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# **LEVEL 1 INSPECTION & TESTING CORIDALE ESTATE STAGE 7A LARA**

Prepared for Creo Consultants Pty Ltd

**Report Reference: GSSW1302.1 AA**

**Date: 23 August 2021**

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## PROJECT DETAILS

Project Reference	GSSW1302.1	Rev	AA
Project Title	Coridale Estate Stage 7A		
Project Location	Lara	State	VIC
Date	23 August 2021		

## 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

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FIGURE 1      CORIDALE ESTATE - STAGE 7A LAYOUT PLAN – 1 [NO. 180014.7A R200 REV B]

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APPENDIX B    FIELD DENSITY TEST REPORT SHEETS & TEST LOCATIONS  
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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 Coridale Estate Stage 7A 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 7A. 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 7A Layout Plan – 1 [No. 180014.7A R200 Rev B]).

This report details the Level 1 earthworks process performed on site which commenced on 28<sup>th</sup> of July 2021 and was completed on the 5<sup>th</sup> of August 2021, requiring eight 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 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 2500m<sup>2</sup>;
- 1 test per 500m<sup>3</sup> 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 9<sup>th</sup> of July and the 16<sup>th</sup> of July 2021. Inspection of the prepared subgrade surface was carried out on 16<sup>th</sup> of July 2021 by the representative geotechnician from Ground Science South West. At the time of the inspection, the prepared subgrade was observed to contain silt, boulders and organic materials deeming it unsuitable as a prepared surface for fill placement. Stripping works were subsequently continued until a suitable subgrade was achieved, and a supplementary inspection of the prepared subgrade was carried out on the 21<sup>st</sup> of July 2021 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.

On the 23<sup>rd</sup> of July 2021, the site contractor is understood to have observed additional organic materials perceived to be thicker than previously noted. Ground Science South West were requested to be present during a series of trial pits and to provide our opinion on the retention/removal of the subject organic matter. It was observed that pockets of topsoil, silt and boulders were present throughout the site at the previously approved prepared subgrade level. The site contractor was advised that stripping should continue in these isolated areas until a suitable subgrade surface could be reached. Preparation of the subgrade of these isolated areas continued alongside construction on the previously approved areas during the inspection and testing phase of the bulk earthworks.

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 6 to 18 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 24 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 24 "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 (#7) failed to meet the required target density ratio. This area was subsequently reworked, recompacted and retested (#13) with compliant test results achieved. This area was reworked and retested. No areas failed to reach 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 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.

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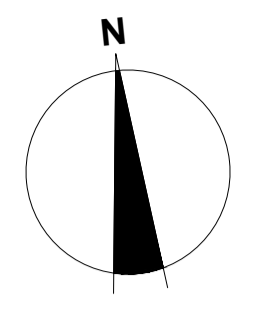
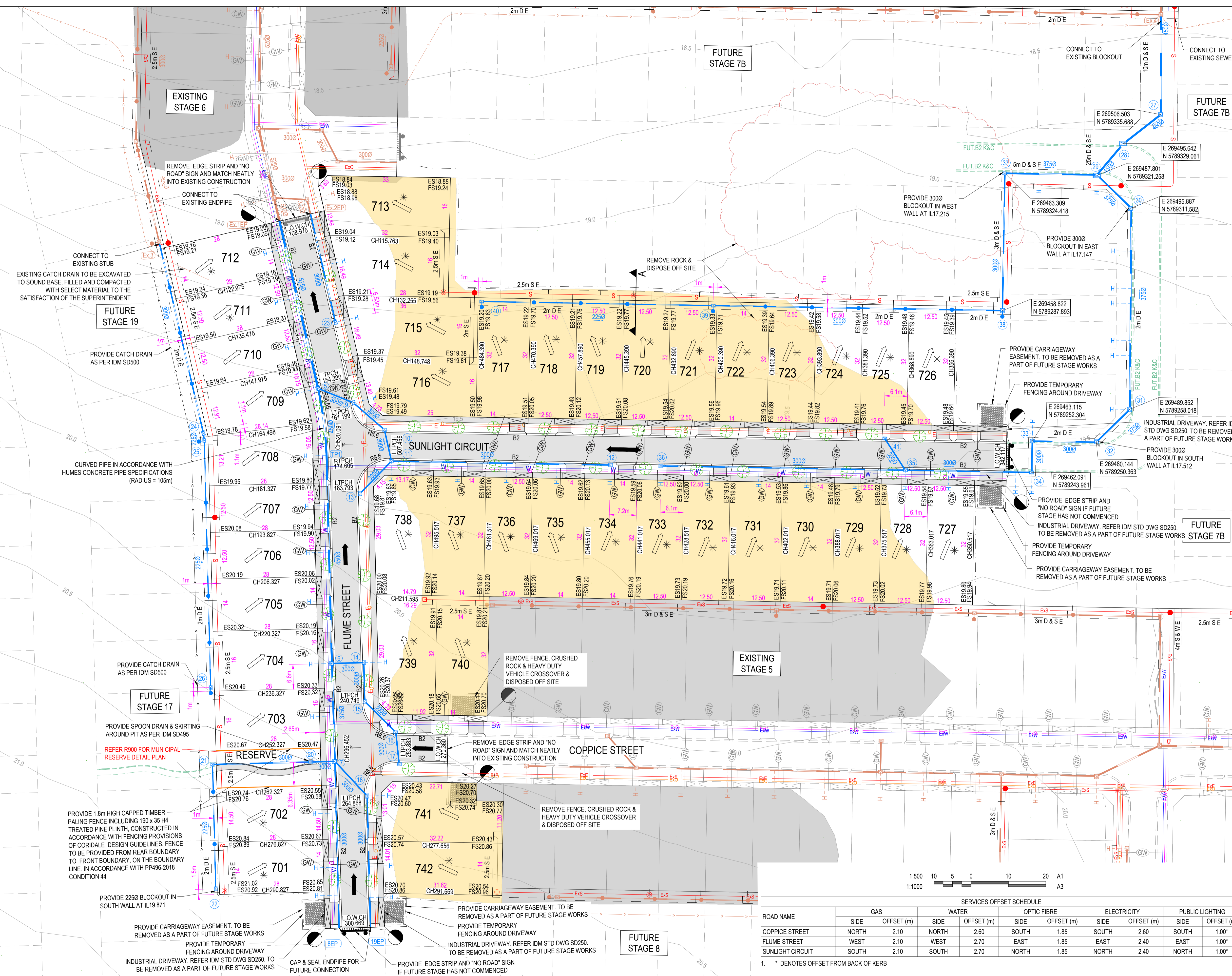


## 8. REFERENCES

- 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**

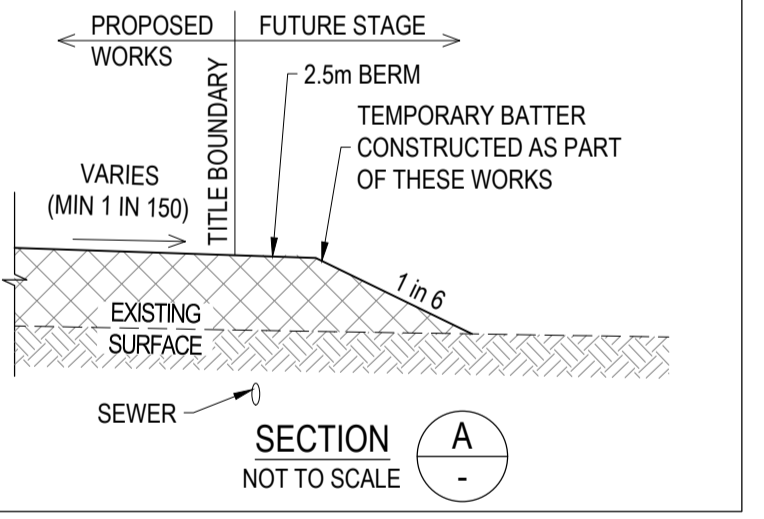
Coridale Estate - Stage 7A Layout Plan – 1 [No. 180014.7A R200 Rev B]



CITY OF GREATER GEELONG TO STAMP HERE UPON APPROVAL

- LEGEND - LAYOUT PLAN**
- STORMWATER DRAIN, PIT & PROPERTY INLET
  - SWALE DRAIN
  - 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
  - PAVEMENT TREATMENT
  - 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
  - STORM WATER PIT SETOUT POINT
  - L2
  - 1.8m HIGH CAPPED TIMBER PALING FENCE INCLUDING 190 x 35 H4 TREATED PINE PLINTH

- NOTES:**
1. ALL VEHICLE AND PRAM CROSSING LAYBACKS, TO BE MINIMUM OF 1.0m FROM PITTS.
  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.



**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**

**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

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)
COPPICE STREET	NORTH	2.10	NORTH	2.60	SOUTH	1.85	SOUTH	2.60	SOUTH	1.00*
FLUME STREET	WEST	2.10	WEST	2.70	EAST	1.85	EAST	2.40	EAST	1.00*
SUNLIGHT CIRCUIT	SOUTH	2.10	SOUTH	2.70	NORTH	1.85	NORTH	2.40	NORTH	1.00*

1. \* DENOTES OFFSET FROM BACK OF KERB

REVISION	DATE	ISSUE DESCRIPTION	DRAWN	CHECKED	APPROVED	CLIENT
B	21/06/21	AMENDED TO COUNCIL COMMENTS (21/06/21)	C.RHODE	M.TROUNCE	T.PALIOS	 Communities Designed for Living
A	14/05/21	ISSUED FOR APPROVAL	C.RHODE	M.TROUNCE	T.PALIOS	

Communities Designed for Living

Level 7, 176 Wellington Parade  
 East Melbourne, VIC, Australia 3002

LARA

DRAWING TITLE  
**CORIDALE ESTATE - STAGE 7A**  
**LAYOUT PLAN**

STATUS  
**ISSUED FOR APPROVAL**  
**NOT FOR CONSTRUCTION**

SCALE AT	DRAWN	DESIGNED
1:500 @ A1	B.LEECH	B.LEECH
PROJECT ENGINEER	PROJECT MANAGER	DATE FIRST ISSUE
M.TROUNCE	T.PALIOS	MAY 2021
PROJECT No.	DRAWING No.	REVISION
<b>180014.7A</b>	<b>R200</b>	<b>B</b>

## **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

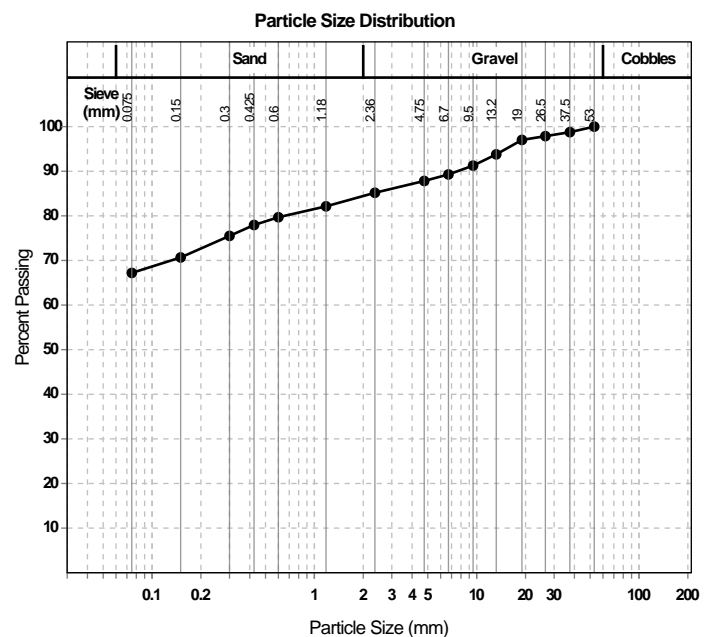
Approved Signatory: Chris Mamalis  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

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		
<b>Plasticity Index (%)</b>	<b>50</b>		

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

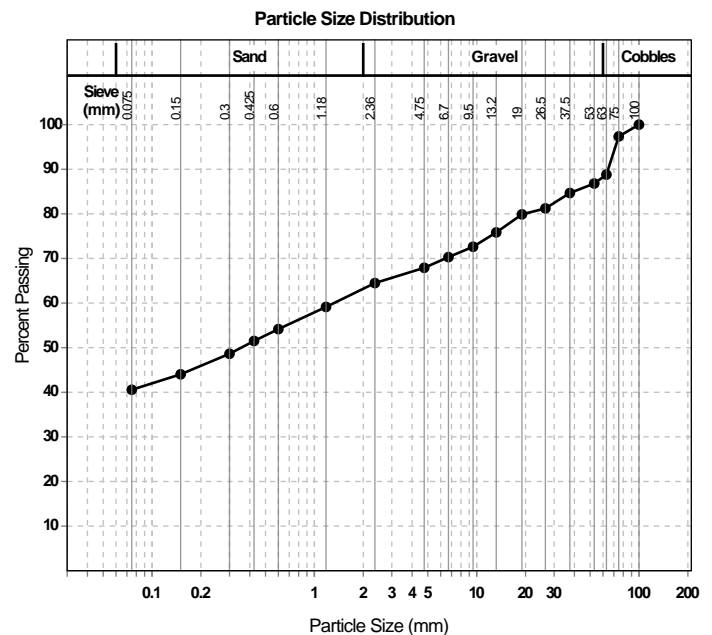
Approved Signatory: Chris Mamalis  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

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		
<b>Plasticity Index (%)</b>	<b>29</b>		

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:** GSSW1302-1  
**Issue Number:** 1  
**Date Issued:** 30/07/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 9995  
**Date Sampled:** 28/07/2021  
**Dates Tested:** 28/07/2021 - 29/07/2021  
**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 737-732  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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



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*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	1302-S1	1302-S2	1302-S3
Date Tested	28/07/2021	28/07/2021	28/07/2021
Time Tested	16:10	16:24	16:48
Test Request #/Location	Lot 735	Lot 737	Lot 732
Elevation (m)	-200mm BFSL	-200mm BFSL	-200mm BFSL
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	3	1	4
Field Wet Density (FWD) t/m <sup>3</sup>	1.94	1.90	1.97
Field Moisture Content %	29.4	25.7	28.6
Field Dry Density (FDD) t/m <sup>3</sup>	1.50	1.51	1.53
Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	1.82	1.87	1.83
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	2.5	2.0	3.0
Hilf Density Ratio (%)	<b>106.5</b>	<b>101.5</b>	<b>108.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

### Moisture Variation Note:

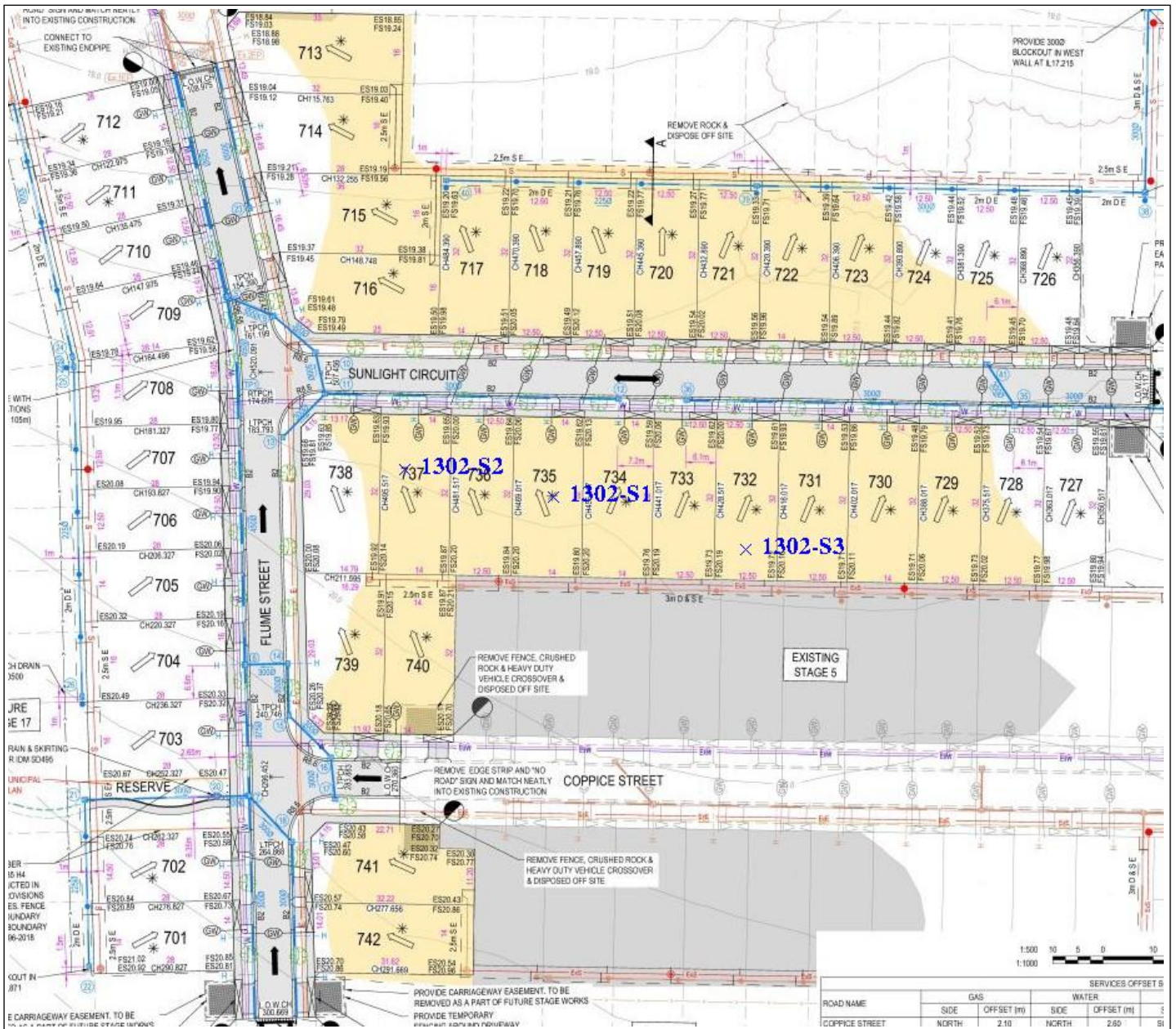
Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

# Sample Locations Plan



**Ground Science South West**

Geotechnical & Environmental Consultants



# Material Test Report



**Ground Science South West**

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**Report Number:** GSSW1302-2  
**Issue Number:** 1  
**Date Issued:** 02/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 9999  
**Date Sampled:** 29/07/2021  
**Dates Tested:** 29/07/2021 - 30/07/2021  
**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 730 - 740  
**Material:** sandy CLAY with gravel, brown H-PI, F-C sand F-C gravel, moist  
**Material Source:** Insitu

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 Phone: (03) 5282 1566  
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*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	1302-S4	1302-S5	1302-S6
Date Tested	29/07/2021	29/07/2021	29/07/2021
Time Tested	15:24	15:43	15:57
Test Request #/Location	Lot 730	Lot 735	Lot 740
Elevation (m)	FSL	FSL	FSL
Layer / Reduced Level	Layer 1	Layer 2	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	6
Field Wet Density (FWD) t/m <sup>3</sup>	1.87	1.85	1.77
Field Moisture Content %	27.5	27.4	27.7
Field Dry Density (FDD) t/m <sup>3</sup>	1.47	1.45	1.38
Peak Converted Wet Density t/m <sup>3</sup>	1.84	1.77	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	1.85
Moisture Variation (Wv) %	2.0	3.0	**
Adjusted Moisture Variation %	**	**	2.0
Hilf Density Ratio (%)	<b>102.0</b>	<b>104.0</b>	<b>95.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
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**

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# Material Test Report



**Ground Science South West**

Geotechnical & Environmental Consultants

**Report Number:** GSSW1302-3  
**Issue Number:** 1  
**Date Issued:** 03/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10012  
**Date Sampled:** 30/07/2021  
**Dates Tested:** 30/07/2021 - 02/08/2021  
**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 717 - 742  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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*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	1302-S7	1302-S8	1302-S9
Date Tested	30/07/2021	30/07/2021	30/07/2021
Time Tested	16:04	16:12	16:24
Test Request #/Location	Lot 717	Lot 731	Lot 742
Elevation (m)	-700mm BFSL	FSL	FSL
Layer / Reduced Level	Layer 1	Layer 2	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY, with gravel	sandy CLAY, with gravel	sandy CLAY, with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	6	6	5
Field Wet Density (FWD) t/m <sup>3</sup>	1.72	1.79	1.92
Field Moisture Content %	26.5	24.6	27.3
Field Dry Density (FDD) t/m <sup>3</sup>	1.36	1.44	1.51
Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	1.86	1.84	1.88
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	2.5	3.0	3.0
Hilf Density Ratio (%)	<b>92.5</b>	<b>97.5</b>	<b>102.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

### Moisture Variation Note:

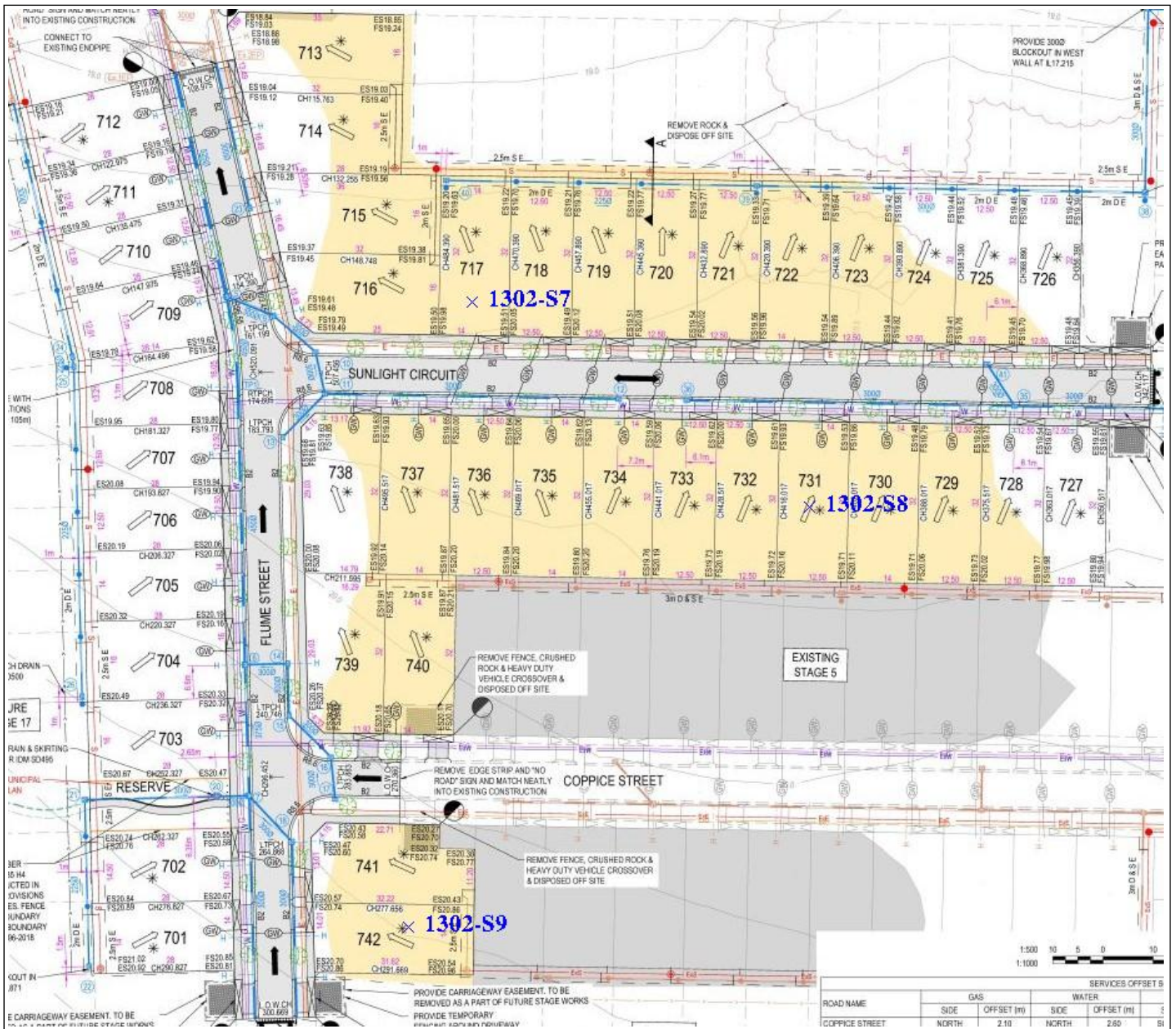
Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

# Sample Locations Plan



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# Material Test Report



**Ground Science South West**

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**Report Number:** GSSW1302-4  
**Issue Number:** 1  
**Date Issued:** 03/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10015  
**Date Sampled:** 31/07/2021  
**Dates Tested:** 31/07/2021 - 02/08/2021  
**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 720 - 722  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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*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	1302-S10	1302-S11	1302-S12
Date Tested	31/07/2021	31/07/2021	31/07/2021
Time Tested	13:28	13:42	13:52
Test Request #/Location	Lot 721	Lot 722	Lot 720
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	11
Field Wet Density (FWD) t/m <sup>3</sup>	1.88	1.86	1.86
Field Moisture Content %	28.2	29.5	27.9
Field Dry Density (FDD) t/m <sup>3</sup>	1.46	1.43	1.46
Peak Converted Wet Density t/m <sup>3</sup>	1.85	1.77	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	1.84
Moisture Variation (Wv) %	2.5	3.0	**
Adjusted Moisture Variation %	**	**	2.5
Hilf Density Ratio (%)	<b>101.5</b>	<b>104.5</b>	<b>101.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

### Moisture Variation Note:

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

# Sample Locations Plan



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# Material Test Report



**Ground Science South West**

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**Report Number:** GSSW1302-5  
**Issue Number:** 1  
**Date Issued:** 04/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10023  
**Date Sampled:** 02/08/2021  
**Dates Tested:** 02/08/2021 - 03/08/2021  
**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 717 - 723  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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 Phone: (03) 5282 1566  
 Email: tomas@groundscience.com.au



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*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	1302-S13	1302-S14	1302-S15
Date Tested	02/08/2021	02/08/2021	02/08/2021
Time Tested	14:43	16:17	16:31
Test Request #/Location	Lot 717	Lot 722	Lot 723
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
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 <sup>3</sup>	1.85	1.86	1.82
Field Moisture Content %	28.6	30.2	30.3
Field Dry Density (FDD) t/m <sup>3</sup>	1.44	1.43	1.40
Peak Converted Wet Density t/m <sup>3</sup>	1.87	1.91	1.91
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Moisture Variation (Wv) %	1.0	-1.0	-1.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	<b>98.5</b>	<b>97.5</b>	<b>95.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

### Moisture Variation Note:

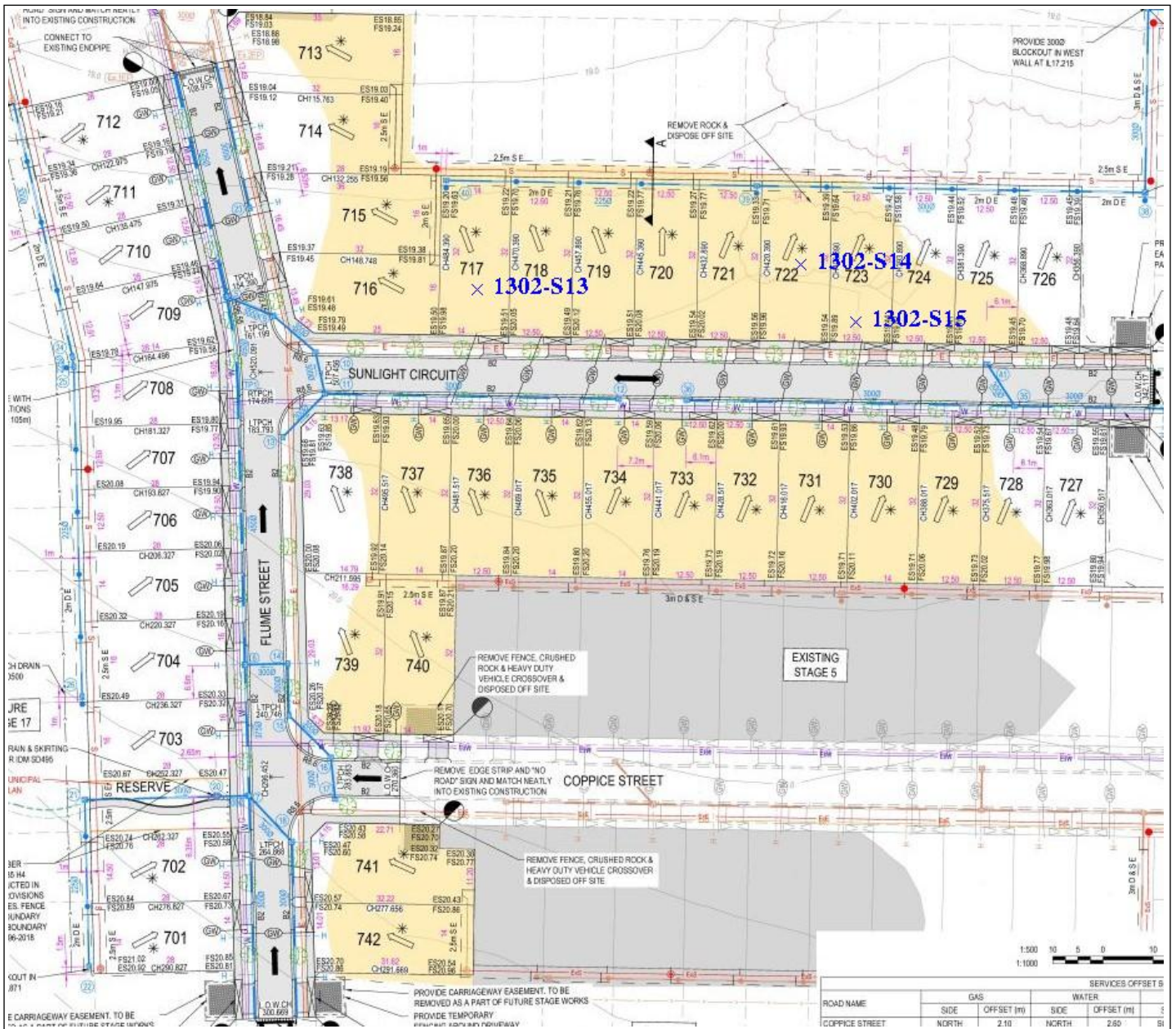
Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

# Sample Locations Plan



**Ground Science South West**

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# Material Test Report



**Ground Science South West**

Geotechnical & Environmental Consultants

**Report Number:** GSSW1302-6  
**Issue Number:** 1  
**Date Issued:** 05/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10029  
**Date Sampled:** 03/08/2021  
**Dates Tested:** 03/08/2021 - 04/08/2021  
**Sampling Method:** AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Remarks:** Variations in stripping has increased the areas that require Level 1 Inspection and Testing from what is labelled on the plan.  
**Specification:** 95% Standard Compaction & +/- 3% Moisture Variation  
**Lot Number:** Lots 724 - 726  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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*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	1302-S16	1302-S17	1302-S18
Date Tested	03/08/2021	03/08/2021	03/08/2021
Time Tested	14:00	14:11	14:24
Test Request #/Location	Lot 724	Lot 725	Lot 726
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	3	6	5
Field Wet Density (FWD) t/m <sup>3</sup>	1.95	1.82	1.81
Field Moisture Content %	22.8	25.0	24.8
Field Dry Density (FDD) t/m <sup>3</sup>	1.59	1.46	1.45
Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	1.87	1.84	1.86
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	3.0	2.5	1.5
Hilf Density Ratio (%)	<b>104.5</b>	<b>99.0</b>	<b>97.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

**Moisture Variation Note:**

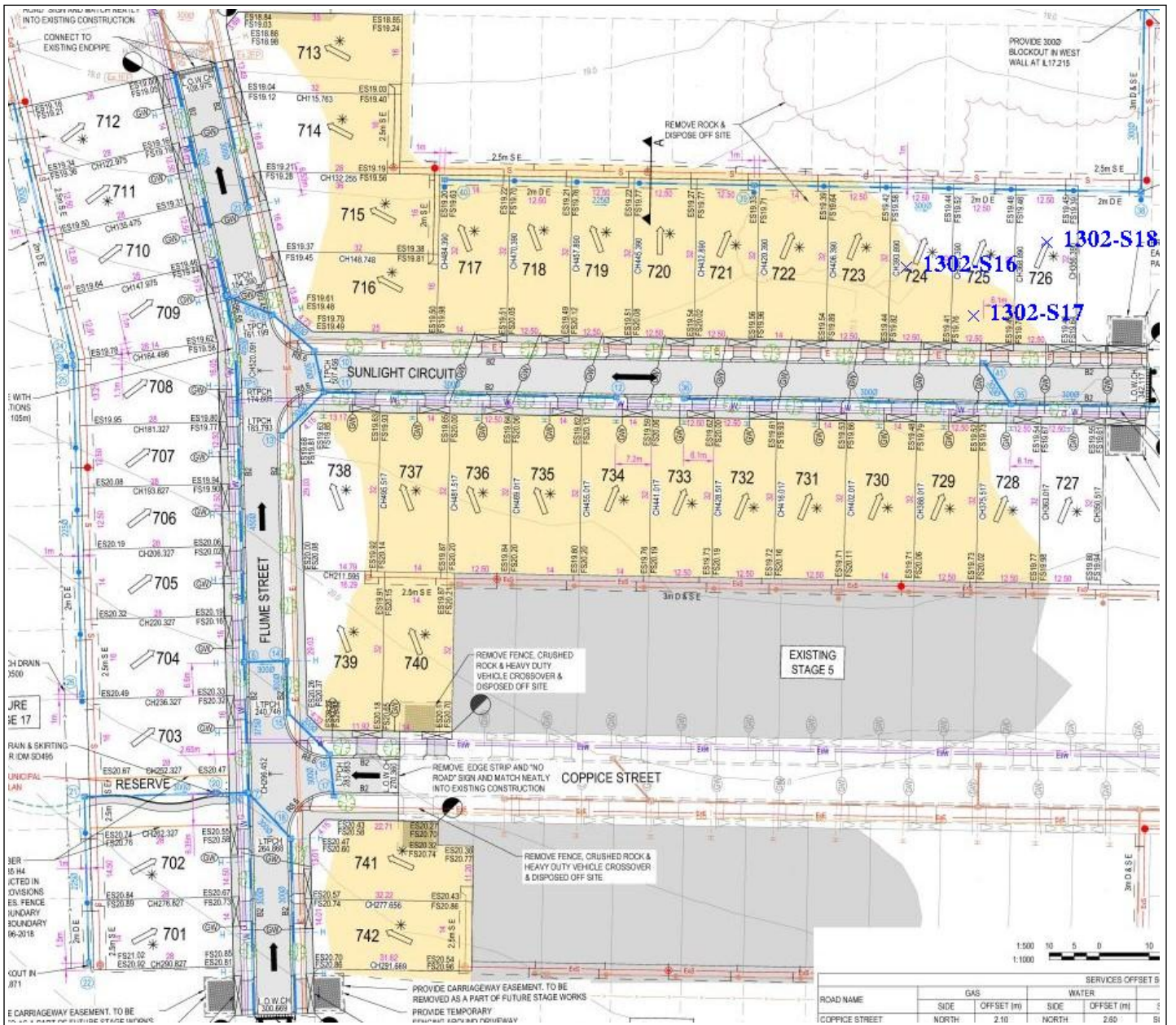
Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

# Sample Locations Plan



**Ground Science South West**

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# Material Test Report



**Ground Science South West**

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**Report Number:** GSSW1302-7  
**Issue Number:** 1  
**Date Issued:** 06/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10039  
**Date Sampled:** 04/08/2021  
**Dates Tested:** 04/08/2021 - 05/08/2021  
**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 713 - 715  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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 Phone: (03) 5282 1566  
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*Tomas Wheadon*

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 Field & Laboratory Technician  
 NATA Accredited Laboratory Number: 20109

## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

Sample Number	1302-S19	1302-S20	1302-S21
Date Tested	04/08/2021	04/08/2021	04/08/2021
Time Tested	13:51	14:03	14:11
Test Request #/Location	Lot 713	Lot 714	Lot 715
Elevation (m)	19.057	19.057	19.057
Layer / Reduced Level	Layer 2	Layer 2	Layer 2
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	7	4
Field Wet Density (FWD) t/m <sup>3</sup>	1.91	1.95	1.91
Field Moisture Content %	24.4	24.8	25.4
Field Dry Density (FDD) t/m <sup>3</sup>	1.53	1.56	1.52
Peak Converted Wet Density t/m <sup>3</sup>	1.85	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	1.82	1.85
Moisture Variation (Wv) %	3.0	**	**
Adjusted Moisture Variation %	**	2.0	3.0
Hilf Density Ratio (%)	<b>103.0</b>	<b>107.0</b>	<b>103.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Report Remarks	**	**	**

### Moisture Variation Note:

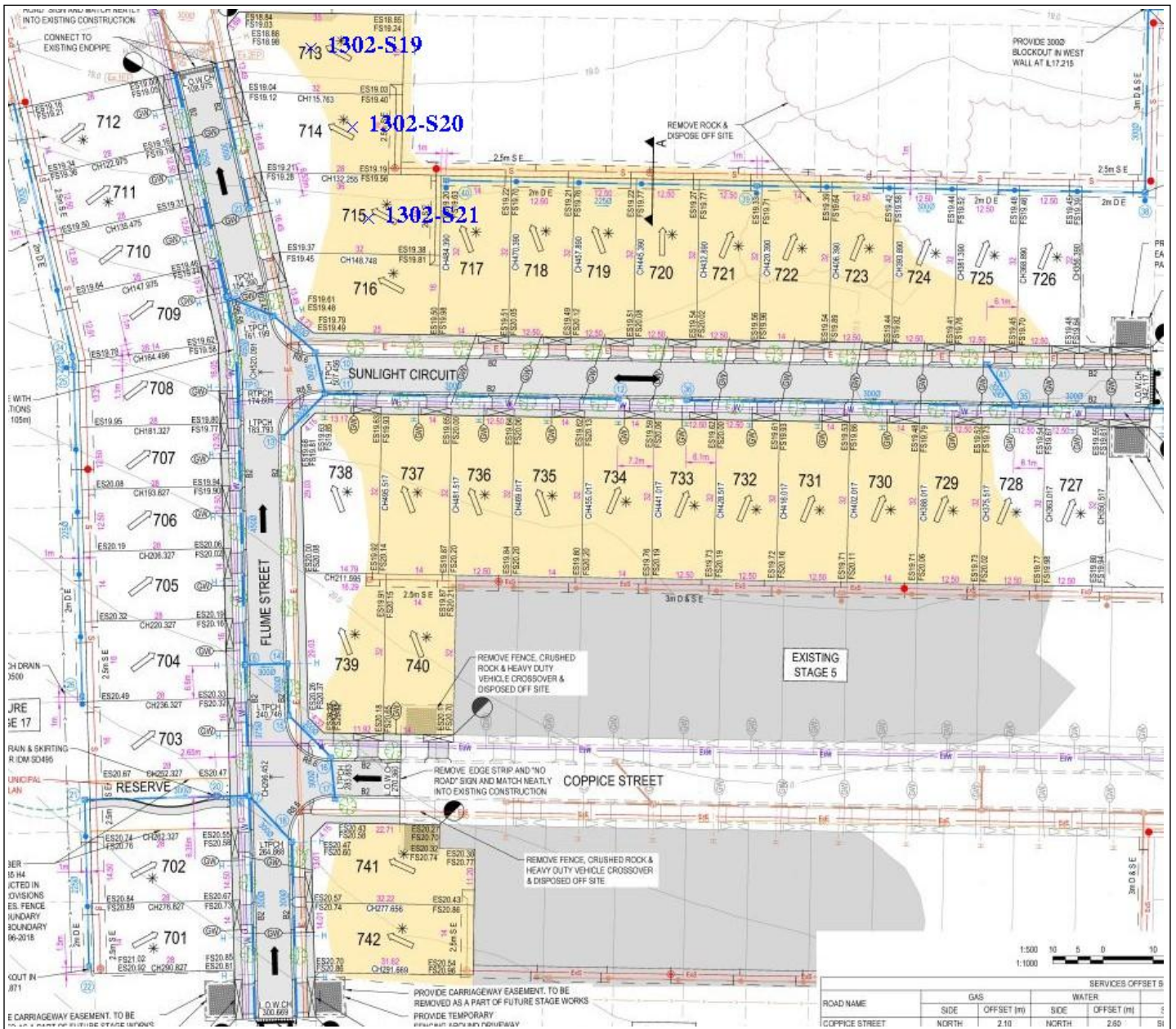
Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

# Sample Locations Plan



**Ground Science South West**

Geotechnical & Environmental Consultants



# Material Test Report



**Ground Science South West**

Geotechnical & Environmental Consultants

**Report Number:** GSSW1302-8  
**Issue Number:** 1  
**Date Issued:** 09/08/2021  
**Client:** CREO CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GSSW1302  
**Project Name:** CORIDALE ESTATE STAGE 7A  
**Project Location:** LARA  
**Work Request:** 10046  
**Date Sampled:** 05/08/2021  
**Dates Tested:** 05/08/2021 - 06/08/2021  
**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 721 - 724  
**Material:** sandy CLAY with gravel, brown, H-PI, F-C sand, F-C gravel, moist.  
**Material Source:** Insitu

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 Phone: (03) 5282 1566  
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*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	1302-S22	1302-S23	1302-S24
Date Tested	05/08/2021	05/08/2021	05/08/2021
Time Tested	13:45	13:56	14:11
Test Request #/Location	Lot 722	Lot 721	Lot 724
Elevation (m)	FSL	FSL	FSL
Layer / Reduced Level	Layer 2	Layer 2	Layer 2
Thickness of Layer (mm)	200	200	200
Soil Description	sandy CLAY with gravel	sandy CLAY with gravel	sandy CLAY with gravel
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	5	7	4
Field Wet Density (FWD) t/m <sup>3</sup>	1.94	1.89	1.83
Field Moisture Content %	21.1	19.2	20.7
Field Dry Density (FDD) t/m <sup>3</sup>	1.60	1.59	1.52
Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	1.89	1.87	1.87
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	3.0	3.0	3.0
Hilf Density Ratio (%)	<b>102.5</b>	<b>101.0</b>	<b>98.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
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**

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## **APPENDIX C**

Site Photographs









