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LEVEL 1 INSPECTION & TESTING HARRIOTT ESTATE STAGE 3 ARMSTRONG CREEK

Prepared for BILD Group Pty Ltd

Report Reference: GSSW1250.1 AA

Date: 23 June 2021

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PROJECT DETAILS

Project Reference	GSSW1250.1	Rev	AA
Project Title	Harriott Estate Stage 3		
Project Location	Armstrong Creek	State	VIC
Date	23 June 2021		

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
Graduate Geotechnical Engineer

REVIEWED:

Gee Singh, MIEAust (NER)
Senior Geotechnical Engineer

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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 3 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 3. 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'). Creo Consultants 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 Creo Consultants Pty Ltd (Harriott Estate - Stage 3 Layout Plan [170164.3 R200 Rev 0]).

This report details the Level 1 earthworks process performed on site which commenced on 2nd of June 2021 and was completed on the same day, requiring 1 full day 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 250mm 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 involvement in the project. It is understood that BILD Group removed all organics, topsoil and compressible (soft) soils between 1st and 2nd June 2021. Inspection of the newly prepared subgrade surface was carried out on 2nd of June 2021 by the representative geotechnician from Ground Science South West. At the time of the inspection, the prepared subgrade was observed to be generally dry of optimum moisture content. The subgrade surface was tined by a bulldozer, then moisture contented using a water cart. 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 onsite. 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, medium to high plasticity, brown, trace sand, moist. Quality assurance tests were performed on the stockpiled fill material, as the selected fill material had undergone testing as part of Stage 1. These tests include California Bearing Ratio and Triaxial Permeability tests, and the results are in Appendix A of this report. Ground Science did not perform any 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 fine with temperatures typically ranging from 7 to 20 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 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 3 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 3 "Rapid HILF" Compaction tests (AS1289 5.7.1).

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. 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 by the technical specification provided in AS3798 (2007).

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
Graduate Geotechnical Engineer

REVIEWED:



Gee Singh
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.

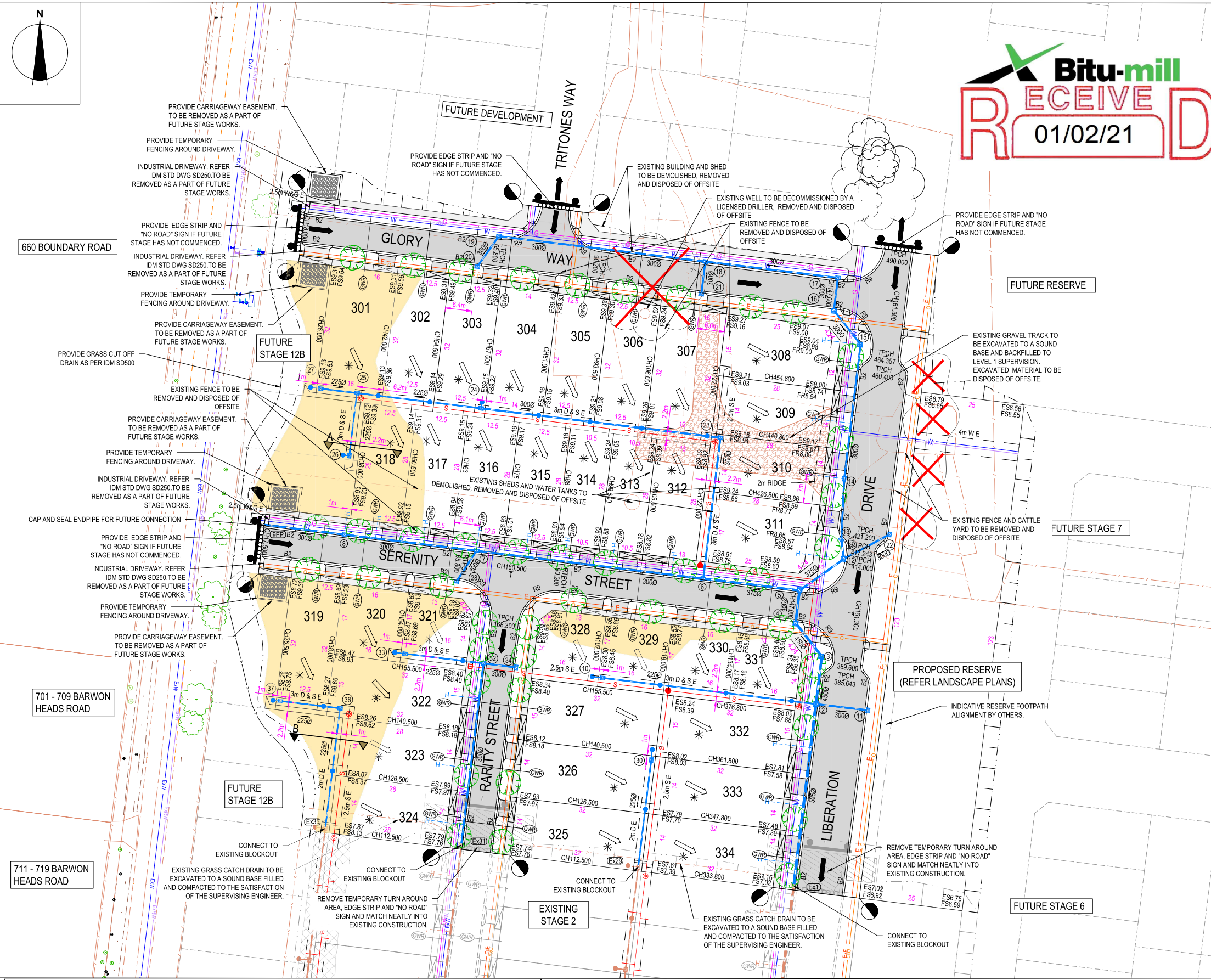
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8. REFERENCES

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

FIGURE 1

Harriott Estate - Stage 3 Layout Plan [170164.3 R200 Rev 0]



- NOTES:**
1. ALL VEHICLE AND PRAM CROSSING LAYBACKS, TO BE MINIMUM OF 1.0m FROM PITS.
 2. ALL PRAM CROSSINGS TO BE A MINIMUM 2.0m FROM VEHICLE CROSSINGS.
 3. ALL PRAM CROSSINGS TO BE DDA COMPLIANT.
 4. VEHICLE EXCLUSION MEASURES BETWEEN ROAD RESERVE AND RESERVE TO FORM PART OF LANDSCAPE WORKS.
 5. THE USE OF DIRECTIONAL AND HAZARD TACTILE PAVERS MUST ACCORD WITH SECTION 2.2.3.1 OF AS/NZS 1428.4:2002.
 6. SEWER MAINTENANCE HOLE CONVERTER SLAB OR CONE, TO BE ROTATED TO ENSURE COVER POSITION IS CENTRALLY LOCATED WITHIN FOOTPATH.
 7. CHAINAGES FOR SETOUT OF PROPERTY INLET POINTS, SERVICING FUTURE LOTS, ARE MEASURED FROM THE DOWNSTREAM PIT.
 8. CONTRACTOR TO LOCATE ALL EXISTING ASSETS PRIOR TO COMMENCEMENT OF WORKS. ANY DAMAGE TO EXISTING ASSETS TO BE RECTIFIED AT CONTRACTORS EXPENSE.
 9. CONTRACTOR TO VERIFY DEPTH OF EXISTING SERVICES, PRIOR TO COMMENCEMENT OF CONSTRUCTION.

LEGEND - LAYOUT PLAN

- STORMWATER DRAIN, PIT & PROPERTY INLET
- SEWER & MAINTENANCE STRUCTURES
- HOUSE DRAIN
- SERVICE CONDUITS
- EXISTING ELECTRICITY (UNDERGROUND)
- EXISTING ELECTRICITY (OVERHEAD)
- EXISTING GAS
- EXISTING OPTIC FIBRE
- EXISTING TELSTRA
- EXISTING WATER
- EXISTING RECYCLED WATER
- EXISTING STORMWATER DRAIN
- EXISTING SEWER
- EXISTING SURFACE LEVEL
- FINISHED BUILDING LINE LEVEL
- FINISHED RIDGE LINE LEVEL
- STRUCTURAL FILL > 200mm DEEP
- EX. STRUCTURAL FILL > 200mm DEEP
- DIRECTION OF FALL
- OVERLAND FLOW
- ALLOTMENT TO BE GRADED EVENLY IN
- DIRECTION OF FALL TO LEVELS INDICATED
- CONCRETE EDGE STRIP WITH SUBSOIL DRAIN
- "NO ROAD" SIGN & BARRIER
- LIMIT OF WORKS
- EXISTING TREE TO BE REMOVED
- PERMANENT SURVEY MARK
- TEMPORARY BENCH MARK
- PROPOSED DRIVEWAY

CITY OF GREATER GEELONG TO STAMP HERE UPON APPROVAL

SECTION A
NOT TO SCALE

SECTION B
NOT TO SCALE

WARNING
BEWARE OF UNDERGROUND & OVERHEAD SERVICES

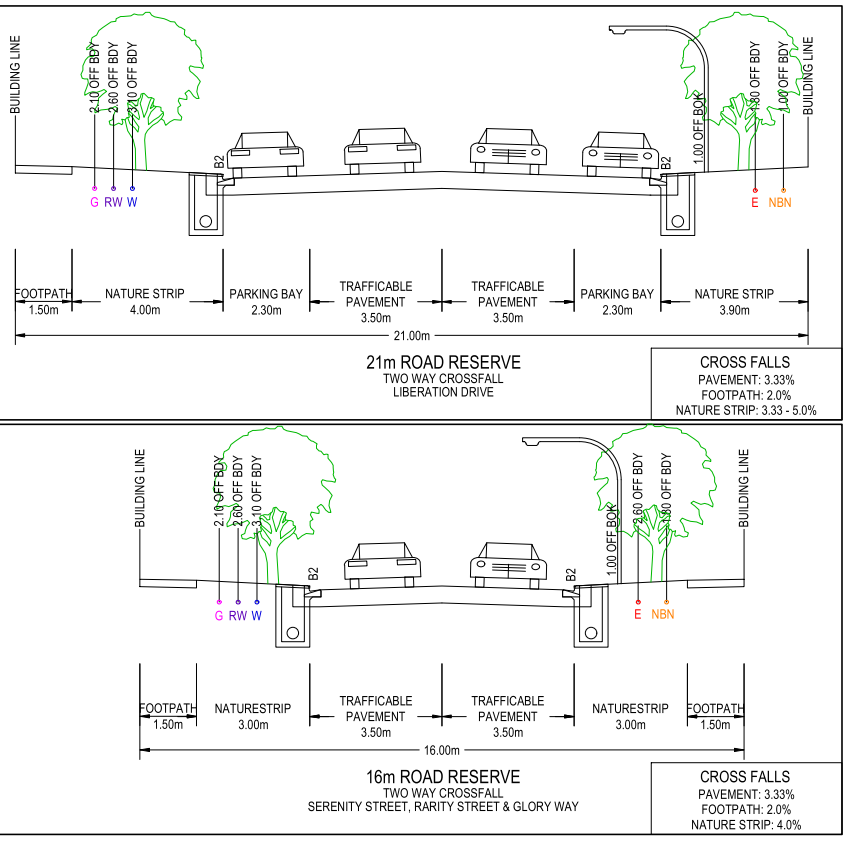
The locations of underground & overhead services are approximate only & their exact position should be proven on site. No guarantee is given that all existing services are shown. Locate all underground services before commencement of works.

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SERVICES OFFSET SCHEDULE												
ROAD NAME	GAS		RECYCLED WATER		WATER		OPTIC FIBRE		ELECTRICITY		PUBLIC LIGHTING	
	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)
LIBERATION DRIVE	WEST	2.10	WEST	2.60	WEST	3.10	EAST	1.00	EAST	1.80	EAST	1.00*
RARITY STREET	WEST	2.10	WEST	2.60	WEST	3.10	EAST	1.80	EAST	2.60	EAST	1.00*
SERENITY STREET	NORTH	2.10	NORTH	2.60	NORTH	3.10	SOUTH	1.80	SOUTH	2.60	SOUTH	1.00*
GLORY WAY	NORTH	2.10	NORTH	2.60	NORTH	3.10	SOUTH	1.80	SOUTH	2.60	SOUTH	1.00*
TRITONES WAY	WEST	2.10	WEST	2.60	WEST	3.10	EAST	1.80	EAST	2.60	EAST	1.00*

REVISION	DATE	ISSUE DESCRIPTION	DRAWN	CHECKED	APPROVED
0	13/11/20	CONSTRUCTION ISSUE	C.ROHDE	M.TROUNCE	T.PALIOS
A	14/08/20	ISSUED FOR APPROVAL	C.ROHDE	M.TROUNCE	T.PALIOS

NOTE: STREET TREE LOCATIONS SHOWN ARE INDICATIVE ONLY. ULTIMATE LOCATION IS TO BE PROVIDED/CONFIRMED BY LANDSCAPE ARCHITECTS



HARRIOTT ESTATE - STAGE 3 LAYOUT PLAN

ISSUED FOR CONSTRUCTION

SCALE AT A1	DRAWN	DESIGNED
1:500 @ A1	C.ROHDE	C.ROHDE
PROJECT ENGINEER	PROJECT MANAGER	DATE FIRST ISSUE
M.TROUNCE	T.PALIOS	AUGUST 2020
PROJECT No.	DRAWING No.	REVISION
170164.3	R200	0

APPENDIX A

California Bearing Ratio & Triaxial Permeability Test Report Sheets

Material Test Report

Report Number: GSSW1017-7
Issue Number: 1
Date Issued: 20/10/2020
Client: BITU MILL (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: GSSW1017
Project Name: HARRIOTT ESTATE STAGE 1
Project Location: ARMSTRONG CREEK
Work Request: 7815
Sample Number: 1017-S7
Date Sampled: 03/10/2020
Dates Tested: 03/10/2020 - 16/10/2020
Sampling Method: AS 1289.1.2.1 6.5.1 - Sampling from hand excavated pit or trench
Sample Location: Wet Lands E: 55H 0270508, N: 5765367, Depth: Insitu
Material: CLAY, trace sand, brown, medium to high plasticity, moist



Accredited for compliance with ISO/IEC 17025 - Testing

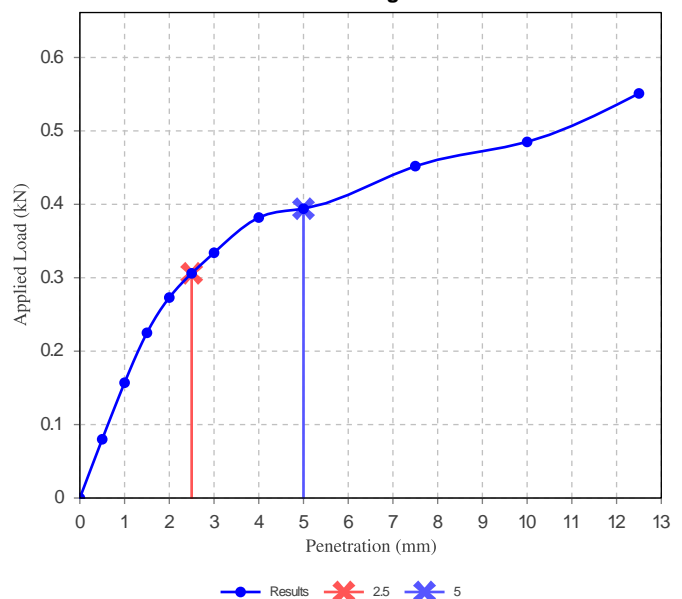
Approved Signatory: Chris Mamalis
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	2.5		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.61		
Optimum Moisture Content (%)	23.5		
Laboratory Density Ratio (%)	98.5		
Laboratory Moisture Ratio (%)	98.5		
Dry Density after Soaking (t/m^3)	1.52		
Field Moisture Content (%)			
Moisture Content at Placement (%)	23.1		
Moisture Content Top 30mm (%)	30.9		
Moisture Content Rest of Sample (%)	23.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	171.6		
Swell (%)	3.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		
Sample remoulded as per Vic Roads Code of Practice RC 500.16			

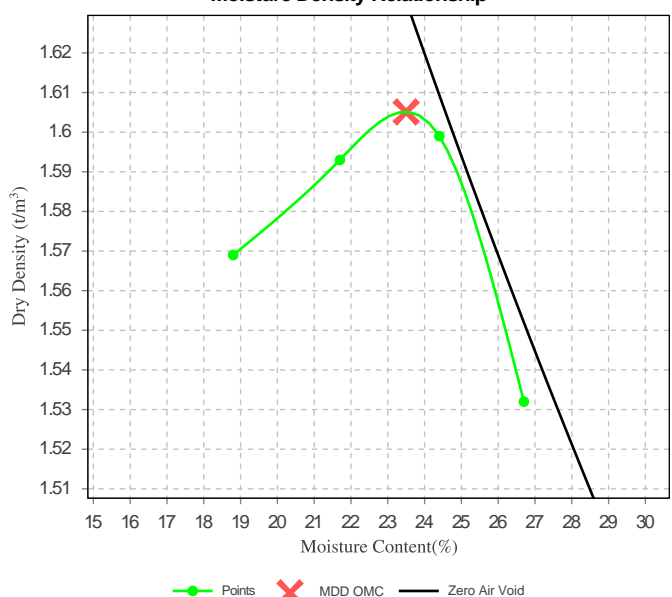
Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	1 LITRE MOULD A
Compaction	Standard
Maximum Dry Density (t/m^3)	1.61
Optimum Moisture Content (%)	23.5
Oversize Sieve (mm)	19
Oversize Material Wet (%)	0
Method used to Determine Plasticity	Visual Assessment
Curing Hours	120.5

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	24.2

California Bearing Ratio



Moisture Density Relationship



Material Test Report

Report Number: GSSW1017-7
Issue Number: 1
Date Issued: 20/10/2020
Client: BITU MILL (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: GSSW1017
Project Name: HARRIOTT ESTATE STAGE 1
Project Location: ARMSTRONG CREEK
Work Request: 7815
Sample Number: 1017-S8
Date Sampled: 03/10/2020
Dates Tested: 03/10/2020 - 16/10/2020
Sampling Method: AS 1289.1.2.1 6.5.1 - Sampling from hand excavated pit or trench
Sample Location: Wetlands E: 55H 0270503, N: 5765350, Depth: Insitu
Material: CLAY, trace sand, brown, medium to high plasticity, moist



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Chris Mamalis

Laboratory Manager

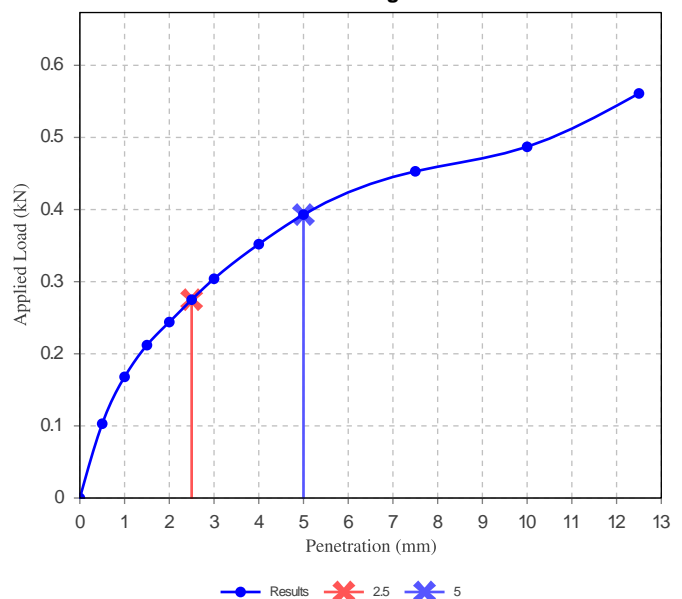
NATA Accredited Laboratory Number: 20109

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	2.0		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m ³)	1.53		
Optimum Moisture Content (%)	24.5		
Laboratory Density Ratio (%)	97.5		
Laboratory Moisture Ratio (%)	102.5		
Dry Density after Soaking (t/m ³)	1.44		
Field Moisture Content (%)			
Moisture Content at Placement (%)	25.0		
Moisture Content Top 30mm (%)	36.9		
Moisture Content Rest of Sample (%)	26.5		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	170.9		
Swell (%)	3.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		
Sample remoulded as per Vic Roads Code of Practice RC 500.16			

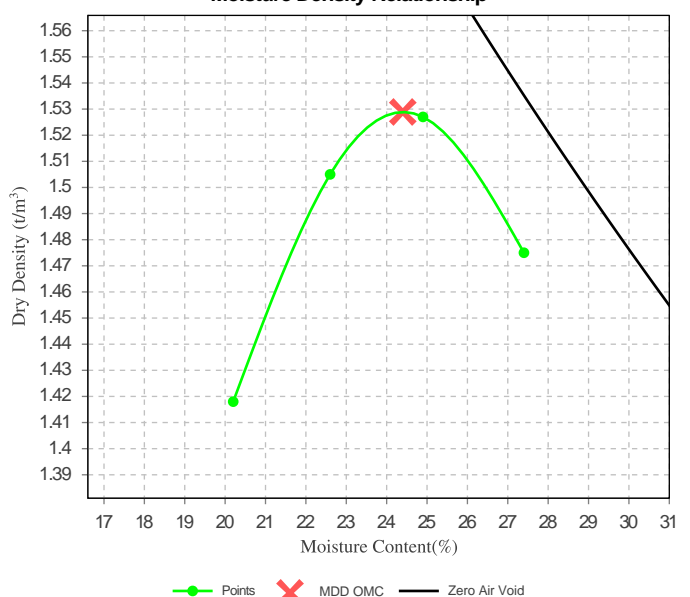
Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)	
Mould Type	1 LITRE MOULD A
Compaction	Standard
Maximum Dry Density (t/m ³)	1.53
Optimum Moisture Content (%)	24.5
Oversize Sieve (mm)	19
Oversize Material Wet (%)	0
Method used to Determine Plasticity	Visual Assessment
Curing Hours	119.9

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	27.7

California Bearing Ratio



Moisture Density Relationship





Ground Science

A C N 105 704 078

13 Brock Street Thomastown VIC, P 03 9464 4617 Email reception@groundscience.com.au



PERMEABILITY - CONSTANT HEAD (Triaxial method) AS1289 6.7.3

Client :	BITU MILL (CAMPBELLFIELD, VIC)		Job No.	GS5117/1
Project:	HARRIOTT ESTATE STAGE 1		Report No.	DM
Location:	ARMSTRONG CREEK		Test date:	13/10/2020
			Page:	1

Sample identification		# 77
Borehole / test pit		GSSW1017-S7 / WetLands E: 55H 0270508, N: 5765367
Depth, m		Insitu

Sample diameter	mm	71.63
Sample height	mm	71.58
Specimen wet density	t/m3	1.950
Specimen dry density	t/m3	1.58
Moisture content	%	23.2
Cell pressure	kPa	500
Inlet pressure	kPa	460
Outlet pressure	kPa	440
Mean effective stress	kPa	50
Hydraulic head	kPa	20
Saturation	%	96
PERMEABILITY	m/sec	2.E-11
Water type	de-aired - filtered	
Specimen description	CLAY, medium to high plasticity, brown, trace sand	
Notes:	Sample remoulded to a target of 98% SMDD @ OMC MDD = 1.61 t/m3 OMC = 23.5 % Density Ratio = 98.5 %	

Comments	Sampled by Client, tested as received. MDD & OMC supplied by Client.
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 <p>ACCREDITED FOR TECHNICAL COMPETENCE</p>	NATA Accredited Laboratory No. 15055 Accredited for compliance with ISO/IEC 17025 - Testing	Date of issue 20/10/2020 Ernie Gmehling Approved Signatory	
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Ground Science

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PERMEABILITY - CONSTANT HEAD (Triaxial method) AS1289 6.7.3

Client :	BITU MILL (CAMPBELLFIELD, VIC)		Job No.	GS5117/1
Project:	HARRIOTT ESTATE STAGE 1		Report No.	DN
Location:	ARMSTRONG CREEK		Test date:	13/10/2020
			Page:	1

Sample identification		# 78	
Borehole / test pit		GSSW1017-S8 / WetLands E: 55H 0270503, N: 5765350	
Depth, m		Insitu	

Sample diameter	mm	71.63
Sample height	mm	71.69
Specimen wet density	t/m3	1.865
Specimen dry density	t/m3	1.50
Moisture content	%	24.1
Cell pressure	kPa	560
Inlet pressure	kPa	520
Outlet pressure	kPa	500
Mean effective stress	kPa	50
Hydraulic head	kPa	20
Saturation	%	100
PERMEABILITY	m/sec	2.E-11
Water type	de-aired - filtered	
Specimen description	CLAY, medium to high plasticity, brown, trace sand	
Notes:	Sample remoulded to a target of 98% SMDD @ OMC MDD = 1.53 t/m3 OMC = 24.5 % Density Ratio = 98.5 %	

Comments	Sampled by Client, tested as received. MDD & OMC supplied by Client.
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 <p>ACCREDITED FOR TECHNICAL COMPETENCE</p>	NATA Accredited Laboratory No. 15055 Accredited for compliance with ISO/IEC 17025 - Testing	Date of issue 20/10/2020 Ernie Gmehling Approved Signatory	
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APPENDIX B

Field Density Test Report Sheets & Test Locations

Material Test Report

Report Number: GSSW1250-1
Issue Number: 1
Date Issued: 04/06/2021
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: tomas@groundscience.com.au

Project Number: GSSW1250
Project Name: HARRIOT ESTATE STAGE 3
Project Location: ARMSTRONG CREEK
Work Request: 9684
Date Sampled: 02/06/2021
Dates Tested: 02/06/2021 - 04/06/2021
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
Lot Number: Lots 322,301,318
Material: sandy CLAY, light brown
Material Source: Insitu



Accredited for compliance with ISO/IEC 17025 - Testing

Tomas Wheadon

Approved Signatory: Tomas Wheadon
 Field & Laboratory Technician
 NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

Sample Number	1250-S1	1250-S2	1250-S3
Date Tested	02/06/2021	02/06/2021	02/06/2021
Time Tested	16:06	16:13	16:22
Test Request #/Location	Harriott Stage 3 Lot 322	Harriott Stage 3 Lot 301	Harriott Stage 3 Lot 318
Chainage (m)	See attached plan	See attached plan	See attached plan
Location Offset (m)	-	-	-
Layer / Reduced Level	Final Layer	Final Layer	Final Layer
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY, light brown	sandy CLAY, light brown	sandy CLAY, light brown
Test Depth (mm)	175	175	175
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	1.97	1.98	1.94
Field Moisture Content %	20.7	30.2	22.0
Field Dry Density (FDD) t/m ³	1.63	1.52	1.59
Peak Converted Wet Density t/m ³	1.93	1.98	1.94
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Moisture Variation (Wv) %	2.5	2.5	2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	102.0	99.5	100.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

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

Geotechnical & Environmental Consultants



APPENDIX C

Site Photographs













