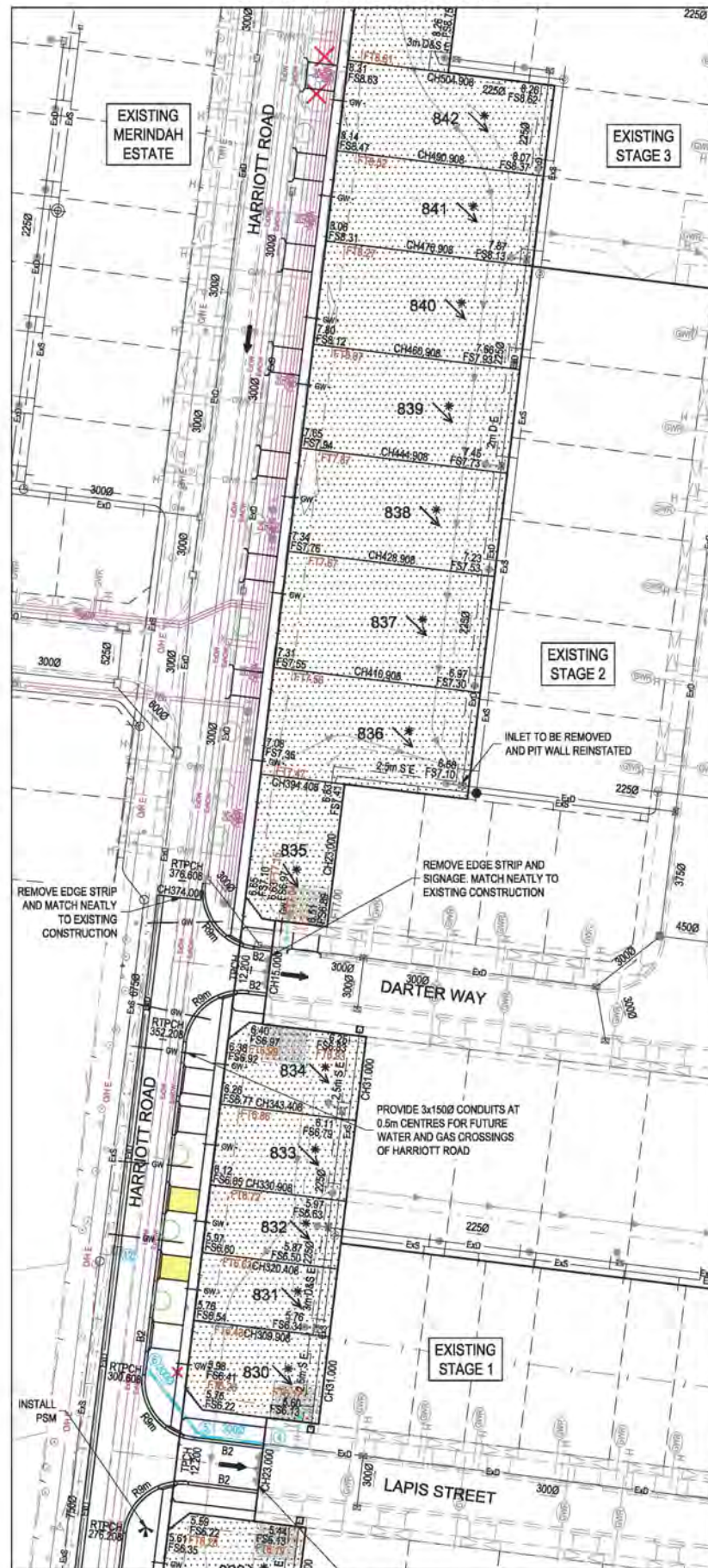
FIGURE 1

Harriott at Armstrong Creek Stage 8B - Layout Plan [0352-08B-R02 Rev B]

FOR CONTINUATION REFER BELOW RIGHT



FOR CONTINUATION REFER BELOW RIGHT



FOR CONTINUATION REFER ABOVE LEFT

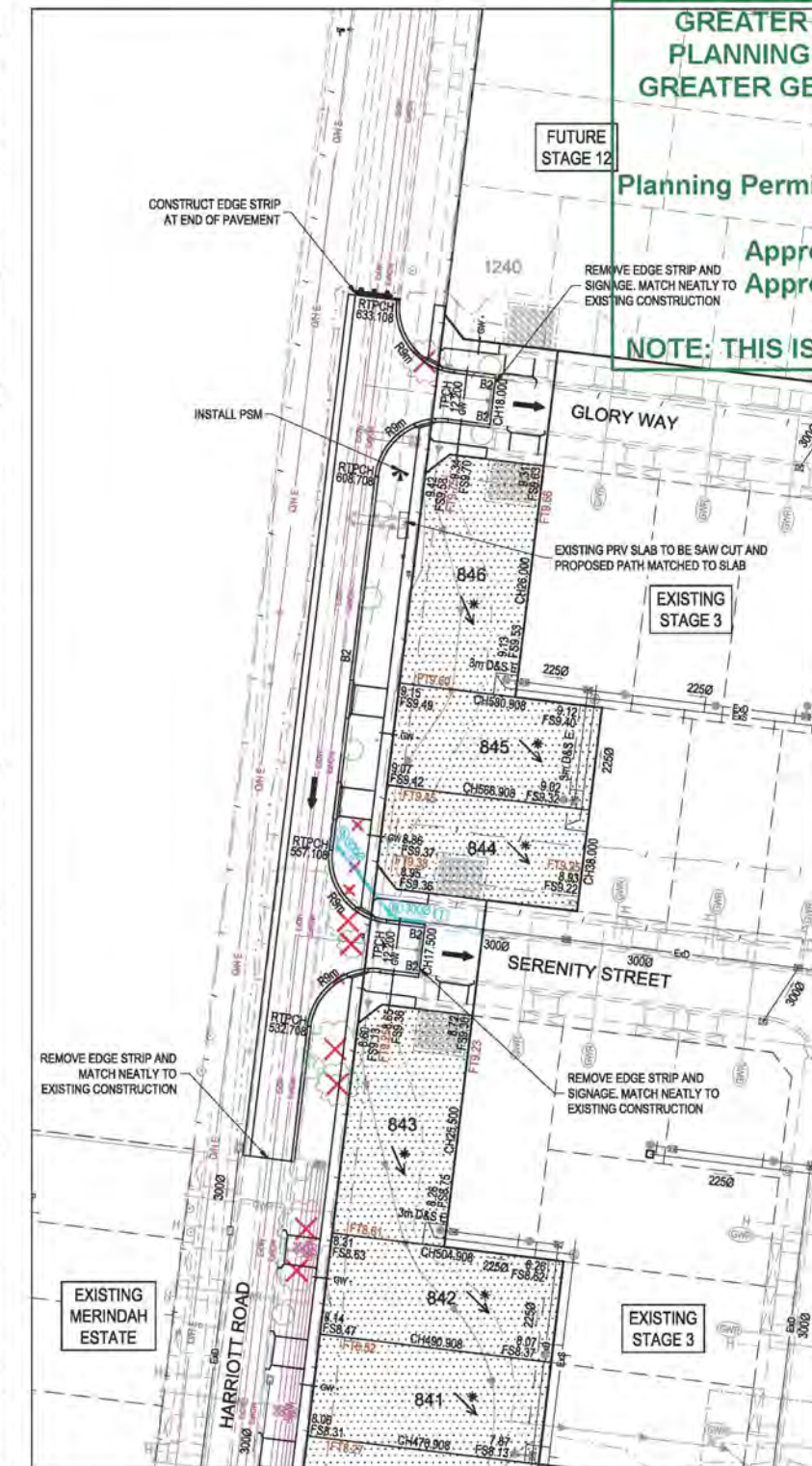
SERVICES OFFSET SCHEDULE

STREET NAME	ROAD RESERVE	BACK OF KERB	SEWER	GAS	NON DRINKING WATER	DRINKING WATER	COMMUNICATIONS	ELECTRICITY	LIGHT POLES
DARTER WAY	16.00	4.35	-	Ex 2.10 N	2.60 N	3.10 N	1.85 S	2.60 S	3.45 S
GLORY WAY	16.00	4.35	-	2.10 N	2.60 N	3.10 N	1.85 S	2.60 S	3.45 S
HARKNESS BOULEVARD	30.00	4.85	-	Ex 2.10 N	Ex 2.60 N	Ex 3.10 N	Ex 1.80 S	Ex 2.60 S	Ex 3.95 S
HARRIOTT ROAD (LOT 826 TO 834)	20.30	6.35 E	Ex 4.90 W	2.10 E	2.60 E, Ex 6.80-7.60 E	3.10 E, Ex 8.00-8.80 E	3.80 E	4.55 E, Ex OH 2.90 W	5.45 E
HARRIOTT ROAD (LOT 835 TO 843)	20.30	6.35 E	Ex 1.00 W	Ex 2.10 E	Ex 2.60 E, Ex 7.60-8.10 E	Ex 3.10 E, Ex 8.80-9.20 E	Ex 3.80 E	Ex 4.55 E, Ex OH 2.90 W	5.45 E
HARRIOTT ROAD (LOT 843 TO 846)	20.30	6.35 E	-	2.10 E	2.60 E, Ex 8.10-8.40 E	3.10 E, Ex 9.20-9.60 E	3.80 E	4.55 E, Ex OH 2.90 W	5.45 E
LAPIS STREET	16.00	4.35	-	2.10 N	2.60 N	3.10 N	1.85 S	2.60 S	3.45 S
PURITY WAY	16.00	4.35	-	2.10 N	2.60 N	3.10 N	1.85 S	2.60 S	3.45 S
SERENITY STREET	16.00	4.35	-	2.10 N	2.60 N	3.10 N	1.85 S	2.60 S	3.45 S

**GREATER GEELONG CITY COUNCIL
PLANNING ENVIRONMENT ACT 1987
GREATER GEELONG PLANNING SCHEME**

Endorsed Plan
Planning Permit No: PP-1389-2018 Cert 15635
Sheet 2 of 20
Approved By Jack Golden
Approved Date 28/10/2022

NOTE: THIS IS NOT A BUILDING APPROVAL



FOR CONTINUATION REFER ABOVE LEFT

VEHICLE CROSSINGS

STANDARD VEHICLE CROSSINGS ARE TO BE 4.0m WIDE OFFSET 1.0m FROM THE SIDE BOUNDARY		
NON STANDARD VEHICLE CROSSINGS ARE TO BE LOCATED AS PER BELOW		
LOT	WIDTH (m)	OFFSET (m)
827	3.7	1.00
828	3.7	1.00
831	3.7	1.00
832	3.7	1.00

NOTE: VEHICLE CROSSINGS

VEHICLE CROSSING FOR LOTS 825, 835 TO 843, 846 AND 1240 ARE TO BE CONNECTED TO EXISTING LAYBACK WITH 450mm LONG DOWEL BARS AT 400mm CENTRES

NOTE: EXISTING TURN AREAS

- EXISTING INDUSTRIAL VEHICLE CROSSINGS ARE TO BE REMOVED AND B2 KERB AND CHANNEL REINSTATED UNLESS LAYBACK REQUIRED FOR RESIDENTIAL VEHICLE CROSSING.
- EXISTING CRUSHED ROCK AREAS AND FENCING TO BE REMOVED AND DISPOSED OFFSITE.

NOTE: HOUSE DRAINS

- HOUSE DRAINS FOR LOTS 830 AND 835 ARE TO BE CONNECTED TO EXISTING DRAINAGE.
- HOUSE DRAIN TO LOT 830 IS TO BE OFFSET 3.0m FROM THE REAR BOUNDARY.

NOTE: SWALE DRAINS

EXISTING SWALE DRAINS TO BE EXCAVATED TO A SOUND BASE AND FILLED AS SPECIFIED.

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.

NOTE: TREES

EXISTING TREE TO BE REMOVED.

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.
DIAL 1100 BEFORE YOU DIG
www.1100.com.au

Rev	Amendment	Des/Dr	App'd	Date
A	Initial Issue	GP/DP	MG	09/08/22
B	Council amendments	GP/DP	MG	30/09/22

Legend		Existing Surface Level at Title	135.12
Existing Drainage	Ex D	Main Drainage	Finished Surface at Title
Existing Sewer	Ex S	Sewer	Level at Top/Toe of Batter/Ridge
Existing Gas	Ex G	Swale Drain	Centreline Chainage
Existing Electricity UG	Ex E	Gas & Water Conduits	Stepped Retaining Wall
Existing Electricity OH	Ex E	Direction of Lot Fall	Rock Retaining Wall
Existing Communications	Ex C	Direction of Overland Flow	PSM / TBM
Existing Drinking Water	Ex DW	Alignment to be Evidently Graded	Structural Fit > 200mm
Existing Non Drinking Water	Ex NDW	Vehicle Crossings	Concrete Infill
Existing Swale Drain	Ex SW		



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

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

Council City of Greater Geelong
Project **Harriott at Armstrong Creek Stage 8B**
Title Layout Plan
Designed: G.Pratt
Drafted: D.Pratt
Authorised: M.Graham
Date: August 2022

Scale @ A1: 1:500
Drawing No. **0352-08B-R02**
Sheet 02 of 20
Rev **B**

APPENDIX A

Field Density Test Report Summary Sheet

Project Summary Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Date: 08/11/2023
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: GSSW1689
Project Name: HARRIOT ESTATE STAGE 8B
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)
**	1689-S30	14/02/2023	Lot 845	**	**	**	Layer 1	105.0	4.5	19.1	2.06
**	1689-S31	14/02/2023	Lot 843	**	**	**	Layer 1	104.0	0.0	22.9	2.04
**	1689-S32	14/02/2023	Lot 841	**	**	**	Layer 1	97.5	-1.5	20.7	2.02
**	1689-S33	14/02/2023	Lot 839	**	**	**	Layer 1	98.5	-0.5	21.3	2.01
**	1689-S34	14/02/2023	Lot 837	**	**	**	Layer 1	98.0	4.0	18.2	2.06
**	1689-S35	14/02/2023	Lot 835	**	**	**	Layer 1	108.0	3.0	13.9	2.07
**	1689-S36	14/02/2023	Lot 833	**	**	**	Layer 2	106.5	3.0	12.9	2.03
**	1689-S37	14/02/2023	Lot 831	**	**	**	Layer 2	105.0	4.5	18.1	2.04
**	1689-S38	14/02/2023	Lot 829	**	**	**	Layer 2	103.0	4.5	13.7	2.02
**	1689-S39	14/02/2023	Lot 827	**	**	**	Layer 2	107.0	5.0	13.5	2.05
**	1689-S40	14/02/2023	Lot 825	**	**	**	Layer 2	103.0	2.0	17.7	2.06
**	1689-S47	17/05/2023	Lot 828	**	**	**	FSL	107.0	-2.0	27.0	2.08
**	1689-S48	17/05/2023	Lot 826	**	**	**	FSL	105.5	-2.0	26.3	2.08
**	1689-S49	17/05/2023	Lot 836	**	**	**	FSL	96.0	0.0	19.8	1.94
**	1689-S50	17/05/2023	Lot 844	**	**	**	FSL	102.0	1.5	15.8	2.00
**	1689-S51	17/05/2023	Lot 831	**	**	**	FSL	100.5	-0.5	21.5	2.03

Moisture Variation Note:

Positive values = test is dry of OMC

Negative values = test is wet of OMC

Geotechnical & Environmental Consultants



Geotechnical & Environmental Consultants



APPENDIX B

Field Density Test Report Sheets & Test Locations

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1689-3
Issue Number: 1
Date Issued: 16/02/2023
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: GSSW1689
Project Name: HARRIOT ESTATE STAGE 8B
Project Location: ARMSTRONG CREEK
Work Request: 14791
Dates Tested: 14/02/2023 - 15/02/2023
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: sandy CLAY, trace gravel, medium to high plasticity
Material Source: On Site

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	1689-S30	1689-S31	1689-S32	1689-S33	1689-S34	1689-S35
Date Tested	14/02/2023	14/02/2023	14/02/2023	14/02/2023	14/02/2023	14/02/2023
Time Tested	12:59	15:00	15:10	15:16	15:22	15:35
Test Request #/Location	Lot 845	Lot 843	Lot 841	Lot 839	Lot 837	Lot 835
Layer / Reduced Level	Layer 1	Layer 1	Layer 1	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	300	300	300	300	300	300
Soil Description	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity
Test Depth (mm)	275	275	275	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0	0	0	0
Field Wet Density (FWD) t/m ³	2.06	2.04	2.02	2.01	2.06	2.07
Field Moisture Content %	19.1	22.9	20.7	21.3	18.2	13.9
Field Dry Density (FDD) t/m ³	1.73	1.66	1.67	1.66	1.74	1.82
Peak Converted Wet Density t/m ³	1.96	1.97	2.07	2.04	2.10	1.91
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**	**	**
Moisture Variation (Wv) %	4.5	0.0	-1.5	-0.5	4.0	3.0
Adjusted Moisture Variation %	**	**	**	**	**	**
Hilf Density Ratio (%)	105.0	104.0	97.5	98.5	98.0	108.0
Compaction Method	Standard	Standard	Standard	Standard	Standard	Standard
Report Remarks	**	**	**	**	**	**

Moisture Variation Note:

Positive values = test is dry of OMC

Negative values = test is wet of OMC

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1689-3
Issue Number: 1
Date Issued: 16/02/2023
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: GSSW1689
Project Name: HARRIOT ESTATE STAGE 8B
Project Location: ARMSTRONG CREEK
Work Request: 14791
Dates Tested: 14/02/2023 - 15/02/2023
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: sandy CLAY, trace gravel, medium to high plasticity
Material Source: On Site

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

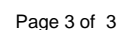
Sample Number	1689-S36	1689-S37	1689-S38	1689-S39	1689-S40	
Date Tested	14/02/2023	14/02/2023	14/02/2023	14/02/2023	14/02/2023	
Time Tested	15:43	15:53	16:18	16:26	16:35	
Test Request #/Location	Lot 833	Lot 831	Lot 829	Lot 827	Lot 825	
Layer / Reduced Level	Layer 2	Layer 2	Layer 2	Layer 2	Layer 2	
Thickness of Layer (mm)	300	300	300	300	300	
Soil Description	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	sandy CLAY, trace gravel, m-h plasticity	
Test Depth (mm)	275	275	275	275	275	
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	0	0	0	
Field Wet Density (FWD) t/m ³	2.03	2.04	2.02	2.05	2.06	
Field Moisture Content %	12.9	18.1	13.7	13.5	17.7	
Field Dry Density (FDD) t/m ³	1.80	1.73	1.78	1.80	1.75	
Peak Converted Wet Density t/m ³	1.91	1.94	1.96	1.91	2.00	
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**	**	
Moisture Variation (Wv) %	3.0	4.5	4.5	5.0	2.0	
Adjusted Moisture Variation %	**	**	**	**	**	
Hilf Density Ratio (%)	106.5	105.0	103.0	107.0	103.0	
Compaction Method	Standard	Standard	Standard	Standard	Standard	
Report Remarks	**	**	**	**	**	

Moisture Variation Note:

Positive values = test is dry of OMC

Negative values = test is wet of OMC

Geotechnical & Environmental Consultants



Material Test Report

Report Number: GSSW1689-4
Issue Number: 1
Date Issued: 19/05/2023
Client: BILD GROUP (CAMPBELLFIELD, VIC)



Ground Science South West

Geotechnical & Environmental Consultants

Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566

Email: chrism@groundscience.com.au

Project Number: GSSW1689
Project Name: HARRIOT ESTATE STAGE 8B
Project Location: ARMSTRONG CREEK
Work Request: 15721
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



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	1689-S47	1689-S48	1689-S49	1689-S50	1689-S51
Date Tested	17/05/2023	17/05/2023	17/05/2023	17/05/2023	17/05/2023
Time Tested	12:40	12:45	12:50	12:58	13:06
Test Request #/Location	Lot 828	Lot 826	Lot 836	Lot 844	Lot 831
Layer / Reduced Level	FSL	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	300	300	300	300	300
Soil Description	CLAY, with sand, trace gravel, m-h PI	CLAY, with sand, trace gravel, m-h PI	CLAY, with sand, trace gravel, m-h PI	CLAY, with sand, trace gravel, m-h PI	CLAY, with sand, trace gravel, m-h PI
Test Depth (mm)	275	275	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0	0	0
Field Wet Density (FWD) t/m ³	2.08	2.08	1.94	2.00	2.03
Field Moisture Content %	27.0	26.3	19.8	15.8	21.5
Field Dry Density (FDD) t/m ³	1.64	1.65	1.62	1.73	1.67
Peak Converted Wet Density t/m ³	1.94	1.98	2.02	1.96	2.02
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**	**
Moisture Variation (Wv) %	-2.0	-2.0	0.0	1.5	-0.5
Adjusted Moisture Variation %	**	**	**	**	**
Hilf Density Ratio (%)	107.0	105.5	96.0	102.0	100.5
Compaction Method	Standard	Standard	Standard	Standard	Standard
Report Remarks	**	**	**	**	**

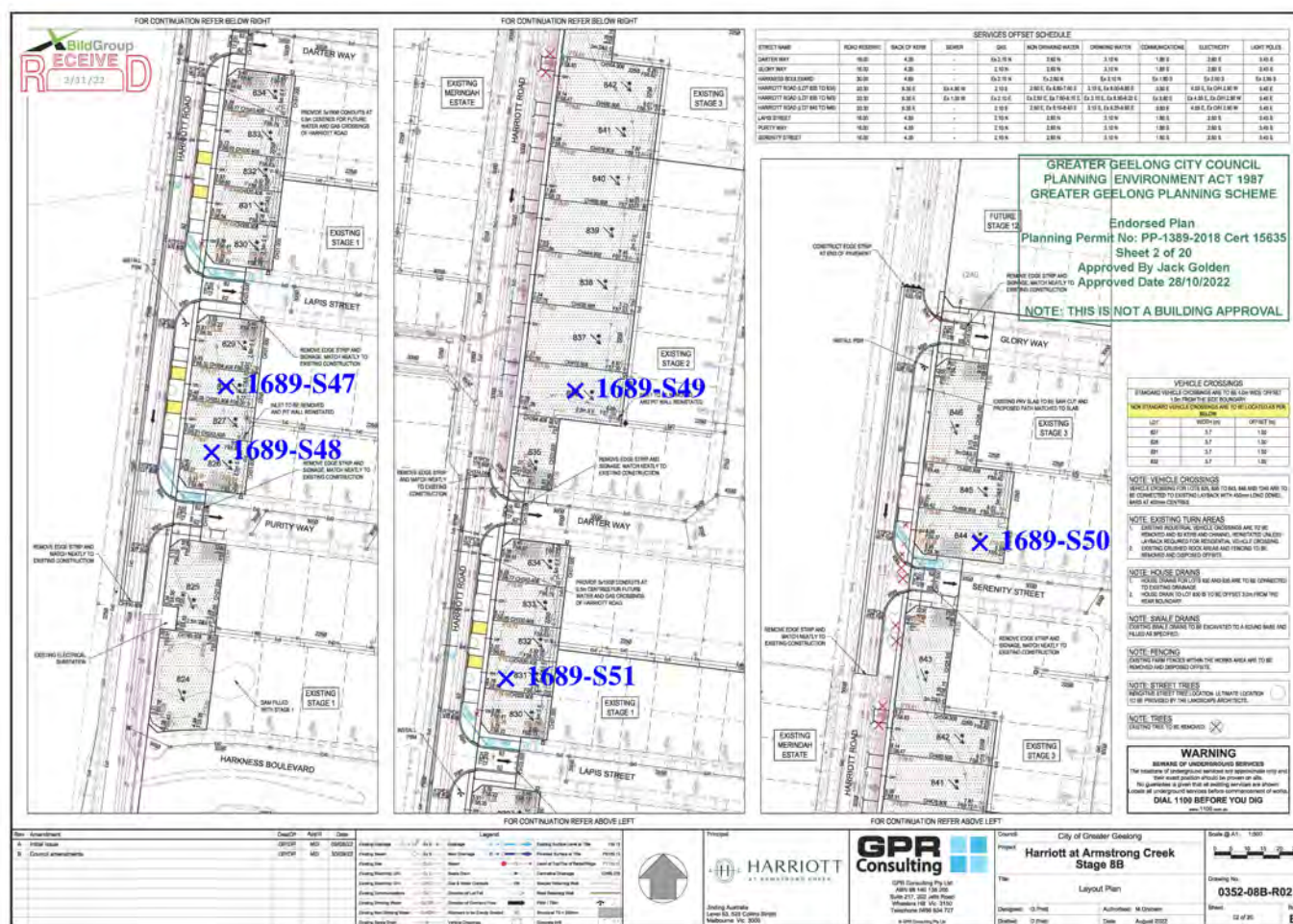
Moisture Variation Note:

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

x - approximate test location



Geotechnical & Environmental Consultants



APPENDIX C

Site Photographs



