

Kingbird Estate Stage 13

GITA Inspection Verification Report

Prepared For: Kingbird Developments

Report Number P21534A V1

Version Release Date 29 Apr 2021

Report Released By C Caulfield

Title Project Manager

Signature



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1 Introduction

Terra Firma Laboratories was engaged by Kingbird Developments as the Geotechnical Inspection and Testing Authority (GITA) to provide Level 1 supervision and testing works on the earthworks component for Kingbird Estate Stage 13. This work was conducted over the period of 11/03/2021 to 31/03/2021.

This report presents that the allotment earthworks was carried out in accordance with AS3798-2007 *Guidelines for Earthworks for Commercial and Residential Development* and in compliance with the compaction control specifications established by the contractor.

2 Scope of Work

2.1 Area of Work

The areas of work included lots 1301 to 1305, 1313-1317, 1321, 1322 & 1325 to 1330, bounded by streets GumFlats Way & Bellthorpe Road. The site will be a Residential development.

The area on which fill was placed is shown on site plan (Appendix 1: *Test Location Plan*) based on drawings prepared by Beveridge Williams (Drawing Reference: 010 P3) and provided by Kingbird Developments.

The supervision work by the GITA involved both inspection of sub grade preparation work and full time inspection and testing of fill placement.

2.2 Specification

The technical specification (Reference from Drawings) for compaction control requirements was provided by Kingbird Developments and established that:

Test Rolling is required for all layers of structural fill and materials within 150mm of permanent subgrade level so as to withstand test rolling without visible deformation or springing. Corrective action is required where unstable areas exceed 20% of the area being considered by test rolling.

Section 5.2 of AS3798-2007 (Section 5.2) establishes a specification requirement for a minimum density ratio of not less than 95% noting that soils containing more than 20% of particles coarser than 37.5mm cannot be tested for relative compaction using the procedures of AS1289 5.1.1 and AS1289 5.2.1.

In accordance with Table 8.1 (AS3798), for large scale operations, (greater than 1500m²), the minimum testing frequency is 1 test per layer per material type per 2500m² or 1 test per 500m³ distributed reasonable evenly throughout full depth and area or 3 tests per lot. AS3798 defines a lot as “an area of work that is essentially homogenous in relation to material type and moisture condition, rolling response and compaction technique, and which has been used for the assessment of the relative compaction of an area of work”. All three of these test frequencies must be achieved and this is typically confirmed to have been achieved when 3 tests per visit (day) have been completed.

2.3 Limitations

Terra Firma Laboratories cannot verify any works completed by others outside of the time period specified in the introduction. Uncontrolled works may include, but are not limited to trenching for services, cut and fill works for slab preparation or subsequent removal of vegetation and back fill of holes unless specified in section 2.1 of this report.

Terra Firma Laboratories cannot verify that the material used as a filling medium is free from chemical or other contamination. The scope and the period of Terra Firma Laboratories as described in the introduction are subject to restrictions and limitations. Terra Firma Laboratories did not perform a complete assessment of all possible conditions and circumstances that may exist at the site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Terra Firma Laboratories.

Verification of finished surface level to design levels is outside of the scope of the GITA report.

Any drawings or marked locations presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Terra Firma Laboratories for incomplete or inaccurate data supplied by others.

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3 Construction Method

3.1 Subgrade Preparation

At the time of subgrade inspection the following was observed:

- Subgrade preparation involved stripping the site of topsoil, vegetation and organic matter to a depth of approximately 200mm below existing levels.
- The site was cleared of all trees and stumps to the extent necessary for the fill placement to proceed
- The roots of all trees and any debris was removed from site prior to any fill placement

The sub-grade area was then proof-rolled to confirm it was capable of withstanding test rolling without visible deformation or springing and any areas observed to be soft or otherwise unsuitable were rectified. The sub-grade was watered and scarified prior to fill placement to aid layer bonding.

3.2 Fill Placement

The contractor was observed to have suitable construction equipment and plant available on-site during the construction period for use in the fill placement.

All fill was placed in layers of thicknesses not exceeding 300mm. At the completion of a placed layer, compaction testing was performed to confirm appropriate compaction had been achieved and supported the observations made. It should be noted that the compaction tests are representative samples of the fill placed and support the visual assessment of the works completed. Each house lot does not necessarily require a compaction test to have been conducted within the house allotment but may have been verified by testing conducted within up to a 2500m² area of the house lot.

Final fill placement levels were verified against design level by others. For the purposes of this report, it was observed that finished levels were in accordance with levels marked on site by survey markers.

The final 300mm of material placed across the site was placed as a topsoil layer or growing medium and should be considered as non-structural, as it was placed in an uncontrolled manner, as allowed by specifications and placement of the final 300mm of material was not observed by the GITA.

4 Construction Verification

Compaction Verification testing is summarized in a detailed test register with test certificates attached provided in Appendix 2: *Compaction Test Register and Test Certificates*. A test location

plan (P21534D1, Appendix 1) providing a schematic of test locations across the extent of scope of works for every placed layer of fill is also documented.

A total of 16 density tests (Hilf method in accordance with 1289 5.7.1) were undertaken with 0 failed results. The results summarised in the compaction test register (Appendix 2) confirm that for every layer of fill placed in a specific work area, satisfactory testing was completed.

5 Statement of Compliance

The intention of this report is to provide a description of the earthworks construction for Stage 13 at Kingbird Estate. For completed fill areas of greater than 300mm, and for works completed between 11/03/2021 and 31/03/2021, earthworks construction activities were conducted under the full time supervision of the Geotechnical Inspection and Testing Authority. Inspections and testing of the fill areas at this site indicate that both sub grade preparation and fill placement have been conducted in accordance with the specification. The earthworks construction for Stage 13 of Kingbird Estate was observed to be constructed in compliance with the requirements of the Technical Specification.



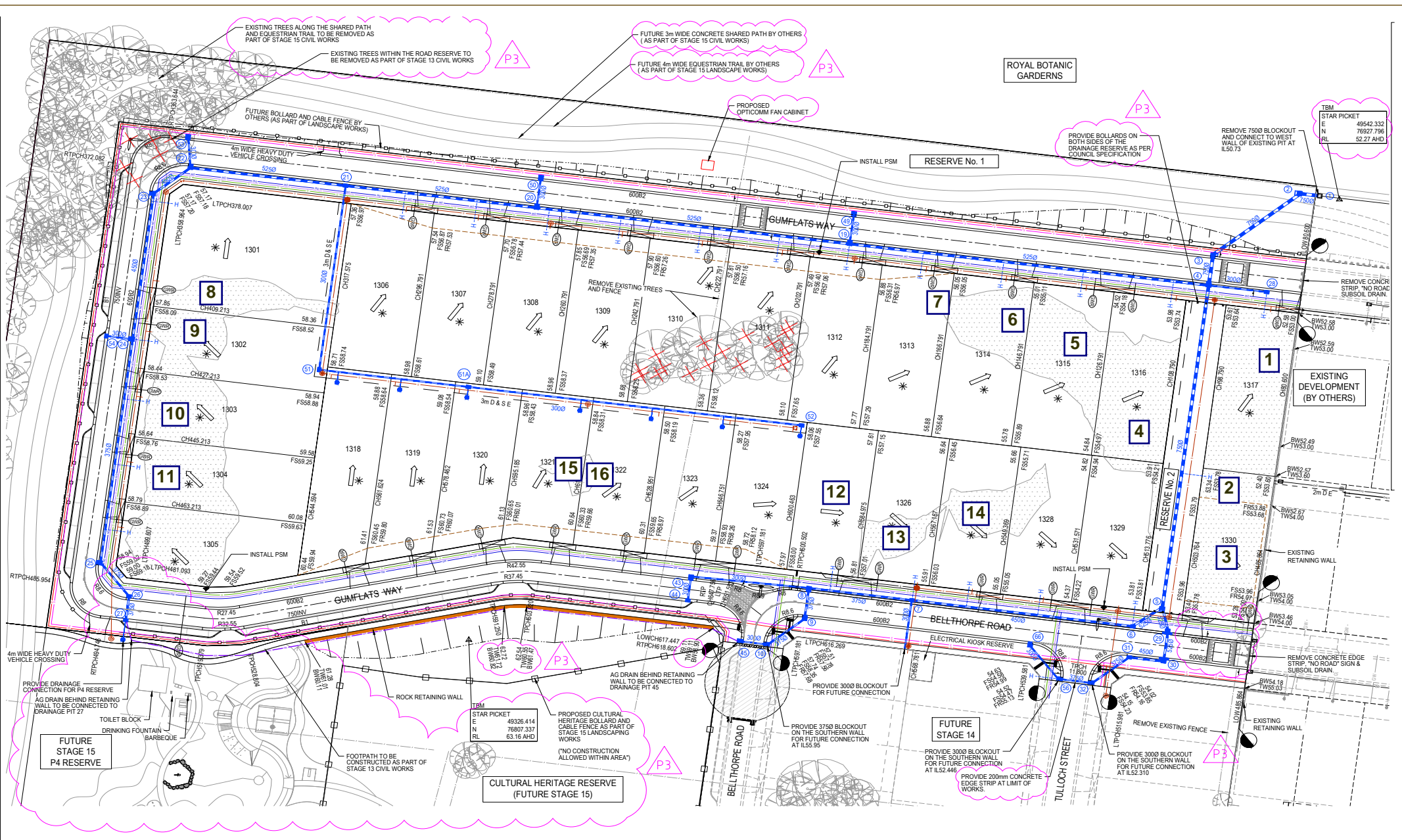
Your Worksite is Our Laboratory.

Appendix 1: Test Location Plan

Our Head Office
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Pakenham, VIC 3810

Our Laboratories
Pakenham 03 9769 5799
Deer Park 03 8348 5596
Bibra Lake 08 9395 7220

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Our Head Office
 47 National Ave
 Pakenham, VIC 3810

Our Laboratories
 Pakenham 03 9769 5799
 Deer Park 03 8348 5596
 Bibra Lake 08 9395 7220

Test Location Plan

not to scale

Client: Kingbird Developments

Project: Kingbird Estate stage 13

Reference: P21534 D1



Your Worksite is Our Laboratory.

Appendix 2: Compaction Test Register and Test Certificates



Compaction Test Register

Client: Kingbird Developments
Project: Kingbird Estate Stage 13

Project No: P21534
Specification: 95%

Date:	Test No:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
11/03/2021	1	Layer 3		104.5%	Pass	Lot 1317	P21534-1
11/03/2021	2	Layer 3		105.5%	Pass	Lot 1330	P21534-1
11/03/2021	3	Layer 3		102.5%	Pass	Lot 1330	P21534-1
12/03/2021	4	Layer 2		108.0%	Pass	Lot 1316	P21534-2
12/03/2021	5	Layer 2		106.5%	Pass	Lot 1315	P21534-2
12/03/2021	6	Layer 1		103.5%	Pass	Lot 1314	P21534-2
12/03/2021	7	Layer 1		103.5%	Pass	Lot 1313	P21534-2
12/03/2021	8	Layer 1		103.5%	Pass	Lot 1301	P21534-2
12/03/2021	9	Layer 1		101.0%	Pass	Lot 1302	P21534-2
12/03/2021	10	Layer 2		101.5%	Pass	Lot 1303	P21534-2
12/03/2021	11	Layer 2		100.5%	Pass	Lot 1304	P21534-2
30/03/2021	12	Layer 1		100.0%	Pass	Lot 1325	P21534-3
30/03/2021	13	Layer 1		100.5%	Pass	Lot 1326	P21534-3
30/03/2021	14	Layer 1		99.5%	Pass	Lot 1327	P21534-3
31/03/2021	15	Layer 2		98.5%	Pass	Lot 1321	P21534-4
31/03/2021	16	Layer 2		100.0%	Pass	Lot 1322	P21534-4

Material Test Report

Report Number: P21534-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Client Added
Date Issued: 04/05/2021
Client: King Bird Development
 29 Berwick Springs Promenade, Narre Warren South VIC 3805
Contact: Junsheng Lui
Project Number: P21534
Project Name: Kingbird Estate Stage 13
Project Location: Cranbourne
Client Reference: 6430
Work Request: 5559
Date Sampled: 11/03/2021 15:00
Dates Tested: 11/03/2021 - 12/03/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95%
Location: Kingbird Stage 13 Level One
Material: silty CLAY
Material Source: Onsite



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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Chris Caulfield
 Project Manager

NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	P21-5559A	P21-5559B	P21-5559C
Test Number	1	2	3
Date Tested	11/03/2021	11/03/2021	11/03/2021
Time Tested	**	**	**
Test Request #/Location	Lot1317	Lot1330	Lot1330
Layer / Reduced Level	Layer 3	Layer 3	Layer 3
Thickness of Layer (mm)	300	300	300
Soil Description	Silty CLAY	Silty CLAY	Silty CLAY
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	0
Field Wet Density (FWD) t/m ³	2.13	2.14	2.02
Field Moisture Content %	17.8	18.6	19.8
Field Dry Density (FDD) t/m ³	1.81	1.80	1.69
Peak Converted Wet Density t/m ³	2.04	2.02	1.98
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	15.9	18.5	20.4
Adj. Field Moisture Content % (AS1289.5.4.1)	17.8	18.6	19.8
Moisture Ratio % (AS1289.5.4.1)	112.0	100.5	97.0
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	-2.0	0.0	0.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	104.5	105.5	102.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

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

Material Test Report

Report Number: P21534-2
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Client Added
Date Issued: 04/05/2021
Client: King Bird Development
 29 Berwick Springs Promenade, Narre Warren South VIC 3805
Contact: Junsheng Lui
Project Number: P21534
Project Name: Kingbird Estate Stage 13
Project Location: Cranbourne
Client Reference: 06181
Work Request: 5576
Date Sampled: 12/03/2021 14:00
Dates Tested: 15/03/2021 - 17/03/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95%
Location: Kingbird Estate Stage 13 - Level One Fill
Material: Mudstone
Material Source: Onsite



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Approved Signatory: Chris Caulfield
 Project Manager

NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1				
Sample Number	P21-5576A	P21-5576B	P21-5576C	P21-5576D
Test Number	4	5	6	7
Date Tested	12/03/2021	12/03/2021	12/03/2021	12/03/2021
Time Tested	16:00	16:00	16:00	16:00
Test Request #/Location	Lot No 1316	Lot No 1315	Lot No 1314	Lot No 1313
Layer / Reduced Level	Layer 2	Layer 2	Layer 1	Layer 1
Thickness of Layer (mm)	300	300	300	300
Soil Description	Mudstone	Mudstone	Mudstone	Mudstone
Test Depth (mm)	275	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	0	0
Field Wet Density (FWD) t/m ³	2.09	2.05	2.03	2.03
Field Moisture Content %	16.3	18.8	19.0	19.7
Field Dry Density (FDD) t/m ³	1.80	1.72	1.71	1.69
Peak Converted Wet Density t/m ³	1.93	1.93	1.97	1.96
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	16.9	20.5	18.9	18.8
Adj. Field Moisture Content % (AS1289.5.4.1)	16.3	18.8	19.0	19.7
Moisture Ratio % (AS1289.5.4.1)	96.5	91.5	100.5	105.0
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**	**
Moisture Variation (Wv) %	0.5	1.5	0.0	-1.0
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	108.0	106.5	103.5	103.5
Compaction Method	Standard	Standard	Standard	Standard
Report Remarks	**	**	**	**

Moisture Variation Note:

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

Material Test Report

Report Number: P21534-2
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Client Added
Date Issued: 04/05/2021
Client: King Bird Development
 29 Berwick Springs Promenade, Narre Warren South VIC
 3805
Contact: Junsheng Lui
Project Number: P21534
Project Name: Kingbird Estate Stage 13
Project Location: Cranbourne
Client Reference: 06181
Work Request: 5576
Date Sampled: 12/03/2021 14:00
Dates Tested: 15/03/2021 - 17/03/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95%
Location: Kingbird Estate Stage 13 - Level One Fill
Material: Mudstone
Material Source: Onsite



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Approved Signatory: Chris Caulfield
 Project Manager

NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1				
Sample Number	P21-5576E	P21-5576F	P21-5576G	P21-5576H
Test Number	8	9	10	11
Date Tested	12/03/2021	12/03/2021	12/03/2021	12/03/2021
Time Tested	16:00	16:00	16:00	16:00
Test Request #/Location	Lot No 1301	Lot No 1302	Lot No 1303	Lot No 1304
Layer / Reduced Level	Layer 1	Layer 1	Layer 2	Layer 2
Thickness of Layer (mm)	300	300	300	300
Soil Description	Mudstone	Mudstone	Mudstone	Mudstone
Test Depth (mm)	275	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	0	0	0	0
Field Wet Density (FWD) t/m ³	2.03	2.04	2.05	2.02
Field Moisture Content %	18.2	14.7	18.9	18.5
Field Dry Density (FDD) t/m ³	1.72	1.78	1.72	1.71
Peak Converted Wet Density t/m ³	1.97	2.02	2.02	2.02
Adjusted Peak Converted Wet Density t/m ³	**	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	17.1	16.8	17.7	18.3
Adj. Field Moisture Content % (AS1289.5.4.1)	18.2	14.7	18.9	18.5
Moisture Ratio % (AS1289.5.4.1)	106.5	87.5	107.0	101.0
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**	**
Moisture Variation (Wv) %	-1.0	2.0	-1.0	0.0
Adjusted Moisture Variation %	**	**	**	**
Hilf Density Ratio (%)	103.5	101.0	101.5	100.5
Compaction Method	Standard	Standard	Standard	Standard
Report Remarks	**	**	**	**

Moisture Variation Note:

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

Material Test Report

Report Number: P21534-3
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Client Added
Date Issued: 04/05/2021
Client: King Bird Development
 29 Berwick Springs Promenade, Narre Warren South VIC 3805
Contact: Junsheng Lui
Project Number: P21534
Project Name: Kingbird Estate Stage 13
Project Location: Cranbourne
Client Reference: 06094
Work Request: 5704
Date Sampled: 30/03/2021 15:00
Dates Tested: 31/03/2021 - 07/04/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95%
Location: KingBird St 13 Level 1 Fill
Material: CLAY
Material Source: Onsite



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Approved Signatory: Chris Caulfield
 Project Manager

NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	P21-5704A	P21-5704B	P21-5704C
Test Number	12	13	14
Date Tested	30/03/2021	30/03/2021	30/03/2021
Time Tested	15:00	15:00	15:00
Test Request #/Location	Lot 1325	Lot 1326	Lot 1327
Layer / Reduced Level	Layer 1	Layer 1	Layer 1
Thickness of Layer (mm)	300	300	300
Soil Description	Clay	Clay	Clay
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0	0	0
Percentage of Dry Oversize (%) (AS1289.5.4.1)	**	0	**
Field Wet Density (FWD) t/m ³	1.95	2.01	2.00
Field Moisture Content %	21.1	20.8	20.4
Field Dry Density (FDD) t/m ³	1.61	1.66	1.66
Peak Converted Wet Density t/m ³	1.95	1.99	2.00
Adjusted Peak Converted Wet Density t/m ³	**	**	**
Adj. Optimum Moisture Content % (AS1289.5.4.1)	21.3	19.8	**
Adj. Field Moisture Content % (AS1289.5.4.1)	21.1	20.8	20.4
Moisture Ratio % (AS1289.5.4.1)	99.0	105.0	109.5
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	0.0	-1.0	-2.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	100.0	100.5	99.5
Compaction Method	Standard	Standard	Standard
Report Remarks	**	**	**

Moisture Variation Note:

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

Material Test Report


Report Number: P21534-4
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Client Added
Date Issued: 04/05/2021
Client: King Bird Development
 29 Berwick Springs Promenade, Narre Warren South VIC 3805
Contact: Junsheng Lui
Project Number: P21534
Project Name: Kingbird Estate Stage 13
Project Location: Cranbourne
Client Reference: 6436
Work Request: 5712
Date Sampled: 31/03/2021 15:00
Dates Tested: 01/04/2021 - 07/04/2021
Sampling Method: AS 1289.1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted
Specification: 95%
Location: Kingbird Estate Stage 13
Material: silty CLAY
Material Source: Onsite



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 Approved Signatory: Chris Caulfield
 Project Manager
 NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	P21-5712A	P21-5712B	
Test Number	15	16	
Date Tested	31/03/2021	31/03/2021	
Time Tested	15:30	15:30	
Test Request #/Location	Lot 1321	Lot 1322	
Layer / Reduced Level	Layer2	Layer2	
Thickness of Layer (mm)	300	300	
Soil Description	Silty CLAY	Silty CLAY	
Test Depth (mm)	275	275	
Sieve used to determine oversize (mm)	19.0	19.0	
Percentage of Wet Oversize (%)	0	0	
Percentage of Dry Oversize (%) (AS1289.5.4.1)	**	**	
Field Wet Density (FWD) t/m ³	1.88	1.90	
Field Moisture Content %	19.9	19.2	
Field Dry Density (FDD) t/m ³	1.57	1.59	
Peak Converted Wet Density t/m ³	1.92	1.90	
Adjusted Peak Converted Wet Density t/m ³	**	**	
Adj. Optimum Moisture Content % (AS1289.5.4.1)	**	19.4	
Adj. Field Moisture Content % (AS1289.5.4.1)	19.9	19.2	
Moisture Ratio % (AS1289.5.4.1)	89.0	99.0	
Adjusted Moisture Ratio % (AS1289.5.4.1)	**	**	
Moisture Variation (Wv) %	2.5	0.5	
Adjusted Moisture Variation %	**	**	
Hilf Density Ratio (%)	98.5	100.0	
Compaction Method	Standard	Standard	
Report Remarks	**	**	

Moisture Variation Note:

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