

ABN: 51 612 825 313

10 Dowsett Street

South Geelong, Vic, 3220

(P) +61 3 5282 1566



LEVEL 1 INSPECTION & TESTING CORIDALE ESTATE STAGE 8 LARA

Prepared for Creo Consultants Pty Ltd

Report Reference: GSSW1431.1 AA

Date: 16 June 2022

ABN: 51 612 825 313

10 Dowsett Street

South Geelong, Vic, 3220

(P) +61 3 5282 1566



PROJECT DETAILS

Project Reference	GSSW1431.1	Rev	AA
Project Title	Coridale Estate Stage 8		
Project Location	Lara	State	VIC
Date	16 June 2022		

CLIENT DETAILS

Prepared For (Client)	Creo Consultants Pty Ltd
Client Address	Level 7/176 Wellington Parade, East Melbourne VIC 3002

DISTRIBUTION

Original Held By	Ground Science South West Pty Ltd
One (1) Electronic Copy	Creo Consultants 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

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	4
7. LIMITATIONS.....	5
8. REFERENCES	6

FIGURES

FIGURE 1 CORIDALE ESTATE - STAGE 8 LAYOUT PLAN – 1 [NO. 180014.8 R200 REV 0]

APPENDICES

APPENDIX A PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS TEST REPORT SHEETS
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 Coridale Estate Stage 8 project, located in Lara, 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 Coridale Estate Stage 8. Ground Science was engaged to provide Level 1 Inspection and Testing services for the construction of these areas. Authorisation to proceed was provided by Creo Consultants Pty Ltd (the 'Client').

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 (Coridale Estate - Stage 8 Layout Plan – 1 [No. 180014.8 R200 Rev 0]).

This report details the Level 1 earthworks process performed on site which commenced on 21st of January 2022 and was completed on the 23rd of April 2022, requiring 4 full days and 4 half 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 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

It is understood that the on-site contractor, Winslow Constructors removed all organics, topsoil and compressible (soft) soils between the 18th of January and the 20th of January 2022. Inspection of the prepared subgrade surface was carried out on 21st of January 2022 by the representative geotechnician from Ground Science South West. At the time of the inspection, the prepared subgrade was deemed acceptable, proof rolled with a 20T water truck and considered suitable for subsequent works to proceed. After this inspection, boulders were found inside the road cuttings, prompting further stripping works. A supplementary inspection of the prepared subgrade was carried out on the 21st of March 2022 by the representative geotechnician from Ground Science South West. At the time of the inspection, the prepared subgrade was deemed acceptable, proof rolled with a 20T water truck and considered suitable for subsequent works to proceed.

It is important to note that this further stripping past the levels nominated on the plans has resulted in an increase in areas that require Level 1 Inspection and Testing.

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 materials used for the project were 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 gravelly CLAY (CH), high plasticity, brown, with sand, moist. Quality assurance tests were performed on the stockpiled fill material before placement during the construction of a previous stage of works. These tests include Particle Size Distribution and Atterberg Limits tests. The test report sheets are presented in Appendix A. 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;
- Grader;

- Scraper;
- Excavator;
- Water Cart;
- Compactor.

During fill placement, the weather conditions ranged from windy to rainy with temperatures typically ranging from 30 to 12 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 grader into thin, loose layers. These layers were 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.

Rain was forecasted multiple times over the course of the works. A sacrificial layer of material was placed by a compactor to protect the previously placed and tested layers from rain. This material was removed when works recommenced 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 12 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 12 "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. One test area (#3) failed to meet the required moisture condition. This area was subsequently reworked, recompacted and retested (#4) with compliant test results achieved. This area was reworked and retested. No areas failed to reach 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 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 South West Pty Ltd**

AUTHOR:



**Michael Knez
Graduate Geotechnical Engineer**

REVIEWED:



**Gee Singh, MIEAust (NER)
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.



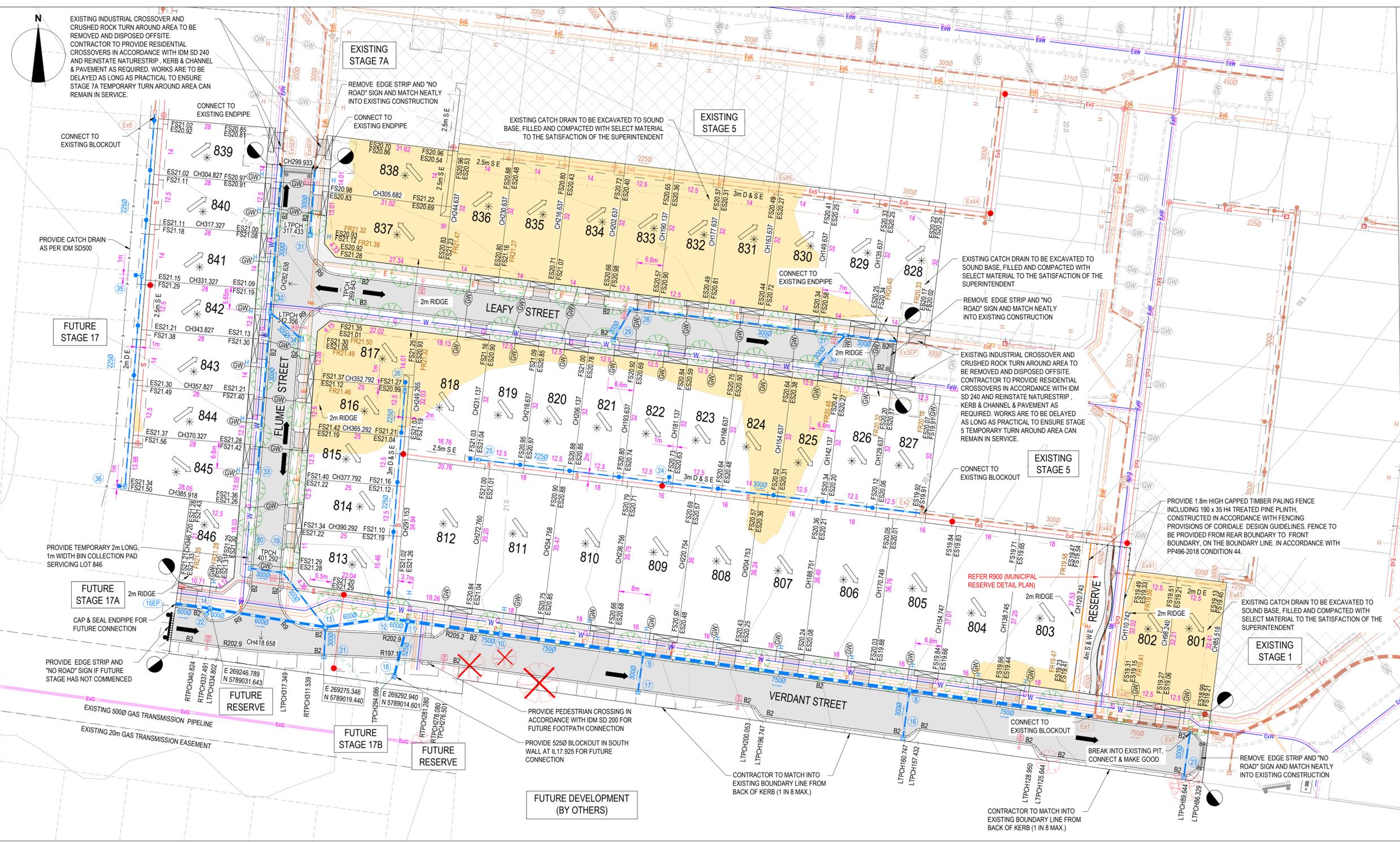
GroundScience

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

Coridale Estate - Stage 8 Layout Plan – 1 [No. 180014.8 R200 Rev 0]



CITY OF GREATER GEELONG TO STAMP HERE UPON APPROVAL

LEGEND - LAYOUT PLAN

- STORMWATER DRAIN & PIT
- SWALE DRAIN
- SEWER & MAINTENANCE STRUCTURES
- HOUSE DRAIN
- PROPERTY INLET PIT
- 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
- PAVEMENT TREATMENT
- 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
- 1.8m HIGH CAPPED TIMBER PALING FENCE INCLUDING 190 x 35 H4 TREATED PINE PLINTH

NOTES:

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

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

NOTE: PUBLIC LIGHT POLE LOCATIONS SHOWN ARE INDICATIVE ONLY. ULTIMATE LOCATION IS TO BE PROVIDED/CONFIRMED BY ELECTRICAL CONSULTANTS

SERVICES OFFSET SCHEDULE

ROAD NAME	GAS		WATER		OPTIC FIBRE		ELECTRICITY		PUBLIC LIGHTING	
	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)	SIDE	OFFSET (m)
VERDANT STREET (EAST LIMIT OF WORKS ONLY)	NORTH	3.80	NORTH	4.30	NORTH	1.85	NORTH	2.40	SOUTH	1.00*
VERDANT STREET	NORTH	2.10	NORTH	2.70	NORTH	3.50	NORTH	4.25	SOUTH	1.00*
FLUME STREET	WEST	2.10	WEST	2.70	EAST	1.85	EAST	2.40	EAST	1.00*
LEAFY STREET	SOUTH	2.10	SOUTH	2.70	NORTH	1.85	NORTH	2.40	NORTH	1.00*
RESERVE	EAST	2.10	EAST	2.60	WEST	1.00	WEST	1.60	-	-

1. * DENOTES OFFSET FROM BACK OF KERB

WARNING
EXISTING 5000 APA GAS TRANSMISSION PIPELINE IN VICINITY OF WORKS. CONTRACTOR TO REFER TO APA CONDITIONS. WRITTEN CONSENT APPROVED FROM APA FOR WORKS WITHIN THE GAS TRANSMISSION EASEMENT

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



REVISION	DATE	ISSUE DESCRIPTION	DRAWN	DESIGNED	APPROVED
0	10/11/21	ISSUED FOR CONSTRUCTION	C.ROHDE	C.ROHDE	M.TROUNCE
B	20/10/21	TENDER ISSUE	C.ROHDE	C.ROHDE	M.TROUNCE
A	27/08/21	ISSUED FOR APPROVAL	C.ROHDE	C.ROHDE	M.TROUNCE

villawood properties
Communities Designed for Living

creo CONSULTANTS
Suite 1, 2 Bloomsbury Street
Geelong, VIC, Australia 3220

Coridale
LARA

CORIDALE ESTATE - STAGE 8 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	M.TROUNCE	AUGUST 2021
PROJECT No.	DRAWING No.	REVISION
180014.8	R200	0

APPENDIX A

Particle Size Distribution and Atterberg Limits Test Report Sheets

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1029-1
Issue Number: 1
Date Issued: 19/10/2020
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1029
Project Name: CORIDALE ESTATE STAGE 4
Work Request: 7868
Sample Number: 1029-S1
Date Sampled: 12/10/2020
Dates Tested: 12/10/2020 - 16/10/2020
Sampling Method: AS 1289.1.2.1 6.2 - Sampling from stockpiles
Remarks: Material classified as per AS 1726:2017
Sample Location: Stockpile 1 (Winslow)
Material: CH - CLAY, with sand, trace gravel, brown, high plasticity, sand 18% fine to coarse grained, gravel 15% fine to medium.
Material Source: Onsite

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



Accredited for compliance with ISO/IEC 17025 - Testing

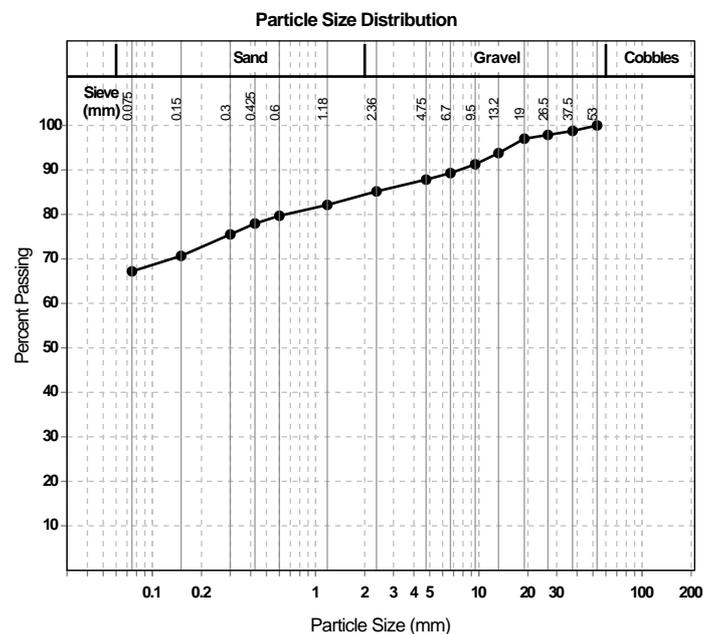
Approved Signatory: Chris Mamalis
 Laboratory Manager
 NATA Accredited Laboratory Number: 20109

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
53 mm	100		0	
37.5 mm	99		1	
26.5 mm	98		1	
19 mm	97		1	
13.2 mm	94		3	
9.5 mm	91		3	
6.7 mm	89		2	
4.75 mm	88		1	
2.36 mm	85		3	
1.18 mm	82		3	
0.6 mm	80		2	
0.425 mm	78		2	
0.3 mm	76		2	
0.15 mm	71		5	
0.075 mm	67		3	

Moisture Content (AS1289.2.1.1)	
Moisture Content (%)	29.8

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	74		
Plastic Limit (%)	24		
Plasticity Index (%)	50		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	18.0		
Cracking Crumbling Curling	Cracking & Curling		



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1029-1
Issue Number: 1
Date Issued: 19/10/2020
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1029
Project Name: CORIDALE ESTATE STAGE 4
Work Request: 7868
Sample Number: 1029-S2
Date Sampled: 12/10/2020
Dates Tested: 12/10/2020 - 15/10/2020
Sampling Method: AS 1289.1.2.1 6.2 - Sampling from stockpiles
Remarks: Material classified as per AS 1726:2017
Sample Location: Stockpile 2 (BituMill)
Material: CH - gravelly CLAY, with sand, brown, high plasticity, 36% gravel fine to coarse, sand 23% fine to coarse grained.
Material Source: Onsite

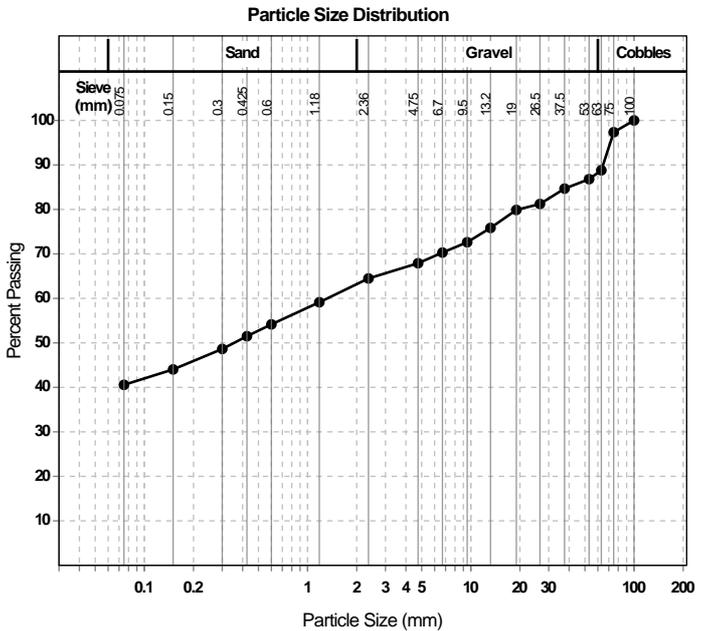
Ground Science South West Pty Ltd
 10 Dowsett Street South Geelong Vic 3220
 Phone: (03) 5282 1566
 Email: chrism@groundscience.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

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

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
100 mm	100		0	
75 mm	97		3	
63 mm	89		9	
53 mm	87		2	
37.5 mm	85		2	
26.5 mm	81		3	
19 mm	80		1	
13.2 mm	76		4	
9.5 mm	73		3	
6.7 mm	70		2	
4.75 mm	68		2	
2.36 mm	64		3	
1.18 mm	59		5	
0.6 mm	54		5	
0.425 mm	52		3	
0.3 mm	49		3	
0.15 mm	44		5	
0.075 mm	41		3	



Moisture Content (AS1289.2.1.1)	
Moisture Content (%)	21.3

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	51		
Plastic Limit (%)	22		
Plasticity Index (%)	29		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.0		
Cracking Crumbling Curling	Cracking		

APPENDIX B

Field Density Test Report Sheets & Test Locations

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1431-1
Issue Number: 1
Date Issued: 28/03/2022
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1431
Project Name: CORIDALE ESTATE STAGE 8
Project Location: LARA
Work Request: 11693
Date Sampled: 25/03/2022
Dates Tested: 25/03/2022 - 26/03/2022
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 98% Standard Compaction & +/- 3% Moisture Variation
Lot Number: Lots 838 - 830
Material: sandy CLAY, with trace gravel
Material Source: Insitu

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



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	1431-S1	1431-S2	1431-S3
Date Tested	25/03/2022	25/03/2022	25/03/2022
Time Tested	14:40	14:50	15:02
Test Request #/Location	Lot 838	Lot 837	Lot 836
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	4	4	3
Percentage of Dry Oversize (%) (AS1289.5.4.1)	4	4	3
Field Wet Density (FWD) t/m ³	1.82	1.80	1.70
Field Moisture Content %	24.2	27.8	24.5
Field Dry Density (FDD) t/m ³	1.47	1.42	1.38
Peak Converted Wet Density t/m ³	**	**	**
Adjusted Peak Converted Wet Density t/m ³	1.79	1.84	1.77
Adj. Optimum Moisture Content % (AS1289.5.4.1)	24.8	26.4	27.2
Adj. Field Moisture Content % (AS1289.5.4.1)	23.4	26.8	23.7
Moisture Ratio % (AS1289.5.4.1)	**	**	**
Adjusted Moisture Ratio % (AS1289.5.4.1)	94.5	101.5	87.5
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	1.5	-0.5	3.5
Hilf Density Ratio (%)	101.5	97.5	96.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

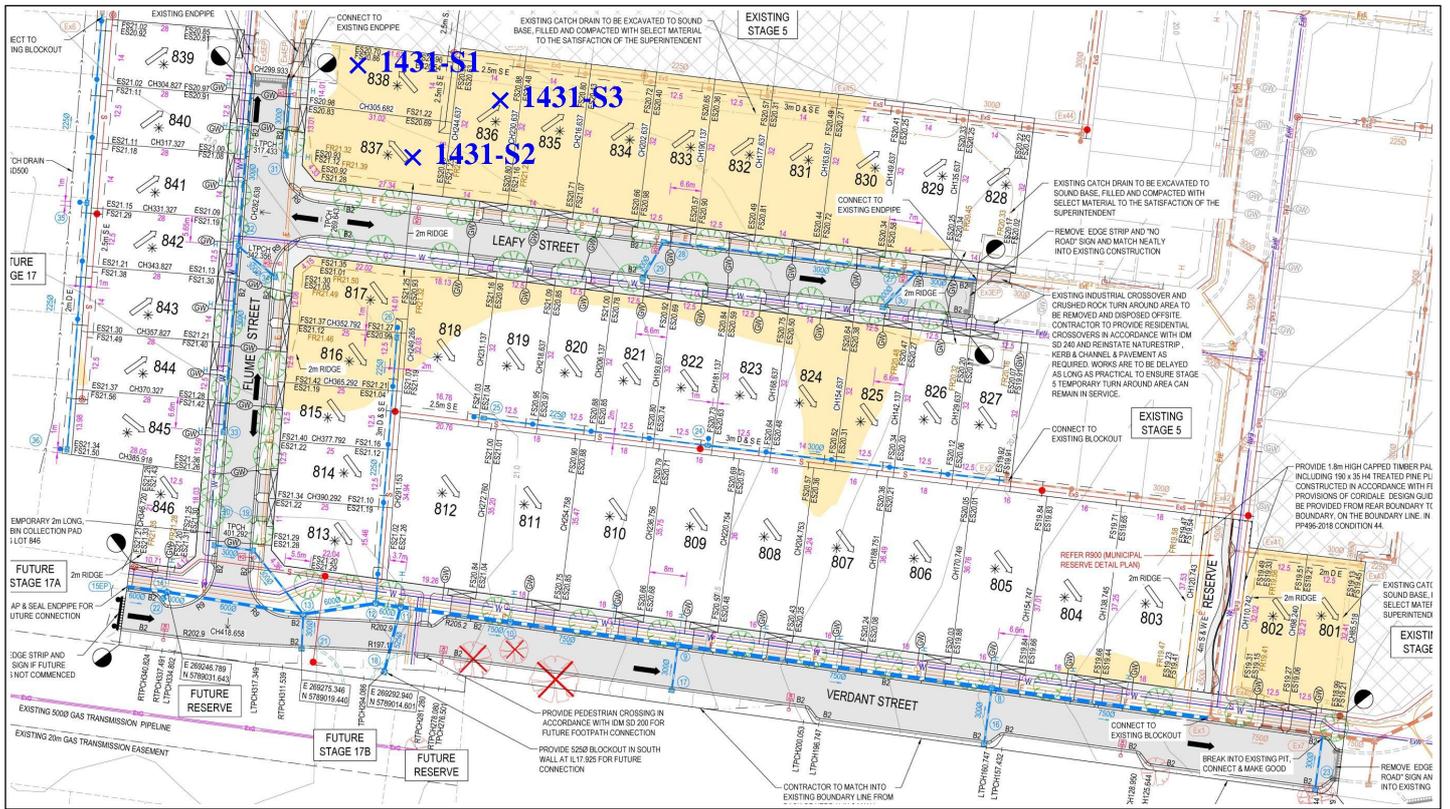
Moisture Variation Note:

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

Sample Locations Plan



Ground Science South West
Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1431-2
Issue Number: 1
Date Issued: 30/03/2022
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1431
Project Name: CORIDALE ESTATE STAGE 8
Project Location: LARA
Work Request: 11715
Date Sampled: 28/03/2022
Dates Tested: 28/03/2022 - 29/03/2022
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 838 - 830
Material: sandy CLAY, with trace gravel
Material Source: Insitu

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



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	1431-S4	1431-S5	1431-S6
Date Tested	28/03/2022	28/03/2022	28/03/2022
Time Tested	11:18	13:41	15:19
Test Request #/Location	Retest of 1431-S3 Lot 836	Lot 834	Lot 835
Layer / Reduced Level	1	2	2
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	2
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	2
Field Wet Density (FWD) t/m ³	1.85	1.84	1.81
Field Moisture Content %	24.8	22.9	24.8
Field Dry Density (FDD) t/m ³	1.48	1.50	1.45
Peak Converted Wet Density t/m ³	1.83	1.84	**
Adjusted Peak Converted Wet Density t/m ³	**	**	1.83
Adj. Optimum Moisture Content % (AS1289.5.4.1)	27.5	26.0	25.8
Adj. Field Moisture Content % (AS1289.5.4.1)	24.8	22.9	24.4
Moisture Ratio % (AS1289.5.4.1)	90.0	88.0	**
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	94.5
Moisture Variation (Wv) %	2.5	3.0	**
Adjusted Moisture Variation %	**	**	1.5
Hilf Density Ratio (%)	101.0	100.0	99.0
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

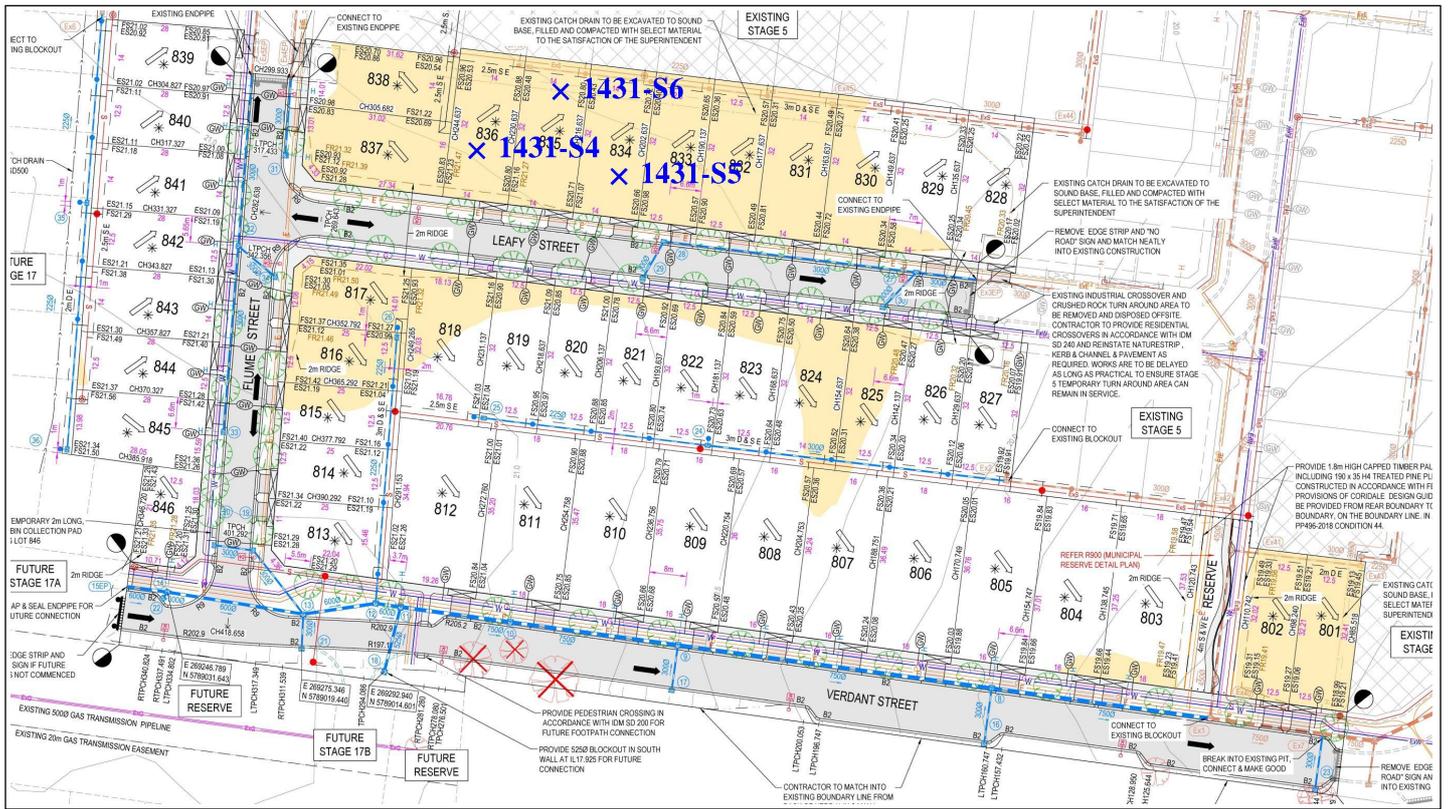
Positive values = test is dry of OMC
 Negative values = test is wet of OMC

Sample Locations Plan



Ground Science South West

Geotechnical & Environmental Consultants



Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1431-3
Issue Number: 1
Date Issued: 26/04/2022
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1431
Project Name: CORIDALE ESTATE STAGE 8
Project Location: LARA
Work Request: 12033
Date Sampled: 22/04/2022
Dates Tested: 22/04/2022 - 26/04/2022
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
Site Selection: Selected by Client
Lot Number: 815-825 + 802-803
Material: sandy CLAY, with trace gravel
Material Source: Insitu

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



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	1431-S7	1431-S8	1431-S9
Date Tested	22/04/2022	22/04/2022	22/04/2022
Time Tested	10:00	11:05	11:30
Test Request #/Location	Lots 815-825 Lot 802	Lots 815-825 Lot 825	Lot 802-803 Lot 816
Chainage (m)	See attached plan	See attached plan	See attached plan
Location Offset (m)	-	-	-
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	300	300	300
Soil Description	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	9	10	9
Percentage of Dry Oversize (%) (AS1289.5.4.1)	9	10	9
Field Wet Density (FWD) t/m ³	2.06	2.10	1.96
Field Moisture Content %	26.3	26.2	26.1
Field Dry Density (FDD) t/m ³	1.66	1.70	1.58
Peak Converted Wet Density t/m ³	**	**	**
Adjusted Peak Converted Wet Density t/m ³	2.01	2.01	2.01
Adj. Optimum Moisture Content % (AS1289.5.4.1)	21.6	21.3	21.5
Adj. Field Moisture Content % (AS1289.5.4.1)	23.9	23.7	23.7
Moisture Ratio % (AS1289.5.4.1)	**	**	**
Adjusted Moisture Ratio % (AS1289.5.4.1)	111.0	111.5	110.0
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	-2.5	-2.5	-2.0
Hilf Density Ratio (%)	102.5	104.5	97.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

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

Material Test Report



Ground Science South West

Geotechnical & Environmental Consultants

Report Number: GSSW1431-4
Issue Number: 1
Date Issued: 27/04/2022
Client: CREO CONSULTANTS PTY LTD
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1431
Project Name: CORIDALE ESTATE STAGE 8
Project Location: LARA
Work Request: 12036
Date Sampled: 23/04/2022
Dates Tested: 23/04/2022 - 26/04/2022
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: 828 - 838
Material: sandy CLAY, with trace gravel
Material Source: Insitu

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



Accredited for compliance with ISO/IEC 17025 - Testing

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	1431-S10	1431-S11	1431-S12
Date Tested	23/04/2022	23/04/2022	23/04/2022
Time Tested	09:40	09:52	10:15
Test Request #/Location	Lot 836 See attached plan	Lot 833 See attached plan	Lot 830 See attached plan
Layer / Reduced Level	2	2	2
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel	sandy CLAY, with trace gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	9	8	9
Percentage of Dry Oversize (%) (AS1289.5.4.1)	9	8	9
Field Wet Density (FWD) t/m ³	1.91	1.91	1.89
Field Moisture Content %	20.8	21.1	20.6
Field Dry Density (FDD) t/m ³	1.60	1.60	1.59
Peak Converted Wet Density t/m ³	**	**	**
Adjusted Peak Converted Wet Density t/m ³	1.92	1.93	1.97
Adj. Optimum Moisture Content % (AS1289.5.4.1)	21.4	21.6	20.9
Adj. Field Moisture Content % (AS1289.5.4.1)	19.0	19.5	18.9
Moisture Ratio % (AS1289.5.4.1)	**	**	**
Adjusted Moisture Ratio % (AS1289.5.4.1)	88.5	90.0	90.5
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	2.5	2.0	2.0
Hilf Density Ratio (%)	99.5	99.0	95.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

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

APPENDIX C

Site Photographs











