Northern Rivers
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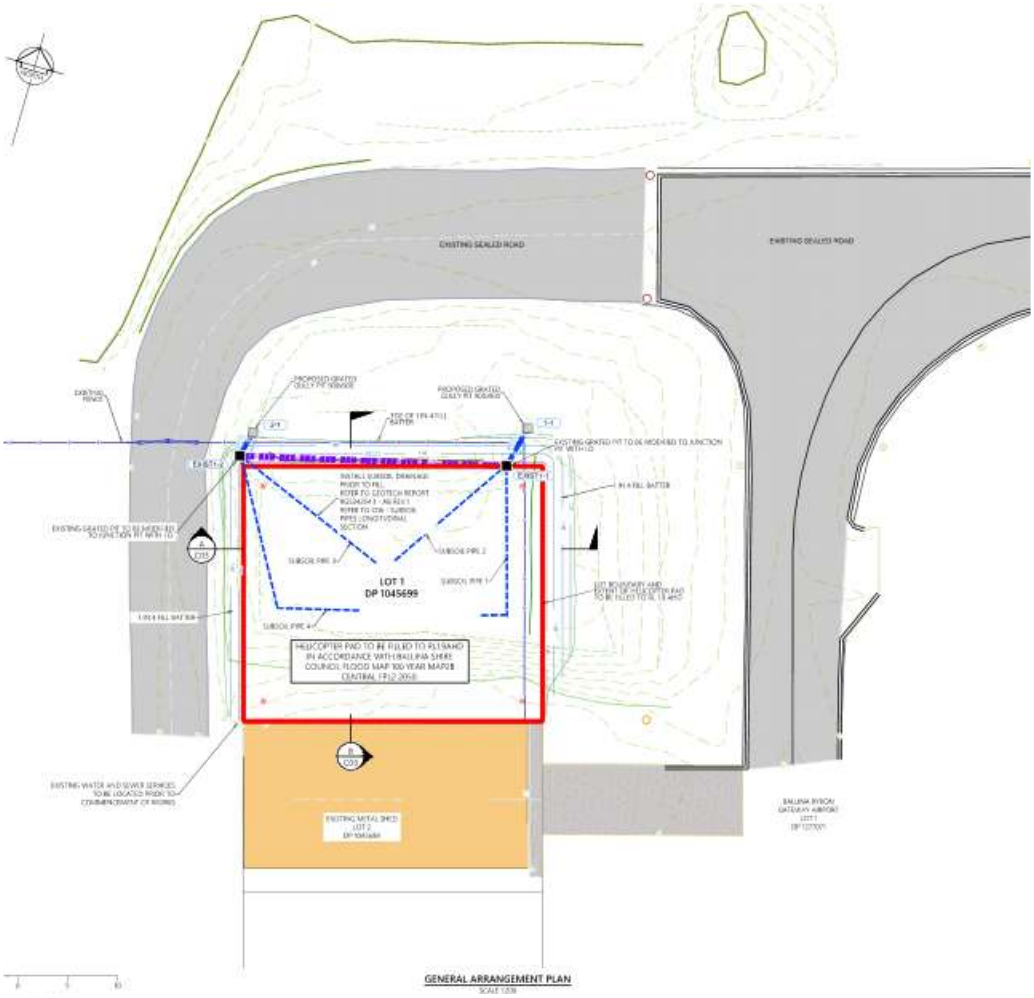
Earthworks Report - AS 3798 Level 1
for
Ballina Airport, Hanger Area



Prepared For:
Morgan Earthworks
7 Racecourse Road, Ballina
Reference Number: 3657-4
Laboratory Number: 19286
Date: 3/02/2025

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1.0 Introduction

Australian Soil & Concrete Testing P/L (ASCT) was commissioned by Morgan Earthworks (the Contractor). ASCT was engaged in the role of *Geotechnical Inspection & Testing Authority* (the GITA), to provide 'Level 1' services in accordance with section 8.2 of *AS 3798 – 'Guidelines on earthworks for commercial and residential developments'.*

This engagement included the inspection and testing of construction earthworks at the Ballina Gateway Airport, General Aviation Hanger. Specifically, the filling of the aircraft hangar building and adjacent verges. A graphical representation of the extent of earthworks covered by this report, is provided in Appendix A.

The earthworks were undertaken by Morgan Earthworks (the Constructor).

2.0 Earthworks

The site is located at Southern Cross Drive, Ballina NSW and surrounded by existing Hangars and taxi ways.

The subject earthworks were commenced on the 7/1/2025 and concluded on the 23/1/2025.

Filling operations were undertaken using imported materials. These materials generally consisted of metal dust. The materials exhibited no plasticity.

Fill materials were moisture conditioned, placed in layers not exceeding 200mm, and compacted in place using a pad foot roller.

3.0 Specifications

In the absence of a project specific earthworks specification, ASCT adopted the following criteria;
Compaction - Minimum 95% Standard (AS 3798, Table 5.1).

4.0 Inspection & Testing Procedure

Inspections were provided by experienced ASCT Technicians, to confirm that earthworks were constructed to the principles of AS 3798 section 6.2 'Fill Construction'.
These inspections included (as appropriate);

a) The adequate removal of topsoil and organics.
b) The soundness of the fill foundation, to provide a dense stable surface for filling.
c) The placement of imported materials.
d) The moisture conditioning of materials, and subsequent compaction.
e) Testing (Field & Laboratory).

Testing was carried out by ASCT Technicians, in accordance with the Australian Standards AS 1289. The frequency of testing was in accordance with AS 3798 Table 8.1.

Test locations were randomly selected by ASCT. The tests were generally distributed evenly throughout the earthworks, having regard for any areas of concern observed during inspections.

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The reported test locations were determined by ASCT. They were not professionally surveyed and should be considered as approximate only.

In the conduct of the inspections & testing (above), ASCT was afforded full access to the works without impairment or undue influence of any kind.

All test results (e.g.: Moisture Content, Moisture Variation & Relative Compaction) have been completed, calculated, rounded & reported strictly in accordance with the stated test methods – By ASCT, without fear or favour of any kind.

5.0 Results of Compliance Testing

The assessment of compaction test results against the specification, was conducted on a 'not any to fail' basis (see AS 3798 Appendix C). As such, if any test result failed to meet the specification - the earthworks portion represented by that test result has been re-worked & re-tested by ASCT.

ASCT can confirm that all test results indicate that the earthwork materials have been compacted in accordance with the specification.

All test reports pertaining to the earthworks are included in Appendix B.

6.0 Limitations

Unless otherwise stated in this report, this report does not address or include: Backfill behind retaining structures, Backfilling of service trenches, Any topsoil placed on the site, Slope stability, or Site drainage.

7.0 Conclusion

The earthworks have been conducted under section 8.2 - **Level 1 Inspection and Testing**, of AS 3798 – *Guidelines on earthworks for commercial and residential developments (2007)*.

Based on the inspections and field/laboratory testing, it is the opinion of ASCT that the earthworks are compliant with the project specifications.

Should you require any further assistance please do not hesitate to call this office.

Yours Faithfully,

Darran Kennedy (Laboratory Manager)

Australian Soil & Concrete Testing – Northern Rivers

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Appendix A – Extent of Earthworks

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Appendix B – Test Reports

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Compaction Control Test Report (Nuclear Gauge & Hilf)

Client:	Morgan Earthworks	Report No:	**1**
Client Address:	7 Racecourse Road, Ballina	Report Date:	21/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Lot Fill	Test Request:	NA
Lot Number:	NA	ITP/PCP:	

Sample Information & Location

Sample Number:		**19052**	**19053**	**-**	**-**	**-**
Field Test Number:		1	2	-	-	-
Date - Field Tested:		20/01/2025	20/01/2025	-	-	-
Time - Field Tested:		9:26	9:32	-	-	-
Material Source / Type:		Imported Crusher Dust - Crusher Dust				
Remarks / Notes:						
Control Line:		NA	NA			
Location/Chainage/Easting:	(m)	See Plan	See Plan	-	-	-
Position/Offset/Northing:	(m)	See Plan	See Plan	-	-	-
Level/Layer/R.L.		Layer 1	Layer 1	-	-	-
Layer Depth:	(mm)	>300	>300	-	-	-
Depth Tested:	(mm)	300	300	-	-	-

Field & Laboratory Results

Field Wet Density:	(t/m^3)	2.26	2.14	-	-	-
Field Dry Density:	(t/m^3)	2.09	2.05	-	-	-
Retained Oversize (Wet basis):	(%)	0% on 19.0mm	0% on 19.0mm	-	-	-
Material Description:		Sandy Gravel	Sandy Gravel	-	-	-
Moisture Content Method:		AS1289.2.1.1 - Oven	AS1289.2.1.1 - Oven	-	-	-
Field Moisture Content:	(%)	8.0	4.0	-	-	-
Adjusted Lab OMC:	(%)	11.0	9.8	-	-	-
Fraction Tested:		Passing 19.0mm	Passing 19.0mm	-	-	-
Lab Max Converted Wet Density:	(t/m^3)	2.22	2.16	-	-	-
Adjusted Lab Max CWD:	(t/m^3)	2.22	2.16	-	-	-
Compactive Effort:		Standard	Standard	-	-	-

Relative Compaction & Moisture

Moisture Variation	(%)	**3.0% Dryer than OMC**	**6.0% Dryer than OMC**	**-**	**-**	**-**
Moisture Ratio	(%)	**74.5**	**41.0**	**-**	**-**	**-**
Density Ratio	(%)	**102.0**	**99.0**	**-**	**-**	**-**

Specified Density Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-
Specified Moisture Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-

Test Methods Used.

AS1289.1.1 (Prep), AS1289.5.4.1 - (Moisture Ratio), AS1289.5.7.1 - (Hilf Density/Moisture Ratio (Rapid Method)), AS1289.5.8.1 (Nuclear Gauge, Direct Transmission), , AS 1289.1.2.1, Cl 6.4(b) (Sampling),

Remarks Regarding the Lot.

Laboratory testing 20/01/2025

Accredited for compliance with ISO/IEC 17025 - Testing. The results relate only to the items sampled/tested.

Accreditation number: 19644

Approved By: Darran Kennedy
Approved Signatory

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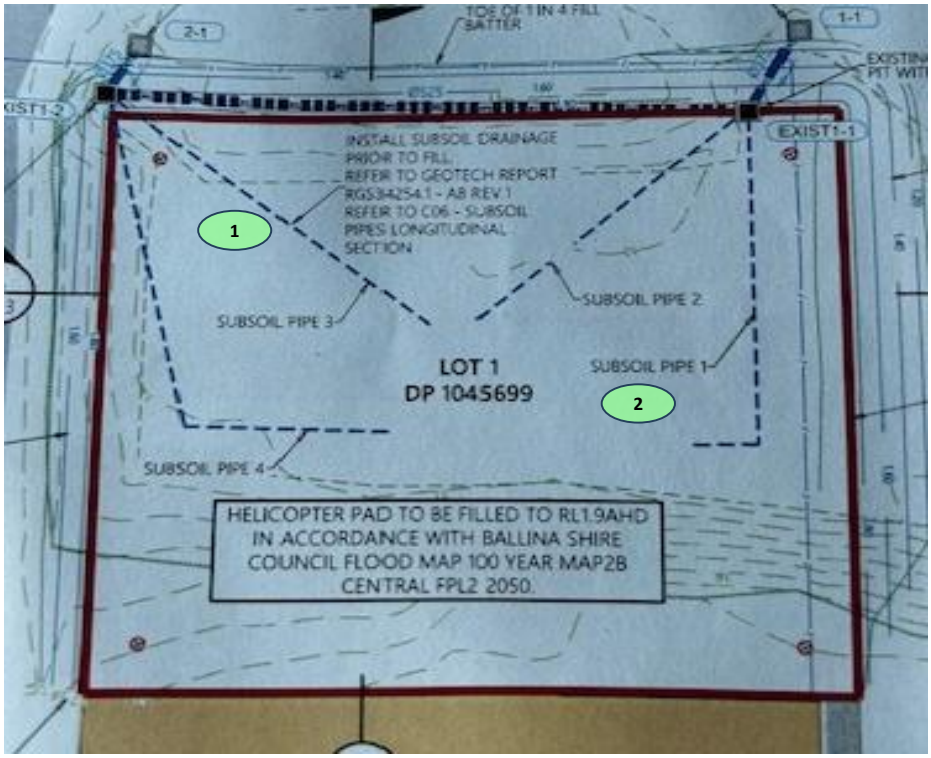
Compaction Control Test Report (Nuclear Gauge & Hilf)

Client:	Morgan Earthworks	Report No:	**1**
Client Address:	7 Racecourse Road, Ballina	Report Date:	21/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Lot Fill	Test Request:	NA
Lot Number:	NA	ITP/PCP:	



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Compaction Control Test Report (Nuclear Gauge & Hilf)

Client:	Morgan Earthworks	Report No:	**2**
Client Address:	7 Racecourse Road, Ballina	Report Date:	23/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Lot Fill	Test Request:	NA
Lot Number:	NA	ITP/PCP:	

Sample Information & Location

Sample Number:		**19081**	**19082**	**-**	**-**	**-**
Field Test Number:		1	2	-	-	-
Date - Field Tested:		22/01/2025	22/01/2025	-	-	-
Time - Field Tested:		7:37	7:43	-	-	-
Material Source / Type:		Imported Crusher Dust - Crusher Dust				
Remarks / Notes:						
Control Line:		NA	NA			
Location/Chainage/Easting:	(m)	See Plan	See Plan	-	-	-
Position/Offset/Northing:	(m)	See Plan	See Plan	-	-	-
Level/Layer/R.L.		Layer 2	Layer 2	-	-	-
Layer Depth:	(mm)	N/O	N/O	-	-	-
Depth Tested:	(mm)	300	300	-	-	-

Field & Laboratory Results

Field Wet Density:	(t/m^3)	2.04	2.10	-	-	-
Field Dry Density:	(t/m^3)	1.87	1.93	-	-	-
Retained Oversize (Wet basis):	(%)	0% on 19.0mm	0% on 19.0mm	-	-	-
Material Description:		Manufactured Sand	Manufactured Sand	-	-	-
Moisture Content Method:		AS1289.2.1.1 - Oven	AS1289.2.1.1 - Oven	-	-	-
Field Moisture Content:	(%)	9.0	8.5	-	-	-
Adjusted Lab OMC:	(%)	9.6	10.7	-	-	-
Fraction Tested:		Passing 19.0mm	Passing 19.0mm	-	-	-
Lab Max Converted Wet Density:	(t/m^3)	2.05	2.07	-	-	-
Adjusted Lab Max CWD:	(t/m^3)	2.05	2.07	-	-	-
Compactive Effort:		Standard	Standard	-	-	-

Relative Compaction & Moisture

Moisture Variation	(%)	**0.5% Dryer than OMC**	**2.0% Dryer than OMC**	**-**	**-**	**-**
Moisture Ratio	(%)	**96.0**	**80.5**	**-**	**-**	**-**
Density Ratio	(%)	**99.0**	**101.0**	**-**	**-**	**-**

Specified Density Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-
Specified Moisture Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-

Test Methods Used.

AS1289.1.1 (Prep), AS1289.5.4.1 - (Moisture Ratio), AS1289.5.7.1 - (Hilf Density/Moisture Ratio (Rapid Method)), AS1289.5.8.1 (Nuclear Gauge, Direct Transmission), , AS 1289.1.2.1, Cl 6.4(b) (Sampling),

Remarks Regarding the Lot.

Laboratory testing 22/01/2025

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Approved Signatory

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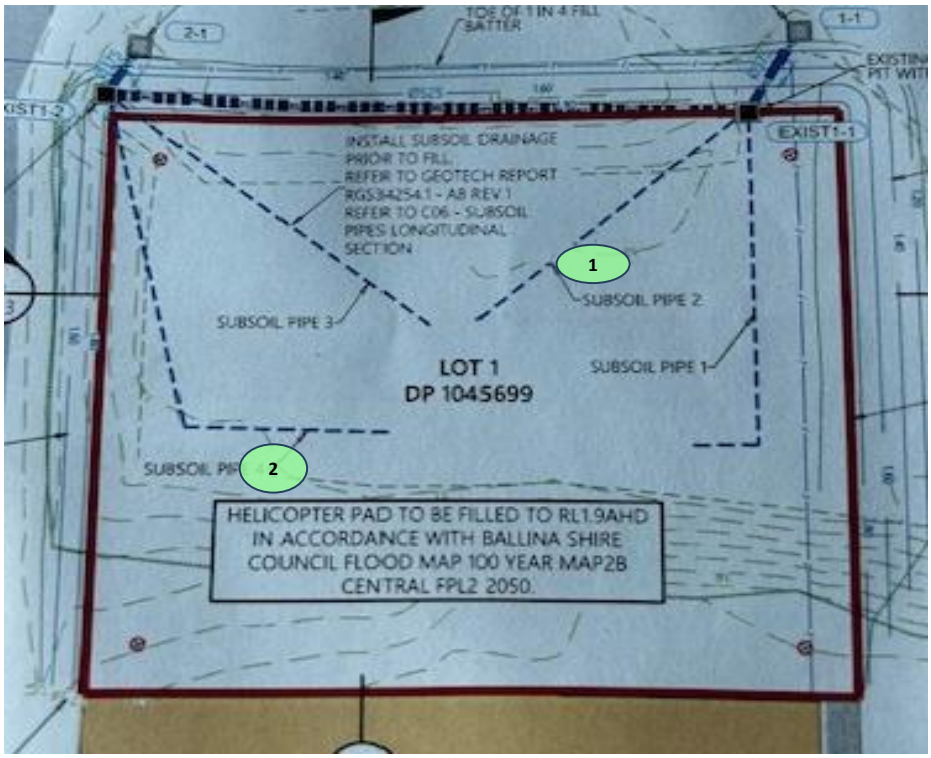
Compaction Control Test Report (Nuclear Gauge & Hilf)

Client:	Morgan Earthworks	Report No:	**2**
Client Address:	7 Racecourse Road, Ballina	Report Date:	23/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Lot Fill	Test Request:	NA
Lot Number:	NA	ITP/PCP:	



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Compaction Control Test Report (Nuclear Gauge & Hilf)

Client:	Morgan Earthworks	Report No:	**3**
Client Address:	7 Racecourse Road, Ballina	Report Date:	29/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Fill Pad	Test Request:	NA
Lot Number:	NA	ITP/PCP:	

Sample Information & Location

Sample Number:		**19108**	**19109**	**19110**	**19111**	**-**
Field Test Number:		1	2	3	4	-
Date - Field Tested:		23/01/2025	23/01/2025	23/01/2025	23/01/2025	-
Time - Field Tested:		7:56	8:02	8:10	8:17	-
Material Source / Type:		Crusher Dust - Crusher Dust				
Remarks / Notes:						
Control Line:		NA	NA	NA	NA	
Location/Chainage/Easting:	(m)	See Plan	See Plan	See Plan	See Plan	-
Position/Offset/Northing:	(m)	See Plan	See Plan	See Plan	See Plan	-
Level/Layer/R.L.		Layer 3	Layer 3	Layer 4	Layer 4	-
Layer Depth:	(mm)	N/O	N/O	N/O	N/O	-
Depth Tested:	(mm)	300	300	300	300	-

Field & Laboratory Results

Field Wet Density:	(t/m^3)	2.01	2.02	2.03	2.02	-
Field Dry Density:	(t/m^3)	1.83	1.85	1.87	1.85	-
Retained Oversize (Wet basis):	(%)	0% on 19.0mm	0% on 19.0mm	0% on 19.0mm	0% on 19.0mm	-
Material Description:		Crusher Dust	Crusher Dust	Crusher Dust	Crusher Dust	-
Moisture Content Method:		AS1289.2.1.1 - Oven	AS1289.2.1.1 - Oven	AS1289.2.1.1 - Oven	AS1289.2.1.1 - Oven	-
Field Moisture Content:	(%)	9.5	9.0	9.0	9.0	-
Adjusted Lab OMC:	(%)	11.2	10.6	10.8	10.9	-
Fraction Tested:		Passing 19.0mm	Passing 19.0mm	Passing 19.0mm	Passing 19.0mm	-
Lab Max Converted Wet Density:	(t/m^3)	2.01	2.01	2.01	2.02	-
Adjusted Lab Max CWD:	(t/m^3)	2.01	2.01	2.01	2.02	-
Compactive Effort:		Standard	Standard	Standard	Standard	-

Relative Compaction & Moisture

Moisture Variation	(%)	**1.5% Dryer than OMC**	**1.5% Dryer than OMC**	**2.0% Dryer than OMC**	**2.0% Dryer than OMC**	**-**
Moisture Ratio	(%)	**86.5**	**85.5**	**82.0**	**83.5**	**-**
Density Ratio	(%)	**100.0**	**100.5**	**101.0**	**100.0**	**-**

Specified Density Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-
Specified Moisture Ratio		Characteristic Value	Number of Tests	Mean	Standard Deviation	Constant k
Minimum (%)		-	-	-	-	-
Maximum (%)		-	-	-	-	-

Test Methods Used.

AS1289.1.1 (Prep), AS1289.5.4.1 - (Moisture Ratio), AS1289.5.7.1 - (Hilf Density/Moisture Ratio (Rapid Method)), AS1289.5.8.1 (Nuclear Gauge, Direct Transmission), , AS 1289.1.2.1, Cl 6.4(b) (Sampling),

Remarks Regarding the Lot.

Laboratory testing 23/01/2025

NATA

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Compaction Control Test Report (Nuclear Gauge & Hilf)

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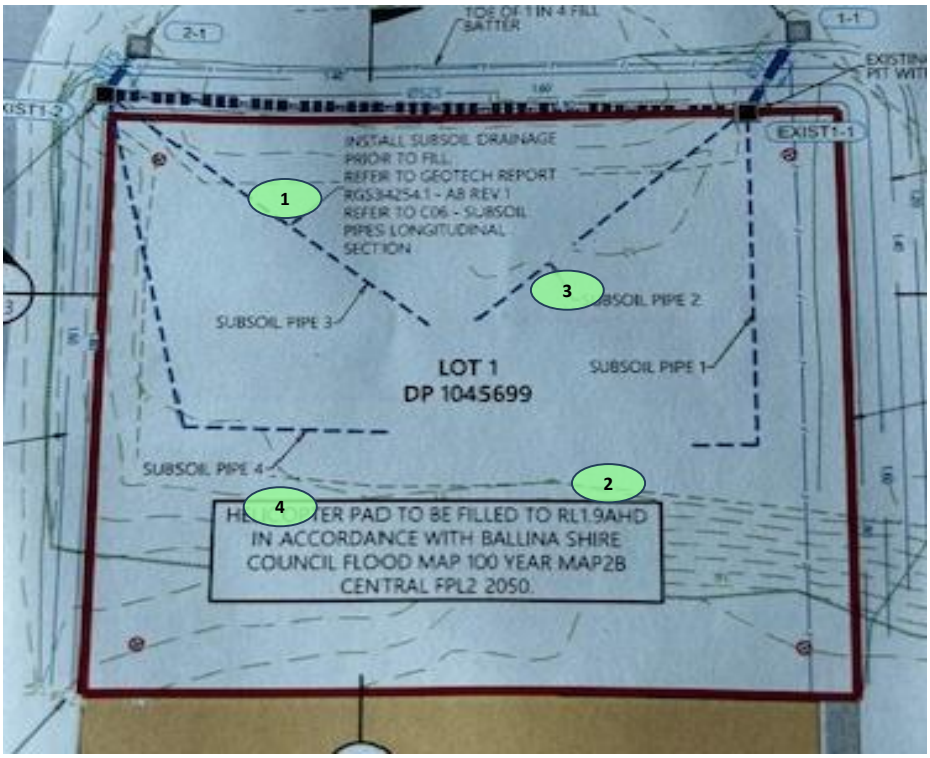
Client Address:	7 Racecourse Road, Ballina	Report Date:	29/01/2025
Project:	Ballina Airport, Hanger Area	Project No:	3657
Component:	Fill Pad	Test Request:	NA
Lot Number:	NA	ITP/PCP:	



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