JOB NO. ML17/090 (DL17/006) **OCTOBER, 2018**

HALL CONTRACTING PTY LTD
LEVEL ONE EARTHWORKS COMPLIANCE REPORT
FOR EARTHWORKS FILLING OPERATIONS
FRASER ROAD AND LOTS 9 TO 16
STAGE 23 NORTH HARBOUR BURPENGARY

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Maroochydore Office
Job: ML17/090 (DL17-006)
Ref: 2445 Rev0
Author: D Taylor

12th October 2018

Hall Contracting Pty Ltd
PO Box 519
Buderim QLD 4556

ATTENTION: MR NELSON RIDDLE
Email: NelsonRiddle@hallcontracting.com.au

Dear Sir,

RE: LEVEL ONE EARTHWORKS COMPLIANCE REPORT FOR EARTHWORKS FILLING OPERATIONS – FRASERS ROAD AND LOTS 9 TO 16 STAGE 23 NORTH HARBOUR BURPENGARY

Table of Contents

1.0 INTRODUCTION

1.1 General

This report summarises the results of Level 1 Inspections, Field Testing and associated Compaction Compliance testing of Earthworks Filling operations constructed to form residential Lots 9 to 16 and embankments below subgrade along Frasers Road at Stage 23 North Harbour, Burpengary (The Site).

Our involvement with the Earthworks Filling operations at The Site was between 5th June 2017 and 23rd June 2017.

The work was commissioned by Mr Tom Fox representing Hall Contracting (The Client).

Earthworks were carried out by The Client.

1.2 Previous Earthworks

As far as we have been made aware or what could be determined onsite, no previous earthworks have been carried out at The Site prior to our involvement.

1.3 The Project

The site is bounded by undeveloped land to the north, east, south and south west and existing developments to the north west. KN Group earthworks drawings 16-234-04 indicate the thickness and extent of the filling operations to be constructed at the Site. This drawing is considered to be a reasonable indication of the actual filling operations constructed. This report covers the fill as shown on this plan.

The actual fill thickness on each Lot should be obtained from the Developer as a Lot Disclosure Plan.

Photo 1 – Aerial View View of the Site (Nearmap 26th July 2018)

2.0 THE BRIEF

Our Brief from the Client was limited to:

- Level 1 Inspection and Testing of the placement and compaction of bulk earthworks fill materials in accordance with AS3798-2007 – "Guidelines on Earthworks for Commercial and Residential Developments".
- Compaction Control Testing in accordance with AS1289 – Testing of Soils for Engineering Purposes and at frequencies defined in AS3798-2007 Table 8.1.
- Notes on KN Group Drawing 16-234-25.
- Moreton Bay Regional Council requirements.

3.0 METHODOLOGY

Earthworks Inspections and Testing were carried out on the stripped and exposed ground surfaces and during the placement and compaction of fill materials forming residential building platforms and embankments below subgrade.

Field and laboratory testing included a walk over assessments of the existing ground conditions, proof roll testing of the stripped surfaces, observations of filling and compaction activities and field density testing using a nuclear soil moisture density gauge and Hilf Density compactions.

3.1 Stripped Surface Assessment

The Site was observed to be cleared of all debris, trees and topsoil. Any visible organic matter, loose soils, silty soils, and any over wet areas were compacted or removed to depths exposing a suitable fill foundation.

Typical materials forming the foundation for new fill are summarised below:

- Natural –Sandy CLAY (CI-CH), at least stiff, medium to high plasticity, fine to medium grained sands, orange brown and moist.
- Natural - Silty SAND (SM), at least medium dense, fine to coarse grained sand, low plasticity fines, grey and moist.

The stripped surface was proof rolled using loaded water truck carrying out multiple passes. When no discernable movement or vertical deflection was observed, the stripped surface was assessed to be suitable for support and placement of new fill.

Photo 2 – View of Stripped Surface Prior to Placement of Fill

3.2 Filling Operations

Fill materials were sourced on site and typically comprised:

- Sandy CLAY(CI), medium plasticity, fine to medium grained sand, red brown

Placement, moisture conditioning and compaction of fill materials were carried out using the following plant:

- 815 Compactor
- Water Truck
- D6 Dozer
- 30t Excavators
- Water Cart
- 8t Pad Foot Roller
- Grader
- Scrapers
- Articulated Dump Trucks

Photo 3 – View of Filling Operations

All fill was placed in thin layers appropriate for the above plant and compacted by carrying out several passes (up and back). The fill was moisture conditioned at the fill source and during placement and thoroughly mixed to achieve moisture contents suitable for compaction. Materials containing excessive amounts of silts or deleterious materials such as sticks, or construction debris were sorted to remove contaminants prior to placement, or rejected for use.

Sloping areas requiring filling were benched and continually keyed into the slope prior to and during placement. Some oversize particles may remain in the fill profile however are not considered to have any consequence on the performance of the fill as a mass. This method of placement and compaction was observed to be consistent for the entire thickness of fill.

Field density tests and laboratory compactions were carried out on the bulk earthworks fill materials in accordance with Table 5.1 and 8.1 of AS3798-2007 (Guidelines on Earthworks for Commercial and Residential Developments) and tested to AS1289 test methods (Testing of Soils for Engineering Purposes). Testing achieved the required Specification of 95% of the Hilf Density.

Fill placed and compacted at measured density ratios less than 95% were tyned, moisture conditioned and re-compacted until the required specification was achieved. Retesting (if required) was carried out using Random Stratified locations within the reworked areas.

Test reports are attached as Appendix A.

Test Locations are attached as Appendix B. Test locations and levels were not obtained by survey and therefore should only be considered as approximate.

4.0 STATEMENT OF COMPLIANCE

Our representative observed all the relevant earthworks operations including the stripped surfaces, filling operations and carried out field density tests in accordance with the required Standard. It is confirmed that Level 1 Supervision has been carried out on the earthworks fill at this project.

The fill and the top 150mm of the existing ground at The Site can be classed as Controlled as defined in AS2870 (Residential Slabs and Footings).

Controlled Fill (Level 1) provides an overview that the earthworks specification has been met. There are sites where long-term settlements of controlled fill can occur. Total and differential settlements can be expected where fill has been placed over soft and compressible soils and where the thickness of controlled fill varies significantly.

5.0 EXCLUSIONS

This statement does not include any top soil, which may be placed for use as lot dressing or any other subsequent earthworks or trench backfill after 23rd June 2017.

Assessments of batter stability, material quality such as soaked CBR and site classifications are excluded from this commission. The stability of any fill batters in the long term must take account of the variable materials used for the construction of the fill platforms and all surface loads including traffic loads near the crest of any batters.

Our on-site attendance specifically excludes assessments of fill material quality and engineering properties that are outside the requirements of AS.3798 - 2007, including soil or fill reactivity and soaked CBR values. We note that the fill materials comprise clay soils, which may result in unfavourable site classifications for individual lots and low subgrade design strengths.

Footings and ground slabs for any structures constructed over natural soils or compacted fill should be designed to accommodate the characteristic ground surface movements and settlement potential. Assessments of these design parameters are beyond the scope of this Report.

6.0 LIMITATIONS

This Report has been prepared by Morrison Geotechnic Pty Ltd (**Morrison Geotechnic**), and may include contributions from Morrison Geotechnic's officers and employees, sub-contractors, sub-consultants or agents (**Contributors**).

This Report is for the sole benefit and use of Hall Contracting (**Client**) for the sole purpose of providing geotechnical advice and recommendations in respect of the proposed residential development, North Harbour Stage 23 **(Project)**. The Report is only intended to address those issues expressly described in the scope of work in the Proposal Letter and this Report.

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(b) have not verified the accuracy or reliability of this information (other than as expressly stated in this Report);

(c) have not made any independent investigations or enquiries in respect of those matters of which it has no actual knowledge at the time of giving this Report to the Client; and

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(a) cannot predict the ground conditions encountered at any untested location because the ground conditions surrounding a test sampling location (or between any two test sampling locations) may be different from the test samples we have obtained;

(b) is not an environmental, contamination or hazardous materials assessment; may be invalid, incomplete or inaccurate (including errors in the scope of work, investigation methodology, observations, opinions and advice) where the information provided to Morrison Geotechnic was invalid, incomplete or inaccurate;

(c) is limited to observations of those parts of the site that were accessible at the time of the field investigation and is not based on observations about areas of the site which were inaccessible to the investigation equipment (including slopes, heavily vegetated areas or service corridors);

(d) is not a comprehensive representation of the actual site conditions and may only show a reasonable interpretation of conditions encountered at discrete test locations along with general site observations.

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Should you require any further information regarding the above, please do not hesitate to contact this office.

Yours faithfully

M. MORRISON
For and on Behalf of
MORRISON GEOTECHNIC PTY LIMITED

Encl. Appendix A - Test Certificates
Appendix B - Test Location Plan

APPENDIX A

Test Certificates

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Hilf Density Ratio Report

Client :	HALL CONTRACTING PTY LTD	Report Number:	DL17/006 - 151
Address :	P O BOX 519, BUDERIM, QLD, 4556	Report Date :	25/06/2017
Project Name :	EARTHWORKS SUPERVISION	Order Number :	NH03
Project Number :	DL17/006	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	NORTH HARBOUR, PHASE 3 , BURPENGARY		

Sample Number :	230493	230494	230495	
Test Number :	491	492	493	
Sampling Method :	-	-	-	
Date Sampled :	09/06/2017	09/06/2017	09/06/2017	
Date Tested :	09/06/2017	09/06/2017	09/06/2017	
Material Type :	**Bulk Fill**	**Bulk Fill**	**Bulk Fill**	
Material Source :	**On Site**	**On Site**	**On Site**	
Lot Number :	-	-	-	
Sample Location :	Stage 23 Bulk Fill Replacement E 499892 N 6999933 0.7m Below Final Level	Stage 23 Bulk Fill Replacement E 499879 N 6999948 0.5m Below Final Level	Stage 23 Bulk Fill Replacement E 499871 N 6999970 0.2m Below Final Level	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m³) :	-	-	-	
Field Moisture Content (%) :	15.0	13.7	13.9	
Hilf MDR Number :	230493	230494	230495	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	94	88.5	99	
Field Wet Density (t/m³) :	2.065	2.124	2.071	
Optimum Moisture Content (%) :	16.0	15.5	14.0	
Moisture Variation :	0.9	1.8	0.1	
Peak Converted Wet Density (t/m³) :	2.033	2.142	2.124	
Hilf Density Ratio (%) :	**101.5**	**99.0**	**97.5**	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	-			

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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

APPROVED SIGNATORY

Liam Mcdowall (Brisbane) - Branch Manager
NATA Accreditation Number
1162 / 1169

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Hilf Density Ratio Report

Client :	HALL CONTRACTING PTY LTD	Report Number:	DL17/006 - 153
Address :	P O BOX 519, BUDERIM, QLD, 4556	Report Date :	05/07/2017
Project Name :	EARTHWORKS SUPERVISION	Order Number :	NH03
Project Number :	DL17/006	Test Method :	AS1289.5.8.1 & 5.7.1
Location:	NORTH HARBOUR, PHASE 3 , BURPENGARY	Page 1 of 1	

Sample Number :	230861	230862	230863	
Test Number :	497	498	499	
Sampling Method :	-	-	-	
Date Sampled :	23/06/2017	23/06/2017	23/06/2017	
Date Tested :	23/06/2017	23/06/2017	23/06/2017	
Material Type :	**Road Embankment**	**Road Embankment**	**Road Embankment**	
Material Source :	**On Site**	**On Site**	**On Site**	
Lot Number :	-	-	-	
Sample Location :	Fraser Road (Stage 24) Ch 60 3m Left of Centreline 0.5m Below Final Level	Fraser Road (Stage 24) Ch 120 2m Right of Centreline 0.5m Below Final Level	Fraser Road (Stage 24) Ch 210 1m Right of Centreline 0.35m Below Final Level	
Test Depth (mm) :	150	150	150	
Layer Depth (mm) :	-	-	-	
Maximum Size (mm) :	19	19	19	
Oversize Wet (%) :	-	-	-	
Oversize Dry (%) :	-	-	-	
Oversize Density (t/m³) :	-	-	-	
Field Moisture Content (%) :	14.7	13.8	13.6	
Hilf MDR Number :	230861	230862	230863	
Hilf MDR Method :	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	AS1289.5.1.1 & 5.7.1	
Compactive Effort :	Standard	Standard	Standard	
Field Density Method :	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	AS1289.5.8.1 & 5.7.1	
Moisture Method :	AS1289.2.1.1	AS1289.2.1.1	AS1289.2.1.1	
Moisture Ratio (%) :	94	84.5	98	
Field Wet Density (t/m³) :	2.179	2.184	2.214	
Optimum Moisture Content (%) :	15.6	16.3	13.8	
Moisture Variation :	0.9	2.4	0.2	
Peak Converted Wet Density (t/m³) :	2.101	2.075	2.231	
Hilf Density Ratio (%) :	**103.5**	**105.0**	**99.0**	
Minimum Specification :	95	95	95	
Moisture Specification :	-	-	-	
Site Selection :	-	-	-	
Soil Description :	-	-	-	
Remarks :	**Hilf performed by Maroochydore Laboratory. Corporate Site No. 17071.**			

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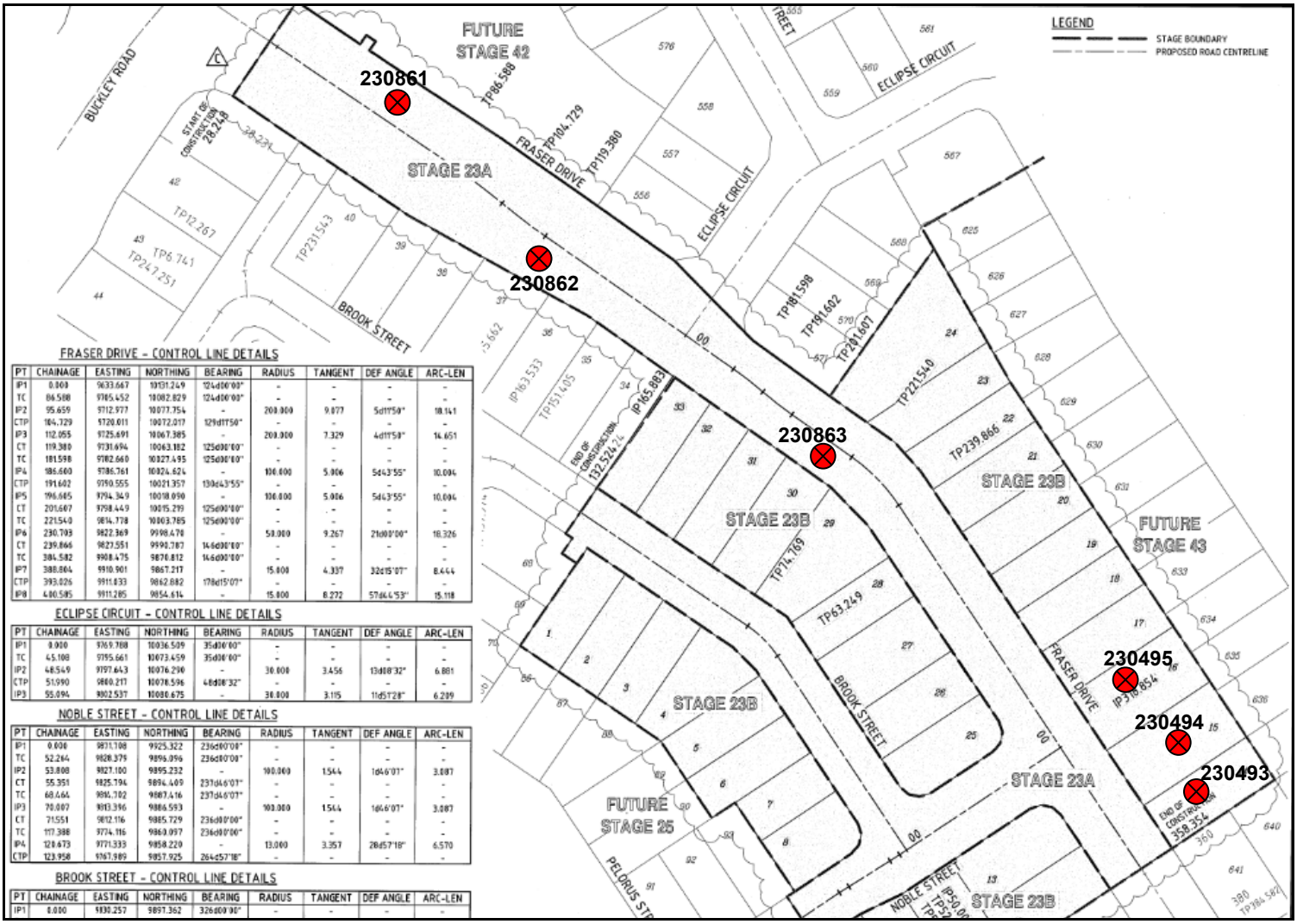
Accredited for compliance with ISO/IEC 17025.

APPROVED SIGNATORY

Liam Mcdowall (Brisbane) - Branch Manager
NATA Accreditation Number
1162 / 1169

APPENDIX B

Test Location Plan



FRASER DRIVE - CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	9633.667	10131.249	124d06'03"	-	-	-	-
TC	86.588	9765.452	10082.829	124d06'03"	-	-	-	-
IP2	95.659	9712.977	10077.754	-	200.000	9.077	5d11'59"	18.141
CTP	104.729	9720.011	10072.017	129d11'50"	-	-	-	-
IP3	112.055	9725.691	10067.385	-	200.000	7.329	4d11'58"	14.651
CT	119.380	9731.694	10063.182	125d00'00"	-	-	-	-
TC	181.598	9782.660	10027.495	125d00'00"	-	-	-	-
IP4	186.660	9786.761	10024.624	-	100.000	5.006	5d43'55"	10.094
CTP	191.602	9790.555	10021.357	130d43'55"	-	-	-	-
IP5	196.665	9794.349	10018.090	-	100.000	5.006	5d43'55"	10.094
CT	201.667	9798.449	10015.239	125d00'00"	-	-	-	-
TC	221.540	9814.778	10003.785	125d00'00"	-	-	-	-
IP6	230.703	9822.369	9998.470	-	50.000	9.267	21d00'00"	18.326
CT	239.866	9827.551	9990.787	146d00'00"	-	-	-	-
TC	384.582	9908.475	9870.812	146d00'00"	-	-	-	-
IP7	388.864	9910.901	9867.217	-	15.000	4.337	32d15'07"	8.444
CTP	393.026	9911.833	9862.882	178d15'07"	-	-	-	-
IP8	400.585	9911.285	9854.614	-	15.000	8.272	57d44'53"	15.118

ECLIPSE CIRCUIT - CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	9769.788	10036.509	35d06'00"	-	-	-	-
TC	45.108	9795.661	10073.459	35d06'00"	-	-	-	-
IP2	48.549	9797.643	10076.290	-	30.000	3.456	13d08'32"	6.881
CTP	51.990	9800.217	10078.596	48d08'32"	-	-	-	-
IP3	55.094	9802.537	10080.675	-	30.000	3.115	11d51'28"	6.209

NOBLE STREET - CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	9831.198	9925.322	236d00'08"	-	-	-	-
TC	52.264	9828.379	9896.996	236d00'08"	-	-	-	-
IP2	53.808	9827.180	9895.232	-	100.000	1.544	1d46'01"	3.087
CT	55.351	9825.794	9894.409	237d46'01"	-	-	-	-
TC	68.464	9816.702	9887.416	237d46'01"	-	-	-	-
IP3	70.007	9813.396	9886.593	-	100.000	1.544	1d46'01"	3.087
CT	71.551	9812.116	9885.729	236d00'00"	-	-	-	-
TC	117.388	9774.116	9860.097	236d00'00"	-	-	-	-
IP4	120.673	9771.333	9858.220	-	13.000	3.357	28d57'18"	6.570
CTP	123.958	9767.989	9857.925	264d57'18"	-	-	-	-

BROOK STREET - CONTROL LINE DETAILS

PT	CHAINAGE	EASTING	NORTHING	BEARING	RADIUS	TANGENT	DEF ANGLE	ARC-LEN
IP1	0.000	9830.257	9897.362	326d09'30"	-	-	-	-

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Client	Hall Contracting Pty Ltd		
Project:	North Harbour Phase 3, Burpengary		
Project No:	DL17/006	Drawing No:	Figure 1
Legend:	Approx. Fill Test Location ⊗		*Date: 9th October 2018*
			Drawing not to Scale