aurecon

Project: Stonebrook Subdivision

Geotechnical Completion Report Stages 9, 10 and 11

Reference: 224926

Prepared for: CDL Land New Zealand Ltd.

Revision: 1

13 November 2014

Document Control Record

Document prepared by:

Aurecon New Zealand Limited
Unit 1, 150 Cavendish Road
Casebrook Christchurch 8051
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

Document control						
Report Title		Geotechnical Completion Report Stages 9, 10 and 11				
Document ID			**Project Number**		224926	
File Path		P:\224926\Geotech\Geotech Completion Report\Stages 9, 10 and 11\224926 - Stages 9, 10 and 11 - Geotech Completion Report .docx				
Client		CDL Land New Zealand Ltd.	**Client Contact**		Jason Adams	
Rev	**Date**	**Revision Details/Status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	30/10/2014	Draft for review	T. Mitchell	T. Mitchell	M. Davidson	
1	13/11/2014	For Issue	T. Mitchell	T. Mitchell	M. Davidson	I. McPherson
Current Revision		**1**				

Approval			
Author Signature		Approver Signature	
Name	T. Mitchell	Name	I. McPherson
Title	Geotechnical Engineer	Title	Technical Director

Contents

Appendices

1. Executive Summary

CDL New Zealand Limited is developing Stages 9, 10 and 11 of the Stonebrook Subdivision, located between Main South Road and Burnham School Road in Rolleston, south west Christchurch. As part of this work, a geotechnical completion report is required to certify that the site works have been carried out to the required standard. This report describes earthworks involved with Stages 9, 10 and 11 of the Stonebrook Subdivision comprising the following lots.

- Stage 9 - Lots 178 to 185 and 187 to 194;
- Stage 10 - Lots 195 to 213;
- Stage 11 - Lots 214 to 218, 227 to 228 and 241 to 246.

Geotechnical testing carried out as part of the subdivision consent stage indicated that the Stonebrook Subdivision is classified as Technical Category 1 (TC1) with a deep groundwater table and competent gravels at shallow depths.

Earthworks to form the subdivision including cutting and filling have occurred on the site. The quality assurance (QA) testing of the earthfill indicates that 95% of Maximum Dry Density or greater compaction levels were consistently achieved. Thus we believe that earthfill placed within the Stages 9, 10 and 11 has achieved the required compaction levels as per intent and definition of NZS4431:1989.

From the monitoring and testing undertaken as part of the development of the Stages 9, 10 and 11 areas the following is concluded:

- Bulk earthworks meet the earthworks specifications, including NZS4431:1989.
- In line with our subdivision consent assessment, the site is likely to perform to the level of TC1 equivalent.
- As the land is likely to perform to a level of TC1, and the lots are underlain by earthfill that has achieved the required compaction, we consider NZS 3604:2011 type foundations will be suitable for light weight timber frame buildings.
- The usual investigations and site observations will be required for the building consent and construction phases.

This report shall be read as a whole. Our limitations are presented in Section 7.

2. Introduction

2.1 Geotechnical Completion

CDL Land New Zealand Limited is developing Stages 9, 10 and 11 of the Stonebrook Subdivision, located on Stonebrook Drive, Rolleston (See Figure 1 in Appendix A). The site works on Stages 9, 10 and 11 have included bulk earthworks. As part of the this work, a geotechnical completion report is required to certify the site works have been carried out to the required standard and to provide recommendations for building development.

This report has been prepared for CDL Land New Zealand Limited and Selwyn District Council. It describes earthworks within Stages 9, 10 and 11 of the Stonebrook Subdivision (See Figure 2 in Appendix A).

The purpose of the geotechnical completion report is to present the following:

- A summary of previous investigation information carried out as part of subdivision consent investigations and detailed design;
- A summary of the ground conditions;
- The extent of earthworks on the lots and compliance testing of bulk earthworks;
- A summary of the findings and recommendations for residential building development.

This report has been prepared based upon known geotechnical data and compaction testing undertaken during and after earthworks construction. All references to cut/fill depths are based on the early 2012 ground levels.

This report shall be read as a whole. Our limitations are presented in Section 7.

2.2 Site Description

The Stonebrook subdivision is located south west of the Rolleston town centre and covers an area of approximately 42ha. The site has been divided into 23 stages between Main South Road to the north and Burnham School Road to the south. This report relates to Stages 9, 10 and 11. The site is essentially flat and currently vegetated with grass.

3. Pre-Development Geotechnical Work

3.1 Geotechnical Investigations

The subdivision consent and detailed geotechnical design for the subdivision included a series of geotechnical investigations comprising a desktop study, test pits and boreholes. The details of these investigations are presented in the Aurecon report *"Brookside Road Subdivision, Geotechnical Report"* for Subdivision Consent, Revision 1 dated 1 November 2011.

The type and number of investigations is presented in Table 1 below.

Table 1: Subdivision Consent Investigations

Type of Investigation	Number of Investigations
Test Pits	64
Borehole with SPT at 1.5m centres	2

3.2 Ground Conditions

From the geotechnical investigations the ground conditions within Stages 9, 10 and 11 are summarised in Table 1.

Table 2: Typical ground conditions within the Stages 9, 10 and 11

Depth to Top of Unit (m)	Depth to Base of Unit (m)	Soil Unit
0	0.15 to 0.35	TOPSOIL: dark brown, SILT.
0.15 to 0.35	>60	Alluvium: brownish grey GRAVEL and Sandy GRAVEL with occasional silt, clay and sand lenses.

Groundwater levels ranged from 10.3m to 13.1m below ground level. During the site earthworks the ground conditions summarised in Table 2 were typically encountered and groundwater was not encountered within the area of interest.

3.3 Liquefaction Potential

No evidence of liquefaction such as sand boils or other surface manifestations were encountered following earthquakes in the Canterbury region since September 2010 based on observations on site during investigations and inspection of the Selwyn District Council Liquefaction Map (Selwyn District Council, 2011). This lack of evidence is consistent with a deep water table.

4. Subdivision Earthworks

4.1 General

Bulk earthworks for Stages 9, 10 and 11 of Stonebrook Subdivision were carried out in accordance with the Selwyn District Council requirements outlined in the engineering approval letter dated 29 August 2012 and NZS4431:1989 "*Code of Practice for Earthfill for Residential Development*". The works comprised regrading of the site contours for the residential lots by predominantly engineered filling with minor areas of cutting.

4.2 Areas of Cut and Fill

Site earthworks within the Stages 9, 10 and 11 include both cut and fill. Table 3, 4 and 5 below shows the lots that have been filled or cut for each of the stages in this report. The engineered fill comprises onsite natural gravel and compacted with a double drum roller. A layer of topsoil has been spread over the engineered fill.

The maximum depth of filling was 2.0m along the northern boundary of the subdivision where a noise barrier bund has been constructed. The maximum depth of cut was 0.7m depth. The gravel fill was sourced from areas of cut close to each of the lots to minimise transportation. The extent of cutting and filling for each stage is shown on Figure 3 in Appendix A.

Table 3: Areas of Cut and Fill Stage 9

Earthwork	Lot Number
Fill	178 to 182, 185 and 187 to 194
Cut	182 to 185, 189 and 190

Table 4: Areas of Cut and Fill Stage 10

Earthwork	Lot Number
Fill	195 to 205 and 207 to 211
Cut	200 to 206, 212 and 213

Table 5: Areas of Cut and Fill Stage 11

Earthwork	Lot Number
Fill	227, 241 and 242
Cut	214 to 218, 227, 228 and 241 to 246

4.3 Compaction Quality Control Testing

Independent testing of earthfill compaction was carried out by City Care Limited Laboratory (City Care) using a Nuclear Densometer (NDM). The acceptance criterion was based on the Selwyn District Council earthworks specification as follows:

- Compaction of fill is to be in accordance with NZS 4431: 1989 *"Code of Practice for Earthfill for Residential Development"*.
- Compaction standard is 95% Maximum Dry Density (MDD) for all areas in accordance with NZS4402:1986 "*Methods of Testing Soils for Civil Engineering Purposes*".

The location of the soil samples obtained for laboratory compaction testing (Test Site D) is shown on Figure 2. The results of the nuclear density tests were compared to the compaction tests to confirm the adequacy of the site compaction.

The compaction test results and the compaction curve for Test Site D is presented in Appendix B.

Stage 9

City Care carried out ten nuclear density tests on lots that had been filled with a test frequency of two tests per lot on Lots 179 and 180 and one test per lot on Lots 178, 181, 192, 193 and 194. The remaining lots with fill have not been tested due to limited depth and extent of filling.

Stage 10

City Care carried out thirty nuclear density tests on filled lots within Stage 10. The tests were carried out with a frequency of six tests on Lot 209, five tests per lot on Lots 207 and 208, three tests on Lot 210, two tests on Lots 195 and 196, and one test on Lots 191, 199, 200 and 211 to 213. The remaining lots with fill have not been tested due to limited depth and extent of filling.

Stage 11

The lots within Stage 11 have not been filled with exception to Lot 227 which was filled along a trench, due to the limited depth and extent of the filling compaction testing was not carried out.

4.4 Compaction Results

The results presented in Appendix C generally indicate that 95% MDD or greater compaction has been consistently achieved with exception to Lots 178 to 180 within Stage 9, Lots 209 to 213, and Lots 195 to 197 and 199 within Stage 10 where less than 95% of MDD was achieved. We understand that the topsoil was removed from the lots and the gravel fill re-compacted and re-tested on 15 October 2014. The results of the final NDM tests indicate that 95% MDD has been achieved. We consider that all the earthfill placed within Stages 9, 10 and 11 has achieved the required compaction.

4.5 Certification

A statement of suitability of earth fill for residential development indicating the standard of bulk earthworks generally meet our earthworks specification and the applicable codes, including NZS4431:1989 is included in Appendix D.

5. Building Development

5.1 Technical Category

Geotechnical investigations including 64 test pits and two boreholes have been carried out by Aurecon as part of the wider subdivision development and encountered no potentially liquefiable material. The ECan/GNS report *"Review of liquefaction hazard information in eastern Canterbury and parts of Selwyn, Waimakariri and Hurunui Districts" dated December 2012*, identifies the site to be non-liquefiable. Therefore the lots within the Stages 9, 10 and 11 are likely to perform to the level of TC1 equivalent.

5.2 Earthworks on Building Lots

The extent of earthfill on Lots within Stages 9, 10 and 11 is shown on Figure 3 in Appendix A.

The fill areas have been constructed using materials and processes that have been measured by independent testing. The testing shows that the placement of filling is generally in accordance with the specification.

5.3 Soil Suitability Criteria

Section 3 of New Zealand Standard NZS 3604:2011 "*Timber Framed Buildings not requiring specific Engineering Design*" provides several criteria for defining foundation soil suitability for lightweight timber framed residential buildings.

Clauses 3.1.3 and 3.3 provide criteria for determining strength and suitability of founding soils.

Clauses 3.4.1 and 3.4.2 discuss depths to founding. For purposes of this report, we have interpreted these clauses as meaning that for sound bearing at depths of 200 to 600mm, standard shallow type foundations can be utilised. For depths greater than this, the use of 10MPa concrete or special foundations such as driven timber piles is to be used or alternatively excavations to "good" ground.

5.4 Building Considerations

As the land is likely to perform to a level of TC1 equivalent and some of the lots are underlain by earthfill that has achieved the required compaction, we consider NZS 3604:2011 type foundations are likely to be suitable.

We note that at the time of writing this report the location and structural form of the future dwelling on the lots are unknown, but we infer that a NZS3604:2011 type lightweight timber framed houses will be constructed.

5.5 Future Earthworks

We do not anticipate that future earthworks will be required on the majority of the lots however should such work be required the following should be noted.

- All earthworks should be carried out in accordance with the Health and Safety and Employment Act 1992 and the Ministry of Building, Innovation and Employment (MBIE) approved Code of Practice for Safety in Excavations and Shafts for Foundations, 1995.
- Cuts that exceed 0.6m high around any of the house sites that support any loads must be retained by a suitable retaining wall designed by a Chartered Professional Engineer.

- We recommend that no more than 450mm of fill is placed on the allotment without detailed engineering design.
- If retaining walls are constructed across the site fill should only be placed away from the wall, unless specifically designed.

Any development where excavations greater than 1.5m in depth are proposed, must be subject to specific investigation and design to confirm these works will have no adverse effect on land stability and/or structures on adjacent lots.

5.6 Stormwater

All stormwater collected by impermeable surfaces (dwelling and pavement) and grassed areas shall be collected by lined channel drains and sumps etc. and be piped away from the lots to discharge into the Council vested infrastructure.

5.7 Construction Observations

The suitability of foundation conditions must be verified at the time of construction (refer Requirements of NZS 3604:2011). Foundation inspections by a Building Inspector who is familiar with this report or a Chartered Professional Engineer is needed and must be carried out to ensure the adequacy of the foundation subgrade prior to the placement of granular hardfill or the construction of foundations.

6. References

NZS 3604:2011. *Timber Framed Buildings*. Standards New Zealand, Wellington, New Zealand.

NZS 4402:1986. *Methods of Testing Soils for Civil Engineering Purposes*. Standards New Zealand, Wellington, New Zealand.

NZS 4431:1989. *Code of practice for earth fill for residential development*. Standards New Zealand, Wellington, New Zealand.

Brackley, H. L. (compiler). 2012; *Review of liquefaction hazard information in eastern Canterbury including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts.* GNS Science Consultancy Report 2012/218. 99 p.

7. Limitations

We have prepared this report in accordance with the brief as provided. The contents of the report are for the sole use of the Client and no responsibility or liability will be accepted to any third party. Data or opinions contained within the report may not be used in other contexts or for any other purposes without our prior review and agreement.

This report has been prepared as part of the development of the Stonebrook Stages 9, 10 and 11 Subdivision. It has been prepared to report on the management of the earthworks during construction, including compaction standards of fills.

This report does not remove the responsibility of the Owner / Builder / Building Certifier to satisfy themselves of foundation depth and suitability at the finally selected house location.

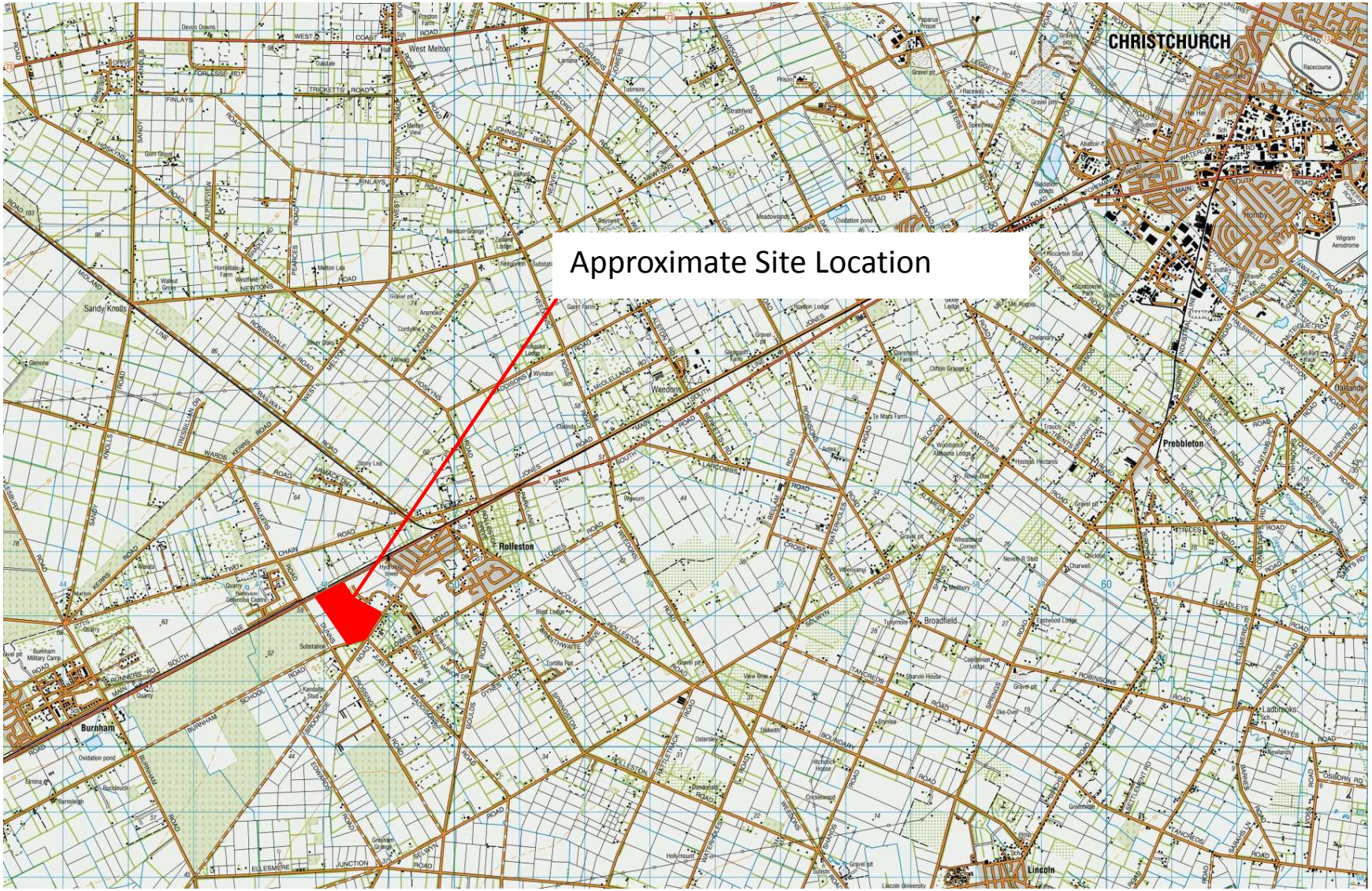
Subsurface conditions relevant to construction works should be assessed by experienced contractors and designers who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes. Subsurface conditions, such as groundwater levels, can change over time. This should be borne in mind, particularly if the report is used after a protracted delay or in wet weather.

It is strongly recommended that any plans and specifications prepared by others and relating to the content of this report, or amendments to the original plans and specifications, are reviewed by Aurecon to verify that the intent of our recommendations is properly reflected in the design. During construction we request the opportunity to review our interpretations if the exposed site conditions are significantly different from those inferred in this report.

This report is not to be reproduced either wholly or in part without our prior written permission.

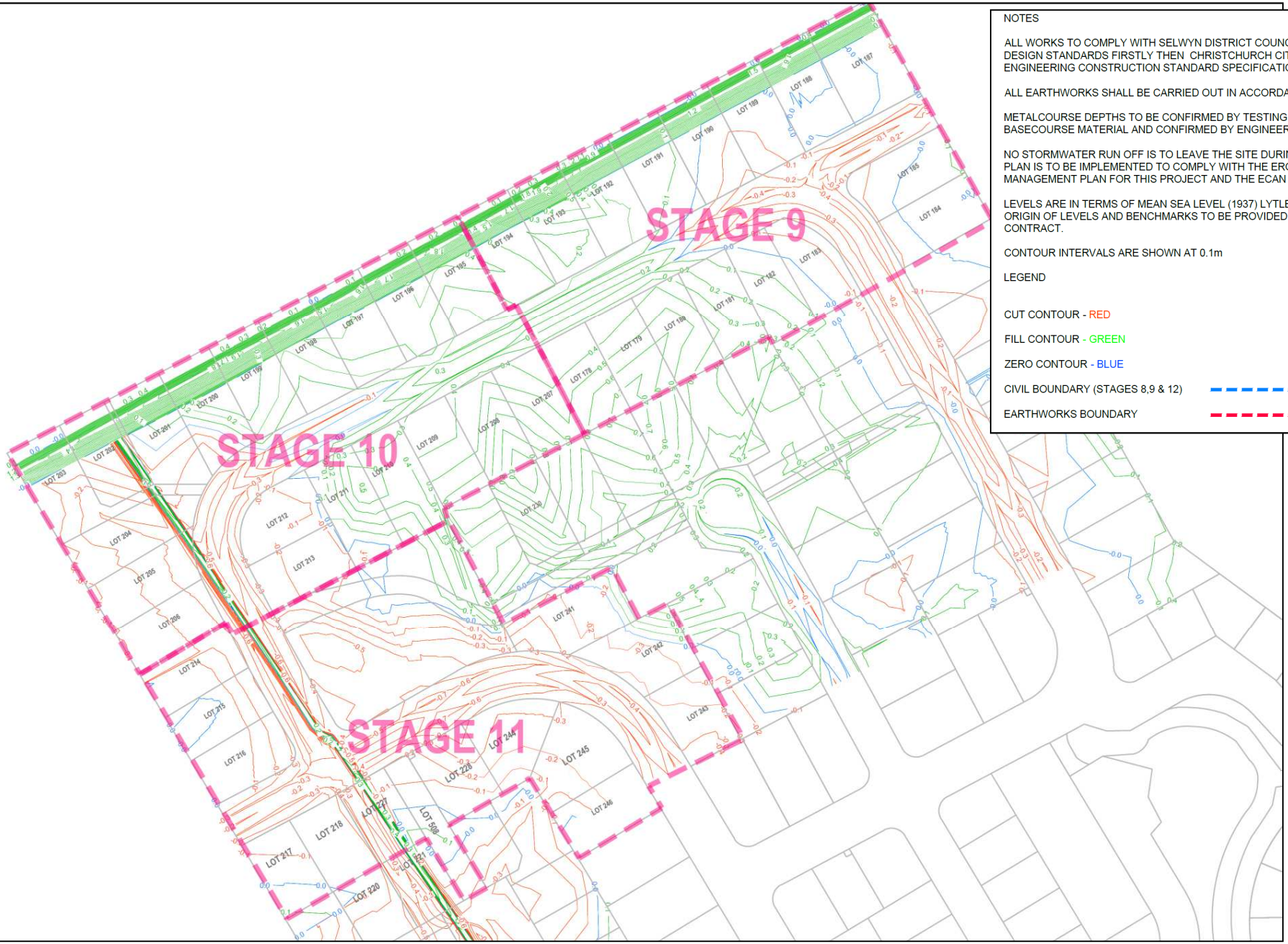
Appendix A

Figures



CLIENT	PRELIMINARY NOT FOR CONSTRUCTION	ALL DIMENSIONS APPROXIMATE ONLY	SCALE	SIZE	TITLE	REGIONAL SITE LOCATION PLAN					
aurecon www.aurecongroup.com	FIGURE	FIGURE 1	NTS	A4							
CDL LAND NEW ZEALAND LIMITED	PROJECT	STONEBROOK SUBDIVISION STAGE 9, 10 AND 11	BY T. MITCHELL		REFERENCE	STONEBROOK SUBDIVISION					
			APPROVED M. DAVIDSON		FIGURE No.	PROJECT	WBS	TYPE	DISC	NUMBER	REV
			DATE 13 NOVEMBER 2014			224926	003	FIG	TRA	01	0

CLIENT	PRELIMINARY NOT FOR CONSTRUCTION	ALL DIMENSIONS APPROXIMATE ONLY	SCALE	SIZE	TITLE	STONEBROOK SUBDIVISION LAYOUT					
aurecon www.aurecongroup.com			NTS	A4							
CDL LAND NEW ZEALAND LIMITED	FIGURE	FIGURE 2	BY								
			T. MITCHELL		REFERENCE	STONEBROOK SUBDIVISION					
	PROJECT	STONEBROOK SUBDIVISION STAGE 9, 10 AND 11	APPROVED								
			M. DAVIDSON								
			DATE		FIGURE No.	PROJECT	WBS	TYPE	DISC	NUMBER	REV
			13 NOVEMBER 2014			224926	003	FIG	TRA	02	0



NOTES

ALL WORKS TO COMPLY WITH SELWYN DISTRICT COUNCIL INFRASTRUCTURE DESIGN STANDARDS FIRSTLY THEN CHRISTCHURCH CITY COUNCIL'S CIVIL ENGINEERING CONSTRUCTION STANDARD SPECIFICATIONS CSS: PARTS 1-7: 2010.

ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH NZS 4431:1989.

METALCOURSE DEPTHS TO BE CONFIRMED BY TESTING SUBGRADE PRIOR TO PLACING BASECOURSE MATERIAL AND CONFIRMED BY ENGINEER.

NO STORMWATER RUN OFF IS TO LEAVE THE SITE DURING EARTHWORKS, THE SEDIMENT CONTROL PLAN IS TO BE IMPLEMENTED TO COMPLY WITH THE EROSION AND SEDIMENT CONTROL MANAGEMENT PLAN FOR THIS PROJECT AND THE ECAN GUIDELINES

LEVELS ARE IN TERMS OF MEAN SEA LEVEL (1937) LYTLETON DATUM.
ORIGIN OF LEVELS AND BENCHMARKS TO BE PROVIDED BY ENGINEER AT THE START OF THE CONTRACT.

CONTOUR INTERVALS ARE SHOWN AT 0.1m

LEGEND

CUT CONTOUR - RED

FILL CONTOUR - GREEN

ZERO CONTOUR - BLUE

CIVIL BOUNDARY (STAGES 8,9 & 12)

EARTHWORKS BOUNDARY

aurecon
www.aurecongroup.com

CDL LAND
NEW ZEALAND LIMITED

CLIENT	PRELIMINARY NOT FOR CONSTRUCTION	ALL DIMENSIONS APPROXIMATE ONLY	
FIGURE	FIGURE 3		
PROJECT	STONEBROOK SUBDIVISION STAGE 9, 10 AND 11		

SCALE	NTS
SIZE	A4
BY	T. MITCHELL
APPROVED	M. DAVIDSON
DATE	13 NOVEMBER 2014

TITLE	EARTHWORKS STAGE 9,10 AND CUT/FILL CONTOURS
REFERENCE	STONEBROOK SUBDIVISION

FIGURE No.	PROJECT	WBS	TYPE	DISC	NUMBER	REV
	224926	003	FIG	TRA	03	0

Appendix B

Compaction Test Results

city care
City Care Ltd Laboratory, 205 Springs Road, Christchurch 8042
T: 03 941 7616 F: 03 941 7618 www.citycare.co.nz

DETERMINATION OF THE DRY DENSITY / WATER CONTENT RELATIONSHIP
New Zealand Standard Compaction Test

Client: K B Contracting & Quarries Limited
Contact Name: Mr A. Hodgson

Sample Type: Sand and aggregate
Sample Source: Rolleston CDL, Test Site D

Sampled By: L. Sim, J. Bennett
Date Sampled: 20 January 2014

Tested By: L. Sim
Date of Test: 5 February 2014

Sample Method: Dug from hole at site specified by Client (sampling is not IANZ Accredited)
Test Method: NZS 4402:1986 Test 4.1.1(Standard Compaction)

Results:

Moisture Content (% by dry mass)	Wet Density (kg/m3)	Dry Density (kg/m3)
1.2	2020	2000
3.4	2100	2030
3.7	2120	2040
6.2	2310	2170
7.6	2380	2210
8.3	2380	2200
8.8	2350	2160

Maximum Dry Density = 2220 kg/m3
Optimum Water Content = 8 %
Note: Natural Water Content = 3.4 %

Sample History: Natural. Test performed on fraction <19.0mm

This report relates only to the sample tested and may only be reproduced in full.

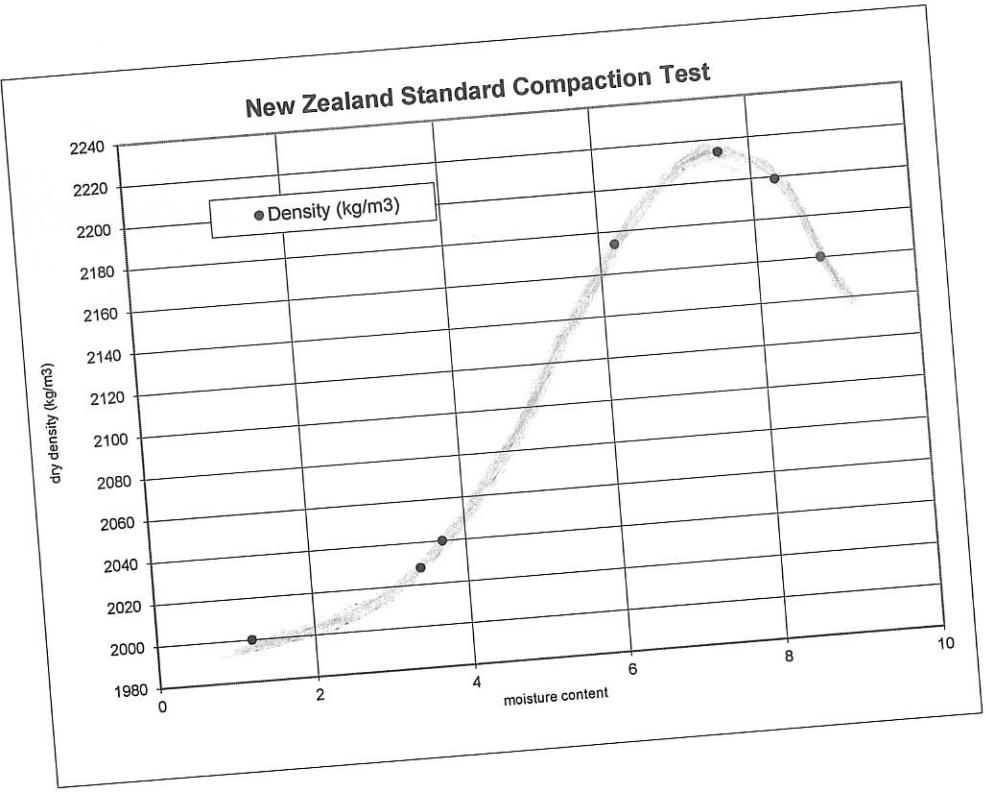
Date of Issue: 18 February 2014

Approved Signatory: _____
(T. O'Regan, Laboratory Manager)

Checked By: _____

DETERMINATION OF THE DRY DENSITY / WATER CONTENT RELATIONSHIP
New Zealand Standard Compaction Test

pe: Sand and aggregate
urce: Rolleston CDL, Test Site D



Appendix C

Nuclear Density Test Results

Test results supplied by City Care for K B Construction and Quarries Ltd and reproduced by Aurecon for the Stonebrook Subdivision Stages 9, 10 and 11 Geotechnical Completion Report.

The material comprising onsite gravel was tested in accordance with NZS 4407:1991 Test 4.2.2 (backscatter mode).

Table 2 Stonebrook Subdivision Stage 9 Nuclear Densometer Test Results (29 January 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
178	2070	2160	4.0	93.2*
179	2030	2110	4.5	91.4*
180	2080	2170	4.5	93.7*

Table 2 Stonebrook Subdivision Stage 9 Nuclear Densometer Test Results (11 April 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
191	2150	2290	6.5	96.8
192	2130	2240	5.0	95.9
193	2130	2250	5.5	95.9

* = Test has not achieved adequate compaction and subsequently the topsoil was removed and the areas compacted further. The re-test results are shown below:

Table 3 Stonebrook Subdivision Stage 9 Nuclear Densometer Re-Test Results (15 October 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
179	2170	2300	5.5	97.7
180	2210	2340	6.0	99.5
181	2160	2300	6.5	97.3
194	2200	2340	6.5	99.1

Table 4 Stonebrook Subdivision Stage 10 Nuclear Densometer Test Results (24 January 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
207	2200	2270	3.5	99.1
207	2120	2210	4.0	95.5
208	2130	2220	4.0	95.9
208	2190	2260	3.0	98.6
209	2120	2200	3.5	95.5
209	2150	2210	3.0	96.8

Table 5 Stonebrook Subdivision Stage 10 Nuclear Densometer Test Results (29 January 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
207	2160	2250	4.0	97.3
207	2170	2260	4.0	97.7
208	2090	2190	4.5	94.1*
208	2130	2210	4.0	95.9
209	2100	2170	3.5	94.6*
209	2170	2270	5.0	97.7

Table 6 Stonebrook Subdivision Stage 10 Nuclear Densometer Test Results (11 April 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
195	2050	2170	6.0	92.3*
196	2050	2170	6.0	92.3*
197	2170	2290	5.5	97.7
199	2030	2200	8.5	91.4*
207	2140	2240	4.5	96.4
208	2210	2330	5.5	99.5
209	2070	2210	6.5	93.2*
210	2110	2220	5.0	95.0
210	2030	2140	5.5	91.4*
211	2090	2190	5.0	94.1*
212	2090	2180	4.5	94.1*
213	2060	2170	5.5	92.8*

* = Test has not achieved adequate compaction and subsequently the topsoil was removed and the areas compacted further. The re-test results are shown below:

Table 7 Stonebrook Subdivision Stage 10 Nuclear Densometer Re-Test Results (15 October 2014)

Lot Number	Dry Density (kg/m^3)	Wet Density (kg/m^3)	Moisture (%)	Compaction (%)
195	2140	2290	7.0	96.4
196	2240	2370	6.0	100.9
199	2130	2280	7.0	95.9
200	2240	2370	6.0	100.9
209	2250	2380	6.0	101.4
210	2220	2350	6.0	100.0

Notes: The NDM test results are calculated using a maximum dry density of 2220 kg/m^3 as determined by New Zealand Standard Compaction (NZS 4402:1986, Test 4.1.1) completed on 20 January 2014 by City Care from an onsite sample (Test Site D). Test Site D is located within Stage 9 and we understand it is relatively consistent with the material placed across the Stages 9, 10 and 11. The locations of the test sites are shown on Figure 2 and the compaction curve provided by City Care for the material from Test Site D is attached.

Appendix D

Certification

NZS 4431 : 1989

STATEMENT OF SUITABILITY OF EARTH FILL FOR RESIDENTIAL DEVELOPMENT

To *Selwyn District Council*
PO Box 90
Rolleston 7643

STATEMENT OF SUITABILITY OF EARTH FILL FOR RESIDENTIAL DEVELOPMENT

Subdivision	*CDL – Stonebrook, Rolleston – Stage 9, 10 and 11*
Owner / Developer	*CDL Land New Zealand Ltd*
Location	*Stonebrook Drive, Rolleston*

The earth filling, with depths of fill are shown on the attached plan 224926-DW-LD-S8-12-AB-FC-01 [A], have been place in compliance with the terms of NZS 4431:1989.

While work was in progress I, Ian McPherson c/- Aurecon NZ Ltd, P O Box 1061, Christchurch, acted as consulting Geotechnical Engineer.

During the work, the inspecting engineer and his staff made periodic visits of inspection to the site. Details of the soil testing carried out to check the quality of the fill by the inspecting engineer can be made available upon request.

The attached plan, 224926-DW-LD-S8-12-AB-FC-01 [A], shows those lots affected by filling and the extent of the fill as part of the development works.

In the opinion of the inspecting engineer the following special limitations should be observed:

Nil

This certification, that the earth fills have been placed in compliance with the terms of NZS 4431:1989 does not remove the necessity for the normal inspection and design of foundations as would be made in natural ground.

IDMcPherson (signature)

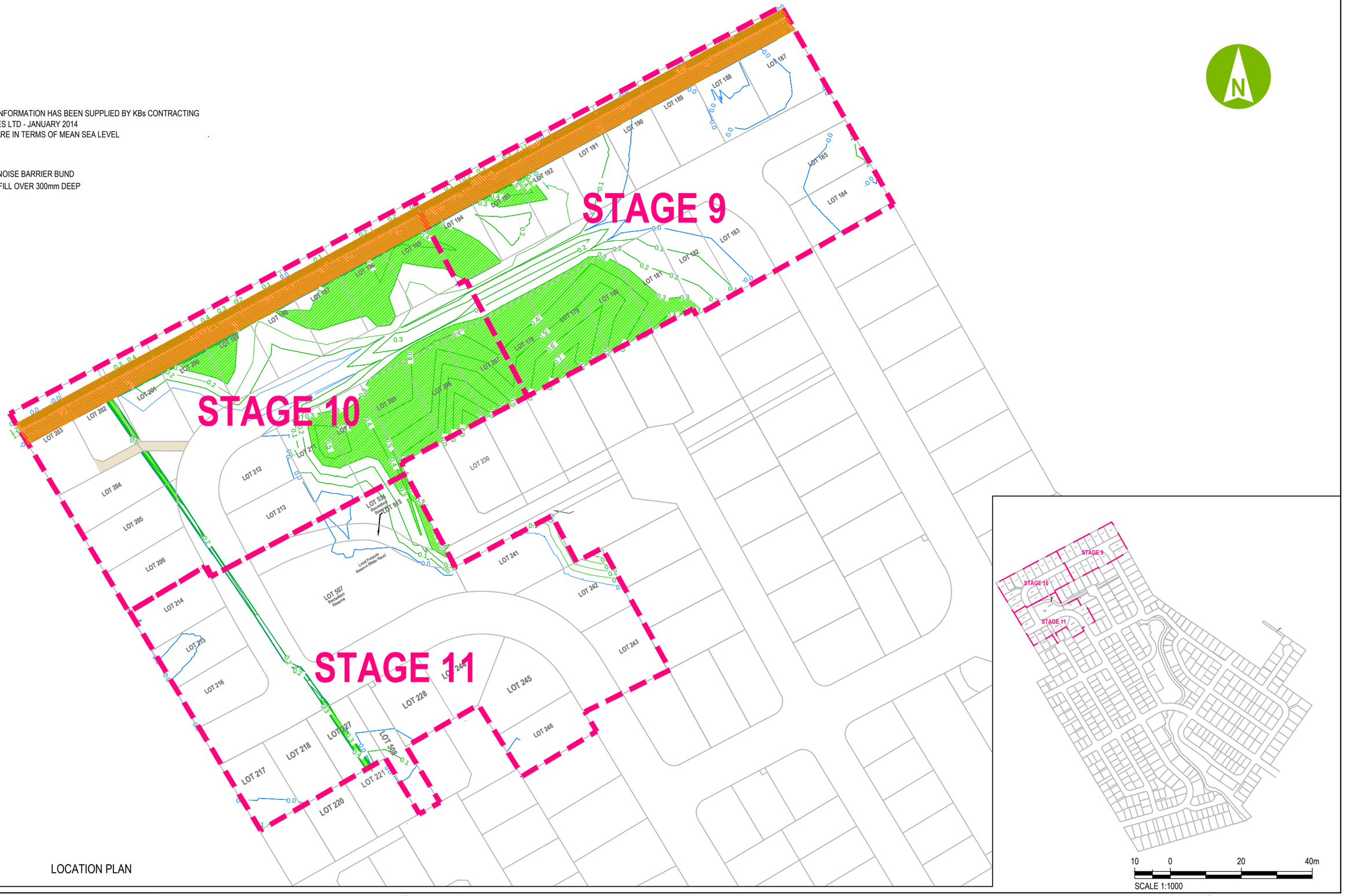
Technical Director (position)

13/11/14 (date)

On behalf of *CDL Land New Zealand Ltd*

Notes:
AS BUILT INFORMATION HAS BEEN SUPPLIED BY KBs CONTRACTING & QUARRIES LTD - JANUARY 2014
HEIGHTS ARE IN TERMS OF MEAN SEA LEVEL

NOISE BARRIER BUND
FILL OVER 300mm DEEP



LOCATION PLAN

0000000

aurecon
www.aurecongroup.com

CLIENT

REV	DATE	REVISION DETAILS	APPROVED
A	04-09-14	AS BUILTS ISSUED	

DRAWN	DESIGNED
A GRAY	M CROWE
CHECKED	
D WATSON	
APPROVED	
DATE	
B TOMS	

PROJECT
STONEBROOK ROLLESTON
TITLE
STAGE 9, 10 AND 11 FILL ASBUILTS

AS BUILT	
PROJECT No.	
224926	
SCALE	SIZE
1:1000	A3
DRAWING No.	REV
DW-LD-S8-12-AB-FC-01	A

Aurecon New Zealand Limited
Unit 1, 150 Cavendish Road
Casebrook Christchurch 8051
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com