



## **Level 1 Inspection & Testing**

Armstrong Estate Stage 35C, Mount Duneed

Creo Civil Consultants Pty Ltd

28 August 2025

CTGSW Ref: GEO22-8\_V1

28 August 2025

Creo Civil Consultants Pty Ltd

## **Level 1 Inspection & Testing Report**

### **Armstrong Estate Stage 35C, Mount Duneed, Victoria**

C&T Geotechnical South West has prepared this report to present the results of Level 1 Inspection & Testing completed for the project located at Armstrong Estate Stage 35C, in Mount Duneed.

#### Distribution

Original held by	C&T Geotechnical South West
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1 electronic copy	Creo Civil Consultants Pty Ltd

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#### **For an on behalf of C&T Geotechnical South West**

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## **1. INTRODUCTION**

This report presents the results of the inspection activities, compaction control and laboratory testing services performed by C&T Geotechnical South West for the Armstrong Estate Stage 35C project, located in Mount Duneed, Victoria (the site).

## **2. PROJECT UNDERSTANDING**

It is understood that the project involves the placement of fill as part of the bulk earthworks for Armstrong Estate Stage 35C. C&T Geotechnical South West was engaged to provide Level 1 Inspection and Testing services for the construction of these areas. Authorisation to proceed was provided by Creo Civil 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'.

C&T Geotechnical South West performed the role of the project Geotechnical Inspection & Testing Authority (GITA) with all Level 1 Inspection & Testing services described in this report undertaken by an experienced GITA site representative.

## **3. SCOPE OF WORK**

### **3.1 AREAS OF WORK**

This report presents Level 1 Inspection and Testing completed on the residential allotments. C&T Geotechnical South West provided Level 1 Inspection and Testing services for the construction of fill in areas requiring greater than 200 mm of fill to achieve finished surface levels. The areas requiring Level 1 Inspection & Testing are shown on the supplied construction drawing, on Figure 1 (Appendix A), prepared by Creo Civil Consultants Pty Ltd (Armstrong Estate Stage 35C – Earthworks Plan [180016.35C – R202 Rev B]).

C&T Geotechnical South West previously witnessed stormwater drain backfilling earthworks that took place inside the residential lots, and these works are detailed in the Level 1 Inspection and Testing report "Armstrong Estate Trench Backfill" (ref: GSSW2268-28 dated 3/07/2025).

This report details the Level 1 earthworks process performed on site which commenced on 25 July 2025 and was completed on 5 August 2025, requiring 7 full days and 1 half day of inspection and testing works.

### **3.2 PLACEMENT METHODOLOGY**

A technical specification for the fill operations was not provided. The placement of controlled fill on the above-mentioned areas was carried out in accordance with Level 1 fill procedures as detailed in AS3798 (2007) 'Guidelines on Earthworks for Commercial and Residential Developments'. The following fill placement guideline was adopted for the works:

1. all existing loose surficial fill, topsoil, soft material, vegetation and materials containing significant organic matter were removed to expose the natural soil subgrade
2. suitable fill material, sourced by the contractor and approved by C&T Geotechnical South West, was placed in loose horizontal layers not exceeding 300 mm in thickness
3. 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)

4. the fill was moisture conditioned to within +/- 3 % of the standard optimum moisture content
5. the fill material was sorted and mixed to eliminate particles greater than 20 % by volume, particles coarser than 37.5 mm and no particle over 200 mm in any dimension
6. 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 200 mm per 2500 m<sup>2</sup>
  - 1 test per 500 m<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 & TESTING**

##### **4.1 SUBGRADE PREPARATION**

Site stripping began on 25 July 2025 with the earthworks contractors removing all organics, topsoil, compressible (soft) soils, as witnessed by the representative geotechnician from C&T Geotechnical South West. Site stripping was carried out progressively throughout the works and commenced from lot 3572 to lot 3583.

Inspection of the prepared subgrade surface on the above lots was carried out on 25 July 2025 by the representative geotechnician from C&T Geotechnical South West. A proof roll using a moxy truck loaded to a weight of 40 tonnes was performed over these lots. At the time of the inspection, the prepared subgrade in this area was deemed acceptable and considered suitable for subsequent works to proceed.

Further inspections of the prepared subgrade surface were performed over the course of the works as stripping works progressed alongside placement of controlled fill on previously approved lots. The following methodology was adopted:

- the surface was visually inspected by the representative geotechnician from C&T Geotechnical South West
- a proof roll using a fully loaded moxy truck or water cart was performed over these lots
- if soft spots were observed, these would be remedied by removing the material in the presence of the representative geotechnician and proof rolled again, until the area showed no deflection.

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 cut areas onsite. The material was carted across site using moxy trucks and stockpiled adjacent to the fill zones. C&T Geotechnical South West 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 CL-CLAY, trace sand & gravel, low plasticity, sand 11 % fine to coarse grained, gravel 4 % fine to medium. Quality assurance tests were performed on the stockpiled fill material before placement. These tests include Particle Size Distribution (AS 1289 3.6.1) and Atterberg Limits (AS 1289 3.1.2, 3.2.1, 3.3.1 & 3.4.1) tests. The test report sheets are presented in Appendix A. C&T Geotechnical South West 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;

1. excavator
2. water cart
3. padfoot compactor
4. moxy truck.

During fill placement, the weather conditions ranged from sunny to cloudy with temperatures typically ranging from 4 to 17 degrees Celsius.

The filling process was generally consistent throughout the project. The approved fill was carted across site in moxy trucks and was stockpiled adjacent to the fill placement zones. The material was spread using an excavator 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 compactor applying a minimum of 5 - 8 passes, per layer observed. The thin layers of fill were compacted to form a composite layer, measuring no greater than 250 mm thick, prior to undertaking the field density testing. This process was adopted for the fill placement works.

#### **4.4 RESULTS OF COMPACTION CONTROL TESTING**

Level 1 Inspection & Testing was undertaken by experienced technicians from C&T Geotechnical South West who attended the site for the duration of the bulk earthworks and nominated the location of the in-situ density tests. Testing comprised a total of 18 in-situ density tests using a nuclear moisture-density gauge in accordance with Australian Standard (AS 1289 5.8.1) together with 18 "Rapid HILF" compaction tests (AS 1289 5.7.1).

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

#### **4.5 FINAL SURFACE LEVELS**

Observations were made by a C&T Geotechnical South West 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. should be obtained from the contractor's survey data.

#### **5. COMPLIANCE**

C&T Geotechnical South West field staff have undertaken Level 1 Inspection and Testing services of the construction of the controlled fill in the areas designated on Figure 1. Geotechnical South West 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 C&T Geotechnical South West 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 & 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. C&T Geotechnical South West (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.

## 7. STATEMENT OF LIMITATIONS

This report has been prepared by C&T Geotechnical South West exclusively for the commissioning client and the project described. The scope of work was limited to the services outlined herein and does not include investigation of all possible site conditions or risks.

Findings, opinions, and recommendations are based on conditions observed during limited sampling, testing, and fieldwork at the time of investigation. Subsurface conditions may vary across the site, and changes can occur after the investigation. No warranty is given that conditions described are representative of the entire site or future conditions.

If site conditions encountered during works differ from those described, C&T Geotechnical South West must be contacted promptly for reassessment and advice. Reliance on this report without such consultation is at the user's risk.

Where information has been provided by the client or third parties, it is assumed to be correct unless otherwise stated. C&T Geotechnical South West accepts no liability for errors, omissions, or misinterpretations arising from such information.

The advice in this report is based on information available at the time of preparation. C&T Geotechnical South West has no ongoing obligation to update or revise this document unless separately engaged.

Plans, diagrams, and sketches included are for illustrative purposes only and should not be used for construction or detailed design without independent verification.

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This report is intended for the commissioning client's use for the stated project only. No responsibility is accepted for use by other parties or for other purposes. This report must not be altered or reproduced **except** in full without written approval.

## **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**

Armstrong Estate Stage 35C – Earthworks Plan [180016.35C – R202 Rev B]



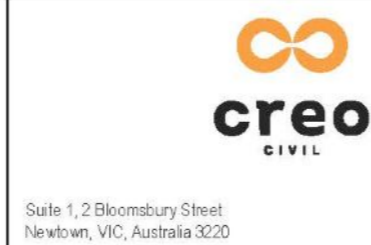
**LEGEND - EARTHWORKS PLAN**

- RIDGE LINE
- - - - - TOE OF BATTER
- - - - - SWALE DRAIN
- ES141.34 EXISTING SURFACE LEVEL
- FS140.35 FINISHED BUILDING LINE LEVEL
- FR157.40 FINISHED RIDGE LINE LEVEL
- TW158.30 TOP OF RETAINING WALL
- BW159.30 BOTTOM OF RETAINING WALL
- RETAINING WALL
- STRUCTURAL FILL > 200mm DEEP
- EX-STRUCTURAL FILL > 200mm DEEP
- DIRECTION OF FALL (ALLOTMENT TO BE GRADED EVENLY IN DIRECTION OF FALL TO LEVELS INDICATED)
- OVERLAND FLOW
- 0.05m CONTOUR

**NOTE:**  
CONTRACTOR IS TO VERIFY ALL CONNECTION LEVELS PRIOR TO COMMENCEMENT OF WORKS AND NOTIFY CREO CIVIL IF THERE ARE DIFFERENCES

**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  
**BEFORE YOU DIG**  
[www.byda.com.au](http://www.byda.com.au)

REVISION	DATE	ISSUE DESCRIPTION	DRAWN	CHECKED	APPROVED
B	11/07/25	COUNCIL COMMENTS DATED 10/07/25	I.HOGAN	J.RAMSAY	M.TROUNCE
A	22/04/25	ISSUED FOR APPROVAL	I.HOGAN	J.RAMSAY	M.TROUNCE



**ARMSTRONG STAGE 35C**  
**EARTHWORKS PLAN**

PLANNING PERMIT No. PP-496-2012

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

SCALE @ A1 : 1:500

DESIGNED	PROJECT ENGINEER	
I.HOGAN	J.RAMSAY (PE0015696)	
DRAWN	PROJECT MANAGER	
I.HOGAN	M.TROUNCE	
PROJECT No.	DRAWING No.	REVISION
<b>180016.35C</b>	<b>R202</b>	<b>B</b>

## **Appendix A**

Quality Assurance Particle Size Distribution & Atterberg Limits Tests Report Sheets

# Material Test Report

**Report Number:** GEO22-2A  
**Issue Number:** 1  
**Date Issued:** 20/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24165  
**Sample Number:** 22-S4  
**Date Sampled:** 29/07/2025  
**Dates Tested:** 29/07/2025 - 19/08/2025  
**Sampling Method:** AS 1289.1.2.1 6.2 - Sampling from stockpiles  
**Sample Location:** Onsite Stockpile  
**Material:** CL - CLAY, trace sand & gravel, low plasticity, sand 11% fine to coarse grained, gravel 4% fine to medium.  
**Material Source:** Reclaimed fill



C & T Geotechnical (South West)  
 8 Freedman Street North Geelong Vic 3215  
 Phone: (03) 5282 1566  
 Email: Chrism@ctgeotechsw.com.au

Accredited for compliance with ISO/IEC 17025 - Testing



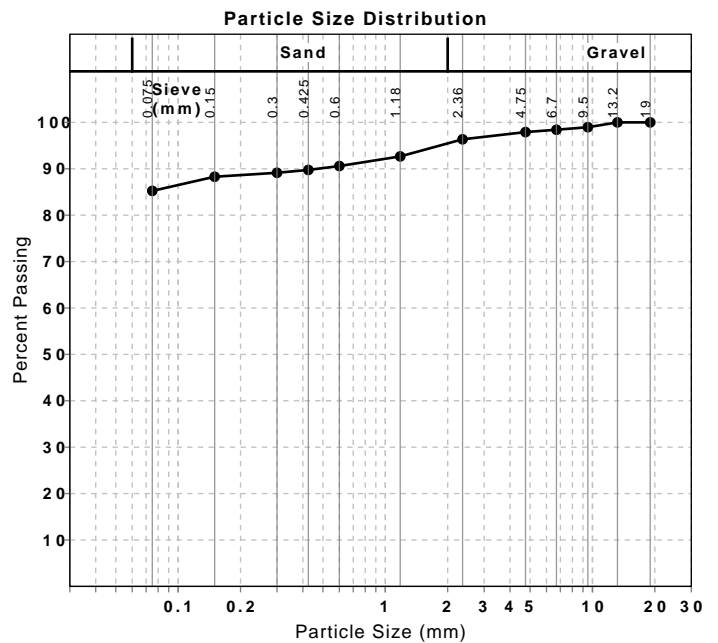
*B. Elliott*

Approved Signatory: Brent Elliott  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
19 mm	100		0	
13.2 mm	100		0	
9.5 mm	99		1	
6.7 mm	98		1	
4.75 mm	98		1	
2.36 mm	96		2	
1.18 mm	93		4	
0.6 mm	91		2	
0.425 mm	90		1	
0.3 mm	89		1	
0.15 mm	88		1	
0.075 mm	85		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 (%)	22		
Plastic Limit (%)	13		
Plasticity Index (%)	9		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	3.5		
Cracking Crumbling Curling	Cracking		



**Appendix B**

Field Density Test Report Summary Sheets

# Project Summary Report

**Report Date:** 14/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNED  
**Specification:** 95% Standard Compaction & +/- 3% Moisture Variation  
**Test Methods:** AS 1289 5.7.1 STD & 5.8.1 & 2.1.1 & 5.4.1



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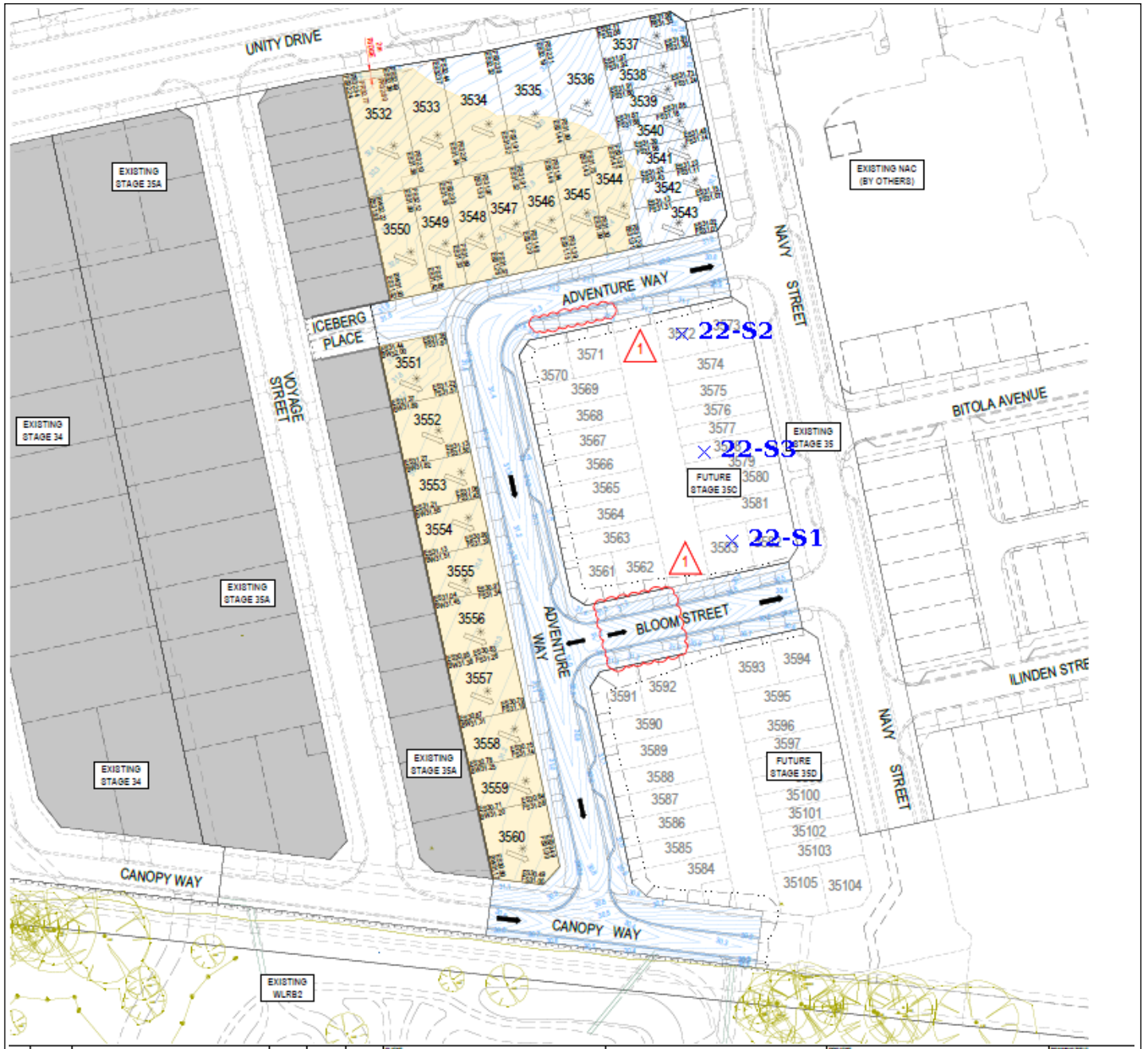
Lot #	Sample #	Date Sampled	Location	Easting	Northing	Elevation (m)	Layer	Relative Compaction (%)	Moisture Variation (%)	Moisture Content (%)	Field Wet Density (t/m3)
**	22-S1	28/07/2025	Refer to attached plan Lot 3583	55H 265825	5765651	**	1	100.0	-2.0	23.3	2.04
**	22-S2	28/07/2025	Refer to attached plan Lot 3572	55H 265833	5765619	**	1	99.0	-1.5	21.9	2.03
**	22-S3	28/07/2025	Refer to attached plan Lot 3578	55H 265837	5765639	**	2	97.0	-1.0	20.8	1.97
**	22-S5	29/07/2025	Refer to attached plan Lot 3580	55H 265827	5765629	**	3	98.0	3.0	14.1	1.98
**	22-S6	29/07/2025	Refer to attached plan Lot 3576	55H 265837	5765654	**	4	103.5	-1.0	21.9	2.08
**	22-S7	29/07/2025	Refer to attached plan Lot 3574	55H 265835	5765661	**	4	100.5	0.0	20.4	2.03
**	22-S8	30/07/2025	Refer to attached plan Spitfire Lane in front of lot 3580	55H 265855	5765664	**	1	98.0	-1.0	21.5	1.99
**	22-S9	30/07/2025	Refer to attached plan Spitfire Lane in front of lot 3572	55H 265811	5765661	**	2	99.5	-1.0	21.5	2.02
**	22-S10	30/07/2025	Refer to attached plan Spitfire Lane in front of lot 3576	55H 265812	5765745	**	3	102.5	0.5	20.6	2.06
**	22-S11	31/07/2025	Refer to attached plan Spitfire Lane in front of lot 3574	55H 265777	5765746	**	4	98.0	-0.5	20.0	2.00
**	22-S12	31/07/2025	Refer to attached plan Adventure Way in front of lot 3564	55H 265783	5765636	**	1	102.0	-2.0	26.2	2.01
**	22-S13	31/07/2025	Refer to attached plan Lot 3564	55H 265800	5765625	**	1	105.0	-0.5	24.2	2.04
**	22-S14	01/08/2025	Refer to attached plan Lot 3569	55H 265751	5765744	**	2	101.0	0.0	24.7	1.99
**	22-S15	01/08/2025	Refer to attached plan Lot 3561	55H 265802	5765613	**	2	99.0	-0.5	23.4	1.98
**	22-S16	01/08/2025	Refer to attached plan Lot 3566	55H 265800	5765642	**	3	102.0	-0.5	20.1	2.10
**	22-S17	04/08/2025	Refer to attached plan Lot 3563	55H 265811	5765621	**	4	100.5	-0.5	20.5	2.05
**	22-S18	04/08/2025	Refer to attached plan Lot 3567	55H 265806	5765643	**	4	100.5	0.0	20.7	2.03
**	22-S19	04/08/2025	Refer to attached plan Adventure Way in front of lot 3570	55H 265780	5765658	**	2	99.0	0.0	21.1	2.03

**Moisture Variation Note:**

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

# Sample Locations Plan

x - approximate test location



# Sample Locations Plan

x - approximate test location



## **Appendix C**

Field Density Test Report Sheets & Test Locations

# Material Test Report

**Report Number:** GEO22-1  
**Issue Number:** 1  
**Date Issued:** 30/07/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24152  
**Date Sampled:** 28/07/2025  
**Dates Tested:** 28/07/2025 - 29/07/2025  
**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  
**Location:** Lot 3572 to 3583  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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Accredited for compliance with ISO/IEC 17025 - Testing



*B Elliott*

Approved Signatory: Brent Elliott  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

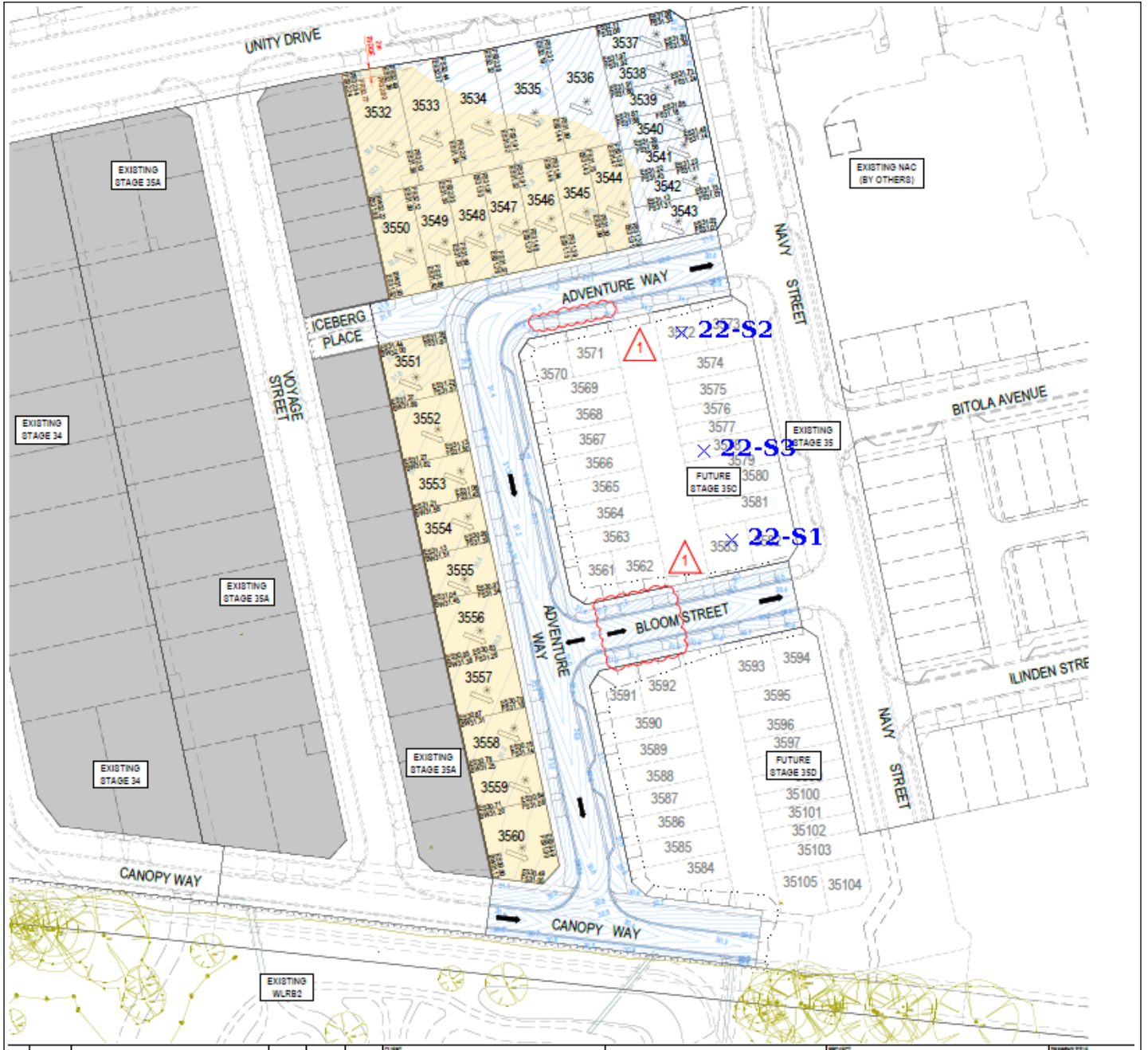
Sample Number	22-S1	22-S2	22-S3
Date Tested	28/07/2025	28/07/2025	28/07/2025
Time Tested	12:27	12:35	15:01
Test Request #/Location	Refer to attached plan Lot 3583	Refer to attached plan Lot 3572	Refer to attached plan Lot 3578
Easting	55H 265825	55H 265833	55H 265837
Northing	5765651	5765619	5765639
Layer / Reduced Level	1	1	2
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	1	3
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	1	3
Field Wet Density (FWD) t/m <sup>3</sup>	2.04	2.03	1.97
Field Moisture Content %	23.3	21.9	20.8
Field Dry Density (FDD) t/m <sup>3</sup>	1.65	1.67	1.64
Peak Converted Wet Density t/m <sup>3</sup>	2.04	**	**
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	2.05	2.03
Adj. Optimum Moisture Content % (AS1289.5.4.1)	21.1	20.0	19.4
Adj. Field Moisture Content % (AS1289.5.4.1)	23.3	21.6	20.3
Moisture Ratio % (AS1289.5.4.1)	110.5	**	**
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	108.5	105.0
Moisture Variation (Wv) %	-2.0	**	**
Adjusted Moisture Variation %	**	-1.5	-1.0
Hilf Density Ratio (%)	<b>100.0</b>	<b>99.0</b>	<b>97.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

### Moisture Variation Note:

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

# Sample Locations Plan

x - approximate test location



# Material Test Report

**Report Number:** GEO22-2  
**Issue Number:** 1  
**Date Issued:** 31/07/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24165  
**Date Sampled:** 29/07/2025  
**Dates Tested:** 29/07/2025 - 30/07/2025  
**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  
**Location:** Lots 3572-3583  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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*B Elliott*

Approved Signatory: Brent Elliott  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

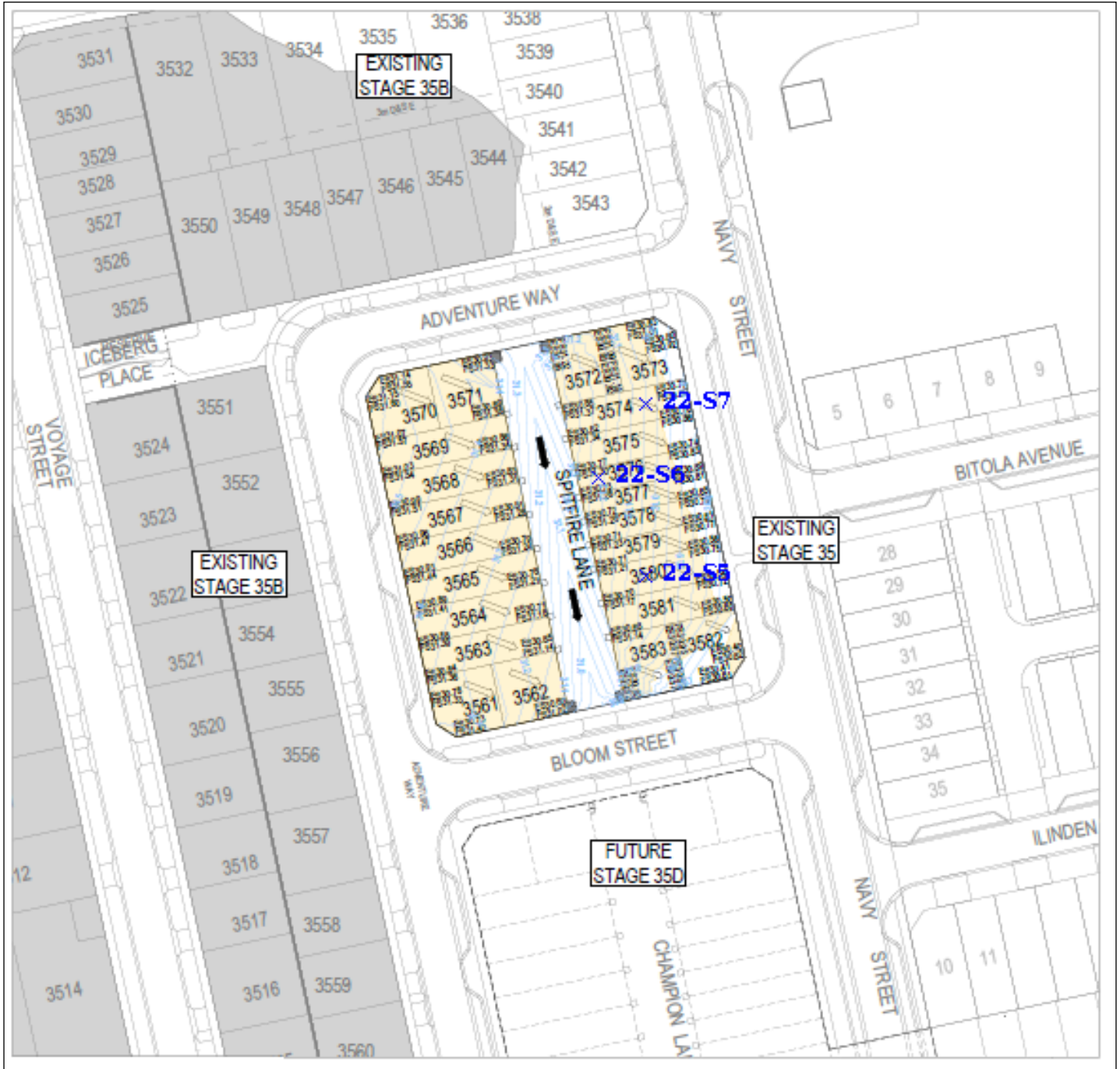
Sample Number	22-S5	22-S6	22-S7
Date Tested	29/07/2025	29/07/2025	29/07/2025
Time Tested	10:16	15:06	15:14
Test Request #/Location	Refer to attached plan Lot 3580	Refer to attached plan Lot 3576	Refer to attached plan Lot 3574
Easting	55H 265827	55H 265837	55H 265835
Northing	5765629	5765654	5765661
Layer / Reduced Level	3	4	4
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	10	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	10	0	0
Field Wet Density (FWD) t/m <sup>3</sup>	1.98	2.08	2.03
Field Moisture Content %	14.1	21.9	20.4
Field Dry Density (FDD) t/m <sup>3</sup>	1.76	1.71	1.69
Peak Converted Wet Density t/m <sup>3</sup>	**	2.01	2.02
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	2.03	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	16.0	20.9	20.4
Adj. Field Moisture Content % (AS1289.5.4.1)	12.7	21.9	20.4
Moisture Ratio % (AS1289.5.4.1)	**	105.0	100.0
Adjusted Moisture Ratio % (AS1289.5.4.1)	79.5	**	**
Moisture Variation (Wv) %	**	-1.0	0.0
Adjusted Moisture Variation %	3.0	**	**
Hilf Density Ratio (%)	<b>98.0</b>	<b>103.5</b>	<b>100.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

### Moisture Variation Note:

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

# Sample Locations Plan

x - approximate test location



# Material Test Report

**Report Number:** GEO22-3  
**Issue Number:** 1  
**Date Issued:** 01/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24174  
**Date Sampled:** 30/07/2025  
**Dates Tested:** 30/07/2025 - 31/07/2025  
**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  
**Location:** Spitfire Lane  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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Approved Signatory: Brent Elliott  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

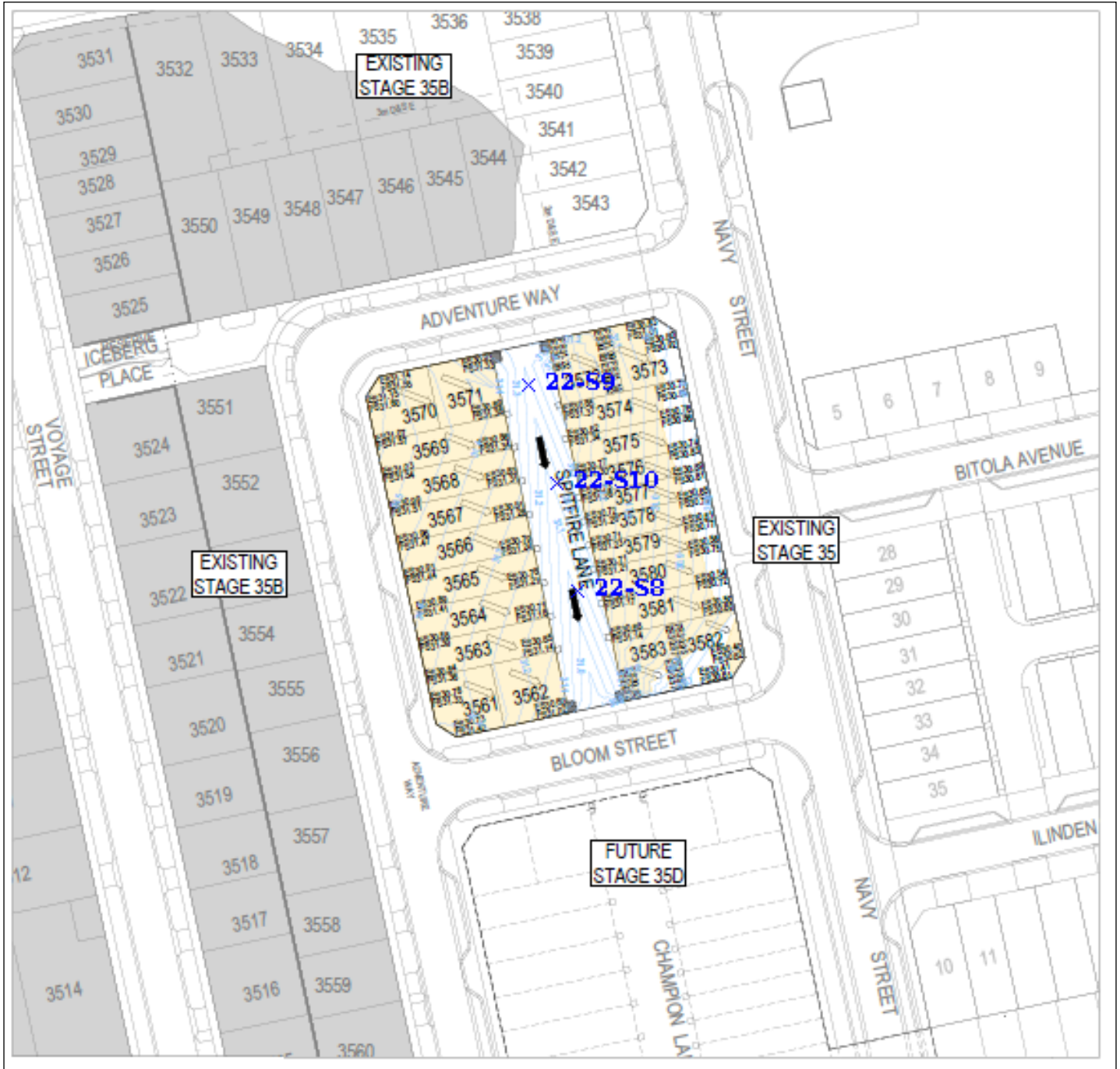
Sample Number	22-S8	22-S9	22-S10
Date Tested	30/07/2025	30/07/2025	30/07/2025
Time Tested	08:43	11:01	14:41
Test Request #/Location	Refer to attached plan Spitfire Lane in front of lot 3580	Refer to attached plan Spitfire Lane in front of lot 3572	Refer to attached plan Spitfire Lane in front of lot 3576
Easting	55H 265855	55H 265811	55H 265812
Northing	5765664	5765661	5765745
Layer / Reduced Level	1	2	3
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	1	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	1	1	0
Field Wet Density (FWD) t/m <sup>3</sup>	1.99	2.02	2.06
Field Moisture Content %	21.5	21.5	20.6
Field Dry Density (FDD) t/m <sup>3</sup>	1.64	1.67	1.71
Peak Converted Wet Density t/m <sup>3</sup>	**	**	2.02
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	2.03	2.03	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	20.2	20.4	21.1
Adj. Field Moisture Content % (AS1289.5.4.1)	21.3	21.4	20.6
Moisture Ratio % (AS1289.5.4.1)	**	**	97.5
Adjusted Moisture Ratio % (AS1289.5.4.1)	105.0	104.5	**
Moisture Variation (Wv) %	**	**	0.5
Adjusted Moisture Variation %	-1.0	-1.0	**
Hilf Density Ratio (%)	<b>98.0</b>	<b>99.5</b>	<b>102.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

### Moisture Variation Note:

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

# Sample Locations Plan

x - approximate test location



# Material Test Report

**Report Number:** GEO22-4  
**Issue Number:** 1  
**Date Issued:** 04/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24185  
**Date Sampled:** 31/07/2025  
**Dates Tested:** 31/07/2025 - 01/08/2025  
**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  
**Location:** Lot 3562 to 3572  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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Approved Signatory: Brent Elliott  
 Laboratory Manager  
 NATA Accredited Laboratory Number: 20109

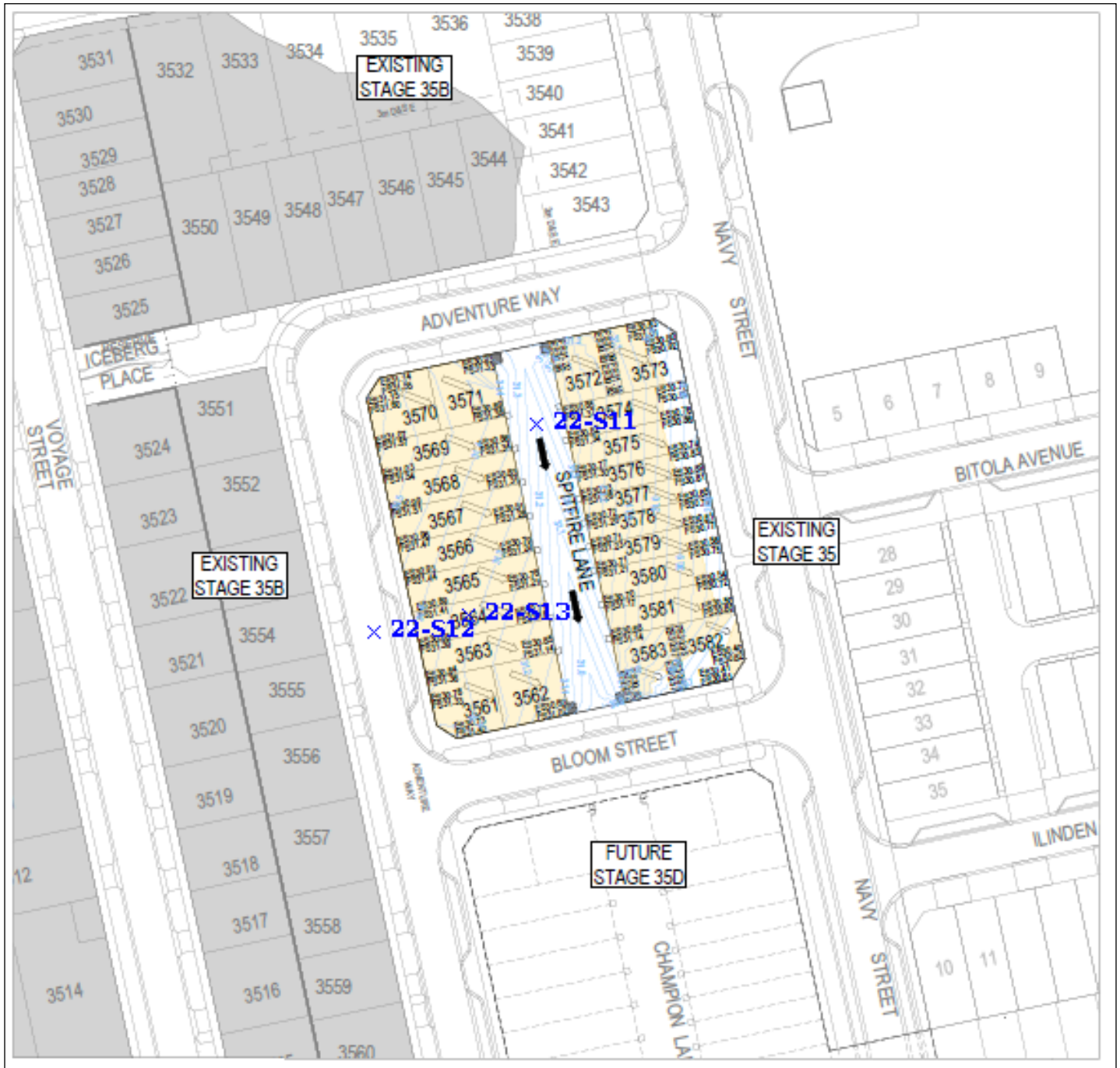
Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	22-S11	22-S12	22-S13
Date Tested	31/07/2025	31/07/2025	31/07/2025
Time Tested	11:30	14:45	14:54
Test Request #/Location	Refer to attached plan Spitfire Lane in front of lot 3574	Refer to attached plan Adventure Way in front of lot 3564	Refer to attached plan Lot 3564
Easting	55H 265777	55H 265783	55H 265800
Northing	5765746	5765636	5765625
Layer / Reduced Level	4	1	1
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	0
Field Wet Density (FWD) t/m <sup>3</sup>	2.00	2.01	2.04
Field Moisture Content %	20.0	26.2	24.2
Field Dry Density (FDD) t/m <sup>3</sup>	1.67	1.59	1.64
Peak Converted Wet Density t/m <sup>3</sup>	2.04	1.97	1.94
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	19.7	24.1	23.5
Adj. Field Moisture Content % (AS1289.5.4.1)	20.0	26.2	24.2
Moisture Ratio % (AS1289.5.4.1)	101.5	108.5	103.0
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	-0.5	-2.0	-0.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	<b>98.0</b>	<b>102.0</b>	<b>105.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

## Moisture Variation Note:

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

# Sample Locations Plan

x - approximate test location



# Material Test Report

**Report Number:** GEO22-5  
**Issue Number:** 1  
**Date Issued:** 05/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24196  
**Date Sampled:** 01/08/2025  
**Dates Tested:** 01/08/2025 - 04/08/2025  
**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  
**Location:** Lot 3561 to 3671  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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 NATA Accredited Laboratory Number: 20109

## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

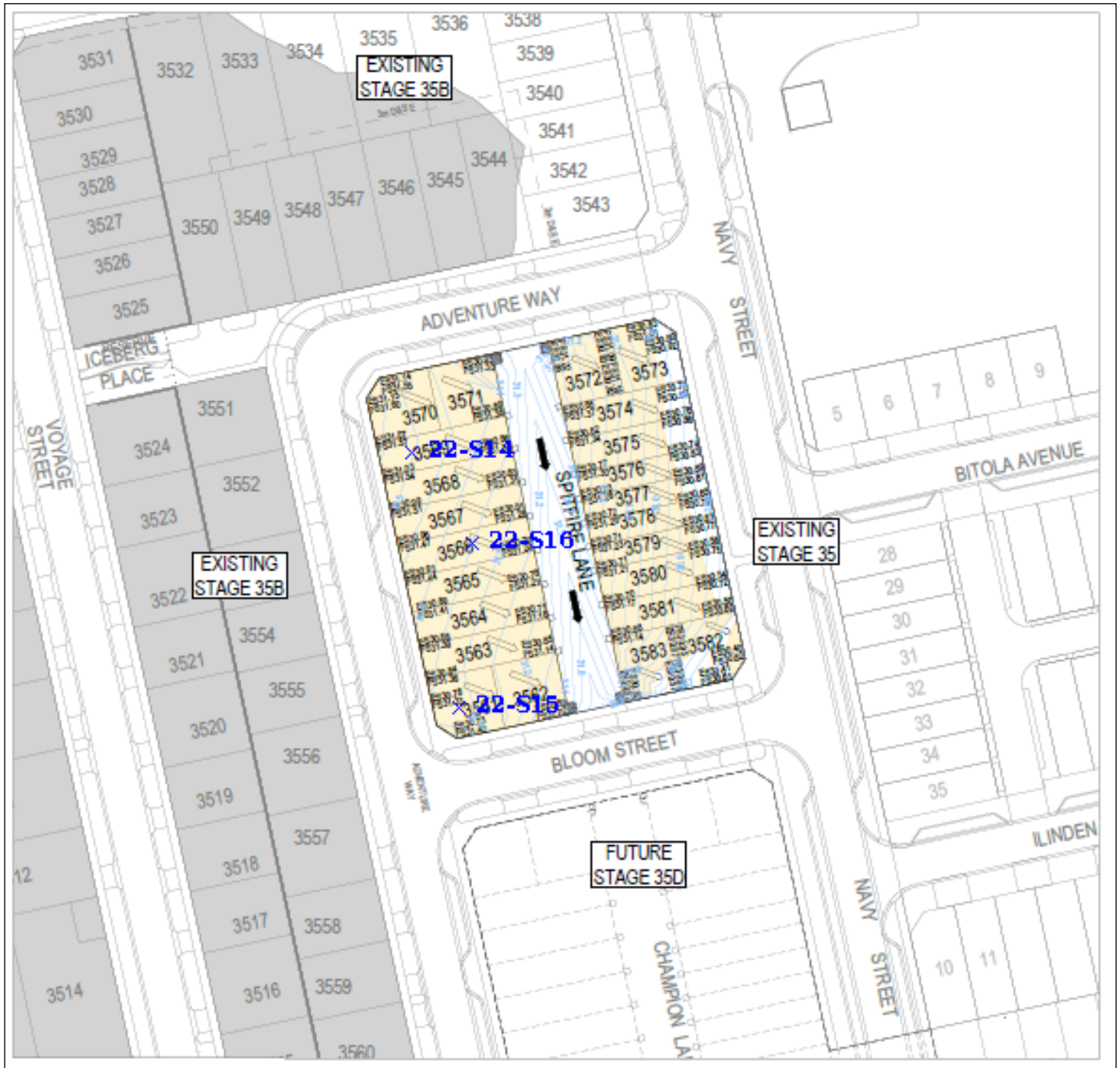
Sample Number	22-S14	22-S15	22-S16
Date Tested	01/08/2025	01/08/2025	01/08/2025
Time Tested	10:07	10:19	14:22
Test Request #/Location	Refer to attached plan Lot 3569	Refer to attached plan Lot 3561	Refer to attached plan Lot 3566
Easting	55H 265751	55H 265802	55H 265800
Northing	5765744	5765613	5765642
Layer / Reduced Level	2	2	3
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	0
Field Wet Density (FWD) t/m <sup>3</sup>	1.99	1.98	2.10
Field Moisture Content %	24.7	23.4	20.1
Field Dry Density (FDD) t/m <sup>3</sup>	1.60	1.61	1.74
Peak Converted Wet Density t/m <sup>3</sup>	1.97	2.00	2.06
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	24.7	23.1	19.6
Adj. Field Moisture Content % (AS1289.5.4.1)	24.7	23.4	20.1
Moisture Ratio % (AS1289.5.4.1)	100.0	101.0	102.5
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	0.0	-0.5	-0.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	<b>101.0</b>	<b>99.0</b>	<b>102.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

### Moisture Variation Note:

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

# Sample Locations Plan

x - approximate test location



# Material Test Report

**Report Number:** GEO22-6  
**Issue Number:** 1  
**Date Issued:** 06/08/2025  
**Client:** CREO CIVIL CONSULTANTS PTY LTD  
 Level 7/176 Wellington Parade, East Melbourne Victoria 3002  
**Project Number:** GEO22  
**Project Name:** ARMSTRONG ESTATE STAGE 35C  
**Project Location:** MOUNT DUNEED  
**Work Request:** 24215  
**Date Sampled:** 04/08/2025  
**Dates Tested:** 04/08/2025 - 05/08/2025  
**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  
**Location:** Lot 3562 to 3571 and Adventure Way section in between  
**Material:** sandy CLAY, trace gravel, high plasticity  
**Material Source:** Reclaimed fill



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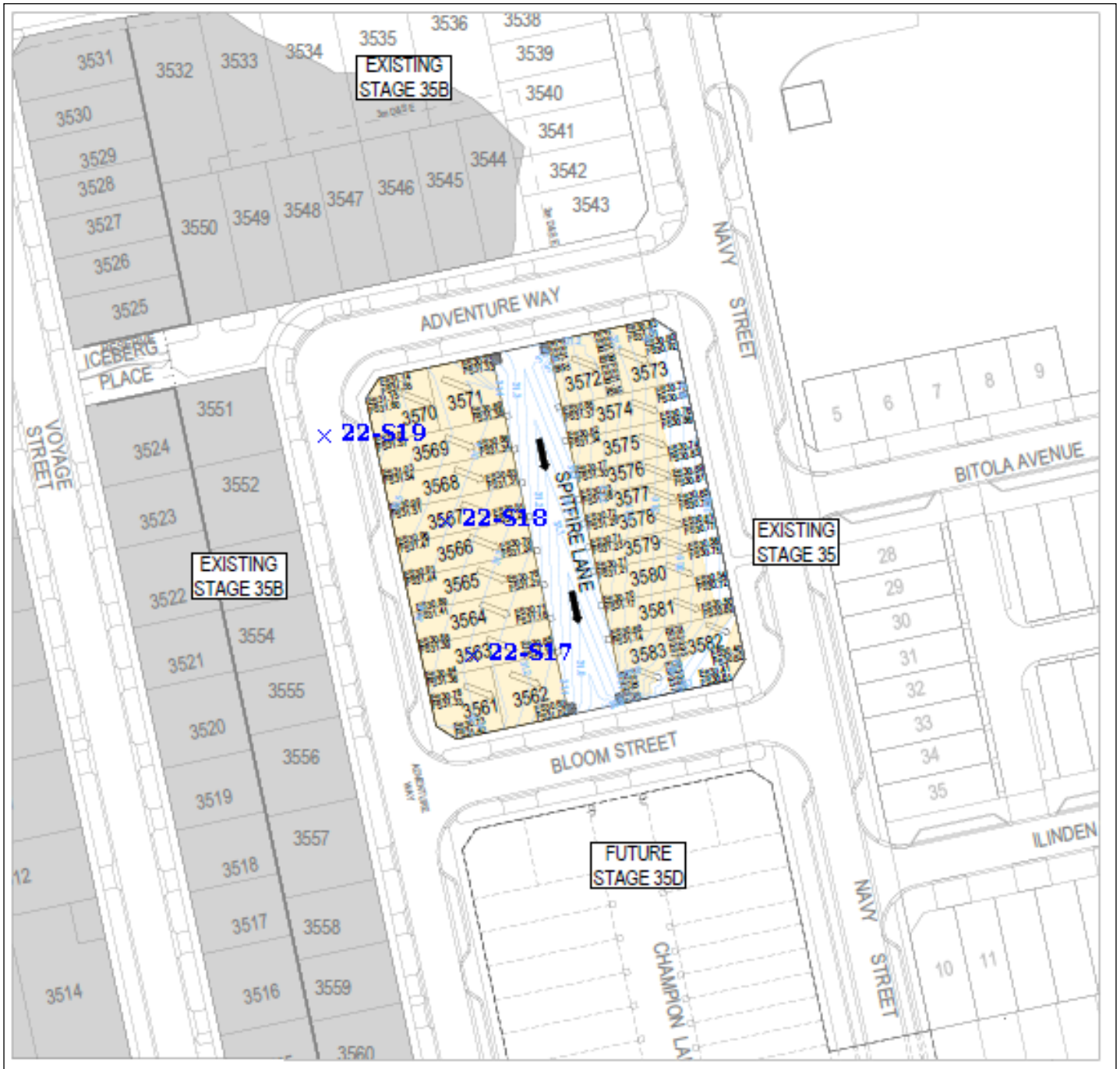
Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	22-S17	22-S18	22-S19
Date Tested	04/08/2025	04/08/2025	04/08/2025
Time Tested	10:51	11:02	15:03
Test Request #/Location	Refer to attached plan Lot 3563	Refer to attached plan Lot 3567	Refer to attached plan Adventure Way in front of lot 3570
Easting	55H 265811	55H 265806	55H 265780
Northing	5765621	5765643	5765658
Layer / Reduced Level	4	4	2
Thickness of Layer (mm)	250	250	250
Soil Description	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity	sandy CLAY, trace gravel, high plasticity
Test Depth (mm)	225	225	225
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	2	1	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	2	1	0
Field Wet Density (FWD) t/m <sup>3</sup>	2.05	2.03	2.03
Field Moisture Content %	20.5	20.7	21.1
Field Dry Density (FDD) t/m <sup>3</sup>	1.71	1.68	1.68
Peak Converted Wet Density t/m <sup>3</sup>	**	**	2.05
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	2.04	2.02	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	19.8	20.3	20.9
Adj. Field Moisture Content % (AS1289.5.4.1)	20.2	20.4	21.1
Moisture Ratio % (AS1289.5.4.1)	**	**	100.5
Adjusted Moisture Ratio % (AS1289.5.4.1)	102.0	100.5	**
Moisture Variation (Wv) %	**	**	0.0
Adjusted Moisture Variation %	-0.5	0.0	**
Hilf Density Ratio (%)	<b>100.5</b>	<b>100.5</b>	<b>99.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>
Remarks	**	**	**

**Moisture Variation Note:**

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

# Sample Locations Plan

x - approximate test location



**Appendix D**  
Site Photographs













