ASCT Illawarra
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
(02) 4256 1684
Illawarra@asct.com.au

Geotechnical Site Investigation Report for

Lot 325-DP 244559, Driftwood Shores-Stage 1, Tuross Head.

ASCT Reference Number: H22-195
Prepared for McCloy Group

ASCT Illawarra
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Re: __
Proposed residential subdivision.

Australian Soil and Concrete Testing Pty Ltd (ASCT) is pleased to present the completed Geotechnical Site Investigation report, in response to your request.

As per your commission, ASCT was tasked with investigation works appropriate to classification of the site in accordance with Australian Standard *AS 2870 – Residential Slabs & Footings* , and associated parameters requisite to the proper design & construction of a structural footings system.

Details of our investigation process, the findings and results are contained within the body of this report. However, please find below a summation of the investigation results;

Lot No.	Site Class.	Lot No.	Site Class.	Lot No.	Site Class.	Lot No.	Site Class.	Lot No.	Site Class.
102	M*	108	M*	114	M*	504	M*	510	M*
103	M*	109	M*	115	M*	505	M*	511	M*
104	M*	110	M*	116	M*	506	M*	512	M*
105	M*	111	M*	501	M*	507	M*		
106	M*	112	M*	502	M*	508	M*		
107	M*	113	M*	503	M*	509	M*		

***Deep Fill (Fill is controlled, but 'Reactive' & more than 0.4m deep) reclassified in accordance with AS2870 Cl 2.5.3 (c)**
***M (Deep Fill controlled by previous GITA)**

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1.0 Introduction & Understanding

It is our understanding that a new residential subdivision is proposed for the site. Accurate information regarding the 'footprint' of the proposed structure wasn't available at the time of investigation.

Information, including anecdotal evidence, provided by our client has been accepted as accurate & complete, and incorporated into the investigation process as appropriate.

2.0 Desktop Study

ASCT maintains an extensive library of previous AS 2870 site classifications. This important resource is consulted with every ASCT site investigation, and appropriate information has been employed during this investigation.

A limited inspection of the available aerial photography, provided no significant information regarding the site history.

Inspection of soil mapping for the area, *NSW 1:1,5000,000 Geological Map* predicts soils originating from *Devonian I type granites*

The site was determined to lie within the bounds of *Climatic Zone 1 (Alpine / Wet Coastal)* and therein have a Depth of design suction change (Hs) in the order of 1.5m.

Having regard to the guidance provided within AS 2870, a value of *Soil suction change* (ΔpF) of 1.2 Pico farads (pF) was deemed appropriate for the site.

3.0 Field Work

Field work at the investigation site was conducted by ASCT representative on the 22nd & 24th January 2025.

These works included:

- Recording of all significant site features having, or potentially having, an effect on the site classification.
- Recording the location, and/or physical measurements, of certain significant features (e.g.: ASCT test holes, Tree heights, Slopes, Structures).
- Digital photography.
- A determination of the ultimate bearing pressure exhibited by the site soils.
- Excavation, and logging of one or more test holes.
- An assessment of groundwater conditions.
- The retrieval of one or more soil samples, for subsequent laboratory testing.

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3.1 Site Description

The site as found by ASCT on the day of the field work is described below. Photo/s and a simple plan of the site are included in Appendix A.

The site is located amidst a coastal area (beach/wet lands).
The proposed construction will occupy the majority of the available site.

At the time of investigation, drilling-rig access onto the site was easily achievable.
Access was gained & all test locations power-augered, using 4WD mounted plant.

Fencing was observed at the site, but is unlikely to restrict construction access.
Machinery access is unlikely to pose any construction issues.
There are some neighbouring structures, but they are unlikely to hinder construction access.

The site is dominated by the existing structure, with surrounding grass and garden beds.
No trees were observed at the site.

Soil mapping of the area suggests that sub-surface boulders are unlikely to be encountered.
No underground services were observed within the proposed construction footprint.

The site comprises an complex/significant intersection of various slopes (not easily described)

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3.2 Sub-Surface Profile

Detailed borehole logs, in accordance with AS 1726 section 6.2, are included in Appendix A.

In essence; the sub-surface profile consists of Silty Clays (CL-CH) through to an approximate depth of 1.0-2.0m, underlain by Silty Sands/ Cayey Sandy Gravels (SM/GC) to the target investigation

The site exhibits controlled fill materials, of a reactive type, up to a depth of 2.0m.

The investigation results indicate that an essentially uniform sub-surface profile exists at the site.

The sub-surface conditions encountered are unlikely to hinder normal footing construction.

3.3 Groundwater

The presence of groundwater table/seepage depends on rainfall, ground conditions, permeability & the inputs from any adjacent creek/river/dam/sea/canal water levels - and will differ over time.

No groundwater inflows were encountered during the investigation field-work.

ASCT believes that groundwater is unlikely to be of detriment to the proposed footings system. However, it is impossible to accurately predict future levels in a complex groundwater system, especially in a limited investigation such as this.

3.4 Bearing Capacity

Where possible ASCT employs the results of AS 1289.6.3.2 – Dynamic Cone Penetrometer (DCP) testing, in the assessment of bearing capacity. In such instances the results of the DCP testing are included on the borehole logs, provided in Appendix A. Other inputs, such as visual/tactile assessments and the use of portable engineering equipment (e.g.: pocket penetrometer), also contribute to the overall assessment.

Having allowance for the weakest state of foundation materials, during normal (natural) site conditions, we have determined the allowable (or design) bearing capacity to be;

In the order of 100 to 200kPa. This is reasonable and likely to be adequate for the support of a normal footings system.

The design bearing capacity given above is available at and below the existing surface level. As with all sites, the value of bearing capacity varies with depth.

DCP testing was stopped at 0.3-1.8m below surface level due to the hard consistency of the soil (extremely weathered rock).

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4.0 Laboratory Work

During the field-work, the ASCT Technician retrieved one or more samples of the soil strata encountered. This sample/s were submitted to our laboratory for testing using the following test method scheme:

AS 1289.3.1.2 – Liquid Limit of a Soil (One-point Casagrande),

AS 1289.3.6.1 – Particle Size Distribution,

AS 1289.7.1.1 – Shrinkage Index of a Soil.

One or more of these methods were undertaken, depending on the type of sample (i.e.: Disturbed or Un-Disturbed) and the nature of the material (i.e.: Plastic or Non-Plastic).

The location of the sample/s & the relevant test results are provided on page 2 of this report.

5.0 Characteristic Surface Movement

Incorporating appropriate values for the Climatic Zone, depth of design suction change (H_S), soil suction change (ΔpF), lateral restraint factor (α), the thickness of each layer (h), and the properties of each layer (Instability Index I_{pt}); We have calculated the expected volume change associated with natural changes in soil moisture, and its' effect at the surface of the soil profile.

The resultant value is known as the *Characteristic Surface Movement* (Y_S). We have determined it (Y_S) to be in the order of:

20mm to 40mm in line with AS 2870 Site Classification M - "Moderately Reactive".

6.0 Site Problems

The applicable Australian Standard AS 2870 contains a list of potential problems that exclude a site from being classified under one of the 'Normal' classifications. Such sites are classified as Class P, so that the issues can be addressed using a tailored solution, by a professional Engineer.

ASCT is pleased to report that none of these potential problems were encountered at your site.

7.0 Earthworks, Site Preparation and Trafficability (If Applicable)

Any earthworks undertaken should be carried out in a responsible manner in accordance with the relevant parts of AS3798 – 2007. It is recommended that all earthworks be carried out under Level 1 inspection and testing arrangements as detailed in clause 8.2 of AS3798-2007.

Prior to the placement of any structural fill across the site, any topsoil, unsuitable, deleterious and organically contaminated surface soils should be stripped to depths exposing competent ground. In addition, any tree roots remaining from any clearing operations should be completely removed.

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The stripped surface prior to filling should be tyned, moisture conditioned and re-compacted to the minimum density ratios detailed in AS 3798-2007 of 95% Standard compaction for residential and 98% standard compaction for commercial developments.

All bulk fill materials should be placed in layers of approximately 0.2m loose and be moisture conditioned within the range of ±2% of Optimum Moisture Content (OMC). Then compacted to the minimum density ratios detailed in AS 3798-2007 of 95% Standard compaction for residential developments and 98% standard compaction for commercial developments.

Excluding any organic and deleterious materials, it is considered that the majority of materials won from excavation on site will generally be suitable for reuse as bulk filling provided that moisture content of the soils on placement approximates to the Optimum Moisture Content (OMC).

Where it is proposed to re-use medium to high plasticity clays as new structural filling materials in building or pavement areas, it is recommended that the cohesive material be placed at depth and granular material or weathered rock be placed close to the subgrade level. This will reduce the effects of seasonal moisture changes to foundations soil reactivity and improve surface trafficability.

It is appropriate to maintain surface drainage conditions during earthworks and ensure that runoff water is discharged away from the construction area to prevent any water ponding. Generally, clayey and silty materials are susceptible to moisture changes.

8.0 Responsibilities

The Australian Standard AS 2870 includes the following statements "*Footing design and construction involves a number of steps: site classification, selection of the footings system, structural design, construction in accordance with the required design details and construction methods, and proper maintenance. In particular, the owner has a responsibility to ensure the site is properly maintained and the Standard attempts to guide owners in this area.*".

We draw your attention to this responsibility and have provided a copy of the CSIRO BTF-18 "Foundation maintenance and Footing performance: A Homeowner's Guide" to assist you. The measures suggested in the CSIRO guide are simple & cost effective, and we recommend that you observe them in consultation with your designer.

We have taken every care to be to accurate, complete & objective in the execution of your commission. Should you have any queries, or require further assistance, please do not hesitate to contact our office. This report is your intellectual property and we will not provide it to any 3rd party without your permission. May we also respectfully request that if you provide this report to others (e.g.: your builder): you provide it in its' entirety, to avoid any miscommunication.

Yours faithfully,
Australian Soil & Concrete Testing

Luke Romano
Laboratory Manager

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LIMITATIONS OF GEOTECHNICAL SITE INVESTIGATION

COMMISSION OF SERVICES
This geotechnical site assessment report ("The Geotechnical Report") has been prepared in accordance with the commission set out in the contract or quote, or as otherwise agreed between the Customer and Australian Soil & Concrete Testing P/L (ASCT). The commission may be limited by a range of factors such as time, cost, accessibility or site constraints and conditions.

RELIANCE ON INFORMATION PROVIDED
In preparing the report, ASCT has relied upon information provided, surveys, analyses, designs, plans and other documentation provided by the customer or other individuals and organisations, most of which are referred to in preparing the report. Except as otherwise stated in the report, ASCT has not verified the accuracy or completeness of the information provided to the extent that the statements, opinions, facts, information, conclusions and recommendations in the report are based in whole or in part on the information provided. The recommendations and conclusions are contingent upon the accuracy and completeness of the information provided. ASCT will not be liable in relation to incorrect conclusions should any provided information or site condition be incorrect or have been concealed, withheld, mis-represented or otherwise not fully disclosed to ASCT.

GEOTECHNICAL INVESTIGATION
Geotechnical site classification is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical lot classification reports are prepared to meet the specific needs of individuals. This report was prepared expressly for the Customer and expressly for the purposes indicated. Use by any other persons for any purpose or by the customer for a different purpose, may result in problems which ASCT cannot be responsible for. The Customer should not use this report for other than its intended purpose without seeking additional geotechnical advice.

THIS GEOTECHNICAL REPORT IS BASED ON SITE SPECIFIC FACTORS
This geotechnical report is based on a subsurface investigation which only identifies the conditions at the locations and time when the investigation was undertaken. Unless further geotechnical advice is obtained this geotechnical report cannot be used when the nature of the site is changed or when the proposed development is modified for the site.

This geotechnical report cannot be applied to an adjacent site. The *Limitations of Geotechnical Site Investigation* in making an assessment of a site from a limited number of boreholes or test pits is the possibility that actual conditions may vary from those identified at the investigation locations. The Site investigation identifies specific subsurface conditions only at those points from which samples have been taken. The investigation programme undertaken is used to provide a general profile of the subsurface condition. The information obtained from the site investigation and subsequent laboratory testing is used to form a presumed opinion regarding the overall subsurface conditions and their likely behaviour with regard to the proposed development. The borehole logs are the subjective interpretation of the limited site investigation and cannot always be definitive.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT
A geotechnical report is based on conditions which existed at the time of site investigation. The subsurface conditions may change due to natural forces or man-made influences. Civil works at or adjacent to the site and natural events such as floods or groundwater fluctuations may also affect subsurface conditions and the relevance of the geotechnical report. The geotechnical report should therefore be regarded as preliminary and ASCT should be consulted if unexpected conditions are encountered to determine the impact on the recommendations of the report.

SLOPE STABILITY
This report does not cover slope stability. If this is required, an independent assessment and investigation should be undertaken by a qualified Geotechnical Engineer.

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AVOID MISINTERPRETATION

The geotechnical report may be misinterpreted by other design professionals. ASCT should be retained to explain relevant geotechnical findings and to review the adequacy of plans and specifications and the implications to the report. The geotechnical report should be maintained as a whole and should not be copied, divided or altered.

GEOTECHNICAL INVOLVEMENT DURING CONSTRUCTION

It is recommended that ASCT should be retained through the construction stage to confirm the actual subsurface conditions are consistent with the geotechnical report. If variations are encountered additional tests may be required to confirm conditions comply with the design specifications and advise on changes to the construction if required.

REPORT FOR BENEFIT OF CUSTOMER

The geotechnical report has been prepared for the benefit of the customer and no other party. ASCT assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusion expressed in the report. ASCT will not be responsible for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusion expressed in the report (including, without limitation, matters arising from any negligent act or omission of ASCT or any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy and completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

ASCT will not be liable to update or revise the report to take into account any events of emergent circumstances or facts occurring or becoming apparent after the date of the report.

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APPENDIX A – Site Photo, Site Plan & Borehole Logs.

View of the site .

Plan of the site, with ASCT test positions.

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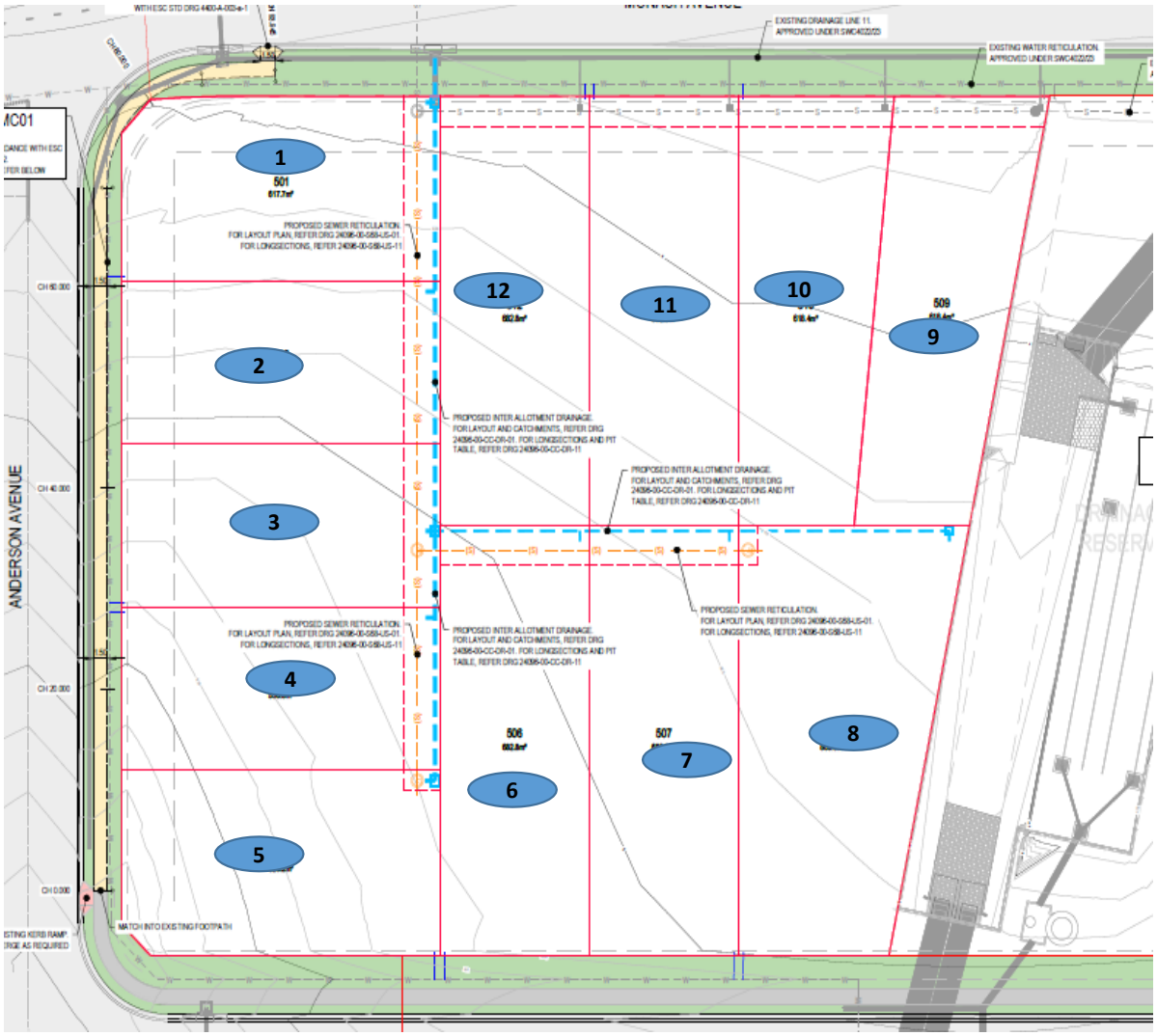
SITE SKETCH & TEST LOCATIONS

Client:	McCloy Group		**ASCT Ref No:**	H22-195
Project:	-	Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch		**Drilling Method:**	Power Auger
Surface Elevation:	Exisiting Surface Level		**Drill Bit:**	100mm Ø TC

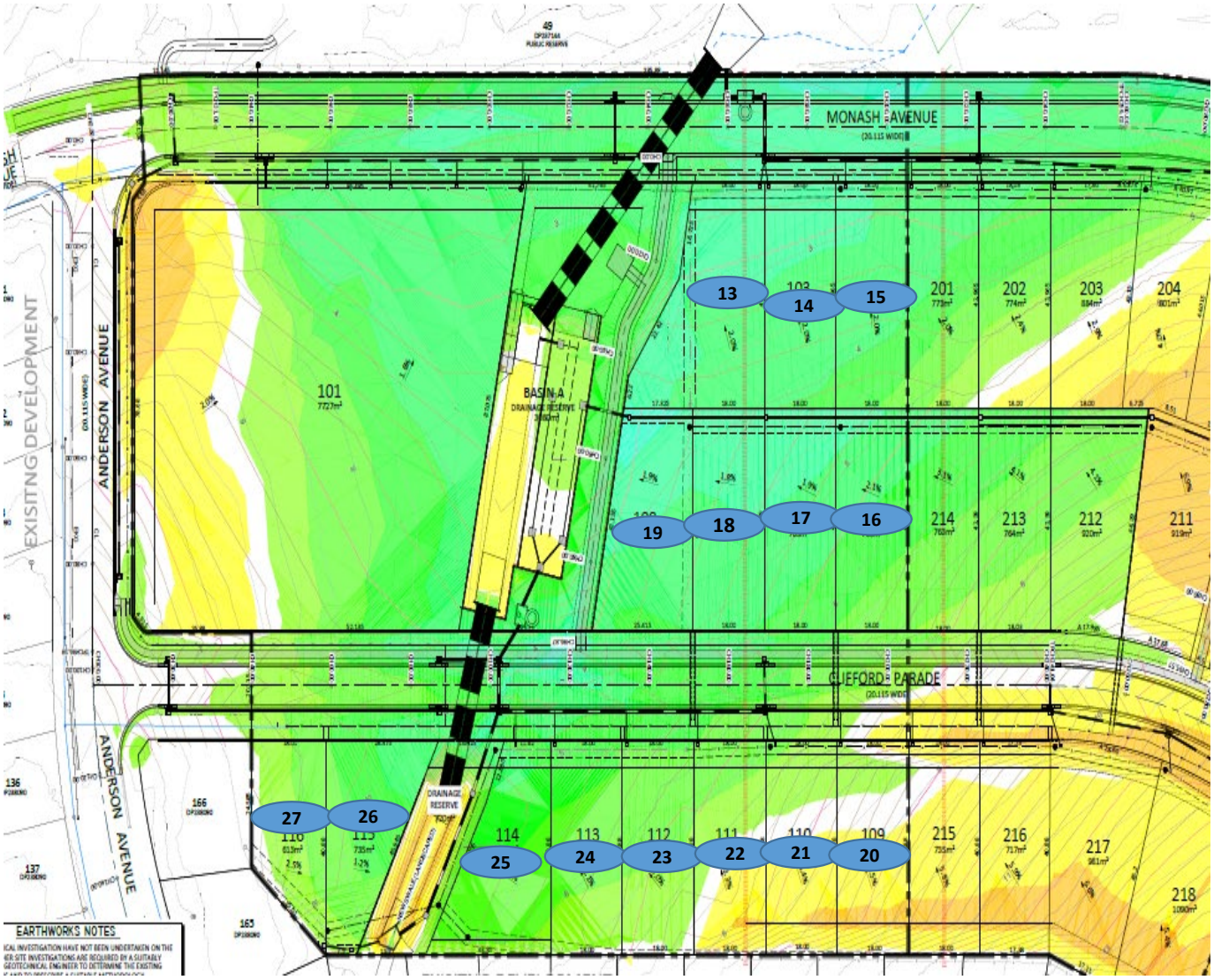
1 Borehole Location



SITE SKETCH & TEST LOCATIONS

Client:	McCloy Group		**ASCT Ref No:**	H22-195
Project:	-	Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch		**Drilling Method:**	Power Auger
Surface Elevation:	Exisiting Surface Level		**Drill Bit:**	100mm Ø TC

1 Borehole Location



BOREHOLE LOG SHEET - 1

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	- Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown grey. Moist.**	**Firm to Stiff**		
0.6 0.7			**Natural: Gravelly Sandy CLAY, low plasticity, brown grey. Dry to moist.**			**Disturbed**
0.8 0.9 **1.0** 1.1 1.2 1.3		**SW**	**Natural: Gravelly SAND, fine to coarse grained, brown grey. Dry.**	**Medium Dense**		
1.4 1.5 1.6 1.7 1.8		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown grey. Moist.**	**Firm to Stiff**		
1.9 **2.0**		**XW**	**Bedrock**	**Medium**		
2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.0m**			

BOREHOLE LOG SHEET - 2

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	- Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
0.5 0.6 0.7 0.8		**SW**	**Natural: Clayey Gravelly SAND, fine to coarse grained, brown grey. Dry to moist.**	**Medium Dense**		**Disturbed**
0.9 **1.0** 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown grey. Moist.**	**Firm**		
2.0 2.1		**XW**	**Bedrock**	**Medium**		
2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.1m**			

BOREHOLE LOG SHEET - 3

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	- Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 1.5		**SW**	**Natural: Clayey Gravelly SAND, fine to coarse grained, brown grey. Dry to moist.** **Natural: Gravelly SAND, fine to coarse grained, brown grey. Dry to moist.**	**Medium Dense**		**Disturbed**
1.6 1.7 1.8 1.9 **2.0**		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown grey. Moist.**	**Firm to Stiff**		
2.1 2.2		**XW**	**Bedrock**	**Medium**		
2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.2m**			

BOREHOLE LOG SHEET - 4

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2			**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2 1.3		**SW**	**Natural: Clayey Gravelly SAND, fine to coarse grained, brown grey. Dry to moist.**	**Medium Dense**		**Disturbed**
1.4 1.5 1.6 1.7 1.8 1.9 **2.0**		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm**		
2.1 2.2 2.3		**XW**	**Bedrock**	**Medium**		
2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.3m**			

BOREHOLE LOG SHEET - 5

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm to Stiff**		**Disturbed**
0.8 0.9 **1.0** 1.1 1.2 1.3 1.4		**SW**	**Natural: Clayey Gravelly SAND, fine to coarse grained, brown grey. Dry to moist.**	**Medium Dense**		
1.5 1.6 1.7 1.8 1.9		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey red brown. Dry.**			
2.0 2.1		**XW**	**Bedrock**	**Medium**		
2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.1m**			

BOREHOLE LOG SHEET - 6

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm**		**Disturbed**
0.9 **1.0** 1.1		**CI**	**Natural: Sandy CLAY, medium plasticity, brown red. Moist.**	**to**		
1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 **2.0**		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Stiff**		
2.1 2.2		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	**Dense**		
2.3 2.4		**XW**	**Bedrock**	**Medium**		
2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.4m**			

BOREHOLE LOG SHEET - 7

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0**		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm to Stiff**		**Disturbed**
1.1 1.2		**CI**	**Natural: Gravelly Sandy CLAY, medium plasticity, brown red. Moist.**	**Firm**		
1.3 1.4 1.5 1.6 1.7 1.8 1.9		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**to Stiff**		
2.0 2.1 2.2 2.3		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	**Medium Dense**		
2.4		**XW**	**Bedrock**	**Medium**		
2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 2.4m**			

BOREHOLE LOG SHEET - 8

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
0.4						
0.5				**Firm**		
0.6						
0.7						**Disturbed**
0.8						
0.9				**to**		
1.0						
1.1						
1.2						
1.3				**Stiff**		
1.4						
1.5						
1.6		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
1.7						
1.8				**Stiff**		
1.9						
2.0						
2.1		XW	**Bedrock**	**Medium**		
2.2						
2.3			**Borehole Refusal at 2.2m**			
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 9

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
0.4						
0.5				**Firm**		
0.6						
0.7						**Disturbed**
0.8				**to**		
0.9						
1.0						
1.1				**Stiff**		
1.2						
1.3						
1.4						
1.5		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
1.6				**Stiff**		
1.7						
1.8						
1.9		XW	**Bedrock**	**Medium**		
2.0						
2.1			**Borehole Refusal at 2.0m**			
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 10

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
0.4						
0.5				**Firm**		
0.6						
0.7						
0.8						**Disturbed**
0.9				**to**		
1.0						
1.1						
1.2						
1.3				**Stiff**		
1.4						
1.5						
1.6						
1.7		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**			
1.8				**Stiff**		
1.9						
2.0						
2.1		XW	**Bedrock**	**Medium**		
2.2			**Borehole Refusal at 2.1m**			
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 11

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		
0.5						
0.6				**to**		**Disturbed**
0.7						
0.8				**Stiff**		
0.9						
1.0						
1.1		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown.**			
1.2				**Stiff**		
1.3						
1.4						
1.5						
1.6		XW	**Possibly Bedrock**	**Medium**		
1.7			**Borehole Refusal at 1.6m**			
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 12

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		**Disturbed**
0.5						
0.6				**to**		
0.7						
0.8						
0.9				**Stiff**		
1.0		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown.**			
1.1			**Moist.**			
1.2						
1.3				**Stiff**		
1.4						
1.5						
1.6						
1.7		**XW**	**Possibly Bedrock**	**Medium**		
1.8			**Borehole Refusal at 1.7m**			
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 13

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0** 1.1		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm** **to** **Stiff**		**Disturbed**
1.2 1.3 1.4 1.5 1.6 1.7 1.8		**CI**	**Natural: Gravelly Sandy CLAY, medium plasticity, brown red orange. Moist.**	**Stiff**		
1.9 **2.0** 2.1 2.2 2.3 2.4 2.5 2.6		**SC**	**Natural: Clayey Silty SAND, fine to medium grained, black. Moist to wet.**	**Medium Dense**		
2.7 2.8 2.9 **3.0**		**SM**	**Natural: Silty SAND, fine to medium grained. Grey. Moist to wet.**			
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Terminated at 3.0m**			

BOREHOLE LOG SHEET - 14

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9 **1.0** 1.1 1.2		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm** **to** **Stiff**		**Disturbed**
1.3 1.4 1.5 1.6 1.7 1.8 1.9 **2.0**		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Stiff**		
2.1 2.2 2.3 2.4 2.5 2.6		**SC**	**Natural: Clayey Silty SAND, fine to medium grained, black. Moist to wet.**	**Medium Dense**		
2.7 2.8 2.9 **3.0**		**SM**	**Natural: Silty SAND, fine to medium grained. Grey. Moist to wet.**			
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Terminated at 3.0m**			

BOREHOLE LOG SHEET - 15

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8		**CH**	**Fill: Silty CLAY, high plasticity, brown. Moist.**	**Firm to Stiff**		**Disturbed**
0.9 **1.0** 1.1 1.2 1.3 1.4 1.5		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Stiff**		
1.6 1.7 1.8 1.9 **2.0** 2.1 2.2		**SC**	**Natural: Clayey Silty SAND, fine to medium grained, black. Moist to wet.**			
2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0**		**SM**	**Natural: Silty SAND, fine to medium grained. Grey. Moist to wet.**	**Medium Dense**		
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Terminated at 3.0m**			

BOREHOLE LOG SHEET - 16

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		
0.5						
0.6				**to**		**Disturbed**
0.7						
0.8				**Stiff**		
0.9						
1.0		**XW**	**Bedrock**	**Medium**		
1.1						
1.2			**Borehole Refusal at 1.1m**			
1.3						
1.4						
1.5						
1.6						
1.7						
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 17

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		**CL**	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		
0.5						
0.6						**Disturbed**
0.7				**to**		
0.8						
0.9						
1.0				**Stiff**		
1.1						
1.2		**XW**	**Bedrock**	**Medium**		
1.3			**Borehole Refusal at 1.2m**			
1.4						
1.5						
1.6						
1.7						
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 18

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		
0.5						
0.6				**to**		**Disturbed**
0.7						
0.8				**Stiff**		
0.9						
1.0						
1.1		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown.**	**Stiff**		
1.2			**Moist.**			
1.3		XW	**Bedrock**	**Medium**		
1.4			**Borehole Refusal at 1.3m**			
1.5						
1.6						
1.7						
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 19

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**			
0.1				**Firm**		
0.2						
0.3		CL	**Fill: Gravelly Sandy CLAY, low plasticity, brown.**			
0.4			**Moist.**	**Firm**		
0.5						
0.6						
0.7				**to**		**Disturbed**
0.8						
0.9				**Stiff**		
1.0						
1.1						
1.2		CL	**Natural: Gravelly Sandy CLAY, low plasticity, brown.**	**Stiff**		
1.3			**Moist.**			
1.4						
1.5						
1.6		XW	**Bedrock**	**Medium**		
1.7			**Borehole Refusal at 1.6m**			
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 20

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8		**CI**	**Natural: Gravelly CLAY, medium plasticity, brown. Moist.**	**Stiff**		**Disturbed**
0.9 **1.0** 1.1		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm to Stiff**		
1.2 1.3 1.4 1.5		**SC**	**Natural: Clayey Gravelly SAND, fine to coarse grained brown. Moist to wet.**	**Medium Dense**		
1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 2.5		**CI**	**Natural: Gravelly Sandy CLAY, medium plasticity, brown. Moist.**	**Stiff**		
2.6 2.7 2.8 2.9 **3.0**		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	**Medium Dense**		
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole terminated at 3.0m**			

BOREHOLE LOG SHEET - 21

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7		**CI**	**Natural: Gravelly CLAY, medium plasticity, brown. Moist.**	**Stiff**		**Disturbed**
0.8 0.9 **1.0**		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Moist.**	**Firm**		
1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8		**SC**	**Natural: Clayey Gravelly SAND, fine to coarse grained brown. Moist to wet.**	**Medium Dense**		
1.9 **2.0** 2.1 2.2 2.3 2.4 2.5		**CI**	**Natural: Gravelly Sandy CLAY, medium plasticity, brown. Moist.**	**Stiff**		
2.6 2.7 2.8 2.9 **3.0**		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	**Medium Dense**		
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole terminated at 3.0m**			

BOREHOLE LOG SHEET - 22

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0		CL	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.1						
0.2						
0.3		CI	**Natural: Gravelly CLAY, medium plasticity, brown. grey red. Moist.**			
0.4						
0.5						**Disturbed**
0.6						
0.7						
0.8				**Stiff**		
0.9						
1.0						
1.1						
1.2						
1.3						
1.4						
1.5		XW	**Bedrock**	**Medium**		
1.6			**Borehole Refusal at 1.5m**			
1.7						
1.8						
1.9						
2.0						
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
3.0						
3.1						
3.2						
3.3						
3.4						
3.5						
3.6						
3.7						
3.8						
3.9						
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						

BOREHOLE LOG SHEET - 23

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4		**CI**	**Natural: Gravelly CLAY, medium plasticity, brown. grey red. Moist.**	**Stiff**		**Disturbed**
0.5 0.6		**XW**	**Bedrock**	**Medium**		
0.7 0.8 0.9 **1.0** 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 0.6m**			

BOREHOLE LOG SHEET - 24

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Dry to moist.**	**Firm to Stiff**		**Disturbed**
0.9 **1.0**		**SC**	**Natural: Clayey Gravelly SAND, fine to coarse brown. Dry to moist.**	**Medium Dense**		
1.1 1.2		**XW**	**Bedrock**	**Medium**		
1.3 1.4 1.5 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 1.2m**			

BOREHOLE LOG SHEET - 25

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown.**	**Firm to Stiff**		
0.6 0.7 0.8 0.9		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Dry to moist.**	**Stiff**		**Disturbed**
1.0 1.1		**SC**	**Natural: Clayey Gravelly SAND, fine to coarse brown. Dry to moist.**	**Medium Dense**		
1.2 1.3		**XW**	**Bedrock**	**Medium**		
1.4 1.5 1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0** 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Refusal at 1.3m**			

BOREHOLE LOG SHEET - 26

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7 0.8 0.9		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Dry to moist.**	**Firm** **to**		**Disturbed**
1.0 1.1 1.2 1.3 1.4 1.5		**CI**	**Natural: Gravelly CLAY, medium plasticity, brown. Moist.**	 **Stiff**		
1.6 1.7 1.8 1.9 **2.0** 2.1 2.2 2.3 2.4		**CI**	**Natural: Sandy CLAY, medium plasticity, brown grey .Moist. With fine to medium grained gravel.**	 **Stiff**		
2.5 2.6 2.7 2.8 2.9 **3.0**		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	 **Medium Dense**		
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Terminated at 3.0m**			

BOREHOLE LOG SHEET - 27

Client:	McCloy Group	**ASCT Ref No:**	H22-195
Project:	325-DP 244 - Driftwood Shores-Stage 1, Tuross Head	**Client Ref No:**	NA
Borehole Position:	See Site Sketch	**Excavation Method:**	Power Auger
Surface Elevation:	Existing Surface Level	**Excavation Device:**	100mm Ø TC

Depth (m)	Graphic Symbol	Group Symbol	Soil Description (AS 1726)	Consistency / Relative Density / Rock Strength	DCP Blows / 100mm	Test Sample
					Cone Tip	
0.0 0.1 0.2		**CL**	**Topsoil: Silty CLAY, low plasticity, black. Moist**	**Firm**		
0.3 0.4 0.5 0.6 0.7		**CL**	**Natural: Gravelly Sandy CLAY, low plasticity, brown. Dry to moist.**	**Firm**		**Disturbed**
0.8 0.9 **1.0** 1.1 1.2 1.3		**CI**	**Natural: Gravelly CLAY, medium plasticity, brown. Moist.**	**to**		
1.4 1.5 1.6 1.7 1.8 1.9 **2.0**		**CI**	**Natural: Sandy CLAY, medium plasticity, brown grey .Moist. With fine to medium grained gravel.**	**Stiff**		
2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 **3.0**		**GC**	**Natural: Clayey Sandy GRAVEL, fine to coarse grained, grey brown. Dry.**	**Medium Dense**		
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 **4.0** 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 **5.0**			**Borehole Terminated at 3.0m**			

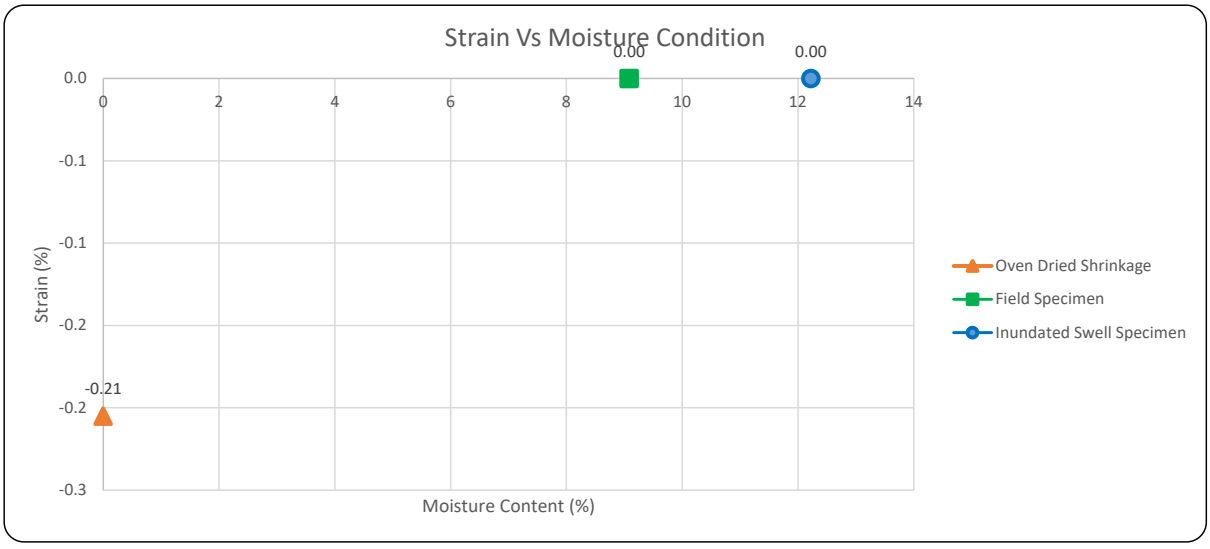
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-1-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 28/01/2025 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH1

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32230	**24/01/2025**	**-**	**-**	**BH1**	**0.5-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	9.0	Gravelly Sandy CLAY light brown, grey
Swell - Field Moisture Content	%	9.2	
Swell - Inundated Moisture Content	%	12.2	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.1**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-2-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 30/01/2025 to 03/02/2025	Control Line:	BH2

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32231	**24/01/2025**	**-**	**-**	**BH2**	**0.4-0.6m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

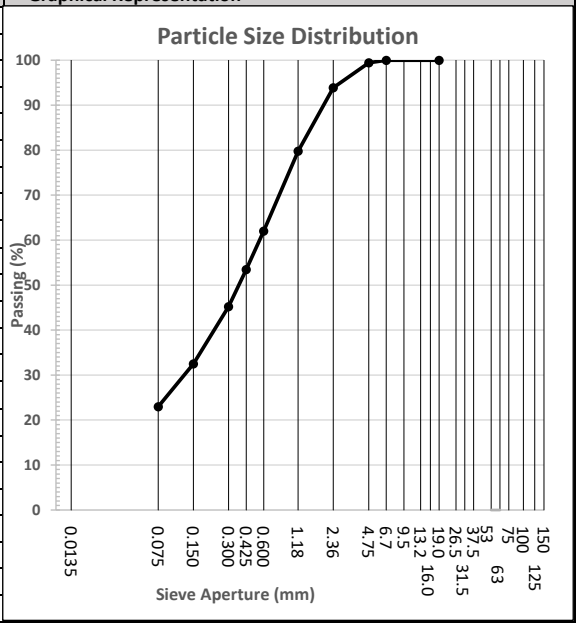
Report Remarks & Endorsement

NATA

Accredited for compliance with ISO/IEC 17025 - Testing.
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%			
Passing 9.5mm Sieve	%			
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**99**		
Passing 2.36mm Sieve	%	**94**		
Passing 1.18mm Sieve	%	**80**		
Passing 0.600mm Sieve	%	**62**		
Passing 0.425mm Sieve	%	**53**		
Passing 0.300mm Sieve	%	**45**		
Passing 0.150mm Sieve	%	**32**		
Passing 0.075mm Sieve	%	**23**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-2-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 30/01/2025 to 03/02/2025	Control Line:	BH2

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32231	**24/01/2025**	**-**	**-**	**BH2**	**0.4-0.6m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**25**		Oven Dried & Dry Sieved
Plastic Limit	%	**16**		Oven Dried & Dry Sieved
Plastic Index	%	**9**		Oven Dried & Dry Sieved

ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-3-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 30/01/2025 to 03/02/2025	Control Line:	BH3

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32232	**24/01/2025**	**-**	**-**	**BH3**	**0.5-0.8m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

NATA
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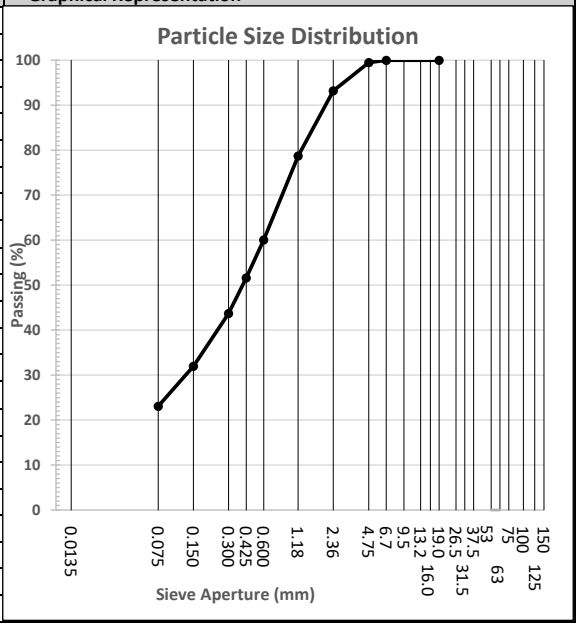
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%			
Passing 9.5mm Sieve	%			
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**99**		
Passing 2.36mm Sieve	%	**93**		
Passing 1.18mm Sieve	%	**79**		
Passing 0.600mm Sieve	%	**60**		
Passing 0.425mm Sieve	%	**52**		
Passing 0.300mm Sieve	%	**44**		
Passing 0.150mm Sieve	%	**32**		
Passing 0.075mm Sieve	%	**23**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-3-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 30/01/2025 to 03/02/2025	Control Line:	BH3

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32232	**24/01/2025**	**-**	**-**	**BH3**	**0.5-0.8m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**30**		Oven Dried & Dry Sieved
Plastic Limit	%	**20**		Oven Dried & Dry Sieved
Plastic Index	%	**10**		Oven Dried & Dry Sieved

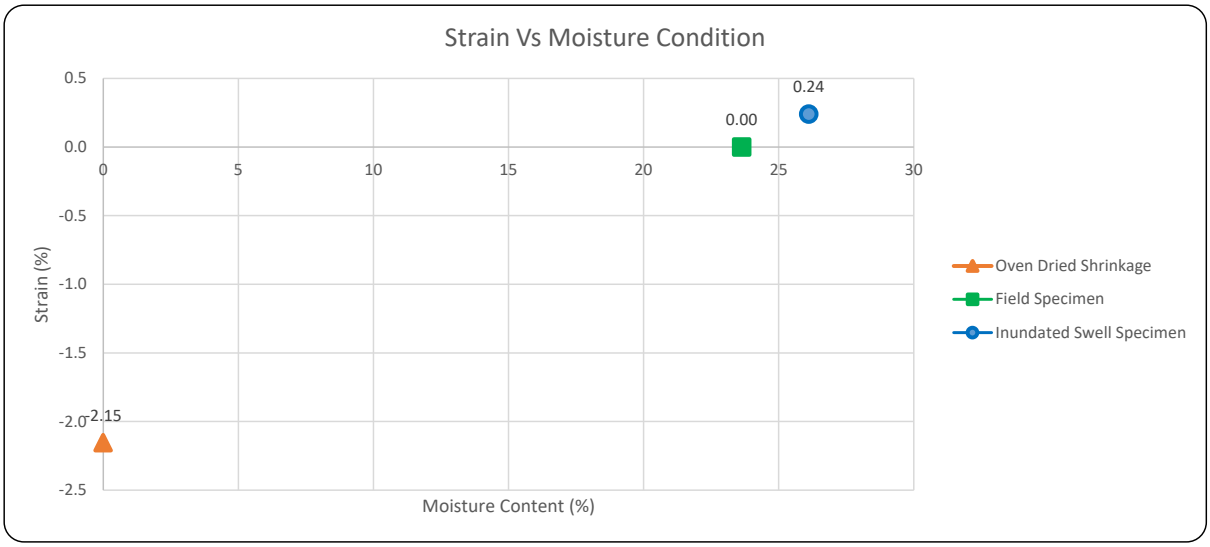
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-4-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 31/01/2025 and was completed 01/02/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH4

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32233	**24/01/2025**	**-**	**-**	**BH4**	**0.6-0.9m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	23.4	Gravelly Sandy CLAY, brown grey
Swell - Field Moisture Content	%	23.9	
Swell - Inundated Moisture Content	%	26.1	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.3**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

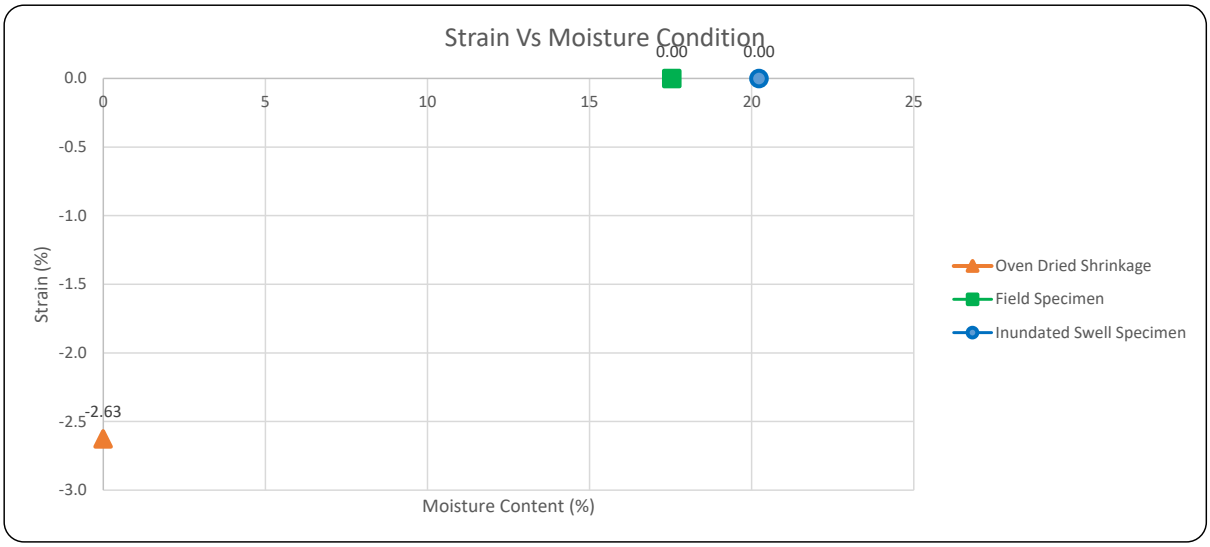
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-5-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 29/01/2025 and was completed 30/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH5

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32234	**24/01/2025**	**-**	**-**	**BH5**	**0.3-0.5m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	17.9	Gravelly Sandy CLAY, light brown
Swell - Field Moisture Content	%	17.2	
Swell - Inundated Moisture Content	%	20.2	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.5**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

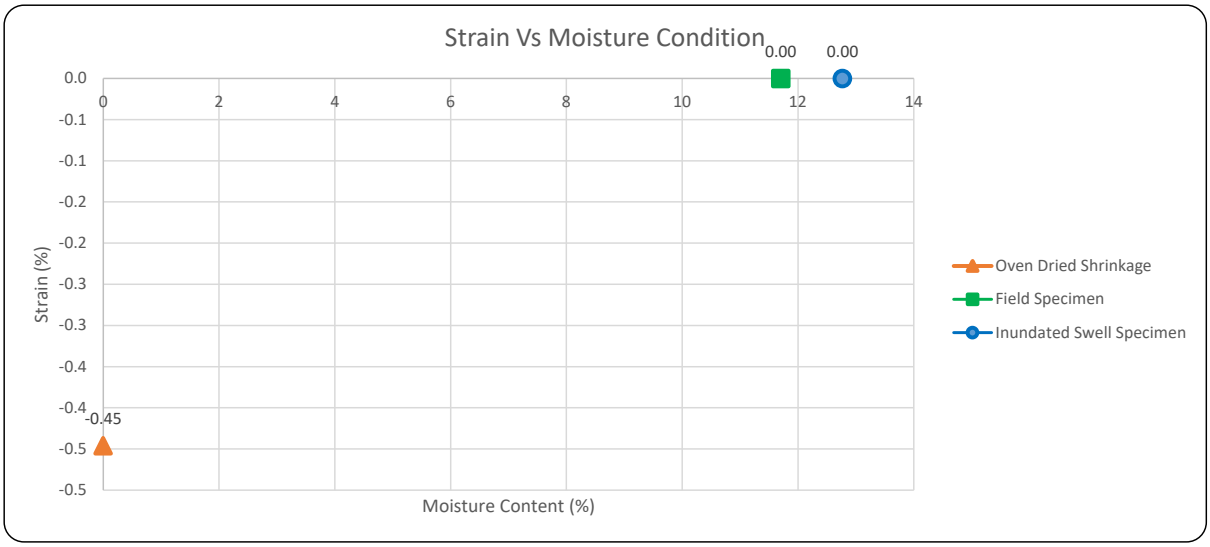
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-6-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 28/01/2025 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH6

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32235	**24/01/2025**	**-**	**-**	**BH6**	**0.4-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	11.8	Gravelly Sandy CLAY, brown
Swell - Field Moisture Content	%	11.6	
Swell - Inundated Moisture Content	%	12.8	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.2**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

WB080 - Rev 36, 04/12/2024

Report on Material Quality

Client:	McCLOY Group	Report No:	**483-7-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH7

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32236	**24/01/2025**	**-**	**-**	**BH7**	**0.5-0.8m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

NATA
Accredited for compliance with ISO/IEC 17025 - Testing.
NATA Accreditation number: 20656

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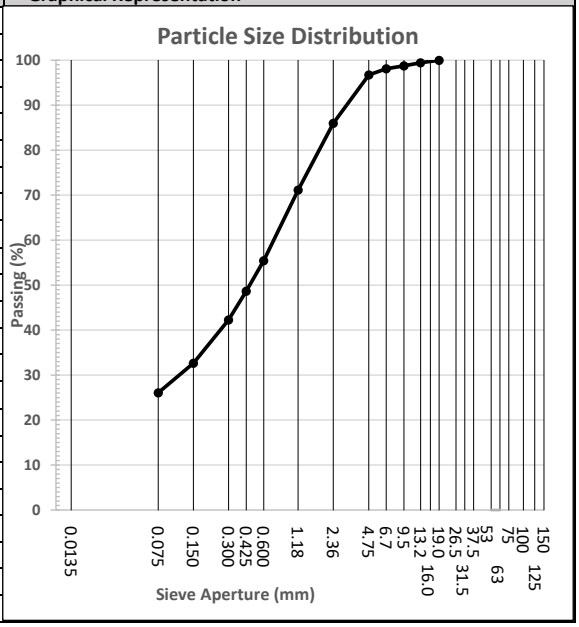
Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%	**99**		
Passing 9.5mm Sieve	%	**99**		
Passing 6.7mm Sieve	%	**98**		
Passing 4.75mm Sieve	%	**97**		
Passing 2.36mm Sieve	%	**86**		
Passing 1.18mm Sieve	%	**71**		
Passing 0.600mm Sieve	%	**55**		
Passing 0.425mm Sieve	%	**49**		
Passing 0.300mm Sieve	%	**42**		
Passing 0.150mm Sieve	%	**33**		
Passing 0.075mm Sieve	%	**26**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

WB080 - Rev 36, 04/12/2024

Report on Material Quality

Client:	McCLOY Group	Report No:	**483-7-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH7

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32236	**24/01/2025**	**-**	**-**	**BH7**	**0.5-0.8m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**37**		Oven Dried & Dry Sieved
Plastic Limit	%	**16**		Oven Dried & Dry Sieved
Plastic Index	%	**21**		Oven Dried & Dry Sieved

ASCT Illawarra
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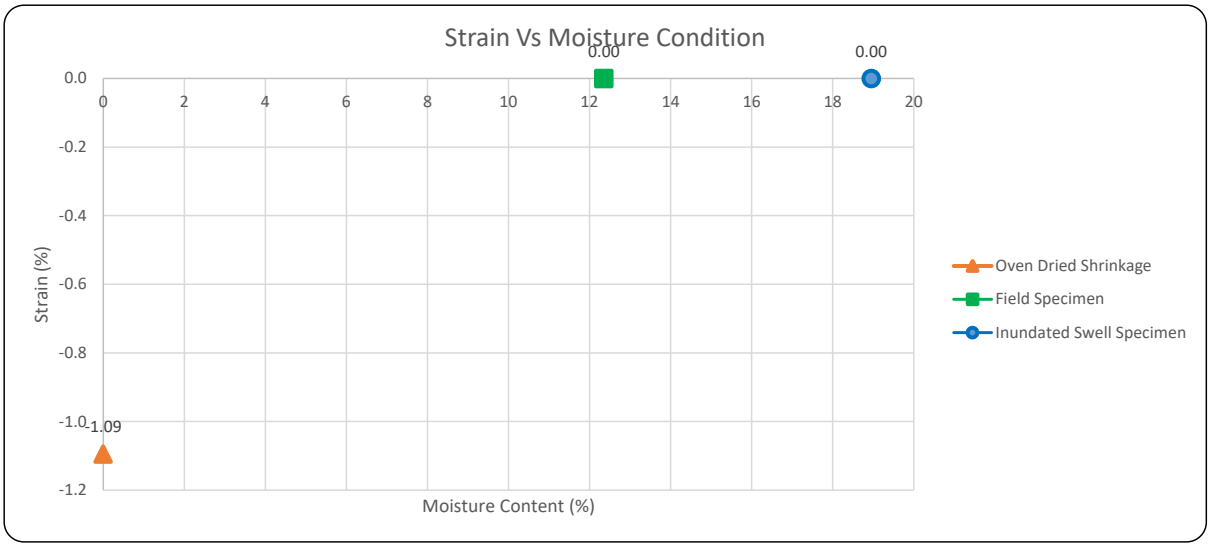
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-8-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 29/01/2025 and was completed 30/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH8

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32237	**24/01/2025**	**-**	**-**	**BH8**	**0.4-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	12.0	Gravelly Sandy CLAY, brown
Swell - Field Moisture Content	%	12.7	
Swell - Inundated Moisture Content	%	19.0	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.6**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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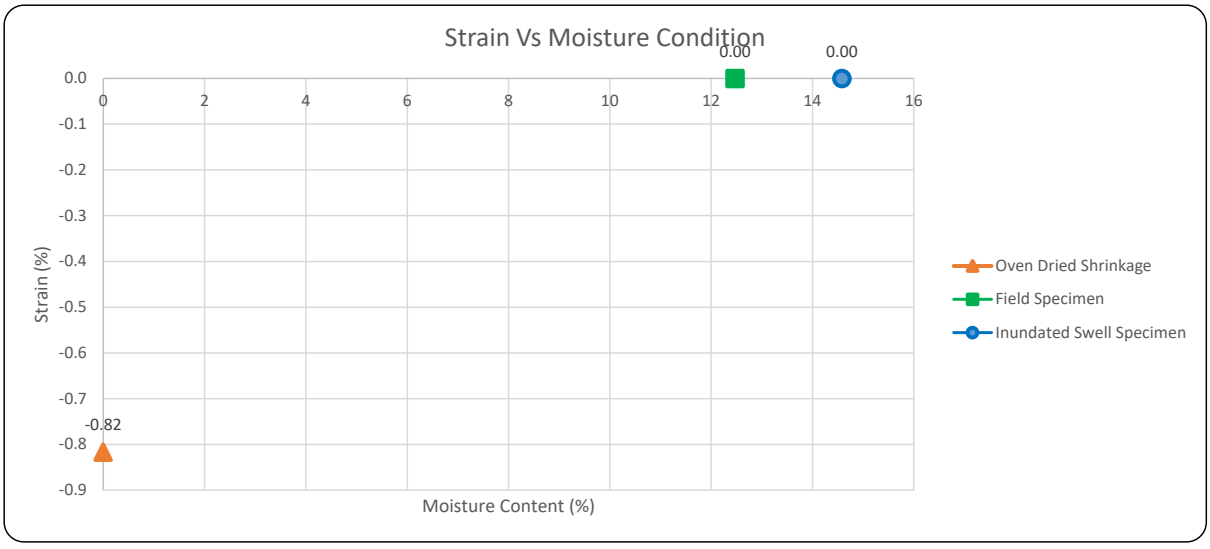
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-9-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 03/02/2025 and was completed 04/02/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH9

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32238	**24/01/2025**	**-**	**-**	**BH9**	**0.5-0.8m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	12.6	Gravelly Sandy CLAY grey
Swell - Field Moisture Content	%	12.3	
Swell - Inundated Moisture Content	%	14.6	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.5**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Approved Signatory

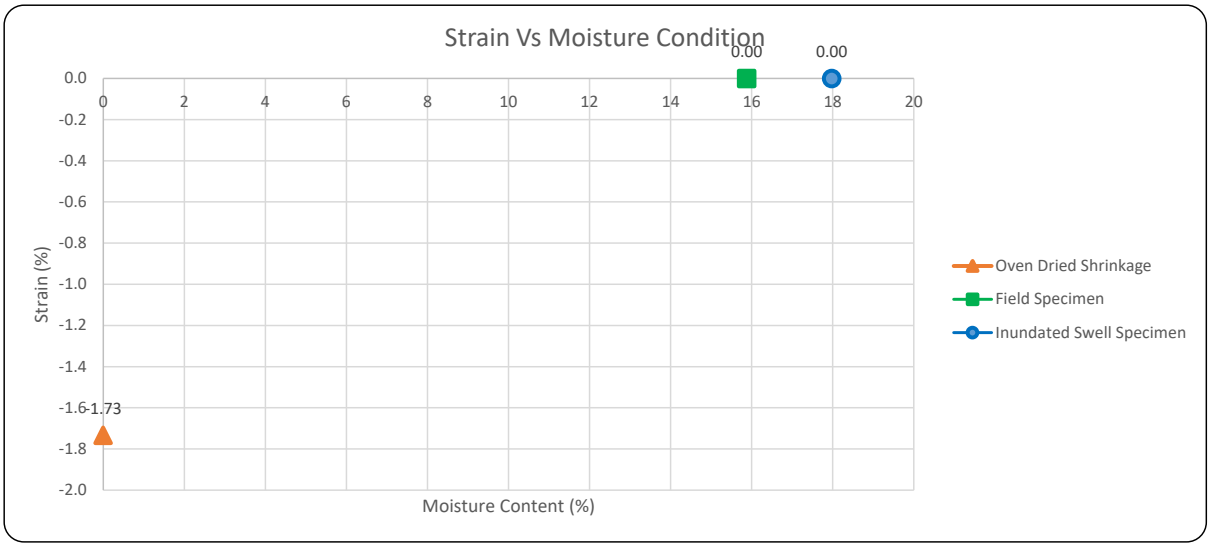
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-10-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 29/01/2025 and was completed 30/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH10

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32239	**24/01/2025**	**-**	**-**	**BH10**	**0.7-1.0m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	15.9	Gravelly Sandy CLAY, brown
Swell - Field Moisture Content	%	15.9	
Swell - Inundated Moisture Content	%	18.0	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.0**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Approved Signatory

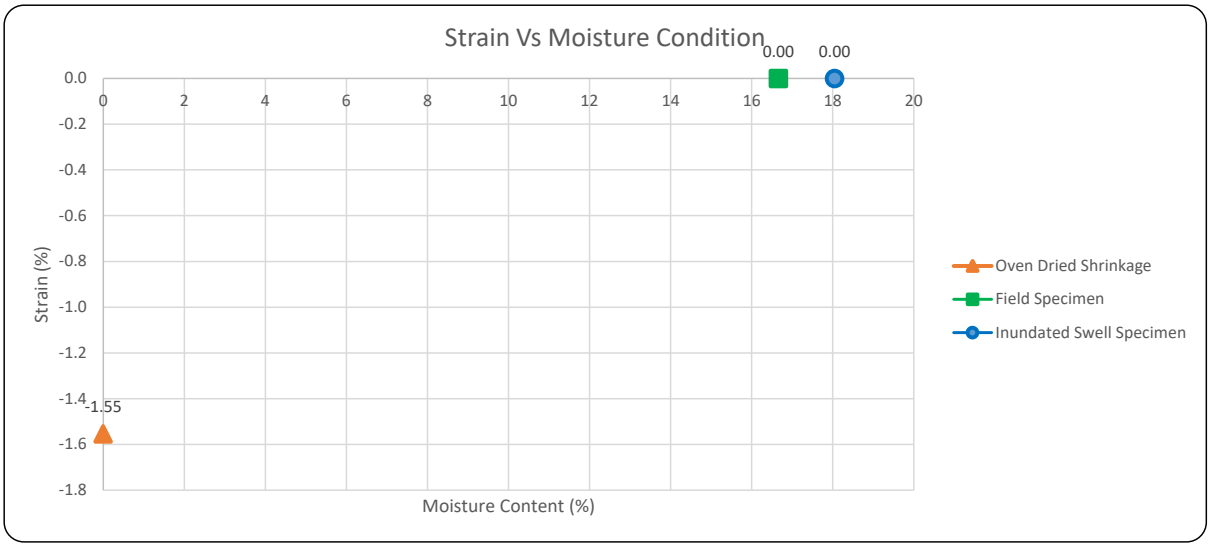
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-11-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 03/02/2025 and was completed 04/02/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH11

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32240	**24/01/2025**	**-**	**-**	**BH11**	**0.5-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	16.6	Gravelly Sandy CLAY grey
Swell - Field Moisture Content	%	16.8	
Swell - Inundated Moisture Content	%	18.0	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.9**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

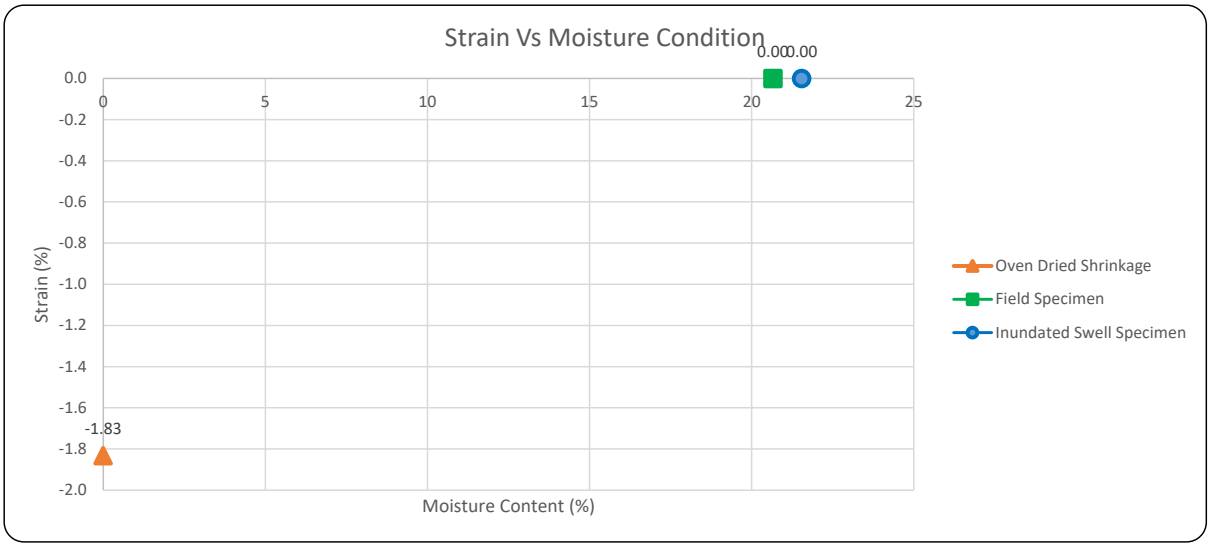
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-12-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 28/01/2025 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH12

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32241	**24/01/2025**	**-**	**-**	**BH12**	**0.3-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	20.9	Gravelly Sandy CLAY, brown
Swell - Field Moisture Content	%	20.4	
Swell - Inundated Moisture Content	%	21.5	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.0**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Approved Signatory

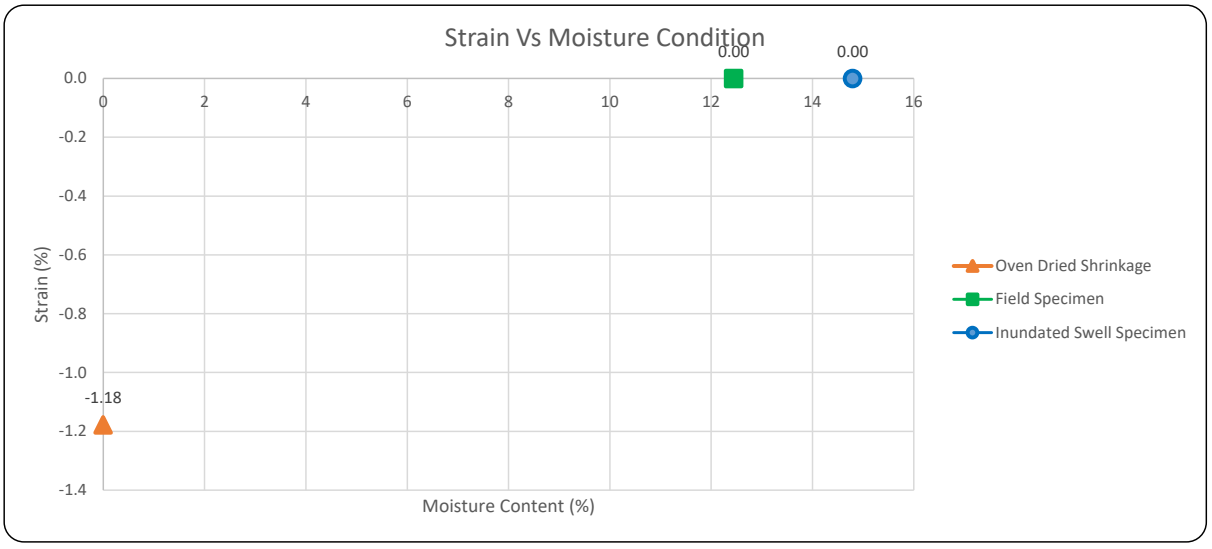
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-13-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 29/01/2025 and was completed 30/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH13

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32242	**24/01/2025**	**-**	**-**	**BH13**	**0.5-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	12.1	Gravelly Sandy CLAY, brown
Swell - Field Moisture Content	%	12.8	
Swell - Inundated Moisture Content	%	14.8	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.7**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

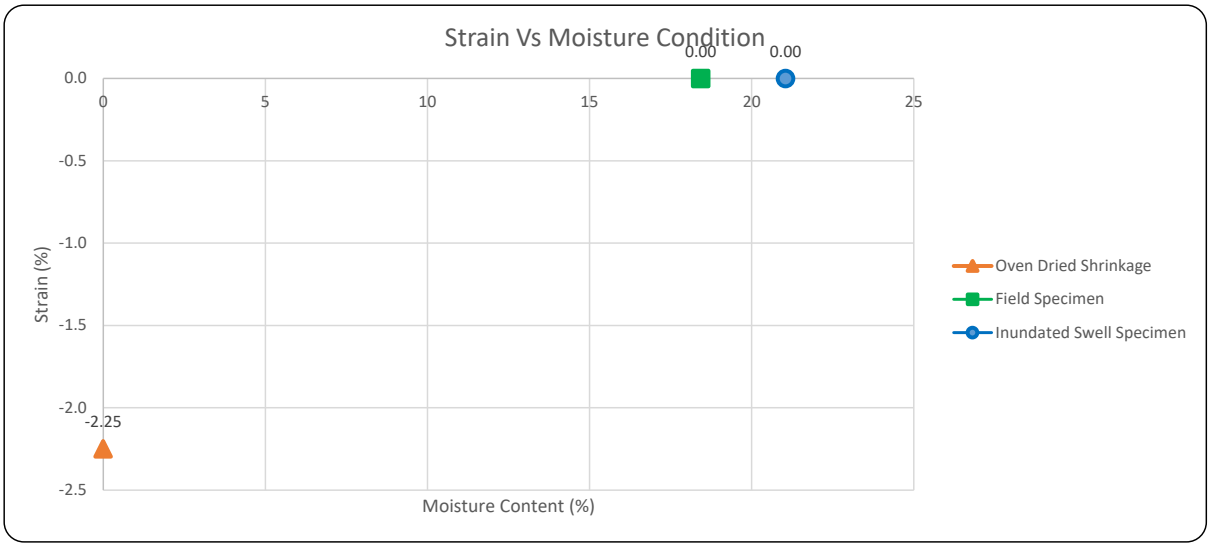
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-14-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 29/01/2025 and was completed 30/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH14

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32243	**24/01/2025**	**-**	**-**	**BH14**	**0.6-0.9m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	18.1	Gravelly Sandy CLAY, light brown, grey
Swell - Field Moisture Content	%	18.8	
Swell - Inundated Moisture Content	%	21.0	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.2**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

ASCT Illawarra
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Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
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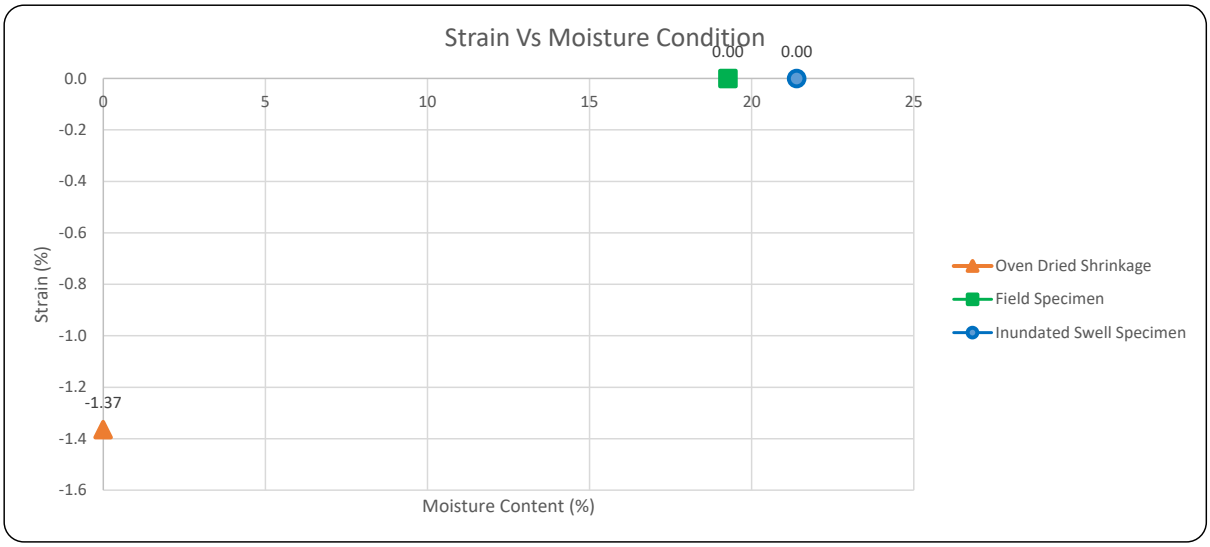
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-15-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 28/01/2025 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH15

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32244	**24/01/2025**	**-**	**-**	**BH15**	**0.5-0.8m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	19.1	Silty CLAY, brown
Swell - Field Moisture Content	%	19.4	
Swell - Inundated Moisture Content	%	21.4	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**0.8**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Approved Signatory

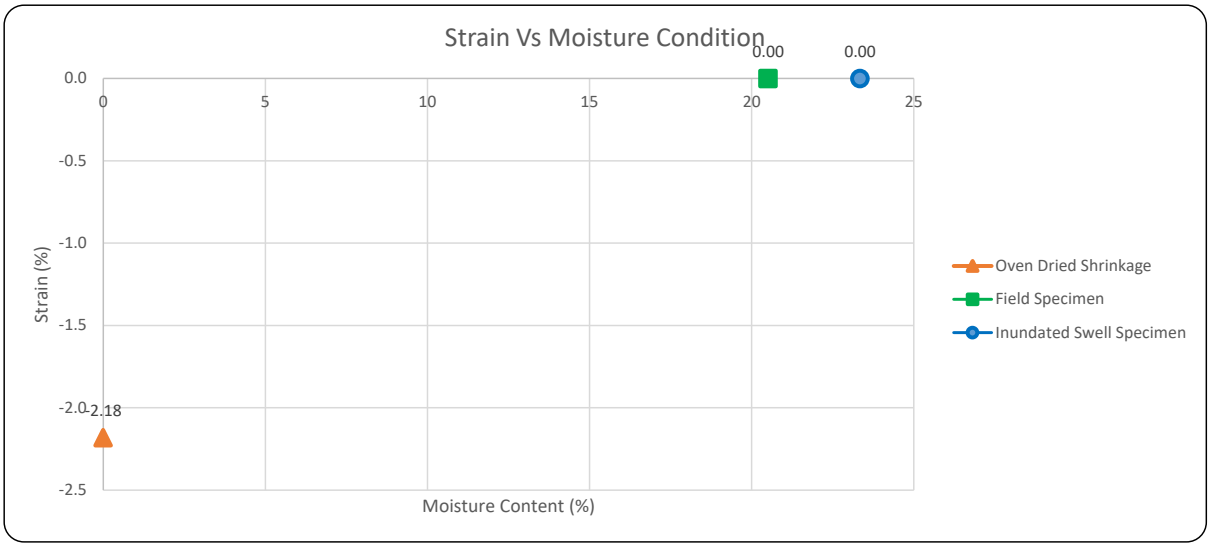
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-16-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	10/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 05/02/2025 and was completed 06/02/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH16

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32245	**24/01/2025**	**-**	**-**	**BH16**	**0.4-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	20.2	Gravelly Sandy CLAY grey/ light brown
Swell - Field Moisture Content	%	20.9	
Swell - Inundated Moisture Content	%	23.3	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.2**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-17-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 31/01/2025	Control Line:	BH17

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32246	**24/01/2025**	**-**	**-**	**BH17**	**0.5-0.9m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

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NATA Accreditation number: 20656

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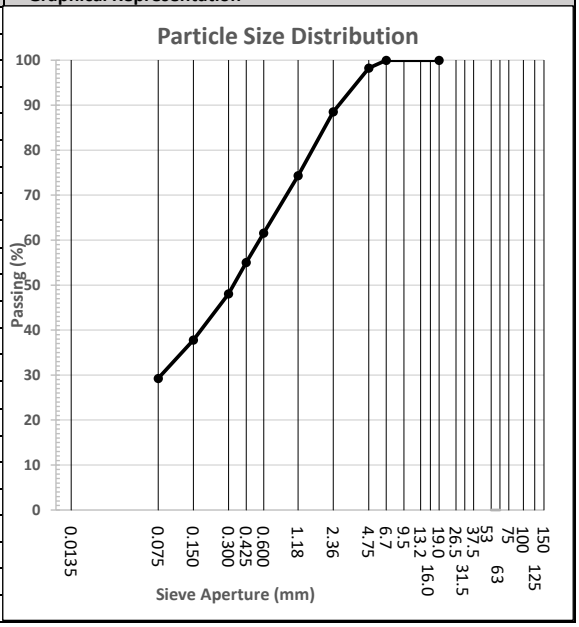
Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%			
Passing 9.5mm Sieve	%			
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**98**		
Passing 2.36mm Sieve	%	**89**		
Passing 1.18mm Sieve	%	**74**		
Passing 0.600mm Sieve	%	**62**		
Passing 0.425mm Sieve	%	**55**		
Passing 0.300mm Sieve	%	**48**		
Passing 0.150mm Sieve	%	**38**		
Passing 0.075mm Sieve	%	**29**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-17-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 31/01/2025	Control Line:	BH17

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32246	**24/01/2025**	**-**	**-**	**BH17**	**0.5-0.9m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**42**		Oven Dried & Dry Sieved
Plastic Limit	%	**19**		Oven Dried & Dry Sieved
Plastic Index	%	**23**		Oven Dried & Dry Sieved

ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
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Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-18-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH18

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32247	**24/01/2025**	**-**	**-**	**BH18**	**0.4-0.7m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
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AS 1289.3.6.1 Coarse: (2009)Particle size distribution of a soil
AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

NATA

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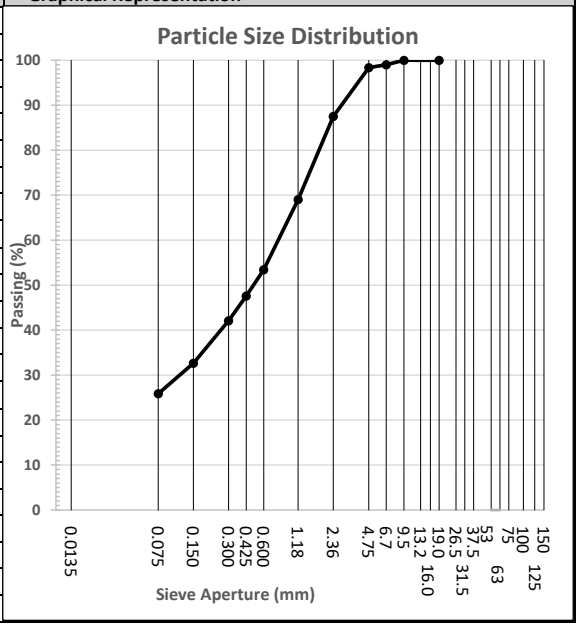
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%			
Passing 9.5mm Sieve	%	**100**		
Passing 6.7mm Sieve	%	**99**		
Passing 4.75mm Sieve	%	**98**		
Passing 2.36mm Sieve	%	**88**		
Passing 1.18mm Sieve	%	**69**		
Passing 0.600mm Sieve	%	**53**		
Passing 0.425mm Sieve	%	**48**		
Passing 0.300mm Sieve	%	**42**		
Passing 0.150mm Sieve	%	**33**		
Passing 0.075mm Sieve	%	**26**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-18-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH18

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32247	**24/01/2025**	**-**	**-**	**BH18**	**0.4-0.7m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**34**		Oven Dried & Dry Sieved
Plastic Limit	%	**19**		Oven Dried & Dry Sieved
Plastic Index	%	**15**		Oven Dried & Dry Sieved

ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-19-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 03/02/2025	Control Line:	BH19

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32248	**24/01/2025**	**-**	**-**	**BH19**	**0.5-0.8m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

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AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

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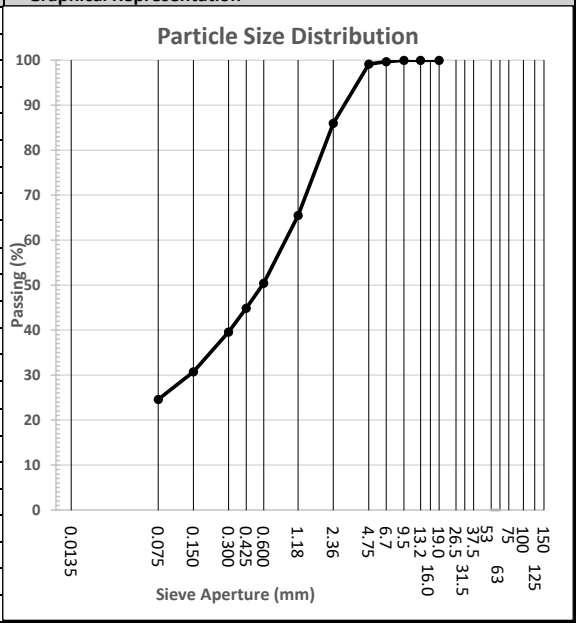
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%	**100**		
Passing 9.5mm Sieve	%	**100**		
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**99**		
Passing 2.36mm Sieve	%	**86**		
Passing 1.18mm Sieve	%	**66**		
Passing 0.600mm Sieve	%	**50**		
Passing 0.425mm Sieve	%	**45**		
Passing 0.300mm Sieve	%	**40**		
Passing 0.150mm Sieve	%	**31**		
Passing 0.075mm Sieve	%	**25**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-19-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 03/02/2025	Control Line:	BH19

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32248	**24/01/2025**	**-**	**-**	**BH19**	**0.5-0.8m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**36**		Oven Dried & Dry Sieved
Plastic Limit	%	**20**		Oven Dried & Dry Sieved
Plastic Index	%	**16**		Oven Dried & Dry Sieved

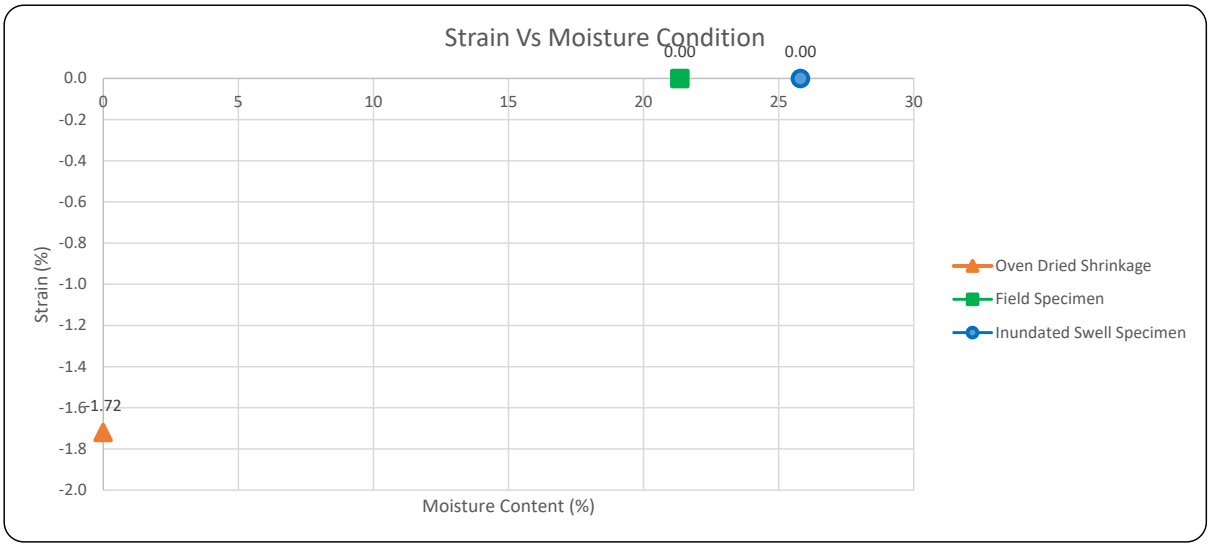
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-20-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 00/01/1900 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH20

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32249	**24/01/2025**	**-**	**-**	**BH20**	**0.3-0.5m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	21.3	Gravelly CLAY, brown
Swell - Field Moisture Content	%	21.4	
Swell - Inundated Moisture Content	%	25.8	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.0**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Approved Signatory

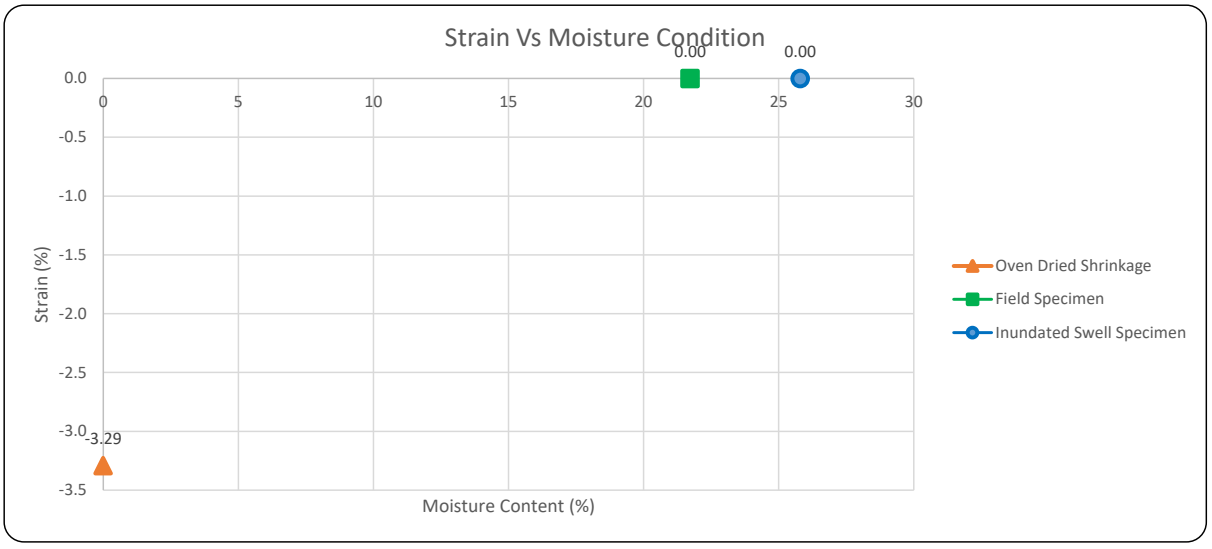
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-21-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 30/01/2025 and was completed 31/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH21

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32250	**24/01/2025**	**-**	**-**	**BH21**	**0.4-0.6m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	21.9	Gravelly CLAY,brown
Swell - Field Moisture Content	%	21.5	
Swell - Inundated Moisture Content	%	25.8	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.8**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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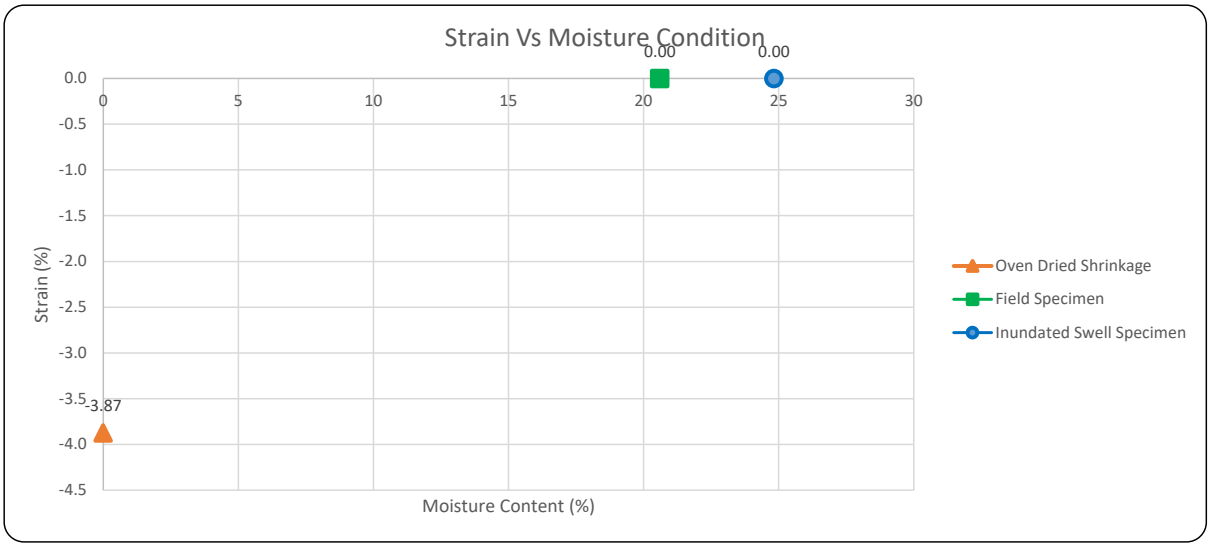
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-22-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 30/01/2025 and was completed 31/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH22

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32251	**24/01/2025**	**-**	**-**	**BH22**	**0.4-0.8m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	20.3	Gravelly CLAY light brown
Swell - Field Moisture Content	%	20.9	
Swell - Inundated Moisture Content	%	24.8	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**2.2**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-23-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 03/02/2025	Control Line:	BH23

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32252	**24/01/2025**	**-**	**-**	**BH23**	**0.3-0.4m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

AS 1289.1.2.1, Cl 6.5.3: (1998)Disturbed Soil Sampling - Powered - Auger
AS 1289.1.1: (2001)Preparation of disturbed soil samples
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AS 1289.3.6.1 Fine: (2009)Particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)
AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

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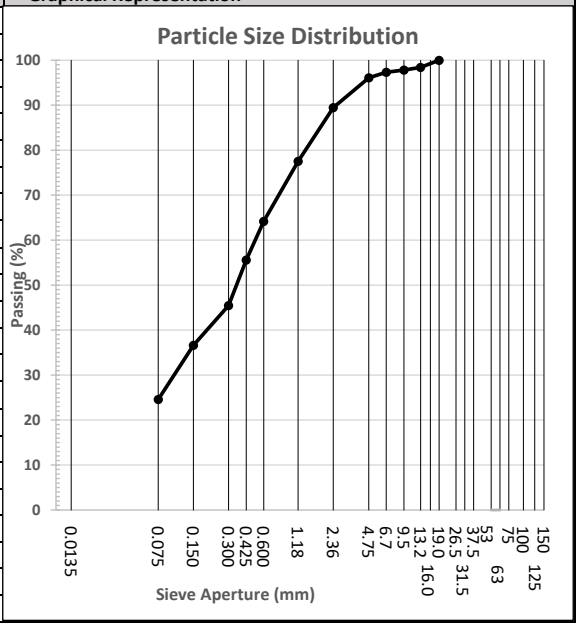
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%	**98**		
Passing 9.5mm Sieve	%	**98**		
Passing 6.7mm Sieve	%	**97**		
Passing 4.75mm Sieve	%	**96**		
Passing 2.36mm Sieve	%	**89**		
Passing 1.18mm Sieve	%	**78**		
Passing 0.600mm Sieve	%	**64**		
Passing 0.425mm Sieve	%	**56**		
Passing 0.300mm Sieve	%	**45**		
Passing 0.150mm Sieve	%	**37**		
Passing 0.075mm Sieve	%	**25**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-23-MQ**
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Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 03/02/2025	Control Line:	BH23

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32252	**24/01/2025**	**-**	**-**	**BH23**	**0.3-0.4m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**32**		Oven Dried & Dry Sieved
Plastic Limit	%	**18**		Oven Dried & Dry Sieved
Plastic Index	%	**14**		Oven Dried & Dry Sieved

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Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH24

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32253	**24/01/2025**	**-**	**-**	**BH24**	**0.4-0.6m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

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AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

Report Remarks & Endorsement

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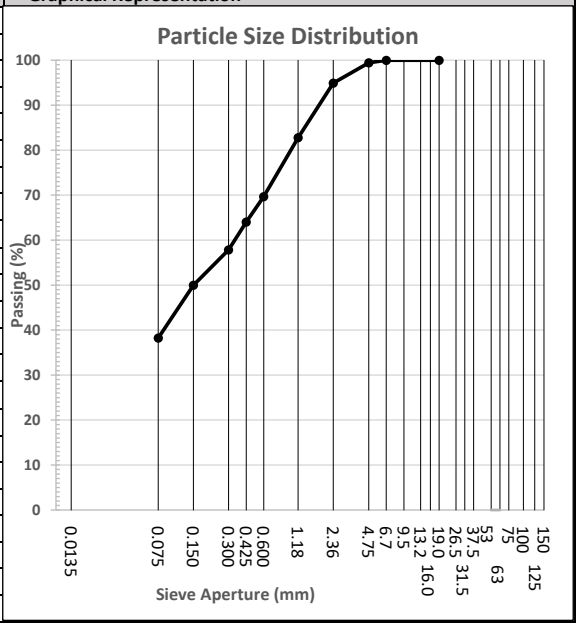
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%			
Passing 9.5mm Sieve	%			
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**99**		
Passing 2.36mm Sieve	%	**95**		
Passing 1.18mm Sieve	%	**83**		
Passing 0.600mm Sieve	%	**70**		
Passing 0.425mm Sieve	%	**64**		
Passing 0.300mm Sieve	%	**58**		
Passing 0.150mm Sieve	%	**50**		
Passing 0.075mm Sieve	%	**38**		
Passing 0.0135mm Sieve	%			



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A.B.N. 34 635 062 609

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Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH24

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32253	**24/01/2025**	**-**	**-**	**BH24**	**0.4-0.6m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**41**		Oven Dried & Dry Sieved
Plastic Limit	%	**15**		Oven Dried & Dry Sieved
Plastic Index	%	**26**		Oven Dried & Dry Sieved

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Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
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Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

Client:	McCLOY Group	Report No:	**483-25-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH25

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32254	**24/01/2025**	**-**	**-**	**BH25**	**0.5-0.8m**

Sampling & Test Methods (Results relate only to the items sampled/tested) **(** NATA accreditation does not cover the performance of this service)**

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AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil

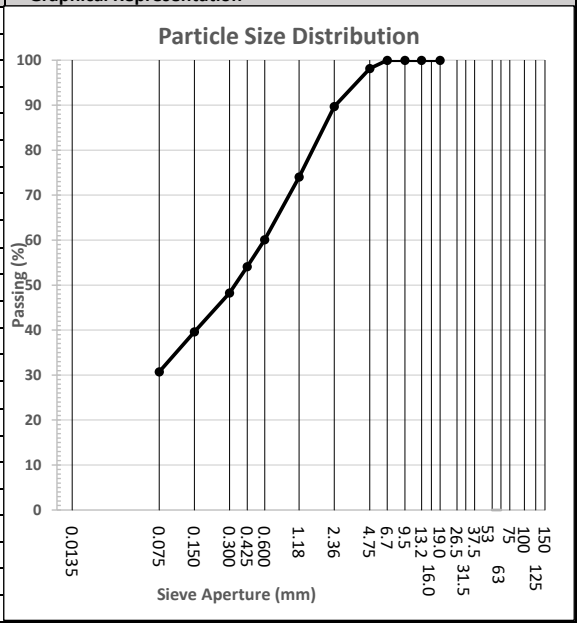
Report Remarks & Endorsement

NATA

Accredited for compliance with ISO/IEC 17025 - Testing.
NATA Accreditation number: 20656

Issued By: L.Romano
Approved Signatory

Specification Name				
Particle Size Distribution (WASHED)	Units	**Result**	**Specification Limits**	**Graphical Representation**
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	**100**		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%	**100**		
Passing 9.5mm Sieve	%	**100**		
Passing 6.7mm Sieve	%	**100**		
Passing 4.75mm Sieve	%	**98**		
Passing 2.36mm Sieve	%	**90**		
Passing 1.18mm Sieve	%	**74**		
Passing 0.600mm Sieve	%	**60**		
Passing 0.425mm Sieve	%	**54**		
Passing 0.300mm Sieve	%	**48**		
Passing 0.150mm Sieve	%	**40**		
Passing 0.075mm Sieve	%	**31**		
Passing 0.0135mm Sieve	%			



ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

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Report on Material Quality

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Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 2 of 2
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 28/01/2025 to 01/02/2025	Control Line:	BH25

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32254	**24/01/2025**	**-**	**-**	**BH25**	**0.5-0.8m**

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	**37**		Oven Dried & Dry Sieved
Plastic Limit	%	**19**		Oven Dried & Dry Sieved
Plastic Index	%	**18**		Oven Dried & Dry Sieved

ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
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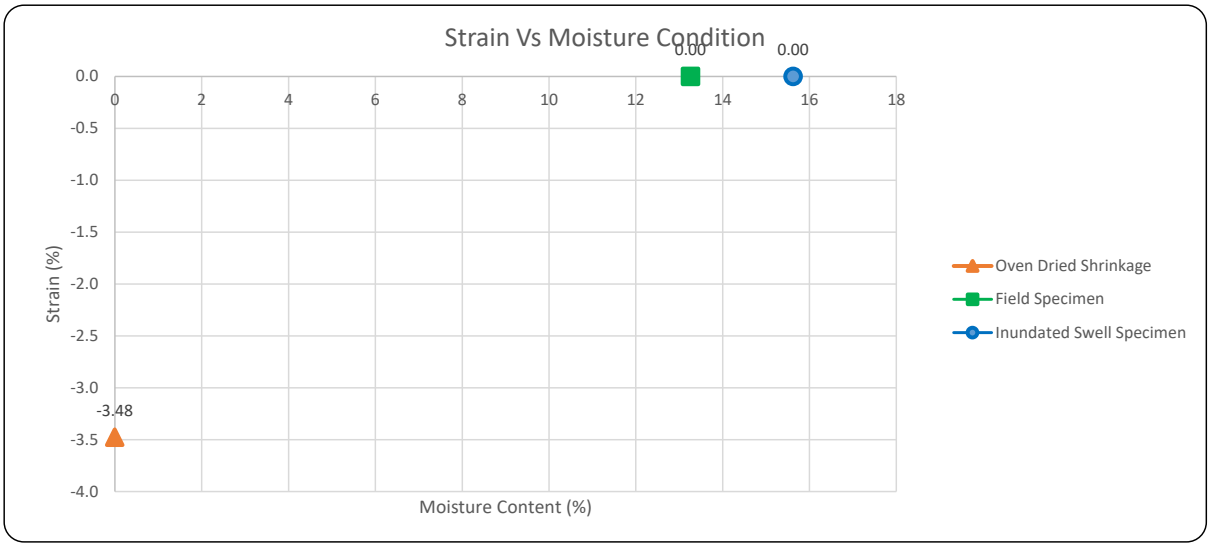
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-26-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	10/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 30/01/2025 and was completed 31/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH26

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32255	**24/01/2025**	**-**	**-**	**BH26**	**0.5-0.9m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	13.5	Clayey Gravelly SAND grey
Swell - Field Moisture Content	%	13.0	
Swell - Inundated Moisture Content	%	15.6	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.9**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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L.Romano
Approved Signatory

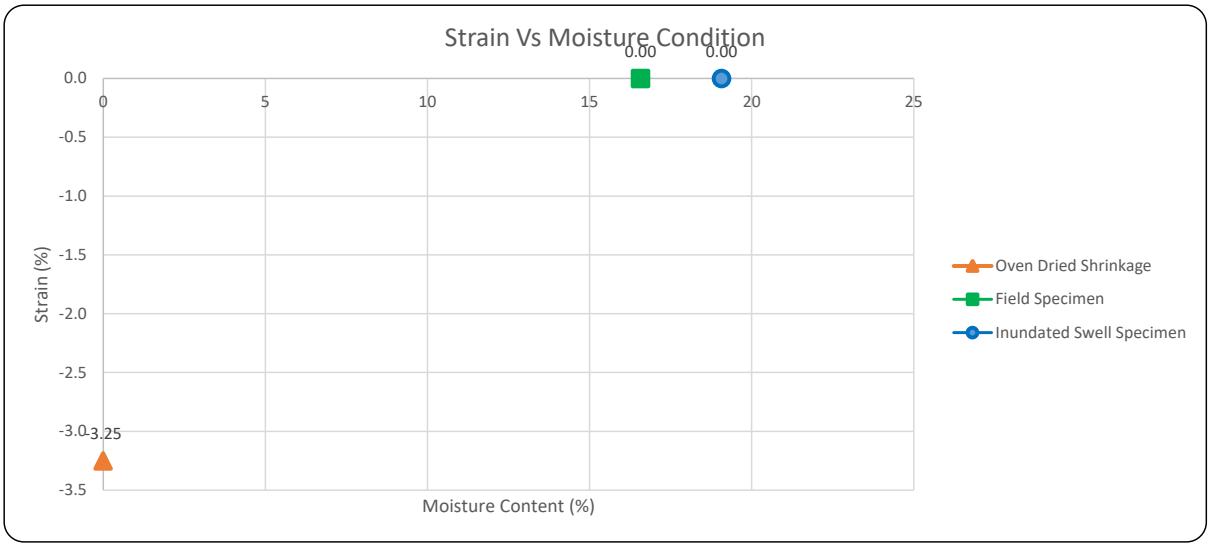
ASCT Illawarra
Postal: 2/15 Miall Way, Albion Park Rail NSW 2527
Lab: 2/15 Miall Way, Albion Park Rail NSW 2527
Telephone: (02) 4256 1684
E-Mail: Illawarra@asct.com.au
Mobile: 0497 979 929
A.B.N. 34 635 062 609

Report on Shrink / Swell Index of a Soil

Client:	McCLOY Group	Report No:	**483-27-MQ**
Client Address:	1 Dickson Road, Loxford NSW 2326	Report Date:	5/02/2025
Project:	Driftwood Shores- Stage 1	Report Page:	Page 1 of 1
Works Component:	AS2870 Lot Classification	Project No:	483
Material Used:	Site Won	Test Request/Order:	20250124
Material Description:	-	Lot Number:	-
Lab Test Date/s:	Testing commenced 28/01/2025 and was completed 29/01/2025.	ITP/PCP Number:	-
Lot Comments:	-	Control Line:	BH27

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
32256	**24/01/2025**	**-**	**-**	**BH27**	**0.4-0.7m**

Parameters	Units	Test Results	Soil Description
Shrinkage - Field Moisture Content	%	16.8	Graavelly Sandy CLAY light brown
Swell - Field Moisture Content	%	16.3	
Swell - Inundated Moisture Content	%	19.1	
Inert Inclusions in the soil	%	10	
Extent of Soil Crumbling	-	None	
Extent of Soil Cracking	-	Minor	
Shrink-Swell Index	**%**	**1.8**	



Sampling & Test Methods (Results relate only to the items sampled/tested)	Report Remarks & Endorsement
AS 1289.7.1.1, Cl 4: (2003) Shrink Swell Index - Thin wall sampler (U50) AS 1289.7.1.1: (2003) Shrink Swell Index of a Soil	

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Foundation Maintenance and Footing Performance:
A Homeowner's Guide

PUBLISHING
BTF 18-2011
replaces
Information
Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870-2011, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction
There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion
All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation
This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil
All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure
This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes

Notes
1. Where controlled fill has been used, the site may be classified A to E according to the type of fill used.
2. Filled sites. Class P is used for sites which include soft fills, such as clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soil subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise.
3. Where deep-seated moisture changes exist on sites at depths of 3 m or greater, further classification is needed for Classes M to E (M-D, H1-D, H2-D and E-D).

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

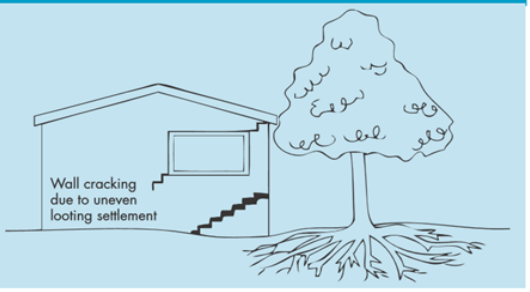
The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Trees can cause shrinkage and damage



Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

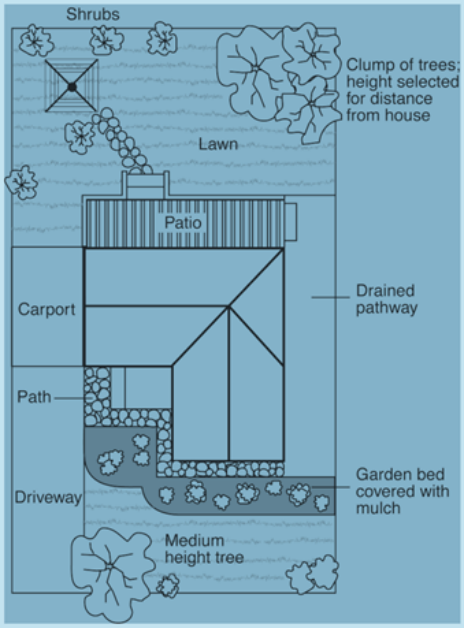
Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4

Gardens for a reactive site



extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

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CSIRO PUBLISHING PO Box 1139, Collingwood 3066, Australia

Tel (03) 9662 7666 Fax (03) 9662 7555 www.publish.csiro.au

Email: publishing.sales@csiro.au