ABN: 51 612 825 313

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LEVEL 1 INSPECTION & TESTING
CORIDALE ESTATE STAGE 4
LARA

Prepared for Creo Consultants Pty Ltd

Report Reference: GSSW1059.1 AA

Date: 2 December 2020

ABN: 51 612 825 313

10 Dowsett Street

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PROJECT DETAILS

Project Reference	GSSW1059.1	Rev	AA
Project Title	Coridale Estate Stage 4		
Project Location	Lara	State	VIC
Date	2 December 2020		

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
Senior Geotechnical Engineer

Table of Contents

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 4 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 4. 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 4 Layout Plan – 1 [No. 180014.4 R200 Rev 0]).

This report details the Level 1 earthworks process performed on site which commenced on 17th of November 2020 and was completed on the 30th of November 2020, requiring 9 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^2;
- 1 test per 500m^3 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 13th of November 2020 and the 17th of November 2020. Inspection of the prepared subgrade surface was carried out on 17th of November, 2020 by the representative geotechnician from Ground Science South West. At the time of the inspection, the prepared subgrade was observed to be generally 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 (CH), high plasticity, brown, with sand, trace gravel, moist. Quality assurance tests were performed on the stockpiled fill material before placement. These tests include Particle Size Distribution and Atterberg Limits tests. The test report sheets are is 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;
- Padfoot Compactor.

During fill placement, the weather conditions ranged from hot to rainy with temperatures typically ranging from 9 to 35 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 grader into thin loose layers. 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. This material was removed when works recommenced and blended with the stockpile for moisture control and reuse. During times of heavier than forecasted rain, affected layers were removed, blended with the stockpile before being replaced and retested.

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 27 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS1289 5.8.1) together with 27 "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. Two test areas (#4 and #7) failed to meet the required target density ratio, and five test areas (#5, #6, #7, #8, and #9) failed to meet the required moisture condition. These areas were subsequently reworked, recompacted and retested (#10 to #15) with compliant test results achieved.

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
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.

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 4 Layout Plan – 1 [No. 180014.4 R200 Rev 0]

REFER R201 FOR CONTINUATION

CONTINUATION

PROVIDE GRASS CATCH DRAIN AS PER IDM SD 500

PROPOSED CLUB CORIDALE

FUTURE STAGE 7

FUTURE STAGE 5

FUTURE STAGE 15

EXISTING STAGE 2

EXISTING STAGE 3

BRISBANE STREET

REVEL LANE

COLMAR STREET

COPPICE STREET

CORIDALE BOULEVARD

CHAMPION WAY

WATTLEBIRD DRIVE

HOMESTEAD DRIVE

EXISTING CATCH DRAIN TO BE EXCAVATED TO SOUND BASE, FILLED AND COMPACTED WITH SELECT MATERIAL TO THE SATISFACTION OF THE SUPERINTENDENT

TYPE 2 PARKING BAY (REFER SHEET R700 FOR DETAIL)

CONNECT TO EXISTING SEWER

REMOVE EDGE STRIP AND "NO ROAD" SIGN AND MATCH NEATLY INTO EXISTING CONSTRUCTION

EXISTING INDUSTRIAL CROSSOVER TO BE REMOVED & DISPOSED OFF SITE. REPLACE WITH STANDARD RESIDENTIAL CROSSOVER IN ACCORDANCE WITH COUNCIL IDM SD 240. PROPERTY OWNER TO BE NOTIFIED PRIOR TO WORKS BEING COMPLETED

CONNECT TO EXISTING ENDPIPE

CONNECT TO EXISTING ENDPIPE

INDUSTRIAL CROSSOVER TO BE REMOVED & DISPOSED OFF SITE

EXISTING INDUSTRIAL CROSSOVER TO BE REMOVED & DISPOSED OFF SITE. REPLACE WITH STANDARD RESIDENTIAL CROSSOVER IN ACCORDANCE WITH COUNCIL IDM SD 240. PROPERTY OWNER TO BE NOTIFIED PRIOR TO WORKS BEING COMPLETED

PROVIDE EDGE STRIP AND "NO ROAD" SIGN IF FUTURE STAGE HAS NOT COMMENCED

ELECTRICAL SUBSTATION SITE

REMOVE EXISTING BLOCKOUT AND CONNECT

PROVIDE 2m LONG SEWER STUB

PROVIDE 375Ø BLOCKOUT IN WEST WALL AT IL17.413

PROVIDE TEMPORARY FENCING AROUND DRIVEWAY

PROVIDE CARRIAGEWAY EASEMENT. TO BE REMOVED AS A PART OF FUTURE STAGE WORKS

INDUSTRIAL DRIVEWAY. REFER IDM STD DWG SD250.TO BE REMOVED AS A PART OF FUTURE STAGE WORKS

CAP AND SEAL ENDPIPE FOR FUTURE CONNECTION

INSTALL PSM

REFER SHEET R700 FOR ALLOTMENT 407 & 408 VEHICLE CROSSING ARRANGEMENT

CITY OF GREATER GEELONG TO STAMP HERE UPON APPROVAL

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.

WARNING

BEWARE OF UNDERGROUND & OVERHEAD SERVICES

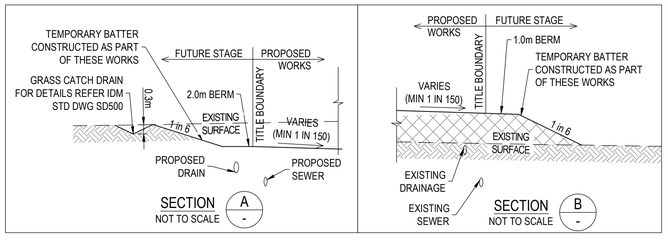
The locations of underground & overhead services are approximate only & their exact position should be proven on site. No guarantee is given that all existing services are shown. Locate all underground services before commencement of works

DIAL 1100 BEFORE YOU DIG

www.1100.com.au

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)
CORIDALE BOULEVARD	EAST	2.10	EAST	2.60	WEST	2.85	WEST	3.70	WEST	1.00*
BRISBANE STREET	WEST / SOUTH	2.10	WEST / SOUTH	2.50 / 2.60	EAST / NORTH	1.85	EAST / NORTH	2.40	EAST / NORTH	1.00*
COLMAR STREET	NORTH	2.10	NORTH	2.60	SOUTH	1.85	SOUTH	2.40	SOUTH	1.00*
COPPICE STREET	NORTH	2.10	NORTH	2.60	SOUTH	1.85	SOUTH	2.60	SOUTH	1.00*
REVEL LANE	-	-	-	-	-	-	-	-	-	-
CHAMPION WAY	EAST	1.80	EAST	2.30	WEST	1.85	WEST	2.40	WEST	1.00*
WATTLEBIRD DRIVE	EAST	2.10	EAST	2.60	WEST	2.85	WEST	3.70	WEST	1.00*
HOMESTEAD DRIVE	NORTH	3.10	NORTH SOUTH	3.60 3.80	SOUTH	1.80	SOUTH	2.40	-	CENTRAL

1. * DENOTES OFFSET FROM BACK OF KERB.

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
- ES141.34 EXISTING SURFACE LEVEL
- FS140.35 FINISHED BUILDING LINE LEVEL
- FR157.40 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

1:500 10 5 0 10 20 A1
1:1000 A3

REVISION	DATE	ISSUE DESCRIPTION	DRAWN	CHECKED	APPROVED
0	20/10/20	CONSTRUCTION ISSUE	C.ROHDE	M.TROUNCE	T.PALIOS
C	02/10/20	AMENDED TO COUNCIL COMMENTS (28/09/20)	C.ROHDE	M.TROUNCE	T.PALIOS
B	14/08/20	TENDER ISSUE	C.ROHDE	M.TROUNCE	T.PALIOS
A	31/07/20	ISSUED FOR APPROVAL	C.ROHDE	M.TROUNCE	T.PALIOS

CLIENT: villawood properties — Communities Designed for Living

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

PROJECT: Coridale LARA

DRAWING TITLE: CORIDALE - STAGE 4 LAYOUT PLAN - 1

STATUS: 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	JULY 2020
PROJECT No.	DRAWING No.	REVISION
180014.4	R200	0

APPENDIX A

Particle Size Distribution and Atterberg Limits Test Report Sheets

Material Test Report

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

Accredited for compliance with ISO/IEC 17025 - Testing

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

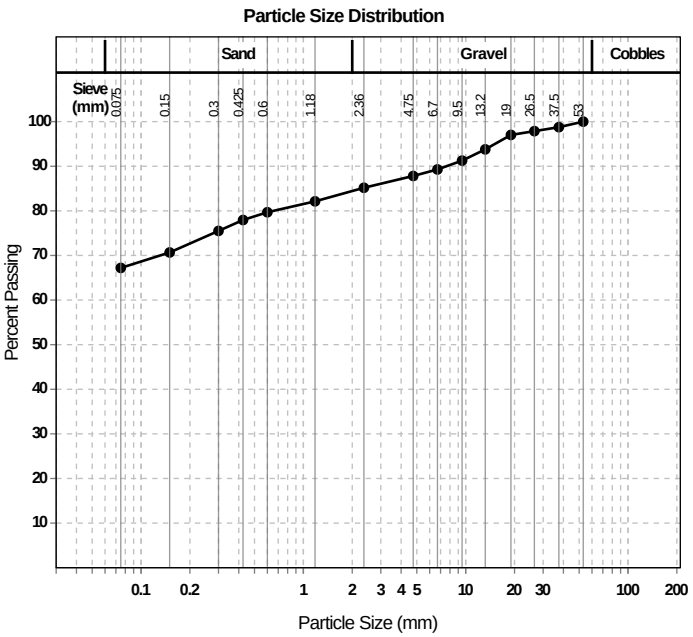
Report Number: **GSSW1029-1**
Issue Number: 1
Date Issued: 19/10/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Project Number: GSSW1029
Project Name: CORIDALE ESTATE STAGE 4
Work Request: 7868
Sample Number: 1029-S1
Date Sampled: 12/10/2020
Dates Tested: 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

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		



APPENDIX B

Field Density Test Report Sheets & Test Locations

Material Test Report

Report Number: GSSW1059-1
Issue Number: 1
Date Issued: 20/11/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8135
Date Sampled: 19/11/2020
Dates Tested: 19/11/2020 - 20/11/2020
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: 421, 423, 419
Material: CLAY with gravel, brown, medium to high plasticity
Material Source: Imported Locally

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

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

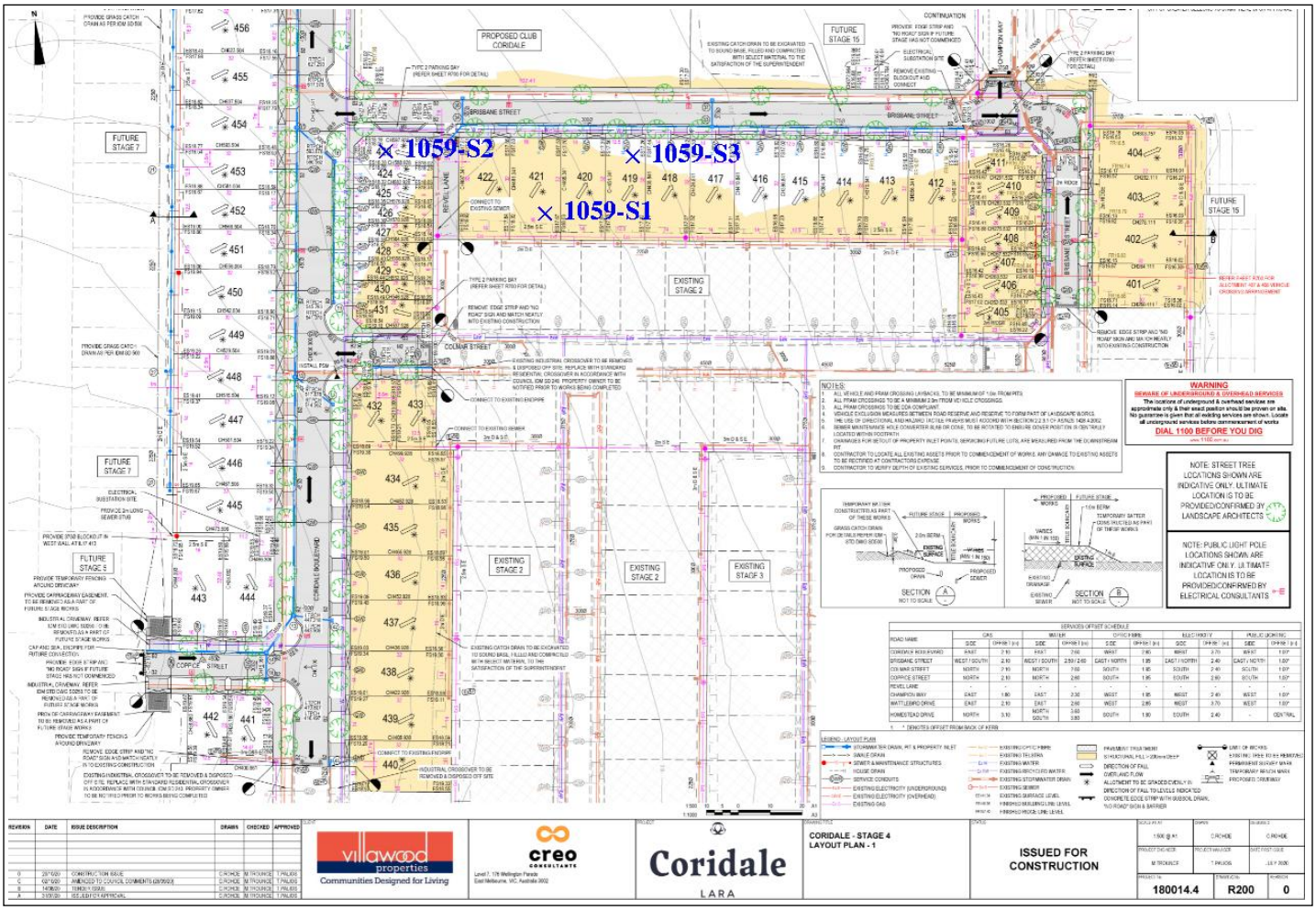
Approved Signatory: Tomas Wheadon
Field & Laboratory Technician
NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	1059-S1	1059-S2	1059-S3
Date Tested	19/11/2020	19/11/2020	19/11/2020
Time Tested	15:08	15:20	15:30
Test Request #/Location	Coridale Estate Stage 4 Lot 421	Coridale Estate Stage 4 Lot 423	Coridale Estate Stage 4 Lot 419
Easting	55H 0269644	55H 0269625	55H 0269684
Northing	5789305	5789307	5789299
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	200	200	200
Soil Description	CLAY with gravel, brown, medium to high plasticity	CLAY with gravel, brown, medium to high plasticity	CLAY with gravel, brown, medium to high plasticity
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	1	4	1
Field Wet Density (FWD) t/m^3	1.76	1.81	1.83
Field Moisture Content %	22.9	22.0	23.6
Field Dry Density (FDD) t/m^3	1.43	1.49	1.48
Peak Converted Wet Density t/m^3	**	**	**
Adjusted Peak Converted Wet Density t/m^3	1.78	1.91	1.93
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	0.0	2.0	1.5
Hilf Density Ratio (%)	**99.0**	**95.0**	**95.0**
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

Report Number: GSSW1059-2
Issue Number: 1
Date Issued: 20/11/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8161
Date Sampled: 19/11/2020
Dates Tested: 19/11/2020 - 20/11/2020
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: 439, 438, 437
Material: CLAY with gravel / CLAY
Material Source: Imported Locally

Ground Science South West
Geotechnical & Environmental Consultants

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

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

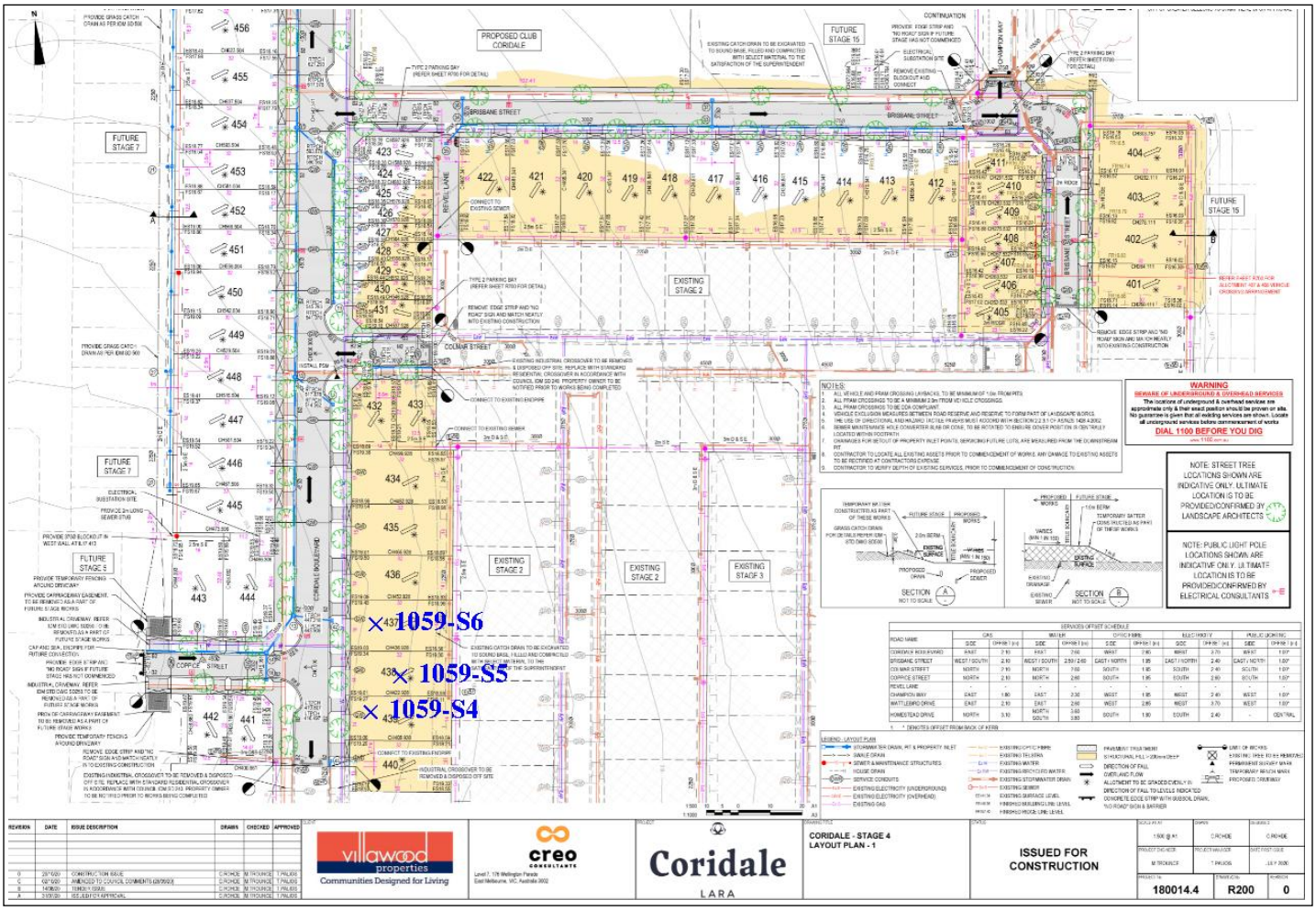
Approved Signatory: Tomas Wheadon
Field & Laboratory Technician
NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	1059-S4	1059-S5	1059-S6
Date Tested	19/11/2020	19/11/2020	19/11/2020
Time Tested	14:39	14:50	15:00
Test Request #/Location	Coridale Estate Stage 4 Lot 439	Coridale Estate Stage 4 Lot 438	Coridale Estate Stage 4 Lot 437
Easting	55H 0269594	55H 0269593	55H 0269597
Northing	5789141	5789153	6789167
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	200	200	200
Soil Description	CLAY with gravel, brown, medium to high plasticity	CLAY, light brown, high plasticity	CLAY, light brown, high plasticity
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	2	2	3
Field Wet Density (FWD) t/m^3	1.85	1.85	1.87
Field Moisture Content %	20.1	18.2	19.1
Field Dry Density (FDD) t/m^3	1.54	1.56	1.57
Peak Converted Wet Density t/m^3	**	**	**
Adjusted Peak Converted Wet Density t/m^3	1.96	1.80	1.78
Moisture Variation (Wv) %	**	**	**
Adjusted Moisture Variation %	1.0	7.0	6.0
Hilf Density Ratio (%)	**94.0**	**103.0**	**105.0**
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

Report Number: **GSSW1059-3**
Issue Number: 1
Date Issued: 23/11/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8175
Date Sampled: 20/11/2020
Dates Tested: 20/11/2020 - 21/11/2020
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: 426, 430, 428
Material: CLAY, light brown, high plasticity
Material Source: Imported Locally

Ground Science South West
Geotechnical & Environmental Consultants

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10 Dowsett Street South Geelong Vic 3220
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Email: tomas@groundscience.com.au

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WORLD RECOGNISED ACCREDITATION

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	1059-S7	1059-S8	1059-S9
Date Tested	20/11/2020	20/11/2020	20/11/2020
Time Tested	14:20	14:37	14:56
Test Request #/Location	Coridale Estate Lot 426	Coridale Estate Lot 430	Coridale Estate Lot 428
Easting	144.375558	144.375547	144.375221
Northing	38.014858	38.014942	38.015046
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	200	200	200
Soil Description	CLAY, light brown, high plasticity	CLAY, light brown, high plasticity	CLAY, light brown, high plasticity
Test Depth (mm)	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	4	2	0
Field Wet Density (FWD) t/m^3	1.71	1.70	1.63
Field Moisture Content %	22.0	23.6	23.6
Field Dry Density (FDD) t/m^3	1.40	1.37	1.32
Peak Converted Wet Density t/m^3	**	**	1.78
Adjusted Peak Converted Wet Density t/m^3	1.81	1.78	**
Moisture Variation (Wv) %	**	**	5.0
Adjusted Moisture Variation %	5.5	5.0	**
Hilf Density Ratio (%)	**94.5**	**95.0**	**92.0**
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
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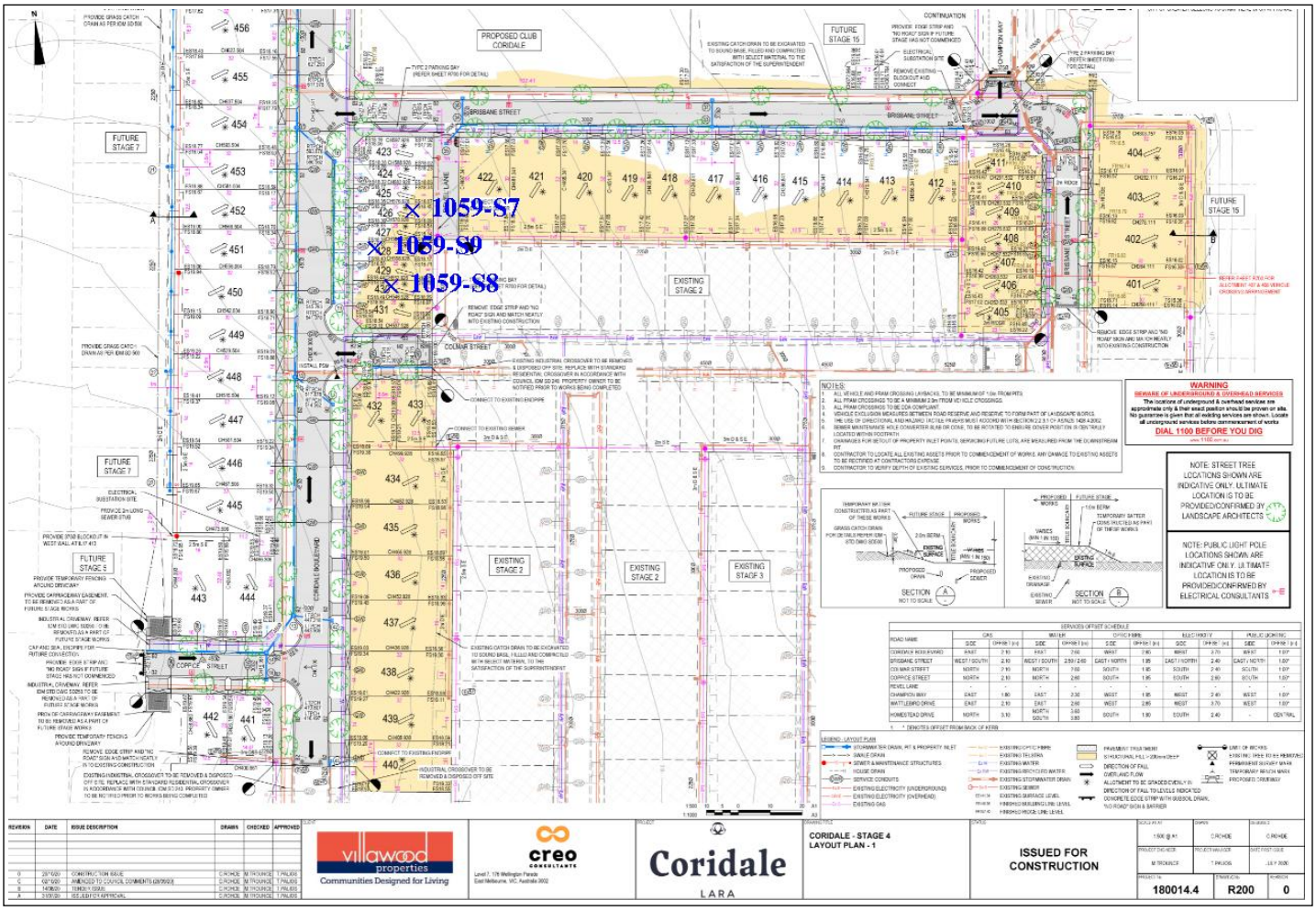

Material Test Report

Ground Science South West
Geotechnical & Environmental Consultants

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

Report Number: **GSSW1059-4**
Issue Number: 2 - *This version supersedes all previous issues*
Reissue Reason: *Updated Report Remarks*
Date Issued: 27/11/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8206
Date Sampled: 25/11/2020
Dates Tested: 25/11/2020 - 26/11/2020
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Remarks: This report replaces GSSW1059-4 Issue 1 dated 27/11/20
Specification: 95% Standard Compaction & +/- 3% Moisture Variation
Lot Number: Lot 432 - 440, 424 - 421
Material: CLAY with gravel, brown, high plasticity
Material Source: Imported Locally

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1						
Sample Number	1059-S10	1059-S11	1059-S12	1059-S13	1059-S14	1059-S15
Date Tested	25/11/2020	25/11/2020	25/11/2020	25/11/2020	25/11/2020	25/11/2020
Time Tested	11:03	11:20	11:50	14:01	14:12	14:21
Test Request #/Location	Coridale Estate Stage 4 Lot 439	Coridale Estate Stage 4 Lot 437	Coridale Estate Stage 4 lot 435	Coridale Estate Stage 4 Lot 430	Coridale Estate Stage 4 lot 429	Coridale Estate Stage 4 lot 427
Easting	38.01617	38.015991	38.015839	38.014989	38.01497	38.014932
Northing	144.37534	144.375394	144.375404	144.375465	144.375462	144.375581
Layer / Reduced Level	1	1	1	1	1	1
Thickness of Layer (mm)	200	200	200	200	200	200
Soil Description	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity
Test Depth (mm)	175	175	175	175	175	175
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	3	5	6	1	8	1
Field Wet Density (FWD) t/m^3	1.82	1.88	2.06	1.90	1.82	1.89
Field Moisture Content %	23.4	27.2	24.3	28.6	28.8	28.0
Field Dry Density (FDD) t/m^3	1.47	1.48	1.65	1.48	1.41	1.48
Peak Converted Wet Density t/m^3	**	**	**	**	**	**
Adjusted Peak Converted Wet Density t/m^3	1.86	1.94	1.98	1.86	1.90	1.89
Moisture Variation (Wv) %	**	**	**	**	**	**
Adjusted Moisture Variation %	2.5	-1.5	0.0	-0.5	-3.0	-3.0
Hilf Density Ratio (%)	**98.0**	**97.0**	**103.5**	**102.0**	**96.0**	**100.0**
Compaction Method	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**	**Standard**
Report Remarks	Retest of 1059-S4	Retest of 1059-S6	Retest of 1059-S5	Retest of 1059-S8	Retest of 1059-S9	Retest of 1059-S7

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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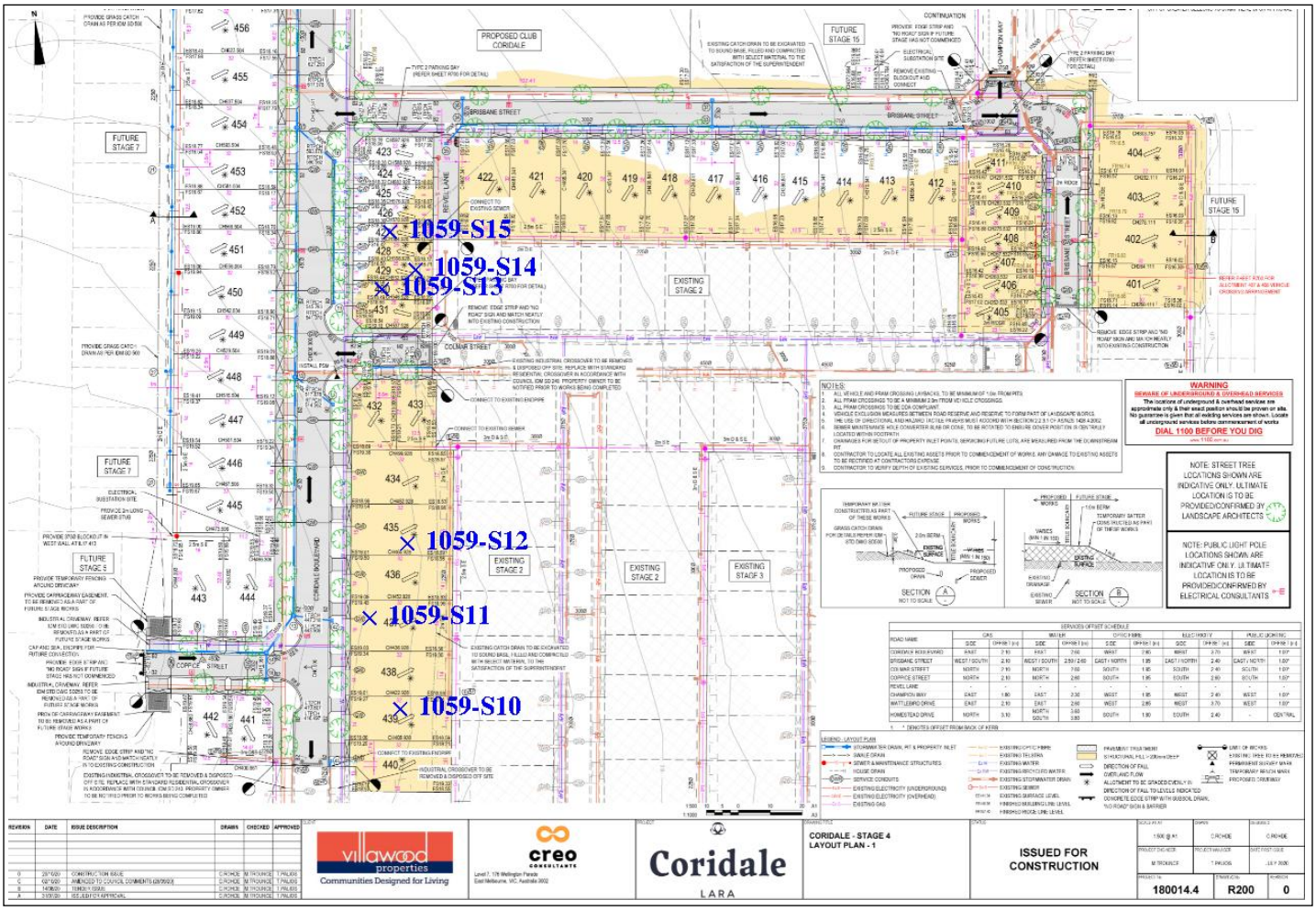

Material Test Report

Report Number: GSSW1059-5
Issue Number: 1
Date Issued: 30/11/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8212
Date Sampled: 26/11/2020
Dates Tested: 26/11/2020 - 27/11/2020
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: Lot 401 - 417
Material: CLAY with gravel, brown, high plasticity
Material Source: Imported Locally

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Email: tomas@groundscience.com.au

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NATA
WORLD RECOGNISED ACCREDITATION

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	1059-S16	1059-S17	1059-S18
Date Tested	26/11/2020	26/11/2020	26/11/2020
Time Tested	11:01	11:21	11:38
Test Request #/Location	Coridale Estate Stage 4 Lot 401	Coridale Estate Stage 4 lot 402	Coridale Estate Stage 4 Lot 403
Latitude	38.015177	38.01508	38.014953
Longitude	144.378201	144.378186	144.378215
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	200	200	200
Soil Description	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity
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	1.94	1.96	1.92
Field Moisture Content %	27.2	25.3	29.3
Field Dry Density (FDD) t/m^3	1.52	1.56	1.48
Peak Converted Wet Density t/m^3	1.89	1.87	1.85
Adjusted Peak Converted Wet Density t/m^3	**	**	**
Moisture Variation (Wv) %	-0.5	1.5	-2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	**102.0**	**105.0**	**103.5**
Compaction Method	**Standard**	**Standard**	**Standard**
Report Remarks	**	**	**

Moisture Variation Note:
Positive values = test is dry of OMC
Negative values = test is wet of OMC

Sample Locations Plan

Ground Science South West
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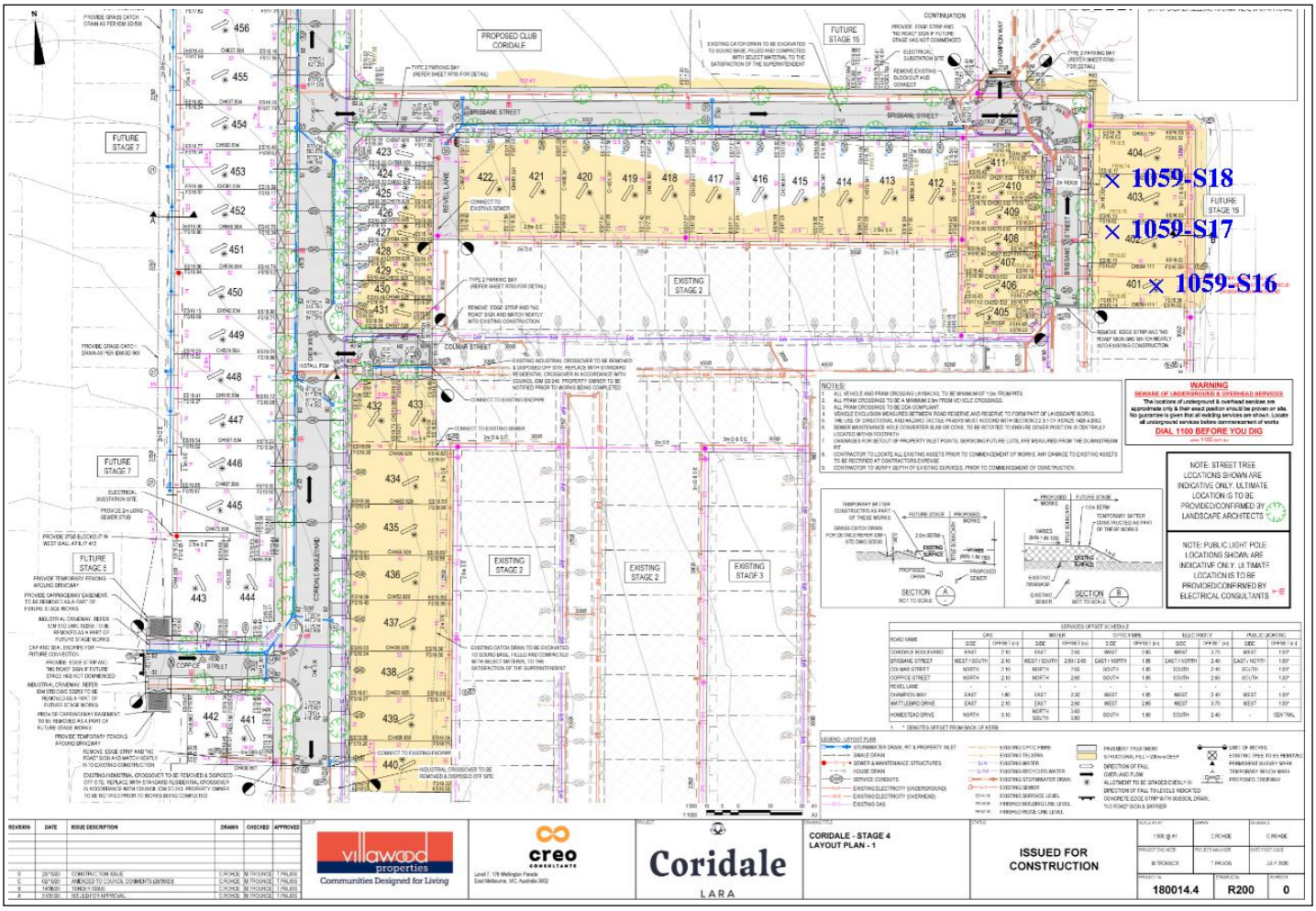

Material Test Report

Report Number: **GSSW1059-6**
Issue Number: 1
Date Issued: 01/12/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8227
Date Sampled: 27/11/2020
Dates Tested: 27/11/2020 - 30/11/2020
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: Lot 405 - 417
Material: CLAY with gravel, brown, high plasticity
Material Source: Imported Locally

Ground Science South West
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WORLD RECOGNISED ACCREDITATION

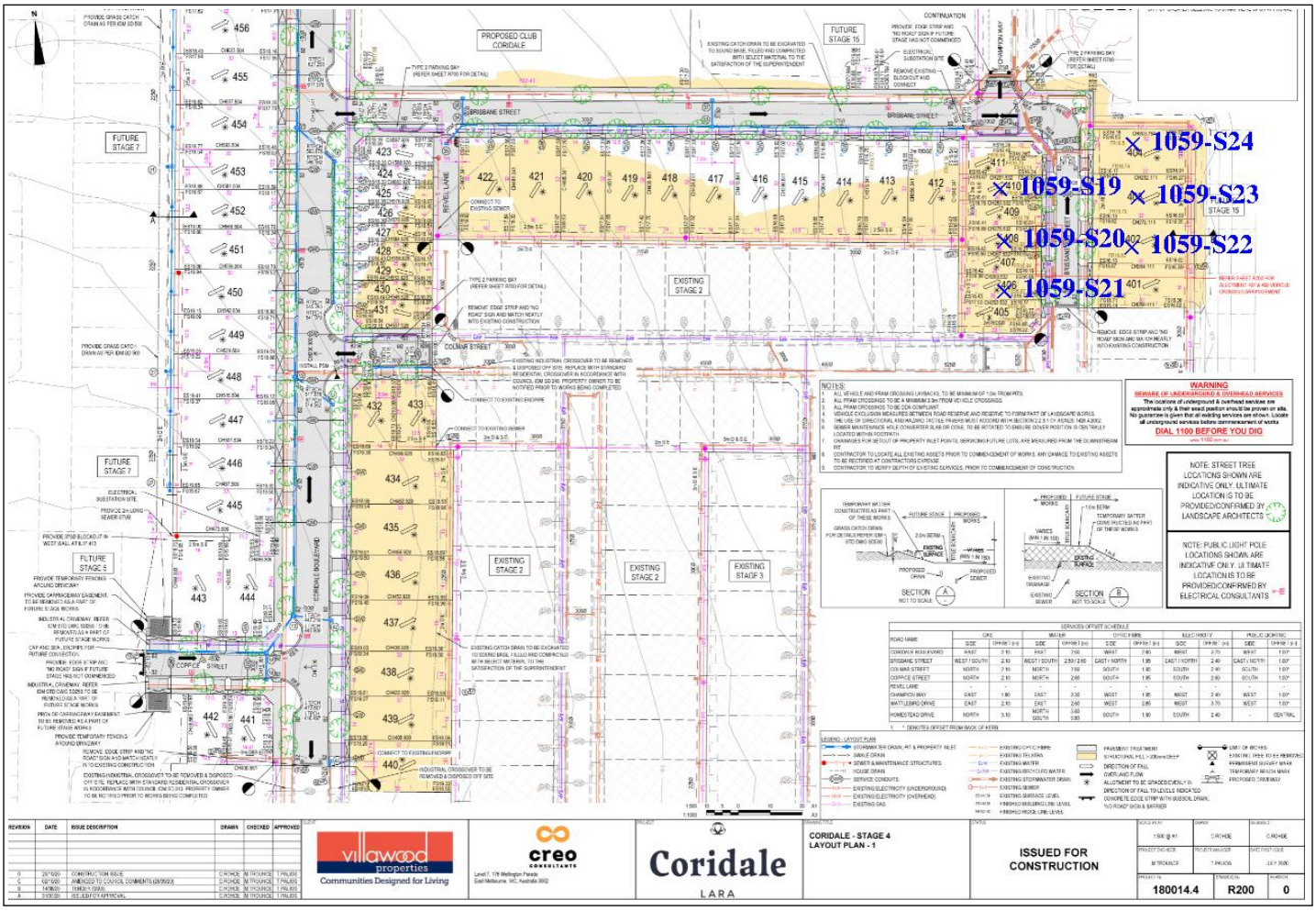
Approved Signatory: Tomas Wheadon
Field & Laboratory Technician
NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1						
Sample Number	1059-S19	1059-S20	1059-S21	1059-S22	1059-S23	1059-S24
Date Tested	27/11/2020	27/11/2020	27/11/2020	27/11/2020	27/11/2020	27/11/2020
Time Tested	09:10	09:20	09:30	14:30	14:45	14:55
Test Request #/Location	Coridale Estate Stage 4 Lot 410	Coridale Estate Stage 4 Lot 408	Coridale Estate Stage 4 Lot 406	Coridale Estate Stage 4 Lot 402	Coridale Estate Stage 4 Lot 403	Coridale Estate Stage 4 Lot 404
Latitude	38.014881	38.014982	38.015081	38.015096	38.015153	38.015240
Longitude	144.377597	144.377788	144.377712	144.37805	144.378148	144.378253
Layer / Reduced Level	1	1	1	2	2	2
Thickness of Layer (mm)	200	200	200	125	125	125
Soil Description	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, medium to high plasticity	CLAY with gravel, brown, medium to high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity
Test Depth (mm)	175	175	175	100	100	100
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0	0	6	0
Field Wet Density (FWD) t/m^3	2.05	1.94	1.99	2.03	2.04	2.04
Field Moisture Content %	22.2	21.2	23.5	22.3	25.7	22.7
Field Dry Density (FDD) t/m^3	1.68	1.60	1.61	1.66	1.62	1.66
Peak Converted Wet Density t/m^3	1.91	1.89	1.90	1.92	**	1.89
Adjusted Peak Converted Wet Density t/m^3	**	**	**	**	1.93	**
Moisture Variation (Wv) %	3.0	2.0	2.0	2.5	**	2.0
Adjusted Moisture Variation %	**	**	**	**	0.5	**
Hilf Density Ratio (%)	**107.5**	**103.0**	**104.5**	**106.0**	**106.0**	**108.0**
Compaction Method	**Modified**	**Standard**	**Standard**	**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

Report Number: **GSSW1059-7**
Issue Number: 1
Date Issued: 01/12/2020
Client: CREO CONSULTANTS PTY LTD
Level 7/176 Wellington Parade, East Melbourne Victoria 3002
Contact: Jahn Kayhan
Project Number: GSSW1059
Project Name: CORIDALE ESTATE - STAGE 4
Project Location: LARA
Contractor: WINSLOW CONSTRUCTORS
Work Request: 8241
Date Sampled: 30/11/2020
Dates Tested: 30/11/2020 - 30/11/2020
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 412 - 417
Material: CLAY with gravel, brown, high plasticity
Material Source: Imported Locally

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Geotechnical & Environmental Consultants

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Email: tomas@groundscience.com.au

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WORLD RECOGNISED ACCREDITATION

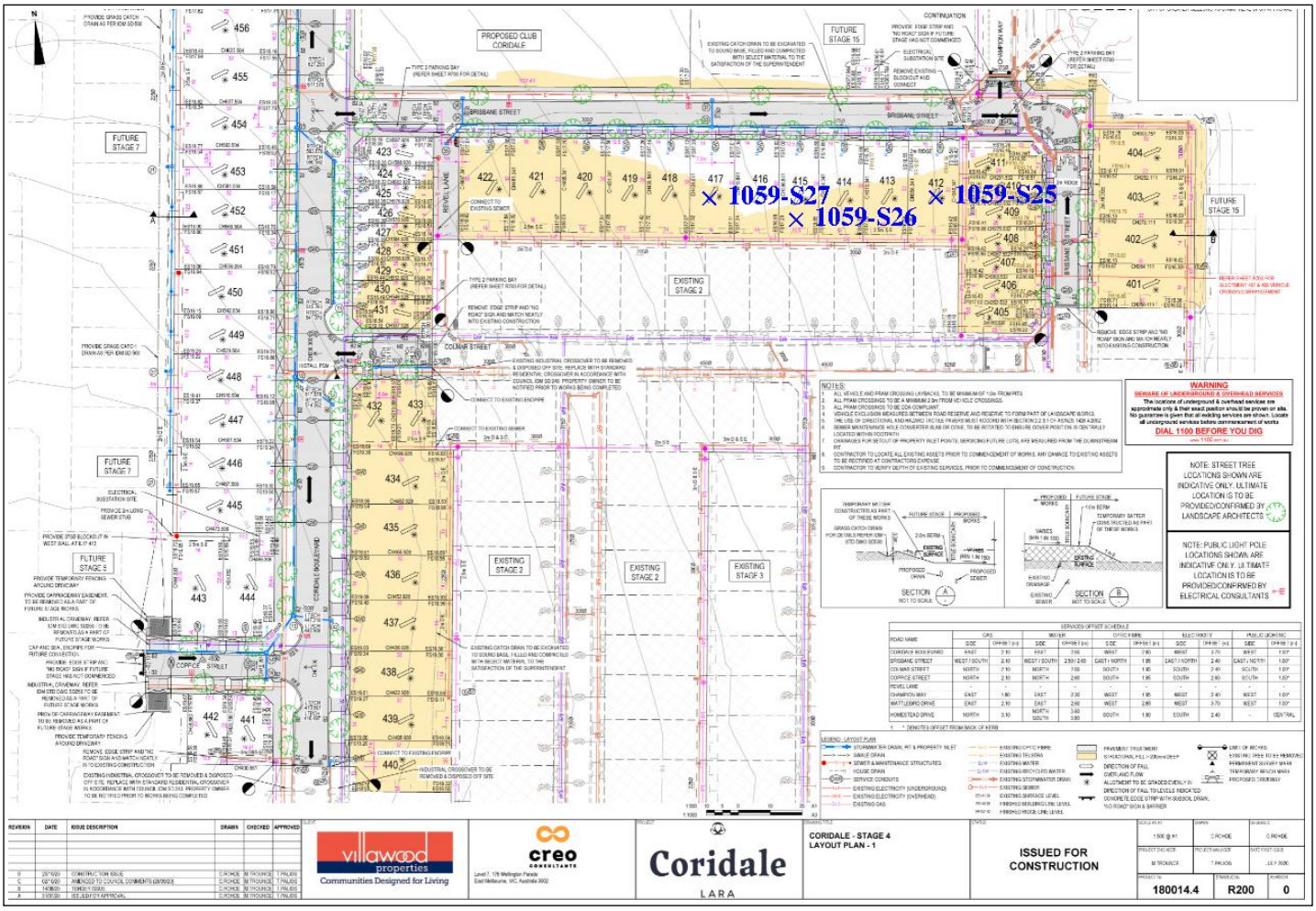
Approved Signatory: Tomas Wheadon
Field & Laboratory Technician
NATA Accredited Laboratory Number: 20109

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	1059-S25	1059-S26	1059-S27
Date Tested	30/11/2020	30/11/2020	30/11/2020
Time Tested	08:50	09:00	09:10
Test Request #/Location	Coridale Estate Stage 4 lot 412	Coridale Estate Stage 4 lot 415	Coridale Estate Stage 4 lot 417
Latitude	38.014848	38.014947	38.014841
Longitude	144.377410	144.377067	144.376969
Layer / Reduced Level	1	1	1
Thickness of Layer (mm)	200	200	200
Soil Description	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity	CLAY with gravel, brown, high plasticity
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	2.07	2.06	2.06
Field Moisture Content %	24.1	26.3	23.4
Field Dry Density (FDD) t/m^3	1.67	1.63	1.67
Peak Converted Wet Density t/m^3	1.89	1.89	1.90
Adjusted Peak Converted Wet Density t/m^3	**	**	**
Moisture Variation (Wv) %	1.0	0.0	1.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	**109.5**	**109.5**	**108.5**
Compaction Method	**Standard**	**Standard**	**Standard**
Report Remarks	**	**	**

Moisture Variation Note:
Positive values = test is dry of OMC
Negative values = test is wet of OMC

Sample Locations Plan

Ground Science South West
Geotechnical & Environmental Consultants



APPENDIX C

Site Photographs


SiteTech


MARRON


WINSLOW
9358 7700
UNIT
310
CAT


CAT


ACTIVE


MARRON
TC McINTYRE
DRAINAGE
0417 057 248
0418 319 347
DX300LC