



PROPOSED PLAN CHANGE INFRASTRUCTURE REPORT

45 CONSTABLE ROAD, WAIUKU (LOT 101)

Prepared for Karikari Express Ltd
July 2021



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This report has been prepared by Crang Consulting Ltd for the sole benefit of the client named on this report, with respect to the particular brief given to us and may also be relied upon for submission of a Resource Consent or Building Consent applications. The data and/or opinions contained in this report may not be used by any other party or for any other purpose without our prior review and agreement.

Contents

1	Introduction	1
1.1	Overview	1
1.2	Scope of Work	1
1.3	Limitations	2
2	Site Description	2
2.1	Current Subdivision	2
2.2	Existing Environment	2
2.3	Land Use	3
3	Earthworks	4
4	Roading	4
5	Stormwater	4
5.1	Existing Stormwater	4
5.2	Stormwater Reticulation	6
5.3	Stormwater Quality and Mitigation	6
5.4	Overland Flow Paths	7
6	Wastewater	7
6.1	Existing Wastewater	7
7	Water Supply and Utility Services	10
8	Conclusions	12

Figures

Figure 1-1:	Locality Plan	1
Figure 2-1:	Two Lot Subdivision Scheme Plan	2
Figure 2-2:	Site Aerial	3
Figure 4-1:	Roading Plan	4
Figure 5-1:	AC GIS showing location of pipes to be upgraded for Lot 101	5
Figure 5-2:	Approved Drainage Plan showing future drainage works	5
Figure 6-1:	Approved Drainage Plan for Lot 102	7
Figure 6-2:	Wastewater Catchment Plan	8
Figure 6-3:	Option A – Wastewater Upgrade Plan for Lot 101	9
Figure 6-4:	Option B – Wastewater Upgrade Plan for Lot 101, 92 and 130 Constable Road, Waiuku	10
Figure 7-1:	Approved Water Reticulation Plan	11

Appendices

Appendix A	Approved Earthworks Consent and Drawings
Appendix B	Fraser Thomas Limited Stormwater Upgrade Plan
Appendix C	Wastewater Capacity Calculations
Appendix D	Water Supply Pressure Testing

1 Introduction

1.1 Overview

Crang Consulting Ltd has been commissioned by Karikari Express Ltd to advise on the infrastructure requirements to support a proposed plan change from rural to residential for the rear half of 45 Constable Road, Waiuku. The location of the site with respect to the surrounding area can be seen in Figure 1-1.

The underlying land parcel (SEC 1 SO 65397) is currently being subdivided into two new lots (namely Lot 101 and Lot 102). Lot 102 is the residentially zoned land and is currently being developed in 2 stages. Lot 101 is the rural land.



Figure 1-1: Locality Plan

Lot 101, 92 & 130 Constable Road form an approximate 32.3ha block that is proposed to be plan changed from rural to residential.

Crang Consulting Ltd has carried out the civil engineering design for Stages 1 and 2 (Lot 102) and made provision for the new infrastructure to cater for the development of Lot 101. The engineering drawings are provided in Appendix A.

1.2 Scope of Work

The scope of work associated with this infrastructure report includes:

- Potential earthworks required for a development of the land
- Erosion and sediment controls that can be provided to protect the environment
- Road layout and access
- Servicing with stormwater, wastewater and water supply
- Availability of utility services for the land

1.3 Limitations

The report has been based off the information made available to Crang Consulting Ltd from the client or public sources at the time of performing the assessment. Should further information become available regarding the site and the area around the site, Crang Consulting Ltd reserves the right to review the report with respect to the additional information.

2 Site Description

2.1 Current Subdivision

The proposed plan change site is being created by a 2 lot subdivision of 45 Constable Road, Waiuku. Resource Consents have issued and at the time of writing this report the titleing process underway. Below is the approved Scheme Plan.

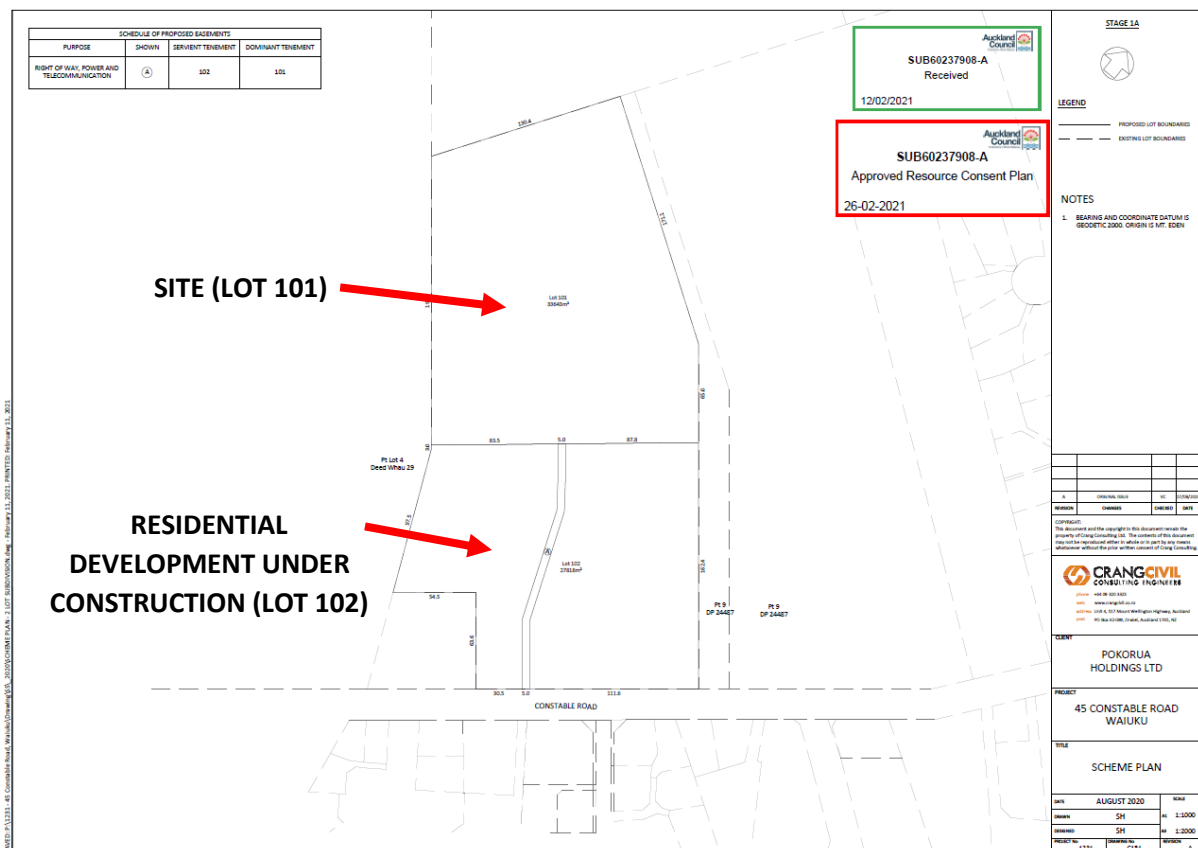


Figure 2-1: Two Lot Subdivision Scheme Plan

Lot 101 on the above scheme plan is subject to the proposed plan change.

2.2 Existing Environment

The plan change site (Lot 101) has recently been earthworked as part of the development of Lot 102. Cut to fill has been undertaken and topsoil respread. At the time of writing this report grass had not re-established. The earthworks undertaken have prepared the site suitable for future development if the land was rezoned. It is relatively flat with areas falling towards where future roads could possibly be constructed.

To the north-west is Council reserve that is currently used for grazing and to the south-west are farming properties for which a rezoning is requested. On the north-eastern boundary is the playing fields of Waiuku College and on the south-eastern boundary is the residential development of Lot 102.

The site is therefore ideally located next to existing amenities and beside land that is currently undergoing development.

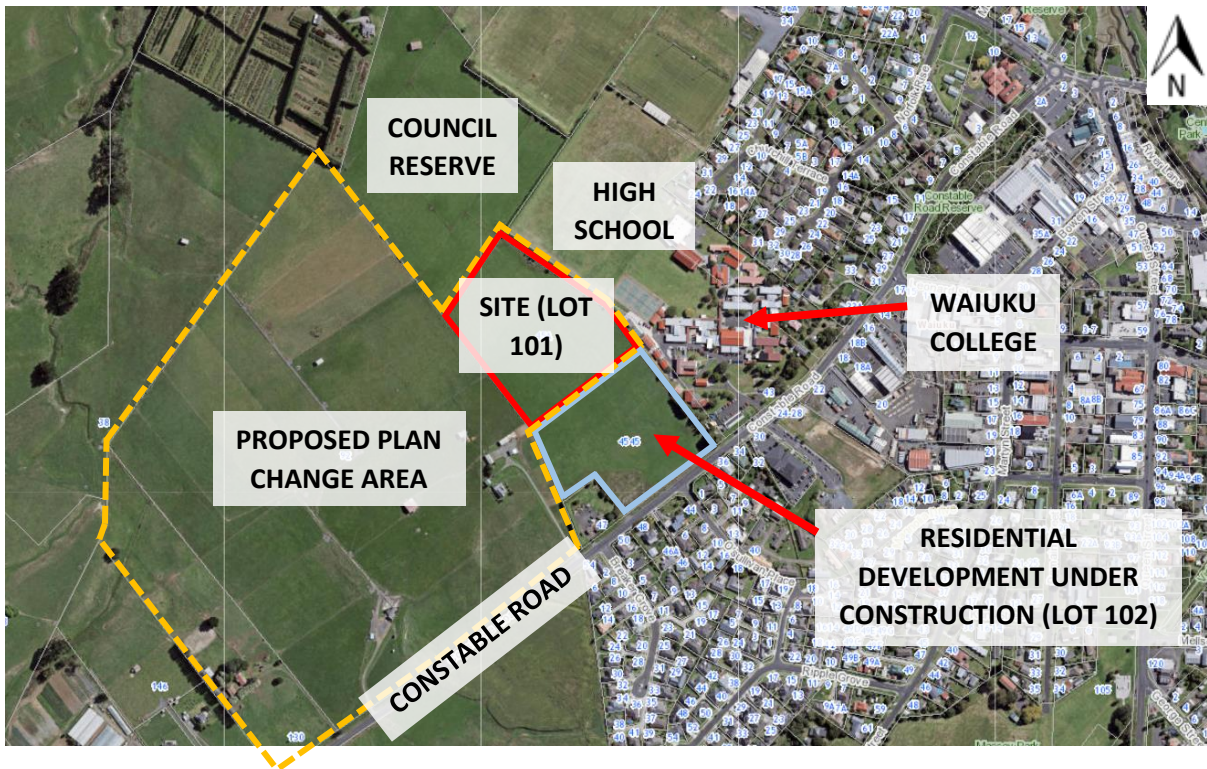


Figure 2-2: Site Aerial

2.3 Land Use

Under the Auckland Unitary Plan, the site is currently zoned as a Mixed Rural Zone.

3 Earthworks

Bulk earthworks have already been undertaken on the site in accordance with the Resource Consents LUC60111076-A and LUC60271724-A. A copy of the approved earthworks decision and plans are contained in Appendix A. These earthworks have prepared the site ready for future development if the land was to be rezoned.

Further minor earthworks will be necessary to build roads and drains. It is expected that the volume will be small and due to the flat nature of the site, sediment controls will consist of decanting earth bunds discharging to the new stormwater reticulation.

4 Rooding

The development of Lot 102 includes extending a new road to Lot 101 to allow for the potential future development of the land if the zone is changed. Below in Figure 4-1 is a copy of the approved Rooding Plan.

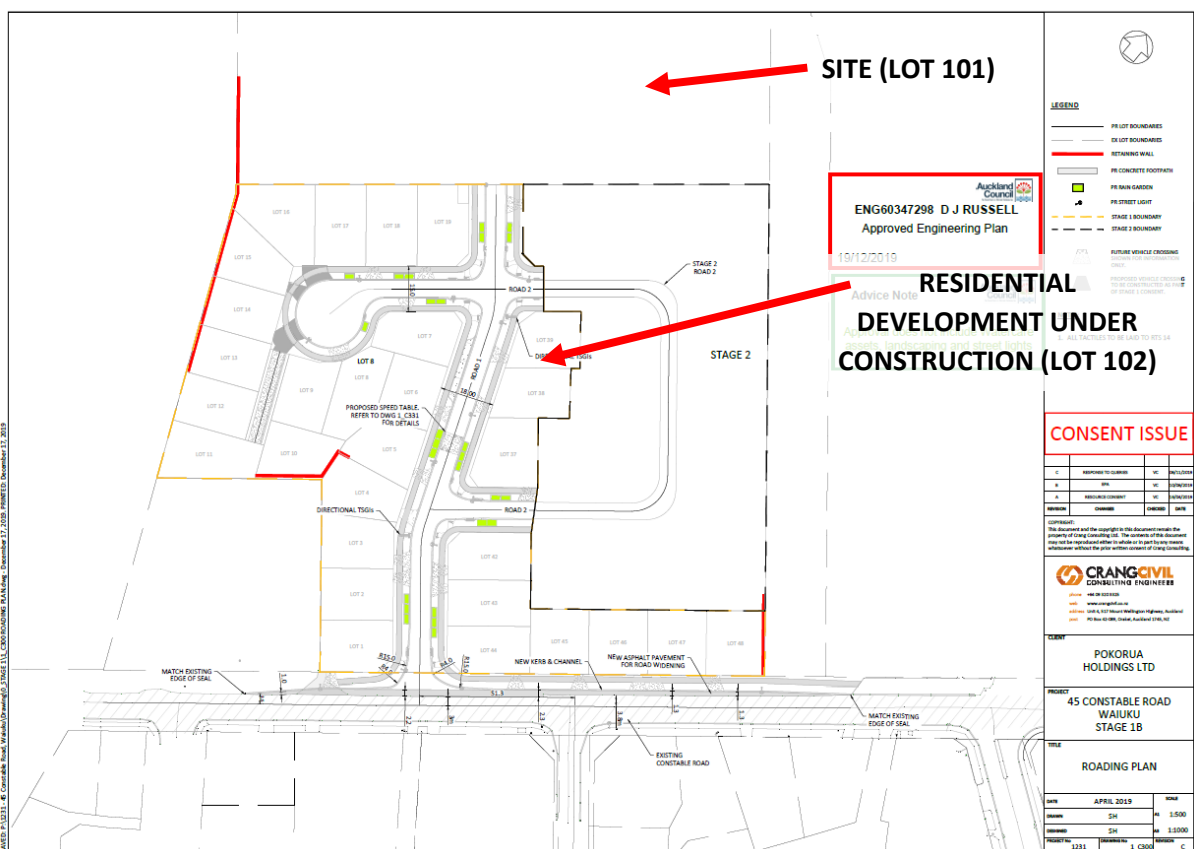


Figure 4-1: Rooding Plan

If the land is rezoned, new roads can be extended within Lot 101 and provide access to lots and neighbouring land.

5 Stormwater

5.1 Existing Stormwater

Stormwater infrastructure is currently being installed within Lot 102 and will be vested to Council upon completion. This new network was designed to take future flows from a potential residential development on Lot 101. The connection point for stormwater is SWMH 1.9 located inside Lot 101. Below in Figure 5-2 is a copy of the stormwater reticulation plan.

The new stormwater network installed in Lot 102 connects to the existing stormwater network located along Constable Road and discharges to an existing 600mm ϕ pipe. The existing stormwater network has capacity to convey flows from the development of Lot 102. The connection to the existing network can be seen in Figure 5-1 and Figure 5-2 below.

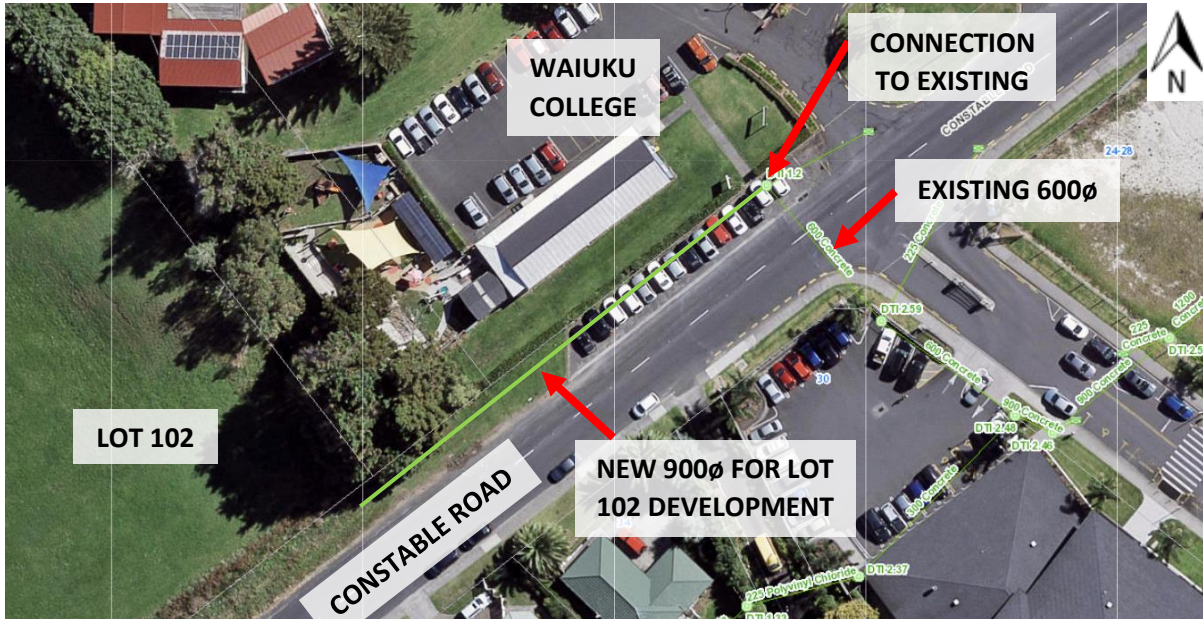


Figure 5-1: AC GIS showing location of pipes to be upgraded for Lot 101

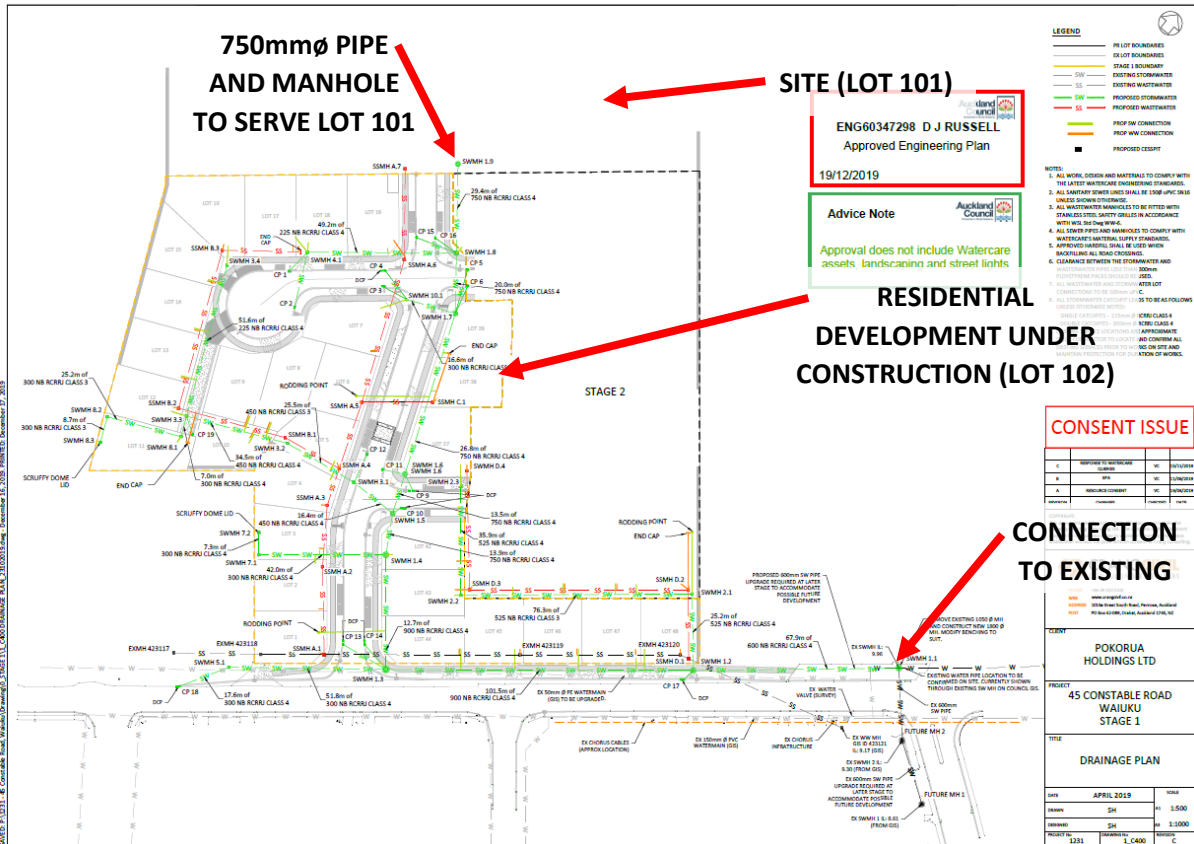


Figure 5-2: Approved Drainage Plan showing future drainage works

5.2 Stormwater Reticulation

Fraser Thomas Ltd are currently completing work for the potential development of 92 and 130 Constable Road, Waiuku. The existing stormwater reticulation is not able to cater for flows from Lot 101, 92 and 130 Constable Road, Waiuku. Fraser Thomas Ltd has completed a stormwater design to cater for the flows from the development of Lot 101, 92 and 130 Constable Road, Waiuku. The design includes abandoning the existing 600mm \varnothing pipe which the Lot 102 development connects to and installing a new network from the new 900mm \varnothing pipe to connect to the 1600mm \varnothing pipe which discharges to the Constable Road Reserve. The proposed upgrades to the stormwater network can be found in Appendix B.

With the proposed upgrades completed as above, the reticulation will have the capacity to cater for the 10% AEP event including climate change flows from residential development of Lot 101.

5.3 Stormwater Quality and Mitigation

Stormwater mitigation measures can be implemented for the potential residential area to ensure that downstream environments are protected. This is generally undertaken using the principles of the Auckland Unitary Plan's SMAF provisions and using best practicable options (BPO).

It is expected that the future development of Lot 101 will require the same provisions that are being provided for in the development of Lot 102, as they are in the same catchment. These are consented as follows:

- Engineering approval requiring: (Condition 6)
 - Pipe reticulation sized for the 10% AEP event
 - Principles of stormwater sensitive design to minimise peak flow rates and improve water quality (further required by Condition 11)
 - Mitigation measures (e.g. peak flow attenuations and/or velocity control) to mitigate the downstream effects shall be taken into account during the design of the stormwater system
 - Ran gardens for treatment of road carriageways
- Recharge Pits (Condition 11)
 - A residential recharge design and pit maintenance guide shall be created by the consent holder and that guide shall be attached to the consent notice for each lot. This guide shall also include standard detail drawings for recharge pit with recommendations in terms of impervious area discharge before overflow to the public stormwater reticulation system.
- Operation and Maintenance Manual (Condition 12)
 - The consent holder shall engage a suitably qualified and experienced engineering professional who shall prepare an Operation and Maintenance Manual for all stormwater devices, setting out the principles for the general operation and maintenance for the stormwater system, outlet channel and the associated management devices.
- Flood and Overland Flow Path Report (Condition 13)
 - The consent holder shall provide a Stormwater Report prepared by an appropriately qualified engineer.
- Recharge Pits – Consent Notice (Condition 32)
 - The owner(s) and all future owners of the lot(s) will be responsible for the maintenance of the soakage/recharge pit system at all times.

The compliance of the above conditions will ensure that any development of Lot 101 will ensure that downstream environments are protected.

5.4 Overland Flow Paths

The Resource Consent for the development of Lot 102 includes advice as follows:

“The rezoning and therefore increase in impervious areas will not increase the vulnerability of users to flood hazards and appropriate mitigation measures to manage flood risks can be put in place including redirection of overland flow paths into the road reserves within the site and the imposition of minimum finished floor levels for each new lot. Further, the proposed development would not increase the adverse effects of flood hazards to downstream properties.”

The future earthworks levels on Lot 101 will direct overland flows into future roads which will convey the flows to the existing exit point of the site, as shown on AC GIS. This exit point is the recreation reserves to the north east. This will ensure that the existing overland flow paths down Constable Road are not affected.

6 Wastewater

6.1 Existing Wastewater

The wastewater infrastructure for Lot 102 is being installed at the time of writing this report and will be vested to Watercare upon completion. This new network was designed to take future flows from Lot 101 and has therefore been designed with spare capacity. The connection point for wastewater is SSMH A.7 located inside Lot 101 at the boundary of Lot 101 and Lot 102 and is shown on the figure below.

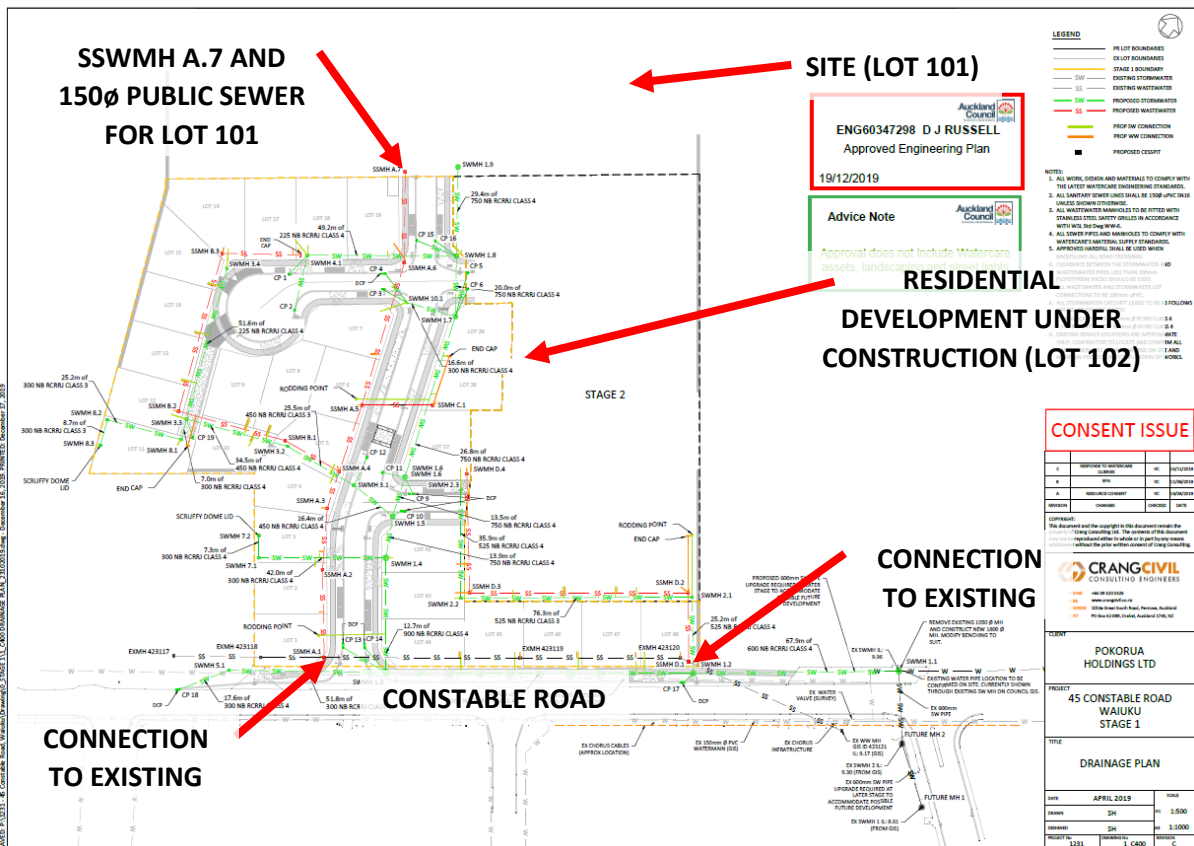


Figure 6-1: Approved Drainage Plan for Lot 102

The new wastewater network installed in Lot 102 connects to the existing wastewater network located along Constable Road. The existing wastewater network conveys flow to the pump station located in Tamakae Reserve. A capacity check was carried out and determined the following: the existing wastewater network is under capacity from MH 7 (GIS ID: 421640) to MH 12 (GIS ID: 422865) when the future flows from Lot 101 are added to the network and the majority of the existing wastewater network is under capacity when the future flows from Lot 101, 92 and 130 Constable Road are added to the network. This can be seen in the figure below.

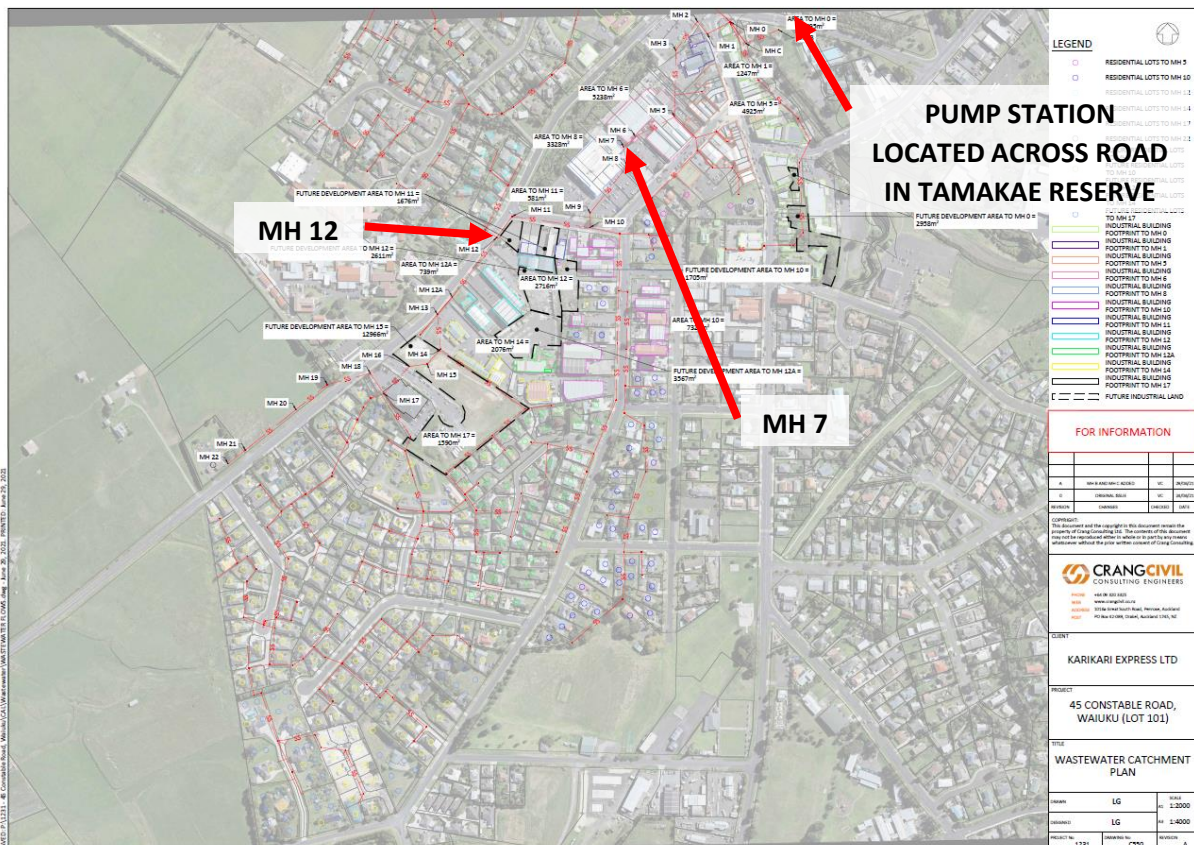


Figure 6-2: Wastewater Catchment Plan

The following upgrade options provide a feasible solution for conveying wastewater from the site to the existing pump station located in Tamakae Reserve without creating capacity issues in the existing wastewater network (Refer to the Wastewater Upgrade Plans in Appendix C):

- Option A: Install a new wastewater network along Constable Road from MH 2 to MH 12, abandon the existing pipe from MH 11 to MH 12 and upgrade the existing pipe from MH B to MH C. This will allow flows upstream of MH 12 to bypass the existing downstream network resulting in a reduction in flows through the existing downstream network. This option caters for the development of Lot 101. This upgrade option is shown in Figure 6-3.

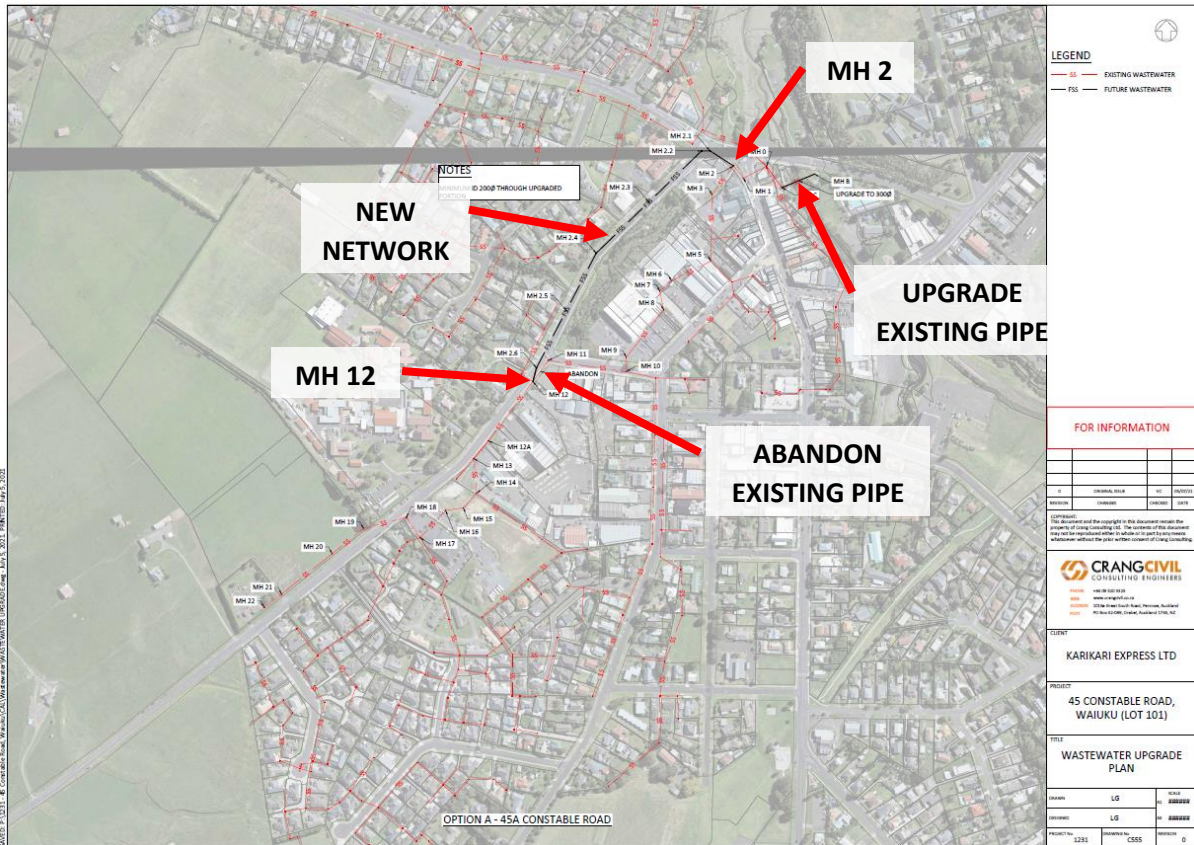


Figure 6-3: Option A – Wastewater Upgrade Plan for Lot 101

- Option B: Install a new wastewater network along Constable Road from MH 2 to 92 Constable Road and upgrade the existing pipe from MH B to MH C. This option caters for the development of Lot 101, 92 and 130 Constable Road. This upgrade option is shown in Figure 6-4.

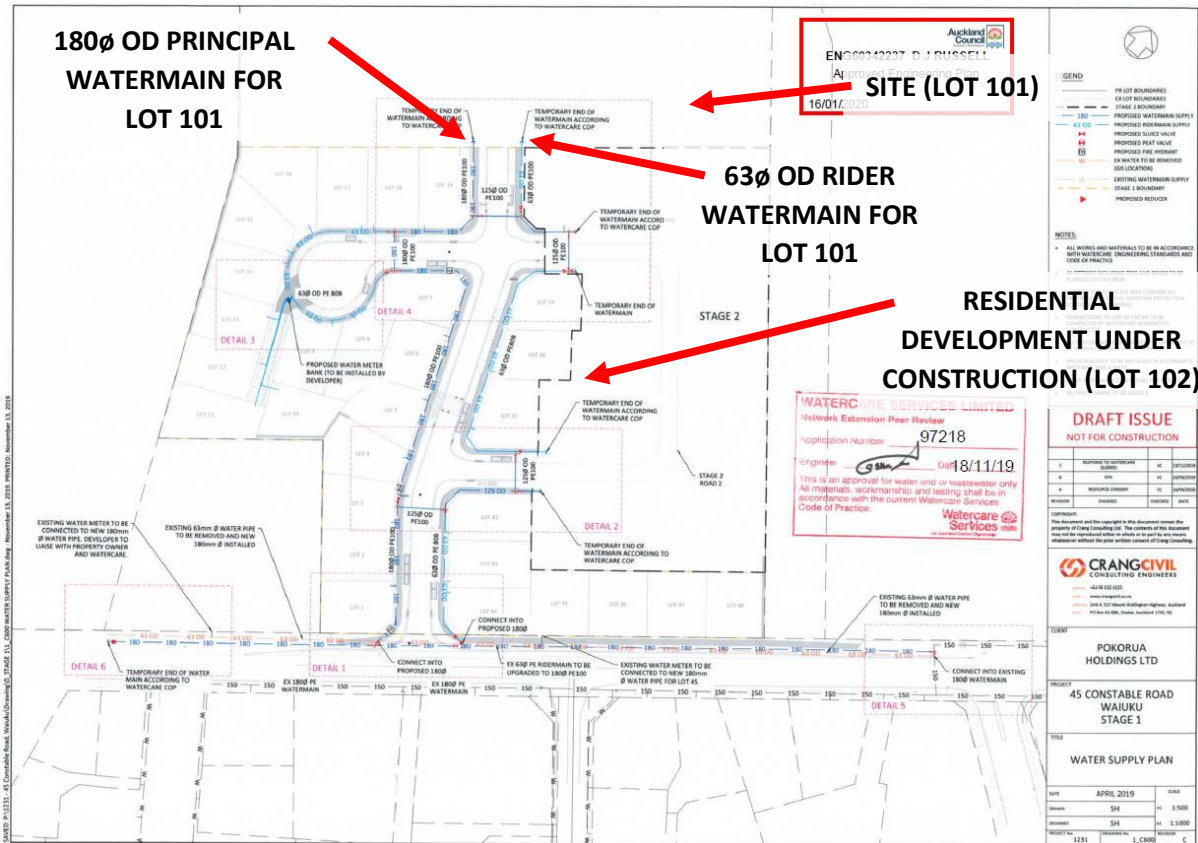


Figure 7-1: Approved Water Reticulation Plan

8 Conclusions

It has been demonstrated that there is adequate infrastructure to enable the rezoning of Lot 101 to residential use. This is summarised as follows:

- Minor additional earthworks will be necessary to complete roads and lot platforms. It is noted that bulk earthworks have already occurred under an existing Resource Consent
- Adequate road access is provided to Lot 101 through the development of Lot 102
- Stormwater upgrading is required along Constable Road so that the reticulation can cater for the 10% AEP flows from a development of Lot 101
- Potential adverse effects from stormwater runoff can be mitigated through appropriate measures such as recharge trenches, rain gardens and management of overland flow paths
- Wastewater upgrades are required and feasible along Constable Road so that the reticulation can cater for the additional flows from a development of Lot 101
- Water and utility services are provided through Lot 102 to service the potential development of Lot 101.

It is therefore considered that there is sufficient infrastructure to support a change from rural to residential use for Lot 101.

APPENDIX A:

APPROVED EARTHWORKS CONSENT AND DRAWINGS

Decision on an application to vary conditions of a resource consent under section 127 of the Resource Management Act 1991



Discretionary activity under section 127(3) for a subdivision consent

Application number: LUC60111076-A and LUC60271724-A
Applicant: Pokorua Holdings Ltd
Site address: 45 and 45A Constable Road, Waiuku
Legal description: Section 1 Survey Office Plan 65394 (NA85A/37)
Proposal:

To vary the condition of consent to position retaining walls 1 and 2 hard to the eastern boundary of the site.

The discretionary activity under s127 of the Resource Management Act 1991 (RMA) is for changes condition(s) of consent LUC60111076 and LUC60271724 involving the following amendments (with ~~strike through~~ for deletion, underline for insertions):

Changes to condition 1

- The earthworks activity shall be carried out in accordance with the documents and drawings and all supporting additional information submitted with the application, detailed below, and all referenced by the council as resource consent number BUN60077077 LUC60271724 LUC60111076 and further amended by the subsequent information with the change of condition application and plans referenced LUC60111076-A and LUC60271724-A.

- Application Form and Assessment of Environmental Effects prepared by Tripp Andrews, dated 27 March 2019
- Application Form and Assessment of Environmental Effects prepared by Tripp Andrews, dated 23/03/17

Report title and reference	Author	Rev	Dated
Resource Consent Application, 45 Constable Road, Waiuku	Tripp Andrews		23/03/17
<u>S127 Application for BUN60077077, LUC60271724, LUC60111076</u>	<u>Tripp Andrews</u>		<u>27 Mar 2017</u>

Drawing title and reference	Author	Rev	Dated
Overall Earthworks Plan, C200	Crang Civil	<u>6-5</u>	<u>06/03/19</u> <u>12/02/19</u>
Earthworks Cross Section A-A and B-B,	Crang Civil	3	14/01/19

C201				
Earthworks Cross Section C-C and D-D, C202	Crang Civil	3		14/01/19
Earthworks Plan Sheet 1, C203	Crang Civil	6 <u>5</u>	06/03/19	<u>12/02/19</u>
Overall Earthworks Plan, Sheet 2, C204	Crang Civil	4		12/02/19
Earthworks Plan, Sheet 1 of 3, C205	Crang Civil	5		12/02/19
Earthworks Plan, Sheet 2 of 3, C206	Crang Civil	5		12/02/19
Earthworks Plan, Sheet 3 of 3, C207	Crang Civil	6 <u>5</u>	06/03/19	<u>12/02/19</u>
Cut-Fill Depth Plan (Isopachs), C210	Crang Civil	4		12/02/19
Cut-Fill Depth Plan (Isopachs) Sheet 1, C211	Crang Civil	4		12/02/19
Cut-Fill Depth Plan (Isopachs) Sheet 2, C212	Crang Civil	4		12/02/19
Erosion and Sediment Control Plan, C220	Crang Civil	1		14/02/19
Erosion and Sediment Control Details 1, C221	Crang Civil	1		14/02/19
Erosion and Sediment Control Details 2, C222	Crang Civil	1		14/02/19
Retaining Wall Plan, C230	Crang Civil	5 <u>4</u>	06/03/19	<u>04/02/19</u>
Retaining Wall Elevations, C240	Crang Civil	5 <u>4</u>	06/03/19	<u>04/02/19</u>
Retaining Wall Details, C250	Crang Civil	0		1/11/18

Decision

I have read the application, supporting documents, and the report and recommendations on the application for resource consent. I am satisfied that I have sufficient information to consider the matters required by the RMA and make a decision under delegated authority on the application.

Acting under delegated authority, under sections 104, 104B, 127, 106 and Part 2 of the RMA, the application for variation to conditions of resource consent is **GRANTED**.

Reasons

The reasons for this decision are:

1. The proposal is appropriately considered under s127 as the changes will not result in a fundamentally different activity or materially different effects.
2. In accordance with an assessment under s104(1)(a)-(ab) and s127(3) of the RMA the actual and potential effects from the variation will be acceptable as:
 - a. The proposal will not compromise the amenity or liveability of the subject site, adjoining properties or the surrounding environment. The outcome of the proposal will remain

consistent with the conclusion reached in the original decision and the integrity of the original decision is considered to be maintained.

- b. The actual and potential effects from the 1m side yard infringement along the eastern boundary of the site will be less than minor as the retaining walls 1 and 2 will be designed and constructed in such a way that it will be sympathetic to the surrounding environment. Written approval from the owner/occupier of the adjacent property to the east of the site that may be adversely affected by the 1m side yard infringement have been provided.
 - c. The proposal will not undermine the amenity and character of the adjacent sites. Any adverse character or amenity effects from this proposal on adjacent persons and sites will be less than minor.
 - d. With reference to s104(1)(ab), there are no specific offsetting or environmental compensation measures proposed or agreed to by the applicant to ensure positive effects on the environment.
3. In accordance with an assessment under s104(1)(b) and s127(3) of the RMA the variation is consistent with the relevant statutory documents. Granting consent to the requested change will not be contrary to the relevant objectives and policies contained within E11.2, E11.3, E12.2, E12.3, H4.2 and H4.3 of the Auckland Unitary Plan (Operative in Part) as the proposed changes are within the scope of the original approval and a separate assessment is not required.
 4. In accordance with an assessment under s104(1)(c) of the RMA no other matters are considered relevant.
 5. This variation achieves the sustainable management purpose of the RMA in Part 2 because the proposal will not result in any adverse effects on the street scape amenity, the character of the area or the amenity of adjoining properties.
 6. Overall the proposal is considered acceptable and, the actual and potential effects will be less than minor as the rural residential character of the surrounding area will be maintained.

Conditions

Under section 108, 108AA and 220 of the RMA, this variation is subject to the following amendments to existing conditions:

The following changes shall be read in conjunction with the original resource consent referenced BUN60077077, LUC60111076 and LUC60371724 granted on 19 March 2019.

Note: Deletions are shown as ~~strikethrough~~ and amendments as **bold**.

Condition 1 has been amended to read

1. The earthworks activity shall be carried out in accordance with the documents and drawings and all supporting additional information submitted with the application, detailed below, and all referenced by the council as resource consent number BUN60077077 LUC60271724 LUC60111076 **and further amended by the subsequent information with the change of condition application and plans referenced LUC60111076-A and LUC60271724-A.**

- **Application Form and Assessment of Environmental Effects prepared by Tripp Andrews, dated 27 March 2019**
- Application Form and Assessment of Environmental Effects prepared by Tripp Andrews, dated 23/03/17

Report title and reference	Author	Rev	Dated
Resource Consent Application, 45 Constable Road, Waiuku	Tripp Andrews		23/03/17
S127 Application for BUN60077077, LUC60271724, LUC60111076	Tripp Andrews		27 Mar 2017

Drawing title and reference	Author	Rev	Dated
Overall Earthworks Plan, C200	Crang Civil	6-5	06/03/19 12/02/19
Earthworks Cross Section A-A and B-B, C201	Crang Civil	3	14/01/19
Earthworks Cross Section C-C and D-D, C202	Crang Civil	3	14/01/19
Earthworks Plan Sheet 1, C203	Crang Civil	6-5	06/03/19 12/02/19
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Earthworks Plan, Sheet 2 of 3, C206	Crang Civil	5	12/02/19
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Cut-Fill Depth Plan (Isopachs) Sheet 2, C212	Crang Civil	4	12/02/19
Erosion and Sediment Control Plan, C220	Crang Civil	1	14/02/19
Erosion and Sediment Control Details 1, C221	Crang Civil	1	14/02/19
Erosion and Sediment Control Details 2, C222	Crang Civil	1	14/02/19
Retaining Wall Plan, C230	Crang Civil	5-4	06/03/19 04/02/19
Retaining Wall Elevations, C240	Crang Civil	5-4	06/03/19 04/02/19
Retaining Wall Details, C250	Crang Civil	0	1/11/18

Advice notes

1. *A copy of the consolidated set of conditions of consent as amended is included as attachment 1 to this section 127 decision.*

Delegated decision maker:

Name: Jane Masters

Title: Team Leader, Resource Consents

Signed: 

Date: 17.4.19.

Attachment 1: Consolidated conditions of consent as amended

General conditions

These conditions apply to all resource consents.

1. The earthworks activity shall be carried out in accordance with the documents and drawings and all supporting additional information submitted with the application, detailed below, and all referenced by the council as resource consent number BUN60077077 LUC60271724 LUC60111076 and further amended by the subsequent information with the change of condition application and plans referenced LUC60111076-A and LUC60271724-A.
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S127 Application for BUN60077077, LUC60271724, LUC60111076	Tripp Andrews		27 Mar 2017

Drawing title and reference	Author	Rev	Dated
Overall Earthworks Plan, C200	Crang Civil	5	12/02/19
Earthworks Cross Section A-A and B-B, C201	Crang Civil	3	14/01/19
Earthworks Cross Section C-C and D-D, C202	Crang Civil	3	14/01/19
Earthworks Plan Sheet 1, C203	Crang Civil	5	12/02/19
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Earthworks Plan, Sheet 1 of 3, C205	Crang Civil	5	12/02/19
Earthworks Plan, Sheet 2 of 3, C206	Crang Civil	5	12/02/19
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Cut-Fill Depth Plan (Isopachs) Sheet 2, C212	Crang Civil	4	12/02/19
Erosion and Sediment Control Plan, C220	Crang Civil	1	14/02/19
Erosion and Sediment Control Details 1, C221	Crang Civil	1	14/02/19
Erosion and Sediment Control Details 2, C222	Crang Civil	1	14/02/19

Retaining Wall Plan, C230	Crang Civil	4	04/02/19
Retaining Wall Elevations, C240	Crang Civil	4	04/02/19
Retaining Wall Details, C250	Crang Civil	0	1/11/18

2. The consent holder shall pay the council an initial consent compliance monitoring charge of \$990 inclusive of GST), plus any further monitoring charge or charges to recover the actual and reasonable costs incurred to ensure compliance with the conditions attached to this consent/s.

Advice note:

The initial monitoring deposit is to cover the cost of inspecting the site, carrying out tests, reviewing conditions, updating files, etc., all being work to ensure compliance with the resource consent. In order to recover actual and reasonable costs, monitoring of conditions, in excess of those covered by the deposit, shall be charged at the relevant hourly rate applicable at the time. The consent holder will be advised of the further monitoring charge. Only after all conditions of the resource consent have been met, will the council issue a letter confirming compliance on request of the consent holder.

Predevelopment Conditions

3. Prior to the commencement of earthworks activity on the subject site, the consent holder shall hold a pre-start meeting that:
 - (i) Is located on the subject site.
 - (ii) Is scheduled not less than 5 days before the anticipated commencement of activity.
 - (iii) Includes Council's Compliance Monitoring Officer and Development Engineer
 - (iv) Includes representation from the contractors who will undertake the works.

The following matters shall be discussed at the meeting:

- The erosion and sediment control measures;
- The earthworks methodology;
- Shall ensure all relevant parties are aware of and familiar with the necessary conditions of this consent; and
- Status of subdivision matters.

The following information shall be made available at the pre-start meeting:

- (i) Resource consent conditions;
- (ii) Timeframes for key stages of the works authorised under this consent;
- (iii) Approved Engineering Plans
- (iv) Traffic Management Plan
- (v) Construction Management Plan

- (vi) Contact details of the site contractor and site engineer;
- (vii) Erosion and Sediment Control Plan; and
- (viii) Chemical Treatment Management Plan (CTMP).

A pre-start meeting shall be held prior to the commencement of the earthworks activity in each period between October 1 and April 30 that this consent is exercised.

Advice Note:

To arrange the pre-start meeting, required by condition above, please contact the Team Leader Compliance Monitoring South on (monitoring@aucklandcouncil.govt.nz).

The conditions of consent will be discussed at this meeting. All additional information required by the Council should be provided 2 days prior to the meeting.

Development in Progress Conditions

Archaeological Matter

4. Although the proposed location of the earthworks do not contain any archaeological sites, it is possible that unrecorded sites may exist. Under the heritage New Zealand Pouhere Taonga Act 2014, it is unlawful for any person to destroy, damage or modify an archaeological site unless the relevant consents have been obtained from the New Zealand Heritage. In the event of archaeological features being uncovered (e.g. shell midden, hangi or oven stones, pit depressions, defensive ditches, artefact material or human bones) work is to cease in the vicinity of the discovery and Heritage NZ and appropriate Iwi authorities, in particular Ngai Tai Ki Tamaki Tribal Trust shall be contacted so that appropriate action can be taken. This includes such persons being given reasonable time to record and recover archaeological features discovered before work may recommence.

Specific conditions –LUC60271724 (Land Disturbance - Regional)

5. Upon abandonment or completion of earthworks on the subject site all areas of bare earth shall be permanently stabilised against erosion in accordance with Auckland Council's Guideline Document 2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05). Written certification shall be provided to the Team Leader – Compliance Monitoring South, Auckland Council by a suitably qualified and experienced person to confirm that all areas of bare earth have been permanently stabilised against erosion in accordance with Auckland Council's Guideline Document 2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05).

Advice Note:

In accordance with Condition 6 should the earthworks be completed or abandoned, bare areas of earth shall be permanently stabilised against erosion. Measures may include:

- *the use of mulching;*
- *top-soiling, grassing and mulching of otherwise bare areas of earth; or,*
- *aggregate or vegetative cover that has obtained a density of more than 80% of a normal pasture sward.*

The on-going monitoring of these measures is the responsibility of the consent holder.

6. For the avoidance of doubt, all Decanting Earth Bunds utilised during earthworks shall be designed to ensure that they:
 - a. Have a three percent storage capacity, being at least 3m³ of impoundment volume for every 100m² of contributing catchment;
 - b. Be constructed to a 3:1 to 5:1 length-to-width ration and have a rectangular shape; and
 - c. Have a T-bar floating decant which decants at a rate of 3 litres per second, per hectare contributing catchment.

Duration

7. Regional Earthworks Consent BUN60077077 LUC60271724 shall expire five years from the date of issue unless it has been surrendered or been cancelled at an earlier date pursuant to the RMA.

Predevelopment Conditions

Chemical Treatment Management Plan

8. Prior to the commencement of bulk earthworks at the site, a Chemical Treatment Management Plan shall be submitted for the written approval of the Team Leader Compliance Monitoring South, Auckland Council. The plan shall include as a minimum:
 - a) Specific design details of the chemical treatment system based on a rainfall activated dosing methodology for the site's Sediment Retention Pond (SRP);
 - b) Monitoring, maintenance (including post storm) and contingency programme (including a record sheet);
 - c) Details of optimum dosage (including assumptions);
 - d) Results of initial chemical treatment trial;
 - e) A spill contingency plan; and
 - f) Details of the person or bodies that will hold responsibility for long term operation and maintenance of the chemical treatment system and the organisational structure which will support this system.

Advice Note:

In the event that minor amendments to the Chemical Treatment Management Plan are required, any such amendments should be limited to the scope of this consent. Any amendments which affect the performance of the Chemical Treatment Management Plan may require an application to be made in accordance with section 127 of the RMA. Any minor amendments should be provided to the Team Leader Southern Monitoring, Compliance, Auckland Council prior to implementation to confirm that they are within the scope of this consent.

Erosion and Sediment Controls

9. Prior to bulk earthworks commencing, a certificate signed by a suitably qualified environmental practitioner (SQEP) shall be submitted to the Team Leader Compliance Monitoring South,

Auckland Council, to certify that the erosion and sediment controls have been constructed in accordance with the erosion and sediment control plan.

Certified controls shall include the Sediment Retention Pond, Runoff Diversion Bunds, Clean Water Diversions and Stabilised Entraceways. The certification for these subsequent measures shall be supplied immediately upon completion of construction of those measures. Information supplied if applicable, shall include:

- a) Contributing catchment area;
- b) Shape and volume of the structure (dimensions of structure);
- c) Position of inlets/outlets; and
- d) Stabilisation of the structure.

Development in Progress Conditions

10. The sediment retention pond and decanting earth bund shall be chemically treated in accordance with the approved Chemical Treatment Management Plan.
11. The operational effectiveness and efficiency of all erosion and sediment control measures specifically required as a condition of resource consent or by the Erosion and Sediment Control Plan shall be maintained throughout the duration of earthworks activity, or until the site is permanently stabilized against erosion.
12. There shall be no deposition of earth, mud, dirt or other debris on any road or footpath resulting from earthworks activity on the subject site. In the event that such deposition does occur, it shall immediately be removed. In no instance shall roads or footpaths be washed down with water without appropriate erosion and sediment control measures in place to prevent contamination of the stormwater drainage system, watercourses or receiving waters.

Advice Note:

In order to prevent sediment laden water entering waterways from the road, the following methods may be adopted to prevent or address discharges should they occur:

- *provision of a stabilised entry and exit(s) point for vehicles*
- *provision of wheel wash facilities*
- *ceasing of vehicle movement until materials are removed*
- *cleaning of road surfaces using street-sweepers*
- *silt and sediment traps*
- *catchpit protection*

Under no circumstances is the washing of deposited materials into drains advised or otherwise condoned.

It is recommended that you discuss any potential measures with the Council's monitoring officer who may be able to provide further guidance on the most appropriate approach to take. Please contact the Team Leader – Compliance Monitoring South, Auckland Council for more details. Alternatively, please refer to Auckland Council's Guidance Document 05 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' (GD05).

13. The site shall be progressively stabilised against erosion at all stages of the earthworks activity, and shall be sequenced to minimise the discharge of contaminants to surface water.

Advice Note:

In accordance with Condition 13 earthworks shall be progressively stabilised against erosion during all stages of the earthwork activity. Interim stabilisation measures may include:

- *the use of waterproof covers, geotextiles, or mulching;*
- *top-soiling and grassing and mulching of otherwise bare areas of earth; or,*
- *aggregate or vegetative cover that has obtained a density of more than 80% of a normal pasture sward.*

It is recommended that you discuss any potential measures with the Council's monitoring officer who may be able to provide further guidance on the most appropriate approach to take. Please contact the Team Leader – Compliance Monitoring South, Auckland Council for more details. Alternatively, please refer to Auckland Council's Guidance Document 05 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' (GD05).

Seasonal Restrictions and Monitoring

14. No earthworks activity on the subject site shall be undertaken between 30 April and 1 October in any year, without the written approval of the Team Leader Compliance Monitoring South, Auckland Council at least two weeks prior to 30 April of any year. Revegetation/stabilisation is to be completed by 30 April in accordance with measures detailed in Auckland Council's Guideline Document 2016/005 *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region* (GD05) and any amendment to this document.

Specific conditions – LUC60111076 (Land Disturbance - District)

15. Under section 125 of the RMA, this consent lapses five years after the date it is granted unless:
- a. The consent is given effect to; or
 - b. The council extends the period after which the consent lapses.

Predevelopment Conditions

Construction Management Plan

16. Prior to commencement of any works on the site, the consent holder shall submit to the Team Leader Compliance Monitoring South a Construction Management Plan (CMP) for the approval. The purpose of the CMP is to set out the management procedures and construction methods to be undertaken in order to avoid, remedy, or mitigate potential adverse effects arising from the construction period.

The CMP shall be implemented and maintained throughout the construction period. The CMP shall contain specific details with regard to avoiding, remedying or mitigating adverse effects on the environment of Earthworks and Engineering Works and the management of all works associated with each stage of development as follows:

- a) Details of the Site Manager, including 24 hour contact details (telephone, email and postal address). The location of a large notice board on the site visible from a public

place that clearly identifies the name, telephone number, email and address for service of the Site Manager;

- b) A general outline of the construction programme for each stage of development.
- c) Measures to maintain the site in a tidy condition in terms of the storage and disposal of rubbish, unloading and storage of building materials and similar construction activities;
- d) Measures to stockpile unearthed tree stumps/logs, preferably away from public roads and reserves, and their disposal;
- e) Plans showing areas where stockpiles, equipment (including contractor parking) will occur so that there is no obstruction of public space (e.g. roads).
- f) Plans showing the location of any site offices, staff facilities and staff car parking required during the construction period.
- g) Ingress and egress to and from the site for vehicles and construction machinery during the Works period;
- h) Location of wheel-wash facilities;
- i) Numbers and timing of truck movements throughout the day and their proposed route/s;
- j) Proposed hours of work on the site (noting the working hours authorised by this consent);
- k) An overview of measures that will be adopted to prevent unauthorized public access during the construction period.
- l) Procedures for ensuring that the owners and/ or occupants in the immediate vicinity of the construction area are given prior notice of the commencement of construction activities and are informed about the expected duration of works and potential effects of the works (e.g. noise associated with construction activities).
- m) Temporary protection measures that will be installed to ensure that there shall be no damage to public roads, footpaths, berms, kerbs, drains, reserves or other public assets as a result of the earthworks and construction activities.
- n) All necessary steps shall be taken to avoid unnecessary damage to other utility services, roading network or private property and any damage shall be made good at the consent holder's expense.
- o) Any other details of the intended Works programme.

No works on the subject site shall commence until written confirmation from the Team Leader, Compliance Monitoring South is provided that the CMP is satisfactory. The approved CMP shall be implemented for the duration of the entire works period.

Erosion and Sediment Control Plans

17. Prior to the commencement of earthworks activity on the subject site, a finalised Erosion and Sediment Control Plan shall be prepared in accordance with Auckland Council's Guideline Document 2016/005 *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region* (GD05) and shall include, but is not limited to:

- a. Specific erosion and sediment control works for the earthworks in accordance with GD05/TP90, including earthworks required to cross beneath the bed of any stream or Significant Ecological Area;
- b. Supporting calculations and design drawings;
- c. Details of construction methods;
- d. Monitoring and maintenance requirements;
- e. Catchment boundaries and contour information;
- f. contingency measures in the event a 'frack-out' occurs; and,
- g. Details relating to the management of exposed areas (e.g. grassing, mulching).

This finalised Erosion and Sediment Control Plan shall be submitted to the Team Leader, Compliance Monitoring South at monitoring@aucklandcouncil.govt.nz . No earthworks activity on the subject site shall commence until written confirmation from the Team Leader Compliance Monitoring South is provided that the finalised Erosion and Sediment Control Plan is satisfactory.

Traffic Management Plan

18. Prior to the commencement of earthworks and construction activities, a Traffic Management Plan (TMP) shall be submitted to, and approved by the Team Leader Compliance Monitoring South. The TMP shall be prepared in accordance with the Auckland Transport Code of Practice 2013 (ATCOP) Standards and shall address the control of vehicle movements to and from the site. No earthworks and construction activities shall commence until confirmation is provided from the Council that the CTMP satisfactorily meets the requirement of ATCOP Standards and any required measures referred to in that plan have been put in place.

Advice Note:

The TMP should contain sufficient detail to address the following matters:

- *Measures to ensure the safe and efficient movement of the travelling public (pedestrians, vehicle occupants and local residents)*
- *Restrict hours of vehicle movements to protect amenity of surrounding environment during earthworks and construction phase.*

Engineering Plan Requirements and approvals

19. Prior to the commencement of works on the site the consent holder shall submit two hard copies and one PDF/CD version of complete engineering plans (including engineering calculations and specifications) to the Team Leader Regulatory Engineering South for approval. Details of the registered engineer who will act as the consent holder's representative for the duration of the development shall also be provided with the application for Engineering Plan Approval.

The engineering plans shall include but not be limited to the information regarding the following engineering works:

- Design and details of any retaining walls in the road reserve or parks reserves or adjacent to the reserve(s), and any other structures in the reserves.

- Design and details of any retaining walls proposed by the development to be in future private property
- Design and location of any counterfort and/or subsoil land drainage required and the proposed ownership and maintenance of the counterfort and/or subsoil land drainage.

Development in Progress Conditions

Sediment Control

20. All earthworks shall be managed to minimise any discharge of debris, soil, silt, sediment or sediment-laden water beyond the subject site to either land, stormwater drainage systems, watercourses or receiving waters. In the event that a discharge occurs, works shall cease immediately and the discharge shall be mitigated and/or rectified to the satisfaction of the Team Leader Compliance Monitoring South.

Advice Note:

All earthworks shall be undertaken to ensure that all potential sediment discharges are appropriately managed. Such means and measures may include:

- *Catchpit protection*
- *run-off diversions*
- *sediment retention ponds*
- *silt and sediment traps*
- *decanting earth bunds*
- *silt fences*

During excavation, the ingress and accumulation of surface run-off water and/or perched groundwater can be minimised by:

- *maintaining a waterproof cover over any excavation trenches and pits outside of working hours,*
- *diversion of surface water flow around the works area, and*
- *regular disposal of the water into an appropriate sediment control device, if ponding occurs within the excavation.*

Please note that the diversion of stormwater and/or groundwater may require a consent in accordance with Chapter E of the Auckland Unitary Plan (Operative in Part).

It is recommended that you discuss any potential measures with the council's monitoring officer who may be able to provide further guidance on the most appropriate approach to take. Please contact the Council's Team Leader Compliance Monitoring South on monitoring@aucklandcouncil.govt.nz for more details. Alternatively, please refer to "Auckland Council's Guideline Document 2016/005 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05).

Noise

21. All works activity on the subject site shall comply at all times with Standard E25.6.27 'Construction noise levels in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone' of the Auckland Unitary Plan (Operative in Part).

Vibration

22. Where works on the site are creating vibrations, that in the opinion of the Team Leader Compliance Monitoring South, constitute an unreasonable disturbance beyond the boundaries of the subject site, the consent holder shall cease works until a suitably qualified expert has been engaged to undertake monitoring of the works and provide confirmation that peak particle velocities measured on any foundation or uppermost full storey of any building not located on the subject site, do not exceed the limits set out in Table 1 of German Standard DIN 4150 Part 3:1986 "Structural Vibration in Buildings – Effects on Structures."

Dust

23. There shall be no airborne or deposited dust beyond the subject site as a result of the earthworks, construction and demolition activity, which in the opinion of the Team Leader Compliance Monitoring South, is noxious, offensive or objectionable.

Advice Note:

In accordance with above condition in order to manage dust on the site consideration should be given to adopting the following management techniques:

- *stopping of works during high winds*
- *watering of haul roads, stockpiles and manoeuvring areas during dry periods*
- *installation and maintenance of wind fences and vegetated strips*
- *positioning of haul roads, manoeuvring areas and stockpiles or the staging of works (in relation to sensitive receptors such as dwellings)*

In assessing whether the effects are noxious, offensive or objectionable, the following factors will form important considerations:

- *The frequency of dust nuisance events*
- *The intensity of events, as indicated by dust quantity and the degree of nuisance*
- *The duration of each dust nuisance event*
- *The offensiveness of the discharge, having regard to the nature of the dust*
- *The location of the dust nuisance, having regard to the sensitivity of the receiving environment.*

It is recommended that potential measures as discussed with the council's monitoring officer who will guide you on the most appropriate approach to take. Please contact the Team Leader Compliance Monitoring South on monitoring@aucklandcouncil.govt.nz for more details. Alternatively, please refer to the Ministry for the Environment publication "Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions".

Vehicle Movements

24. Vehicle movements to and from the site associated with construction and earthworks activities shall be restricted to the following hours:

- Monday to Saturday: 7:30a.m. to 7:00p.m.

There are to be no vehicle movements associated with the earthworks and construction on Sundays or public holidays.

No Obstruction

25. There shall be no obstruction of access to public footpaths, berms, private properties, public services/utilities or public reserves resulting from construction activity at all times. All materials and equipment shall be stored within the subject site's boundaries unless otherwise authorised by the respect land / asset owner.

Inspections

26. All sediment and erosion controls at the site of the works shall be inspected by the consent holder on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the control measure. A record shall be maintained of the date, time and any maintenance undertaken in association with this condition which shall be forward to the Team Leader, Compliance Monitoring South on request.

Clean Fill

27. All imported fill used shall:
- a. comply with the definition for 'cleanfill' in the Ministry for the Environment publication 'A Guide to the Management of Cleanfills' (2002)
 - b. be solid material of a stable, inert nature and
 - c. not contain hazardous substances or contaminants above recorded natural background levels of the receiving site.

Advice Note:

In addition to the characteristics for imported fill outlined in condition 27 please refer to the relevant New Zealand Standard [e.g. NZS 4431:1989 'Code of Practice for Earth Fill for Residential Development'] to ensure that all fill used is of an acceptable engineering standard.

Background contamination levels for the site receiving clean fill referred to by condition 27 can be found in the Auckland Council, Technical Publication No. 153, Background concentrations of inorganic elements in soils from the Auckland Region (2001)

Certification – Clean Fill

28. Within 10 working days following the completion of earthworks, the suitably qualified engineering professional responsible for supervising the works shall provide to the Team Leader Compliance Monitoring South, written evidence that all fill used on the subject site has the characteristics set out in condition 27 above. Written evidence shall be in the form of a receipt, compaction certificate(s) or similar.

Geotechnical

29. The land modification works proposed shall be undertaken in a manner which ensures that the land within the site and the land on adjoining properties remain stable at all times. In this regard the consent holder shall employ a suitably qualified civil / geotechnical engineer to investigate,

direct and supervise all construction works, particularly in close proximity to neighbouring properties to ensure that an appropriate design and construction methodology is carried out to maintain the short and long term stability of the site and surrounds.

30. Any required retaining walls and/or temporary stabilising works shall be constructed in a timely manner under engineering design and supervision. The consent holder shall ensure that all necessary approvals for retaining walls are obtained and that sufficient resources are available to construct the required retaining walls as directed by the geotechnical engineer, prior to commencement of any significant excavation works.

Advise Note

Where applicable retaining walls shall be built under a building consent. This will need to be identified on the engineering plans when lodged for approval

31. The construction of all earthworks including the placement and compaction of fill materials shall be supervised by a suitably qualified engineering professional. In supervising the works, the suitably qualified engineering professional shall ensure that they are constructed and otherwise completed in accordance with the approved plans forming part of the application.
32. Certification from a suitably qualified engineering professional responsible for supervising the works shall be provided to the Team Leader Regulatory Engineering South confirming that the works have been completed in accordance with approved plans within ten (10) working days following completion. Written certification shall be in the form of a Geotechnical Completion Report, producer statement or any other form acceptable to Council.
33. All earthworks and excavation shall be monitored and supervised on-site by a Supervising Engineer. When the earthworks are completed an Engineer's Certificate and Geotechnical Completion Report shall be provided to the satisfaction of the Team Leader Regulatory Engineering South, certifying:
 - a. That the works were undertaken in accordance with NZS4431:1989, the Code of Practice for Earth Fill for Residential Subdivisions; AND
 - a. The suitability of the filled ground and the original unfilled ground for the erection of buildings not requiring specific design under NZS3604:1999; AND
 - b. Recommendations for each lot, confirming adequate factors of safety, and as built records of earthworks and drainage; AND
 - c. The extent to which settlement of the site is expected and its impact on future house construction; AND
 - d. Settlement on the site, and any specific requirements; AND
 - e. Definition of settlement that must have occurred prior to commencement of house construction; AND
 - f. Include a statement of professional opinion as to the suitability of the site for residential development.
- b. Any related matters that are identified in other conditions of this consent.

34. All construction works (including bulk earthworks, subsoil drainage, shear keys, retaining walls and any other stability measures including monitoring) shall be subject to detailed design by a suitably qualified and experienced Chartered Professional Engineer. The Consent Holder shall submit the detailed design (engineering plans) to the Council for approval prior to the commencement of any works onsite. The Council may appoint an independent geotechnical engineer to peer review the detailed design for the purposes of determining if it can give its approval. This shall be done at the consent holder's expense.

Overland Flow Paths

35. The overland flow paths within the development must be designed to the satisfaction of the Team Leader Regulatory Engineering South and be designed in accordance with the following requirements:
- a. The overland flow paths and ponding areas must be able to cope with flows in terms of the Auckland Council's Code of Practice for Land Development and Subdivision.
 - b. The contours surrounding the flow paths must be designed and constructed to channel the excess flow into the overland flow paths; and
 - c. The overland flow paths, where possible, must be located on roads and access ways

Advise Note

The nature of the overland flow path will need to be further detailed with the engineering plans for the subdivision.

Post Development Conditions

Geotechnical Report

36. A Geotechnical Completion Report by a suitably qualified and Registered Engineer shall be provided to Council on completion or abandonment of the earthworks. The report shall confirm the stability of the land for residential development including any special conditions/requirements to be met for any future development on the site. The Geotechnical Completion Report shall also include all associated 'as-built' plans for earthworks and subsoil drains and a Statement of Professional Opinion on Suitability of the Land for building construction.

Advice Note:

The findings of this Geotechnical Completion Report may necessitate the requirement for a consent notice on the residential lots in respect to future development of a dwelling.

37. A Consent Notice pursuant to Section 221 of the RMA shall be registered on the Certificates of Title for any residential lots which are recommended for specific engineering investigation or design as outlined in the Geotechnical Completion Report required by these conditions to ensure that the conditions set out in that report are compiled on a continuing basis.

The consent notices shall be prepared by the Council's solicitor, executed and registered on the Computer Freehold Register (Certificate of Title) for the land at the consent holder's expense, and is to require the owner of the land to comply with this condition on a continuing basis.

Advice notes

1. Any reference to number of days within this decision refers to working days as defined in s2 of the RMA.
2. For the purpose of compliance with the conditions of consent, "the council" refers to the council's monitoring inspector unless otherwise specified. Please contact monitoring@aucklandcouncil.govt.nz to identify your allocated officer.
3. For more information on the resource consent process with Auckland Council see the council's website: www.aucklandcouncil.govt.nz. General information on resource consents, including making an application to vary or cancel consent conditions can be found on the Ministry for the Environment's website: www.mfe.govt.nz.
4. If you as the applicant disagree with any of the above conditions, or disagree with the additional charges relating to the processing of the application, you have a right of objection pursuant to sections 357A or 357B of the Resource Management Act 1991. Any objection must be made in writing to the council within 15 working days of your receipt of this decision (for s357A) or receipt of the council invoice (for s357B).
5. The consent holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.
6. Approval in principle only is given for the proposed retaining walls. A Building Consent is required for any structures, retaining walls, private drainage, demolitions etc. unless exempted under the First Schedule of the Building Act 2004. (ie. retaining walls above 1.5 metres in height or walls which will support a surcharge such as floor or traffic loads.)
7. Any new retaining walls where their heights are equal or more than the distance from the boundary shall be designed to a minimum of 12kPa surcharge.
8. This consent does not constitute authority to build or undertake private drainage works or retaining walls and it may be necessary for you to apply for a Project Information Memorandum and Building Consent if you have not already done so.
9. A copy of this consent and the associated approved drawings should accompany your application for a Project Information Memorandum and Building Consent. If not supplied unnecessary delay may occur in the processing of your application.
10. A Corridor Access Request, (CAR), is required for all works undertaken within the 'road corridor'. See Auckland Transport's website <https://at.govt.nz/about-us/working-on-the-road/corridor-access-requests/#applycar> for more information.
11. The site is subject to an overland flow path as determined by approved engineering drawings, a "right to drain" water easement will be required to be granted over the land in favour of the Auckland Council at the time of subdivision and development of the property.

12. *All machinery associated with the earthworks activity shall be operated in a way which ensures that spillages of hazardous substances such as fuel, oil, grout, concrete products and any other contaminants are prevented.*



LUC60111076-A LUC60271724-A
Approved Resource Consent Plan

17/04/2019



LEGEND

- PROPOSED LOT BOUNDARY
- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
- 10.2 EXISTING CONTOUR
- 10.0 PROPOSED CONTOUR
- 10.2 PROPOSED CONTOUR
- EARTHWORKS EXTENT
- NEW TIMBER RETAINING WALL

SHEET 2

SHEET 1



REVISION	CHANGES	CHECKED	DATE
5	LOT 10 & RW 6 LOWERED		12/02/19
4	RW 4 & 5 REMOVED		14/01/19
3	WALL HEIGHTS REDUCED		05/12/18
2	RESPONSE TO RC QUERIES		8/11/18
1	RESPONSE TO QUERIES		13/08/18
0	ORIGINAL ISSUE	VC	16/04/18

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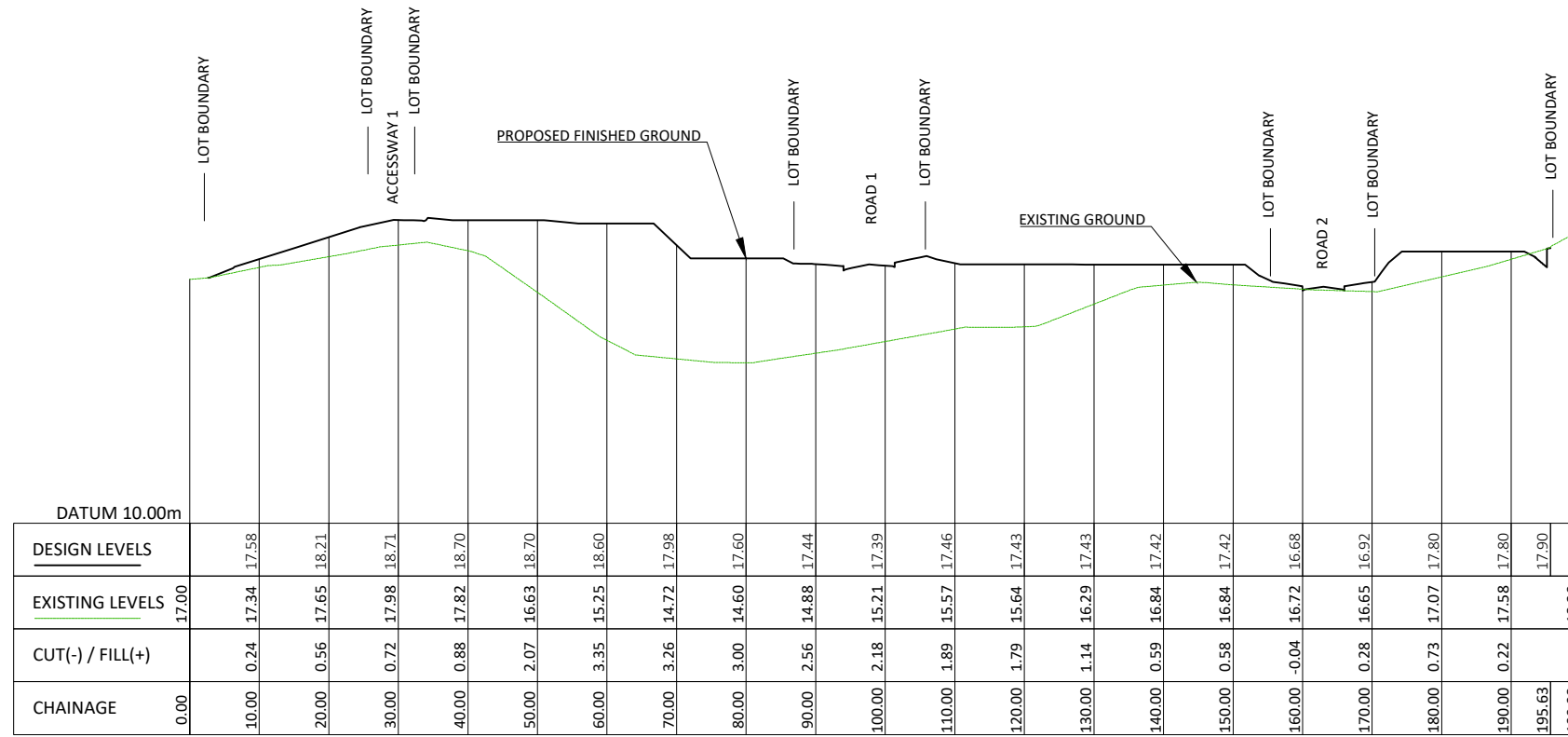
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POKORUA HOLDINGS LTD

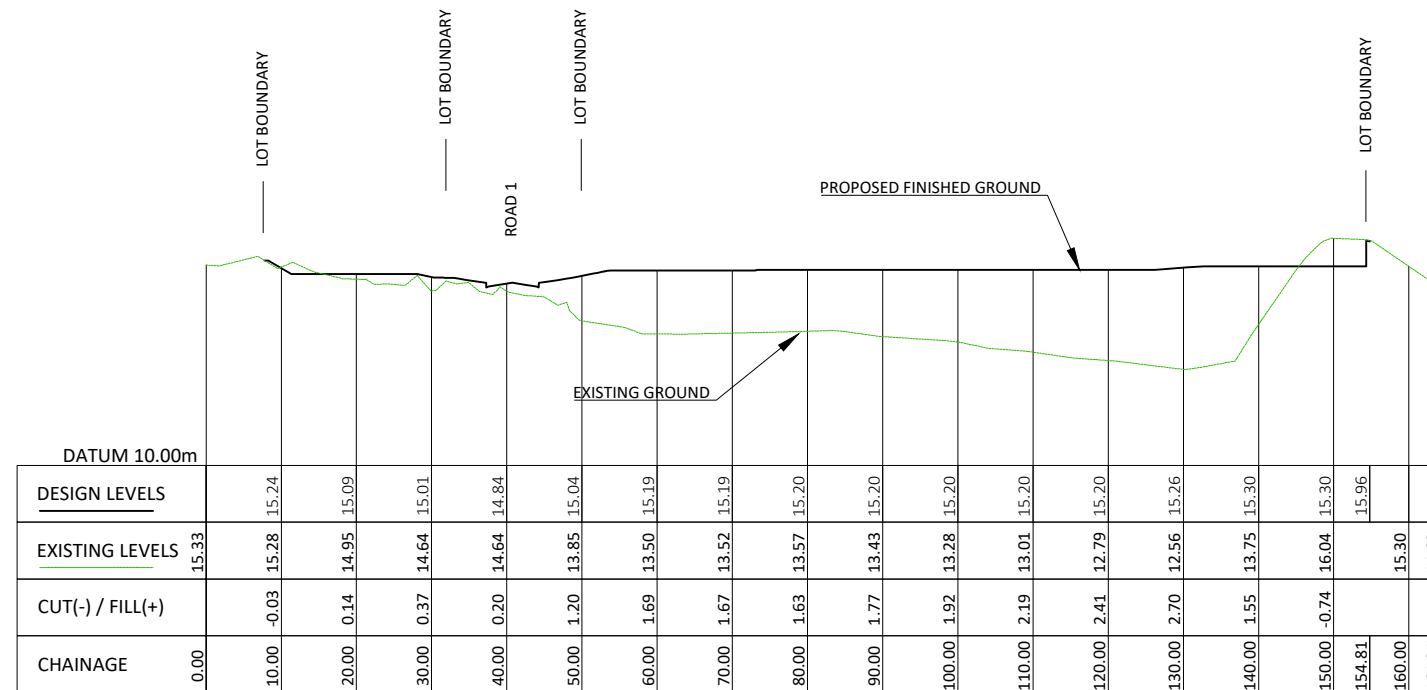
PROJECT
45 CONSTABLE ROAD WAIUKU

TITLE
OVERALL EARTHWORKS PLAN

DATE	SCALE
DEC 2018	A1 1:500
DRAWN SH	A3 1:1000
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C200
	5



CL- CROSS SECTION A-A
SCALE 1H:5V



CL- CROSS SECTION B-B
SCALE 1H:5V

REVISION	CHANGES	CHECKED	DATE
3	RW 4 & 5 REMOVED		14/01/19
2	WALL HEIGHTS REDUCED		05/12/18
1	RESPONSE TO QUERIES		08/11/18
0	ORIGINAL ISSUE	VC	31/01/18

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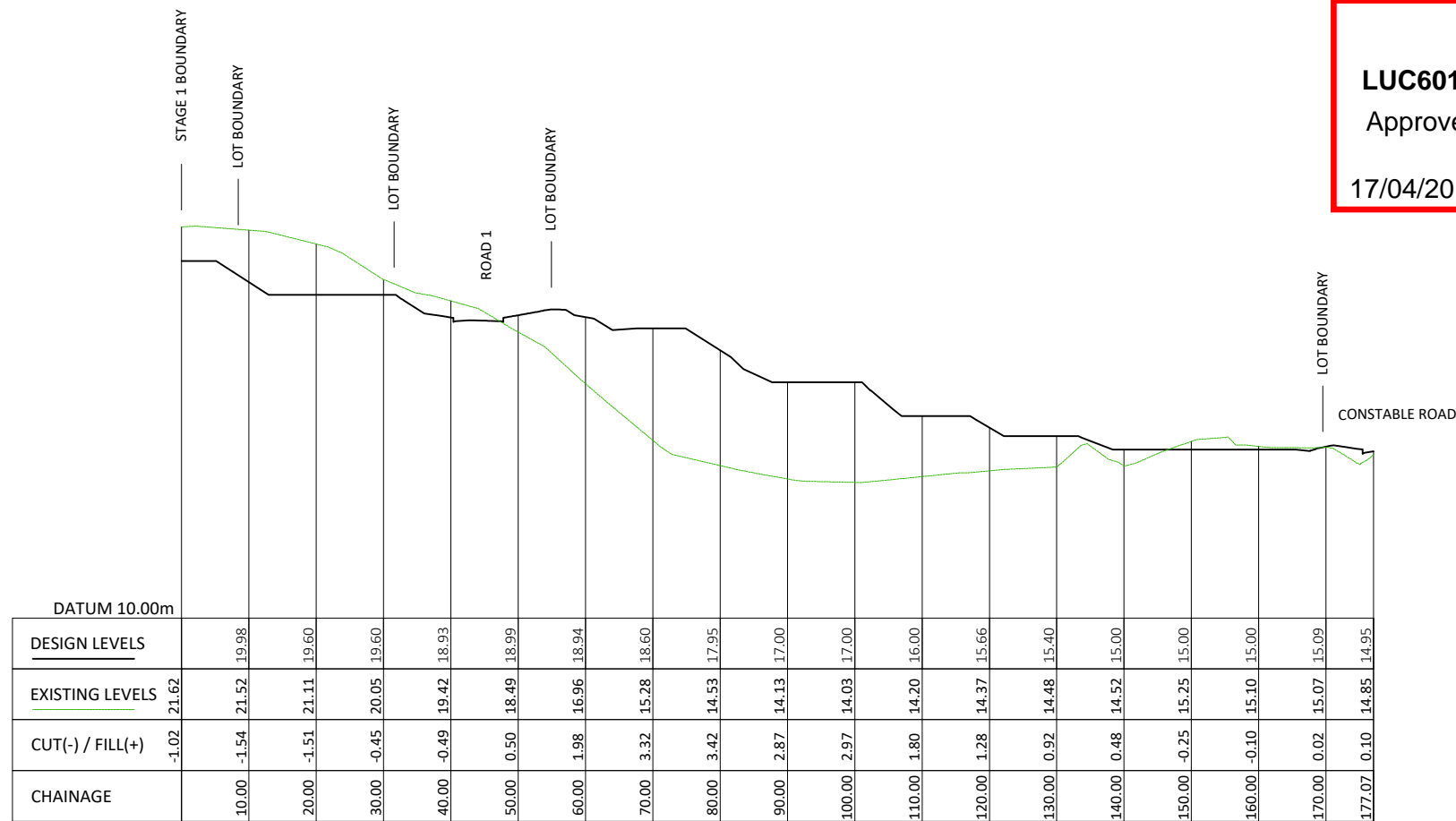
CLIENT
POKURUA HOLDING LTD

PROJECT
45 CONSTABLE ROAD WAIUKU

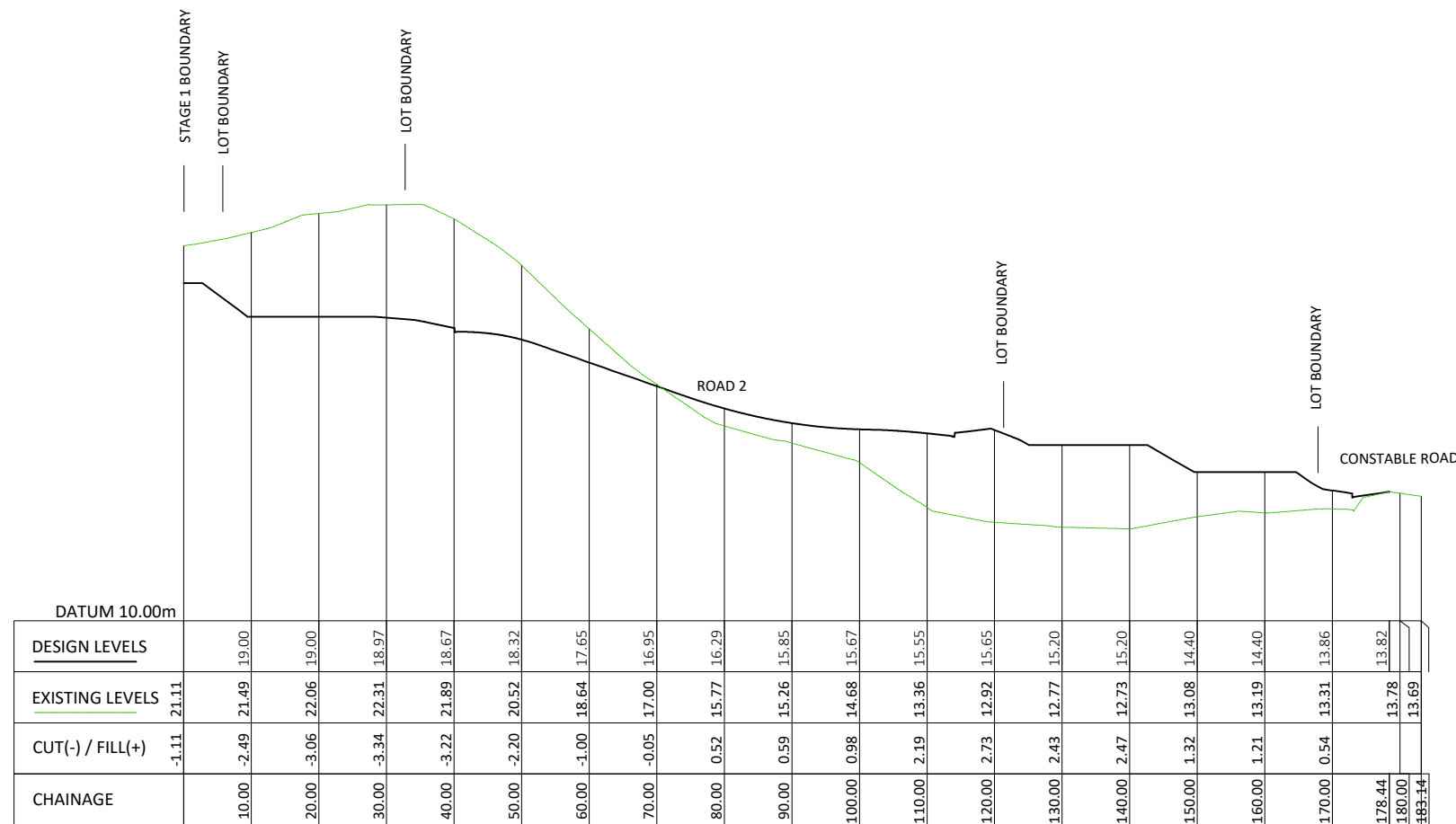
TITLE
EARTHWORKS CROSS SECTION A-A AND B-B

DATE	SCALE
DEC 2018	A1 1:500
DRAWN SH	A3 1:1000
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C201
	3


LUC60111076-A LUC60271724-A
 Approved Resource Consent Plan
 17/04/2019



CL- CROSS SECTION C-C
SCALE 1H:5V



CL- CROSS SECTION D-D
SCALE 1H:5V

3	RW 4 & 5 REMOVED		14/01/19
2	WALL HEIGHTS REDUCED		05/12/18
1	RESPONSE TO QUERIES		08/11/18
0	ORIGINAL ISSUE	VC	31/01/18
REVISION	CHANGES	CHECKED	DATE

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CLIENT
POKURUA HOLDING LTD

PROJECT
45 CONSTABLE ROAD WAIUKU

TITLE
EARTHWORKS CROSS SECTIONS C-C AND D-D

DATE	DEC 2018	SCALE	
DRAWN	SH	A1	1:500
DESIGNED	SH	A3	1:1000
PROJECT No	1231	DRAWING No	C202
		REVISION	3



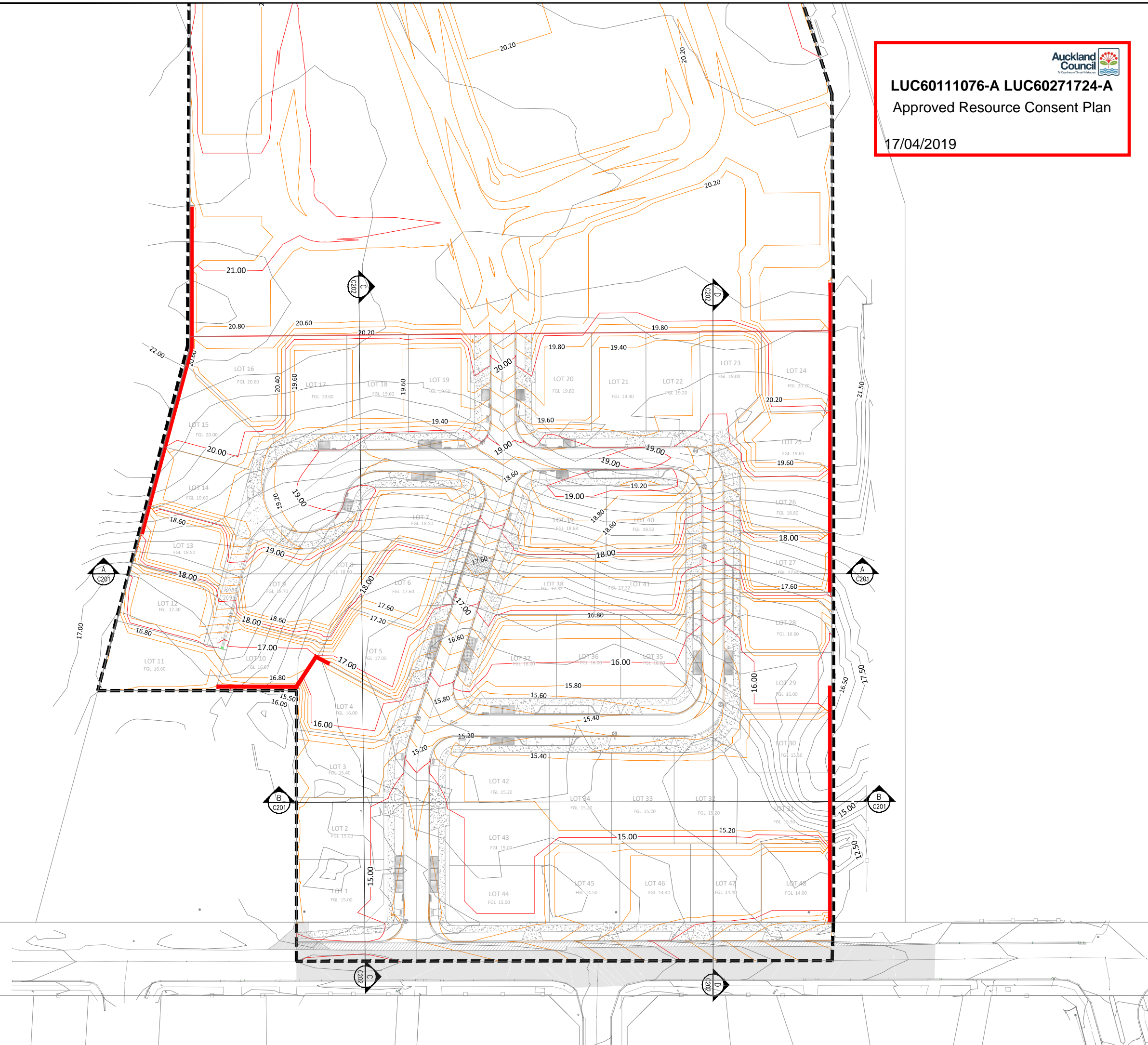
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LEGEND

- PROPOSED LOT BOUNDARY
- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
- 10.5 EXISTING CONTOUR
- 10.0 PROPOSED CONTOUR
- 10.5 PROPOSED CONTOUR
- EARTHWORKS EXTENT
- NEW TIMBER RETAINING WALL



REVISION	CHANGES	CHECKED	DATE
5	LOT 10 & RW 6 LOWERED		12/02/19
4	RW 4 & 5 REMOVED		14/01/19
3	WALL HEIGHTS REDUCED		05/12/18
2	RESPONSE TO RC QUERIES		8/11/18
1	RESPONSE TO QUERIES		13/08/18
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PROJECT No	1231	DRAWING No
		C203
		REVISION
		5



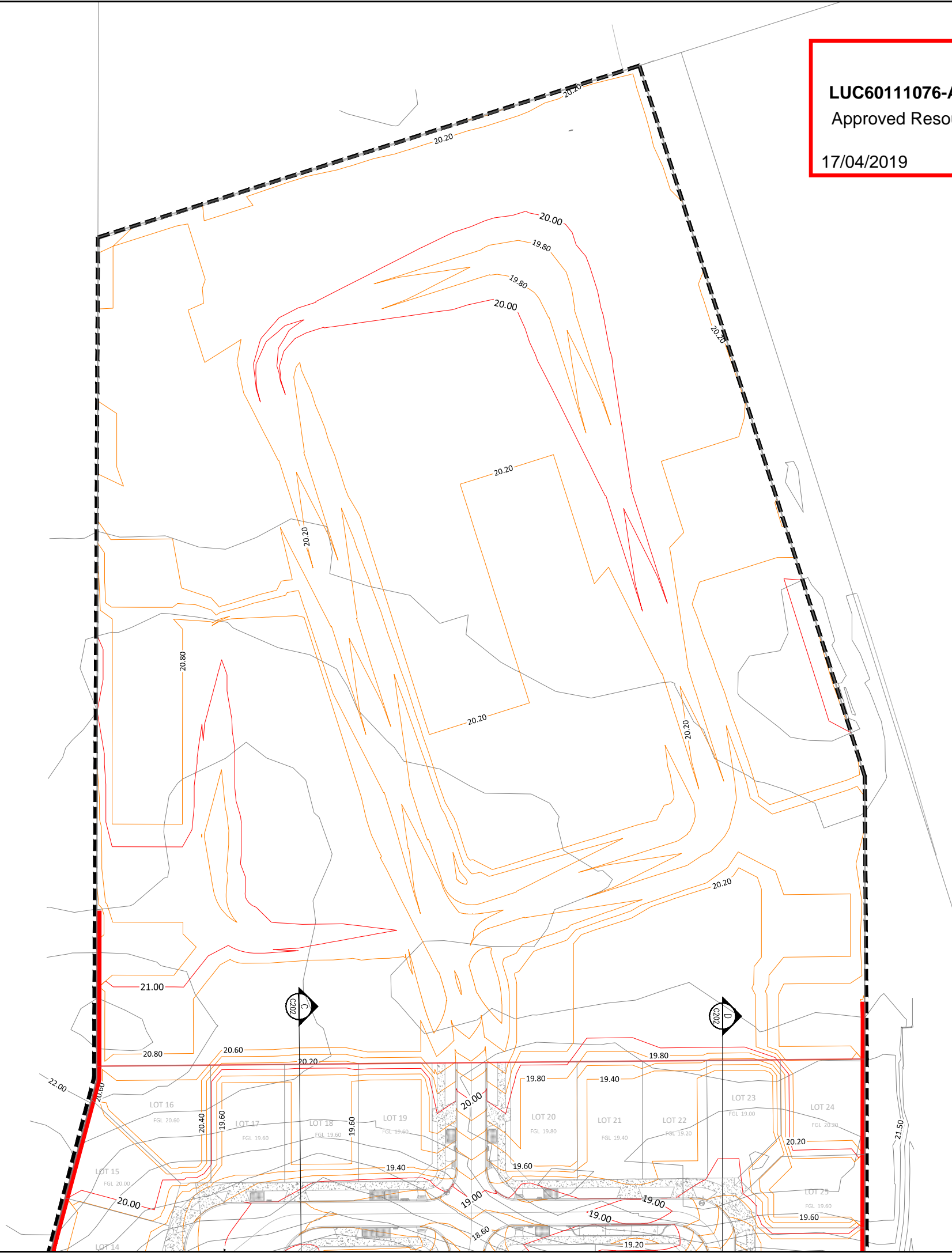
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LEGEND

- PROPOSED LOT BOUNDARY
- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
- 10.5 EXISTING CONTOUR
- 10.0 PROPOSED CONTOUR
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- EARTHWORKS EXTENT
- █ NEW TIMBER RETAINING WALL



REVISION	CHANGES	CHECKED	DATE
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DESIGNED	SH	A3 1:1000
PROJECT No	1231	DRAWING No
		C204
		REVISION
		4

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LEGEND

- PROPOSED LOT BOUNDARY
- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
- 10.5 EXISTING CONTOUR
- 10.0 PROPOSED CONTOUR
- 10.5 PROPOSED CONTOUR
- EARTHWORKS EXTENT
- █ NEW TIMBER RETAINING WALL

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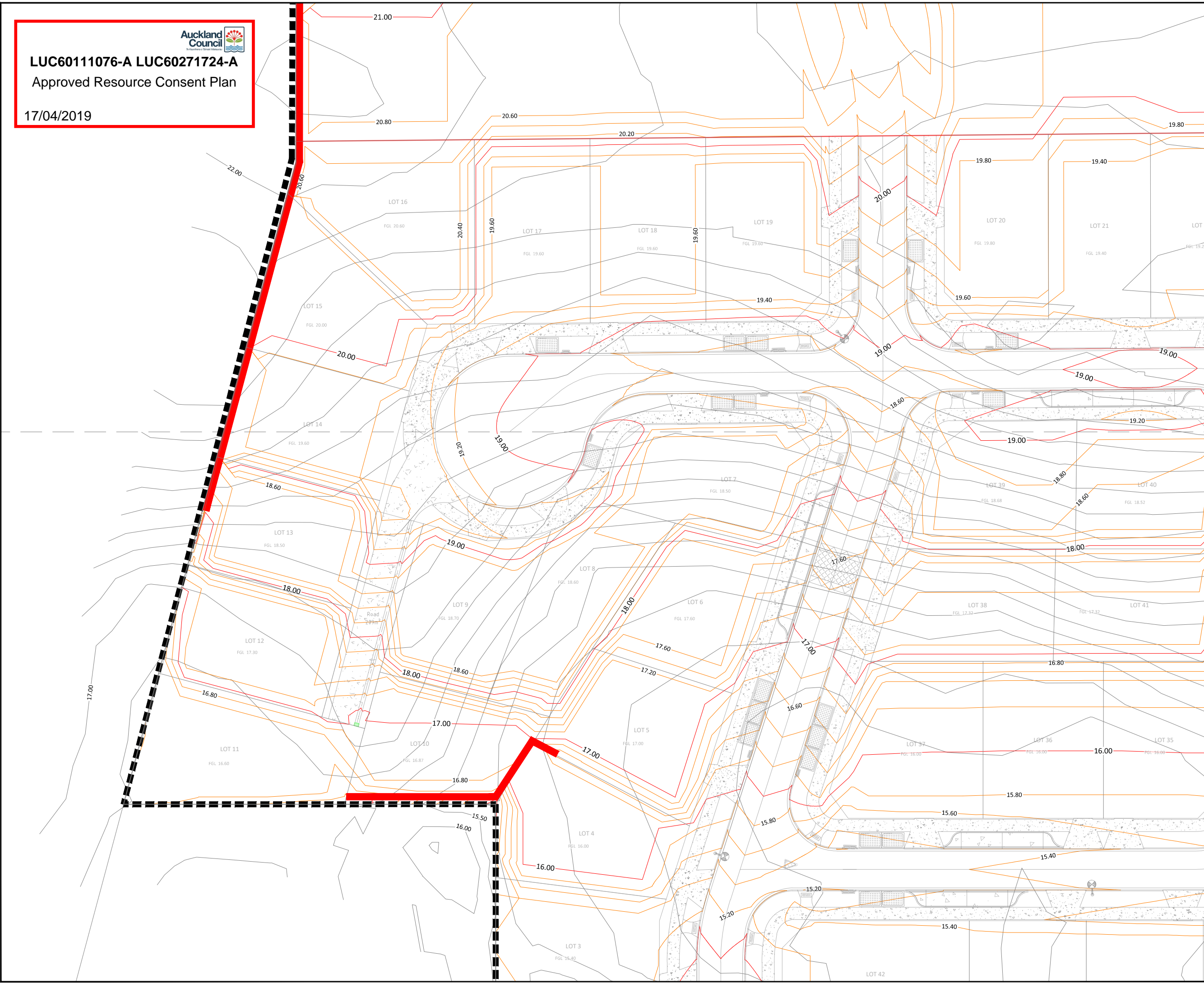
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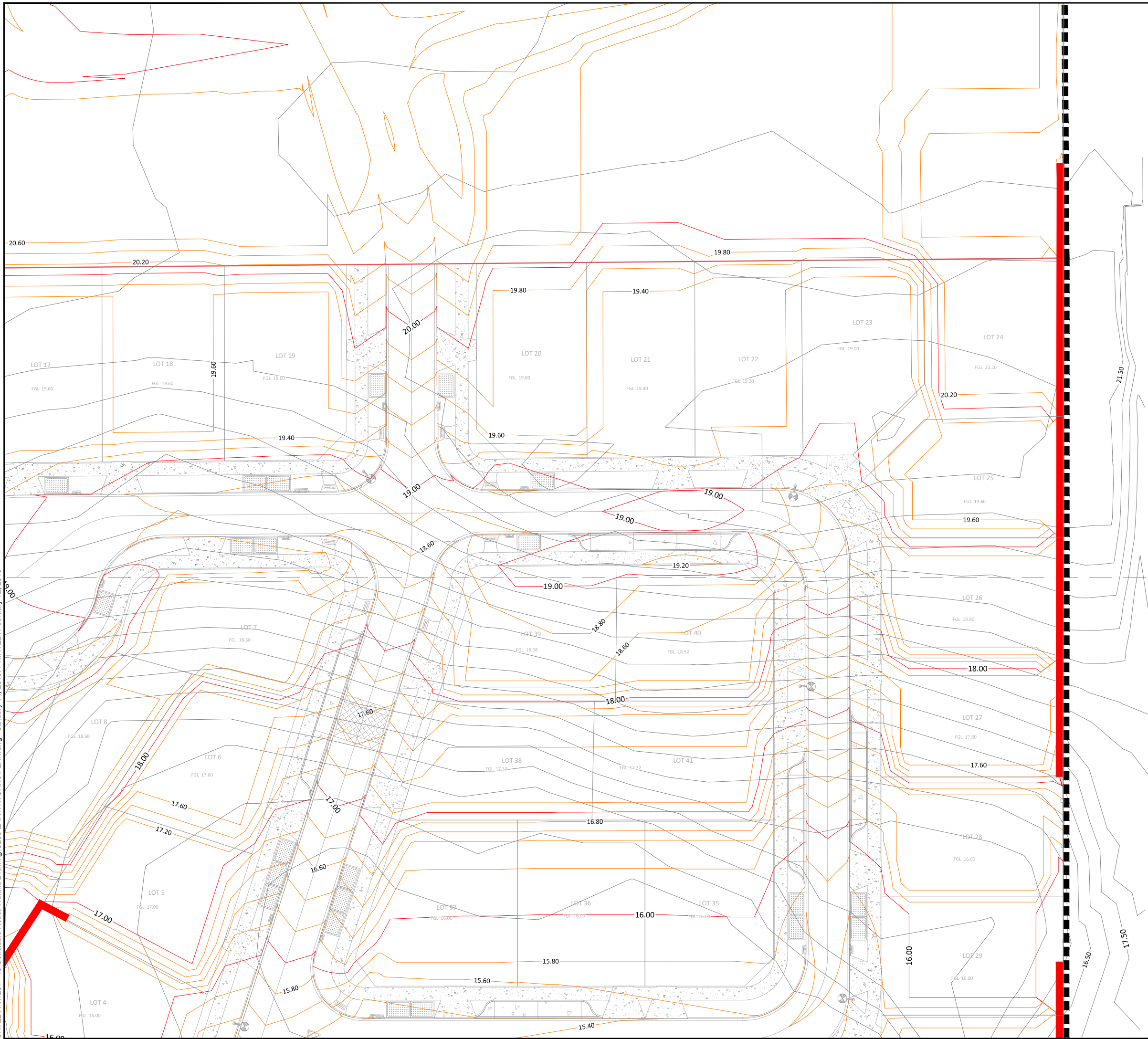
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TITLE
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DATE	SCALE
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DRAWN SH	A3 1:500
DESIGNED SH	REVISION
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- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
- 10.5 EXISTING CONTOUR
- 10.0 PROPOSED CONTOUR
- 10.5 PROPOSED CONTOUR
- EARTHWORKS EXTENT
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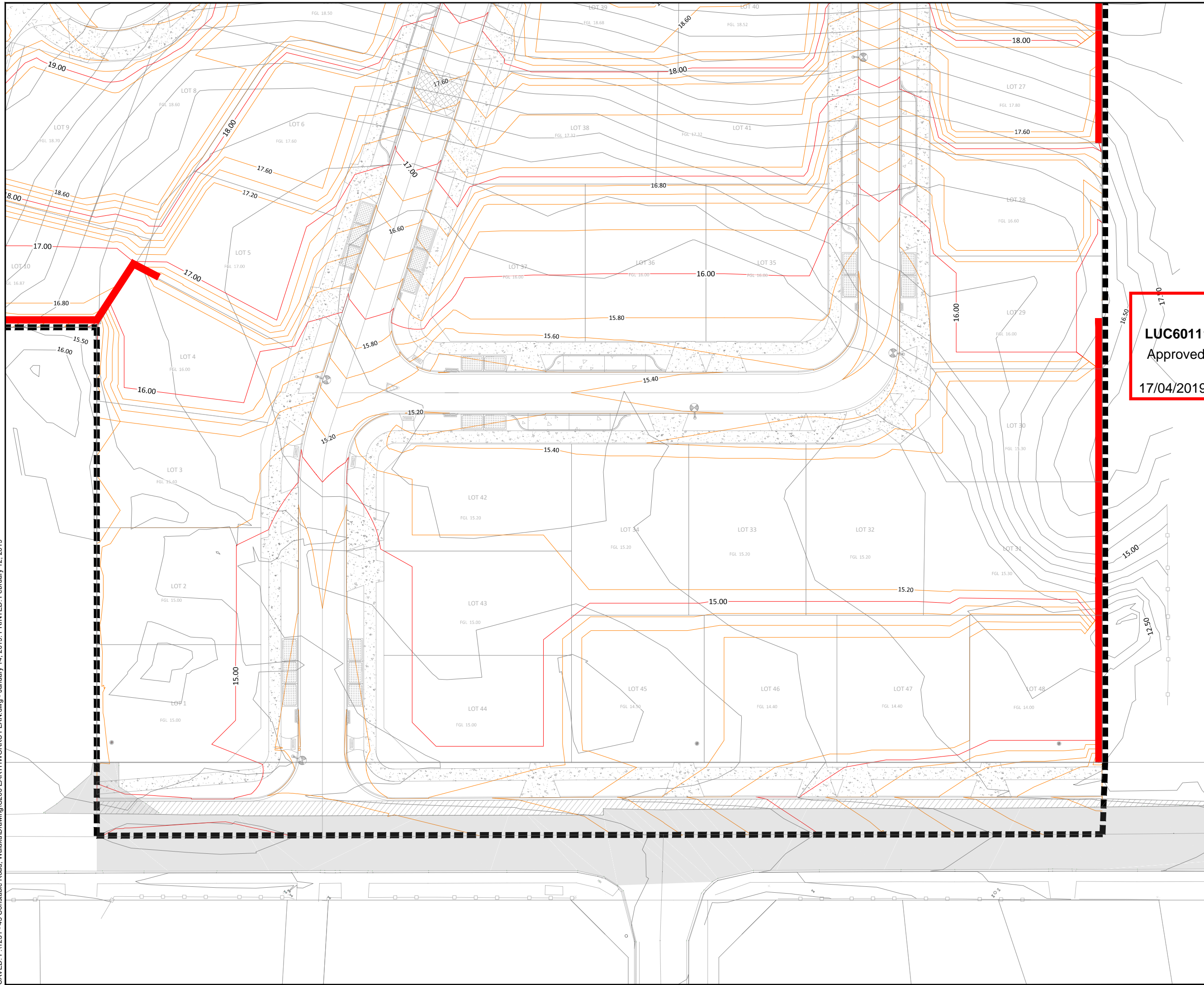
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TITLE
EARTHWORKS PLAN SHEET 2 OF 3


DATE	SCALE
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DRAWN SH	A3 1:500
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C206
	5

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LEGEND

- PROPOSED LOT BOUNDARY
- ADJOINING LOT BOUNDARY
- 10.0 EXISTING CONTOUR
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- 10.5 PROPOSED CONTOUR
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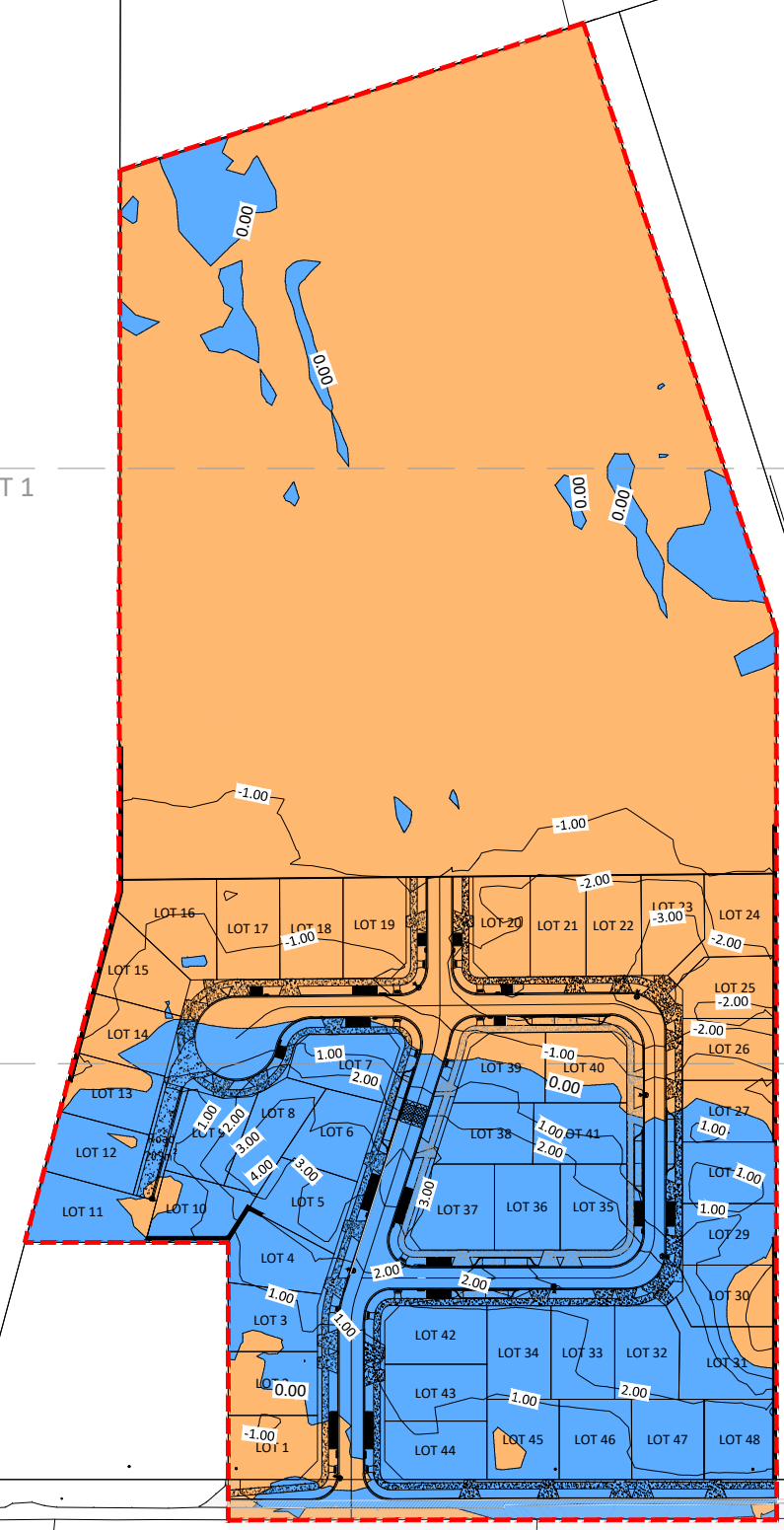
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DATE	SCALE
DEC 2018	A1 1:250
DRAWN SH	A3 1:500
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C207
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SHEET 2

SHEET 1



Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m ³)
1	CUT	-3.557	0.000	26235.1
2	FILL	0.000	4.391	25971.2

*REFER TO NOTES FOR ADJUSTED EARTHWORKS VOLUMES AND ASSUMPTIONS

Auckland Council

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LEGEND

--- EARTHWORKS BOUNDARY

NOTES

- CUT/FILL SURFACE IS FROM EXISTING NATURAL GROUND TO FINISHED SURFACE LEVELS. (NO BULKING FACTORS APPLIED)
- A SUMMARY OF THE BULK EARTHWORKS VOLUMES IS AS FOLLOWS:
 CUT: - 26235 m³
 FILL: + 25971 m³
 BALANCE: - 264 m³ (CUT)
- TOPSOIL STRIP: 12607m³ (200mm ASSUMED DEPTH)
- TOPSOIL RESPREAD: 10821m³ (200mm ASSUMED DEPTH)
- ESTIMATED ADJUSTED VOLUME SUMMARY (TO INCLUDE PAVEMENT THICKNESS (0.51m), FOOTPATH SUBGRADE (0.2m), COMPACTION FACTOR (17.5%) AND SERVICE TRENCH CUT:
 • CUT TO FILL (CLAY/SILT) = 28017m³
 • IMPORTED FILL = 2092m³
- ADJUSTED VOLUMES TO BE CONFIRMED WHEN GEOTECHNICAL REPORT RECEIVED.

REVISION	CHANGES	CHECKED	DATE
4	RW 6 LOWERED		12/02/19
3	RW 4 & 5 REMOVED		14/01/19
2	WALL HEIGHTS REDUCED		05/12/18
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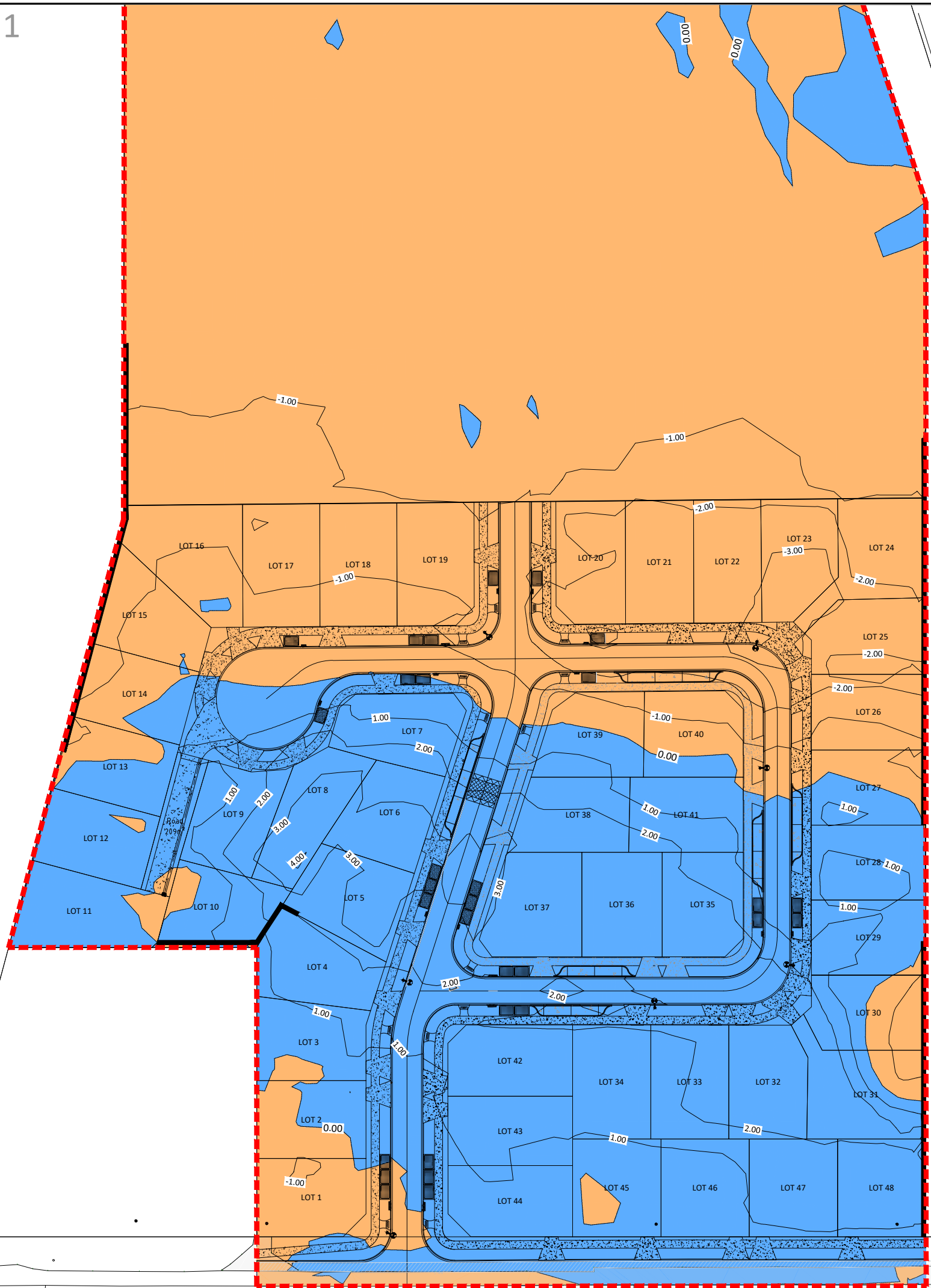
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PROJECT
45 CONSTABLE ROAD WAIUKU

TITLE
CUT - FILL DEPTH PLAN (ISOPACHS)

DATE	SCALE
DEC 2018	A1 1:1000
DRAWN SH	A3 1:2000
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C210
	4


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Surface Analysis: Elevation Ranges

Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m ³)
1	CUT	-3.557	0.000	26235.1
2	FILL	0.000	4.391	25971.2

*REFER TO NOTES FOR ADJUSTED EARTHWORKS VOLUMES AND ASSUMPTIONS


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LEGEND

--- EARTHWORKS BOUNDARY

NOTES

- CUT/FILL SURFACE IS FROM EXISTING NATURAL GROUND TO FINISHED SURFACE LEVELS. (NO BULKING FACTORS APPLIED)
- A SUMMARY OF THE BULK EARTHWORKS VOLUMES IS AS FOLLOWS:
 CUT: - 26235 m³
 FILL: + 25971 m³
 BALANCE: - 264 m³ (CUT)
- TOPOSOIL STRIP: 12607m³ (200mm ASSUMED DEPTH)
- TOPOSOIL RESPREAD: 10821m³ (200mm ASSUMED DEPTH)
- ESTIMATED ADJUSTED VOLUME SUMMARY (TO INCLUDE PAVEMENT THICKNESS (0.51m), FOOTPATH SUBGRADE (0.2m), COMPACTION FACTOR (17.5%) AND SERVICE TRENCH CUT):
 - CUT TO FILL (CLAY/SILT) = 28017m³
 - IMPORTED FILL = 2092m³
- ADJUSTED VOLUMES TO BE CONFIRMED WHEN GEOTECHNICAL REPORT RECEIVED.

REVISION	CHANGES	CHECKED	DATE
4	RW 6 LOWERED		12/02/19
3	RW 4 & 5 REMOVED		14/01/19
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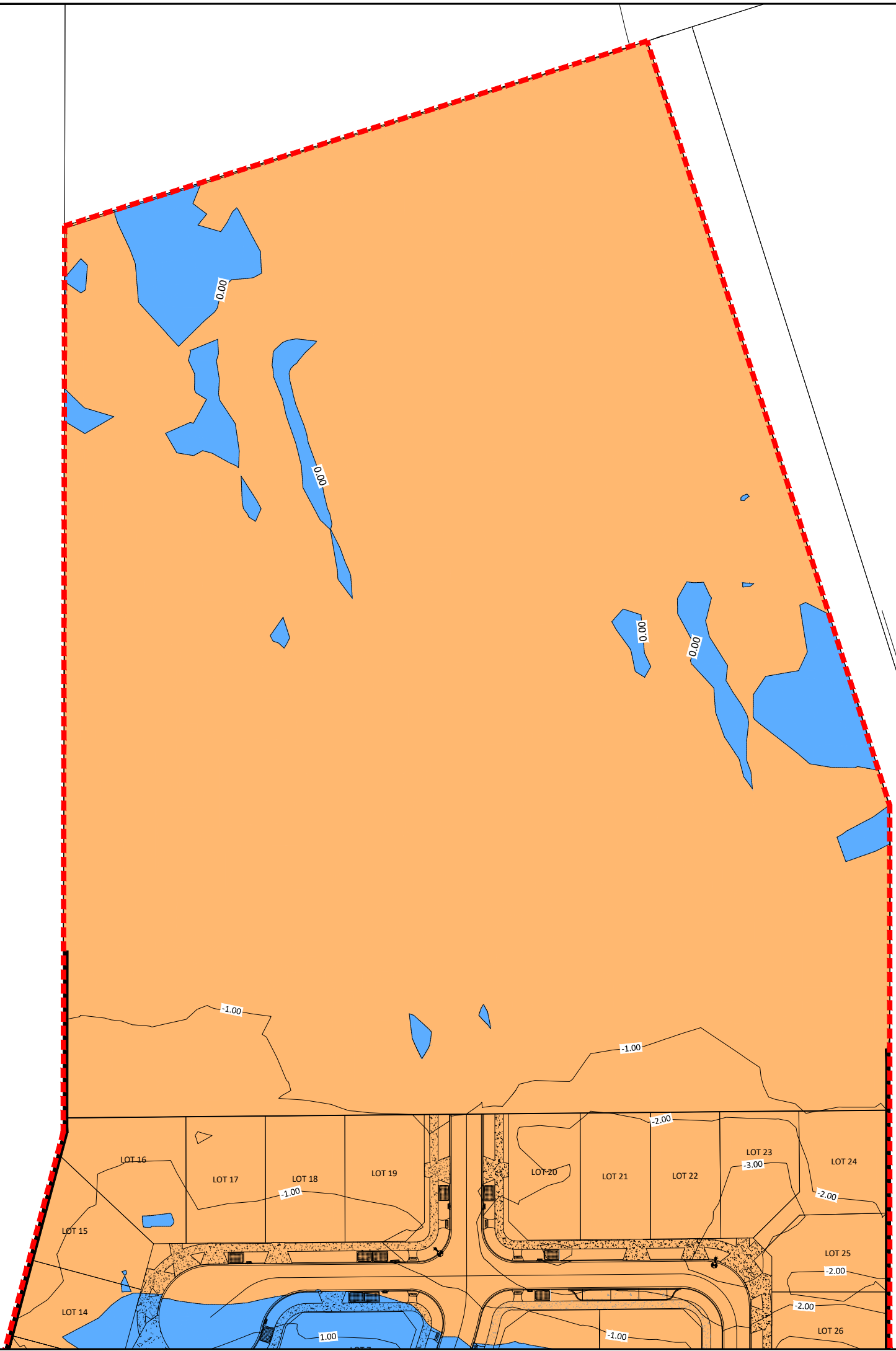

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TITLE
CUT - FILL DEPTH PLAN (ISOPACHS) SHEET 1

DATE	SCALE
DEC 2018	A1 1:500
DRAWN SH	A3 1:1000
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C211
	4



Surface Analysis: Elevation Ranges				
Number	Color	Minimum Elevation (m)	Maximum Elevation (m)	Volume (m ³)
1	CUT	-3.557	0.000	26235.1
2	FILL	0.000	4.391	25971.2

*REFER TO NOTES FOR ADJUSTED EARTHWORKS VOLUMES AND ASSUMPTIONS

Auckland Council
Te Aparahi o Tāmaki Makaurau

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LEGEND

--- EARTHWORKS BOUNDARY

NOTES

- CUT/FILL SURFACE IS FROM EXISTING NATURAL GROUND TO FINISHED SURFACE LEVELS. (NO BULKING FACTORS APPLIED)
- A SUMMARY OF THE BULK EARTHWORKS VOLUMES IS AS FOLLOWS:
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 FILL: + 25971 m³
 BALANCE: - 264 m³ (CUT)
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 - CUT TO FILL (CLAY/SILT) = 28017m³
 - IMPORTED FILL = 2092m³
- ADJUSTED VOLUMES TO BE CONFIRMED WHEN GEOTECHNICAL REPORT RECEIVED.

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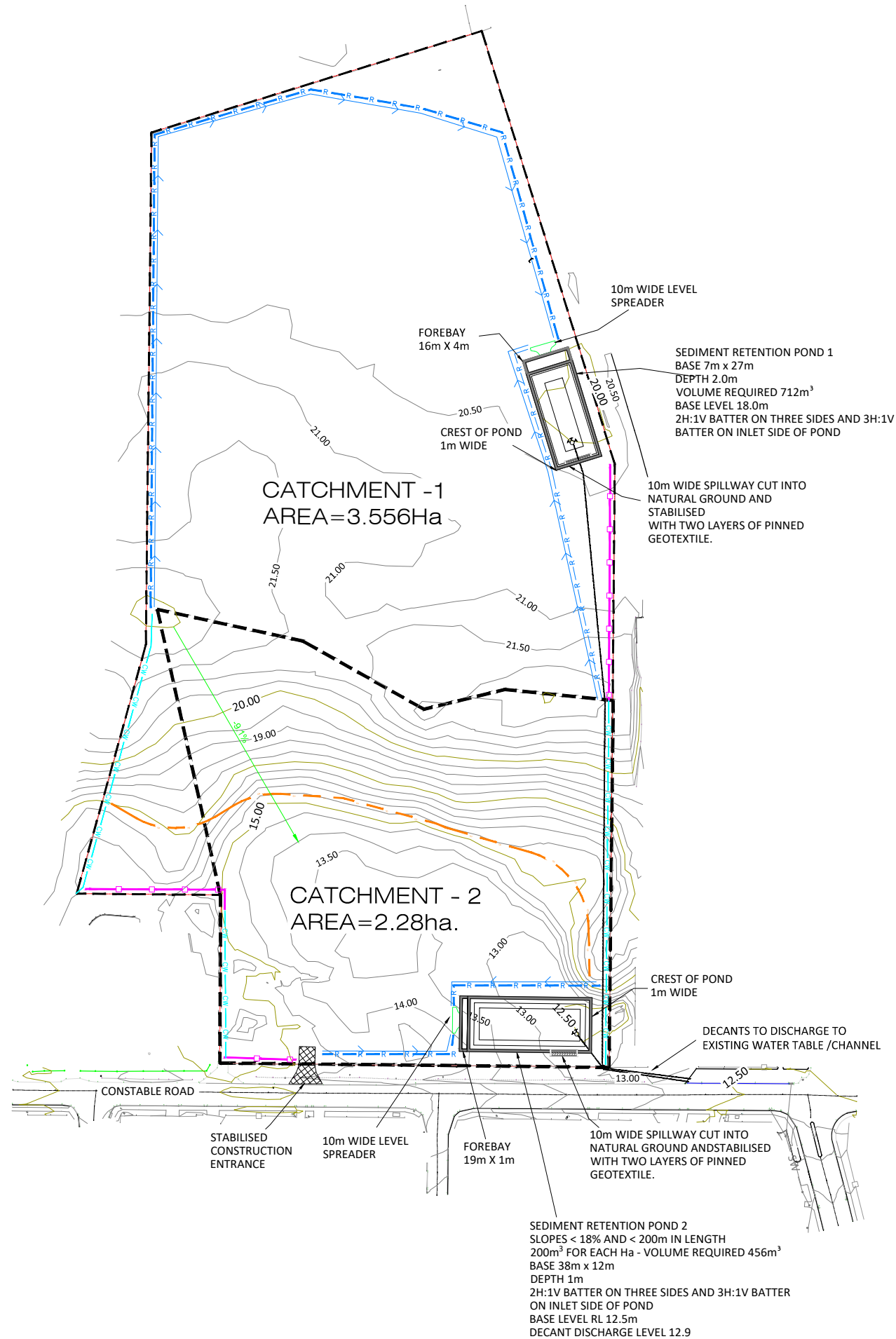
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DATE	SCALE
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DRAWN SH	A3 1:1000
DESIGNED SH	REVISION
PROJECT No 1231	DRAWING No C212
	4



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LEGEND

- RUNOFF DRAIN
- CLEAN WATER
- SILT FENCE
- CONTOUR DRAIN
- LOT BOUNDARY
- CATCHMENT BOUNDARY
- 20.00 EXISTING CONTOUR
- 20.50 EXISTING CONTOUR

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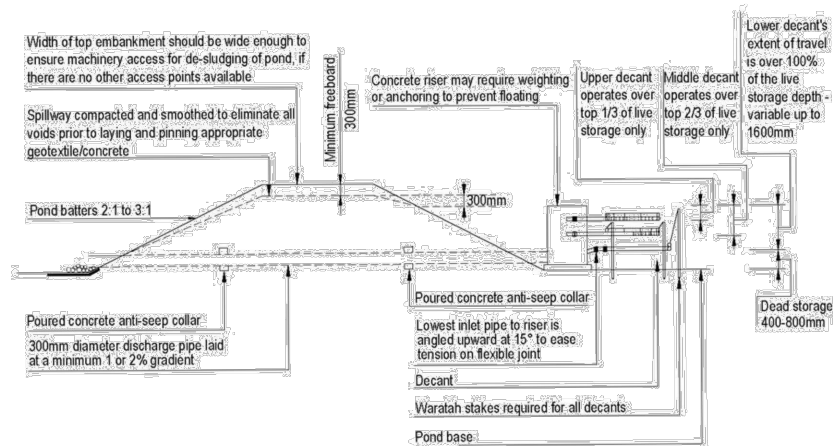
PROJECT
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TITLE
EROSION AND SEDIMENT CONTROL PLAN

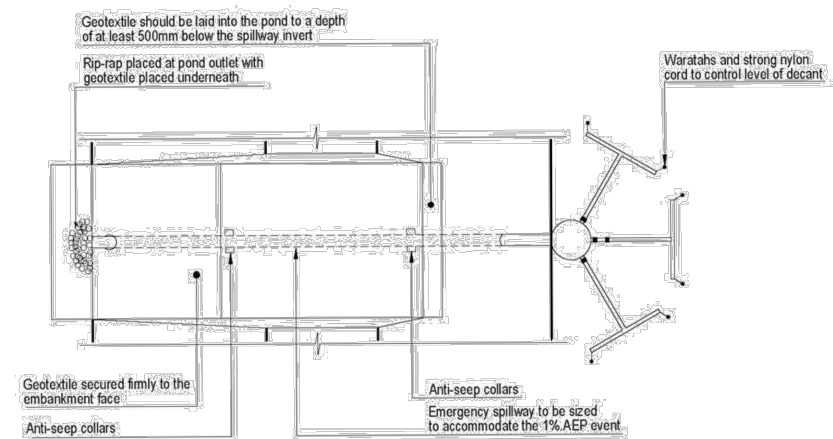
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DEC 2018	A1 1: 2000
DRAWN SH	A3 1: 1000
DESIGNED SH	REVISION 1
PROJECT No 1231	DRAWING No C220

NOTES:

1. ALL SEDIMENT AND EROSION CONTROLS TO BE CONSTRUCTED IN ACCORDANCE WITH AUCKLAND COUNCIL GD05 (EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVITIES IN THE AUCKLAND REGION GUIDELINE DOCUMENT 2016/005)



Cross-section



Plan view

Figure 73: Sediment retention pond for 3 to 5 ha catchment

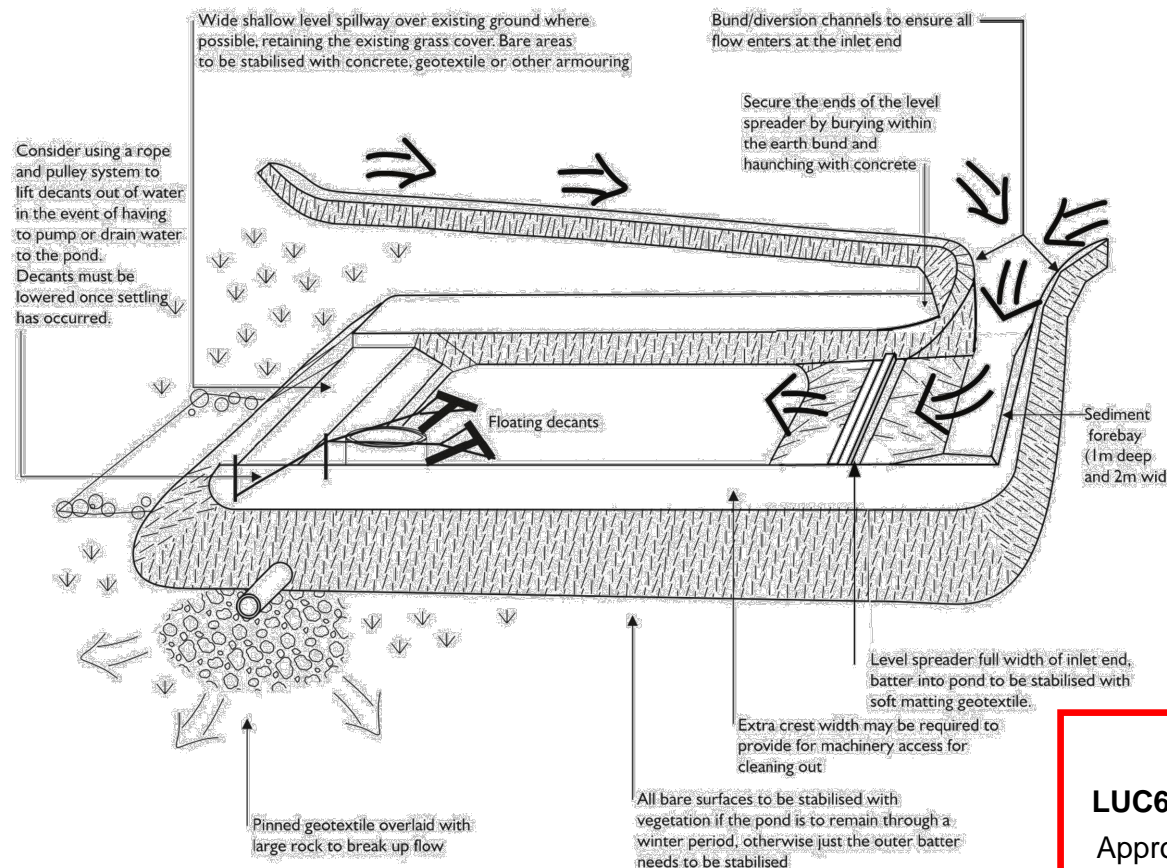



Figure 64: Schematic of a sediment retention pond


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STABILISED CONSTRUCTION ENTRANCE – SPECIFICATIONS:

APPLICATION

USE A STABILISED CONSTRUCTION ENTRANCE AT ALL POINTS OF CONSTRUCTION SITE INGRESS AND EGRESS WITH A CONSTRUCTION PLAN LIMITING TRAFFIC TO THESE ENTRANCES ONLY. THEY ARE PARTICULARLY USEFUL ON SMALL CONSTRUCTION SITES BUT CAN BE UTILISED FOR ALL PROJECTS.

DESIGN:

1. CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS AND OTHER UNSUITABLE MATERIAL AND PROPERLY GRADE IT.
2. PROVIDE DRAINAGE TO CARRY RUNOFF FROM THE STABILISED CONSTRUCTION ENTRANCE TO A SEDIMENT CONTROL MEASURE.
3. PLACE AGGREGATE TO THE SPECIFICATIONS BELOW AND SMOOTH IT.

STABILISED CONSTRUCTION ENTRANCE AGGREGATE SPECIFICATIONS:

AGGREGATE SIZE	5-75mm WASHED AGGREGATE
THICKNESS	150mm MINIMUM
LENGTH	10m MINIMUM
WIDTH	4m MINIMUM

MAINTENANCE

1. MAINTAIN THE STABILISED CONSTRUCTION ENTRANCE IN A CONDITION TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. AFTER EACH RAINFALL INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT FROM THE STABILISED CONSTRUCTION ENTRANCE AND CLEAN OUT AS NECESSARY.
2. WHEN WHEEL WASHING IS ALSO REQUIRED, ENSURE THIS IS DONE ON AN AREA STABILISED WITH AGGREGATE WHICH DRAINS TO AN APPROVED SEDIMENT RETENTION FACILITY.

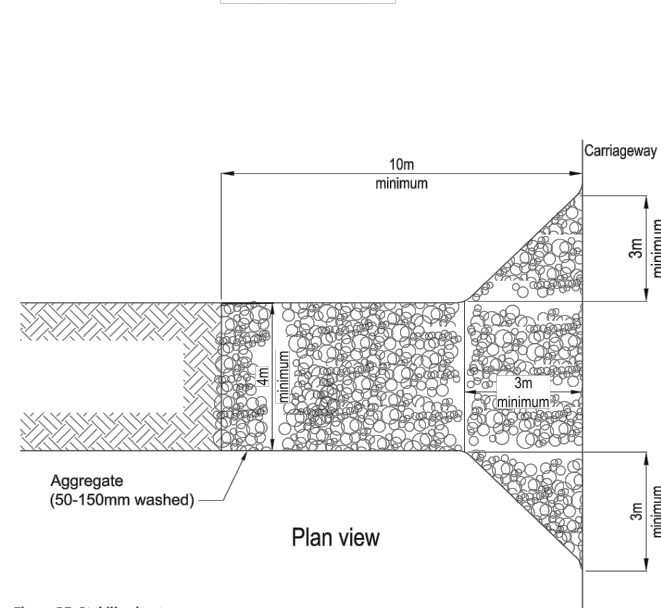
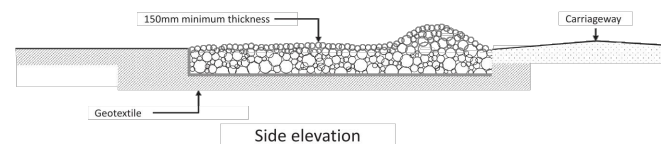
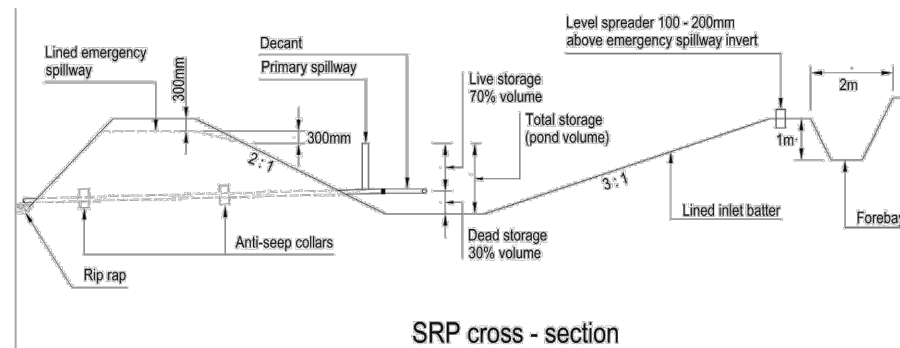


Figure 35: Stabilised entranceway



SRP cross - section

Figure 65: SRP cross-section

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EROSION AND SEDIMENT CONTROL DETAILS SHEET 1

DATE	DEC 2018	SCALE	
DRAWN	SH	A1 1: 2000	
DESIGNED	SH	A3 1: 1000	
PROJECT No	1231	DRAWING No	C221
		REVISION	1

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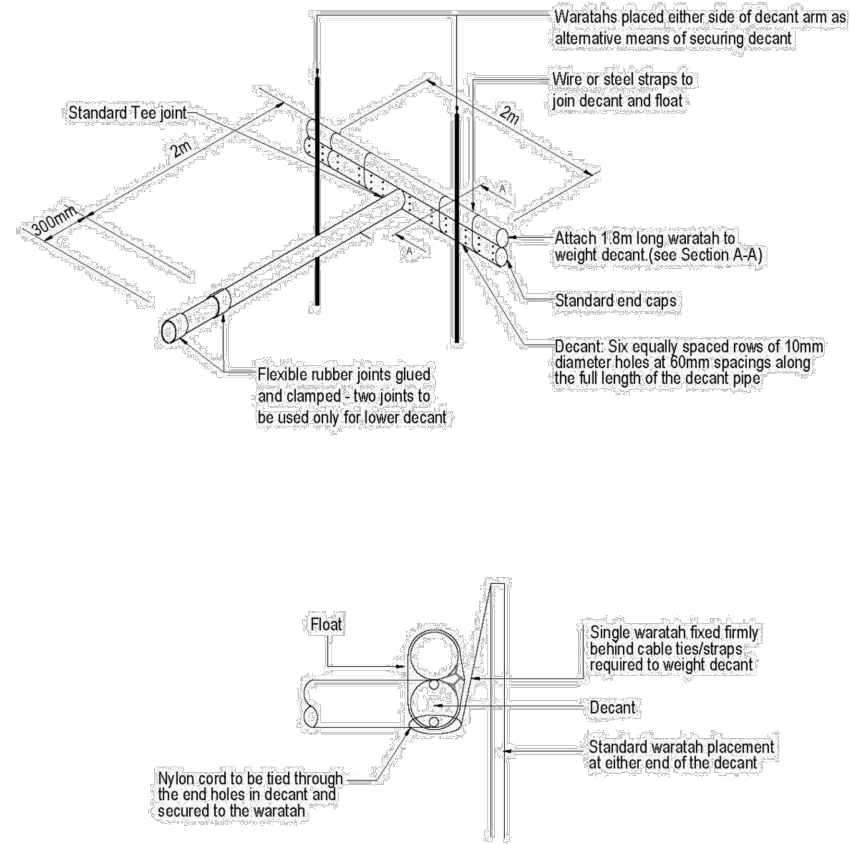


Figure 66: Schematic of standard T-bar design

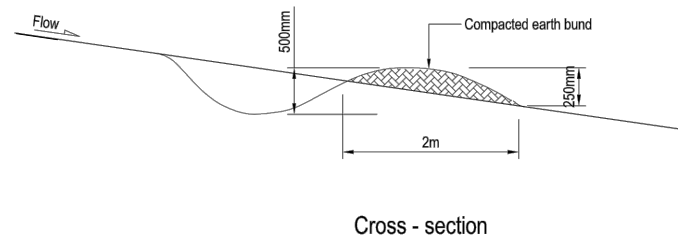


Figure 23: Contour drain cross-section

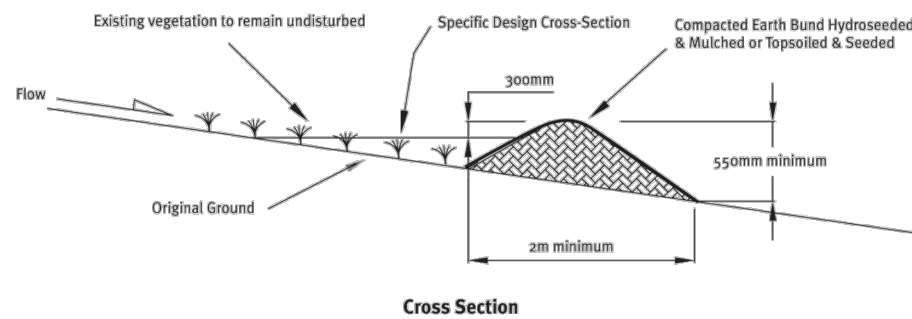


Figure 16: Cross-section of clean water diversion

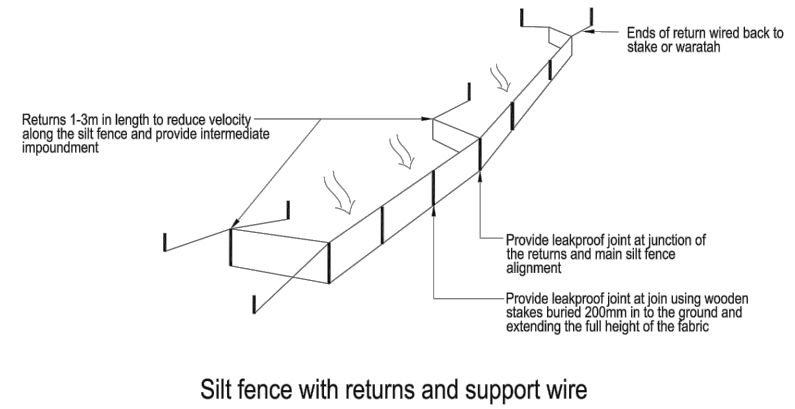
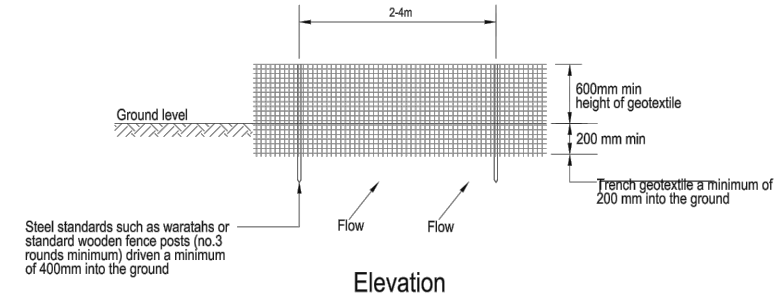



Figure 82: Schematic of a silt fence



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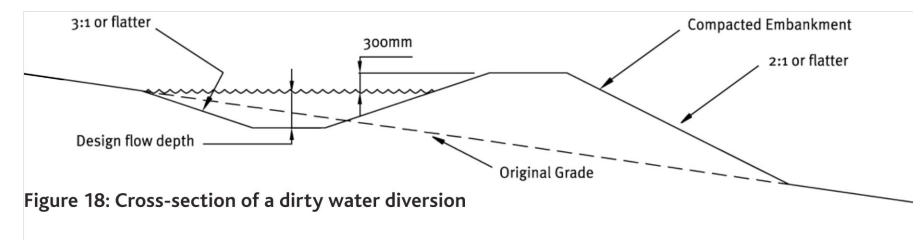


Figure 18: Cross-section of a dirty water diversion

- NOTES:
- ALL SEDIMENT AND EROSION CONTROLS TO BE CONSTRUCTED IN ACCORDANCE WITH AUCKLAND COUNCIL GD05 (EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVITIES IN THE AUCKLAND REGION GUIDELINE DOCUMENT 2016/005)

REVISION	CHANGES	CHECKED	DATE
1	FOR CONSENT		14/02/19
0	ORIGINAL ISSUE		

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CLIENT
POKORUA HOLDINGS LTD

PROJECT
45 CONSTABLE ROAD WAIUKU

TITLE
EROSION AND SEDIMENT CONTROL DETAILS SHEET 2

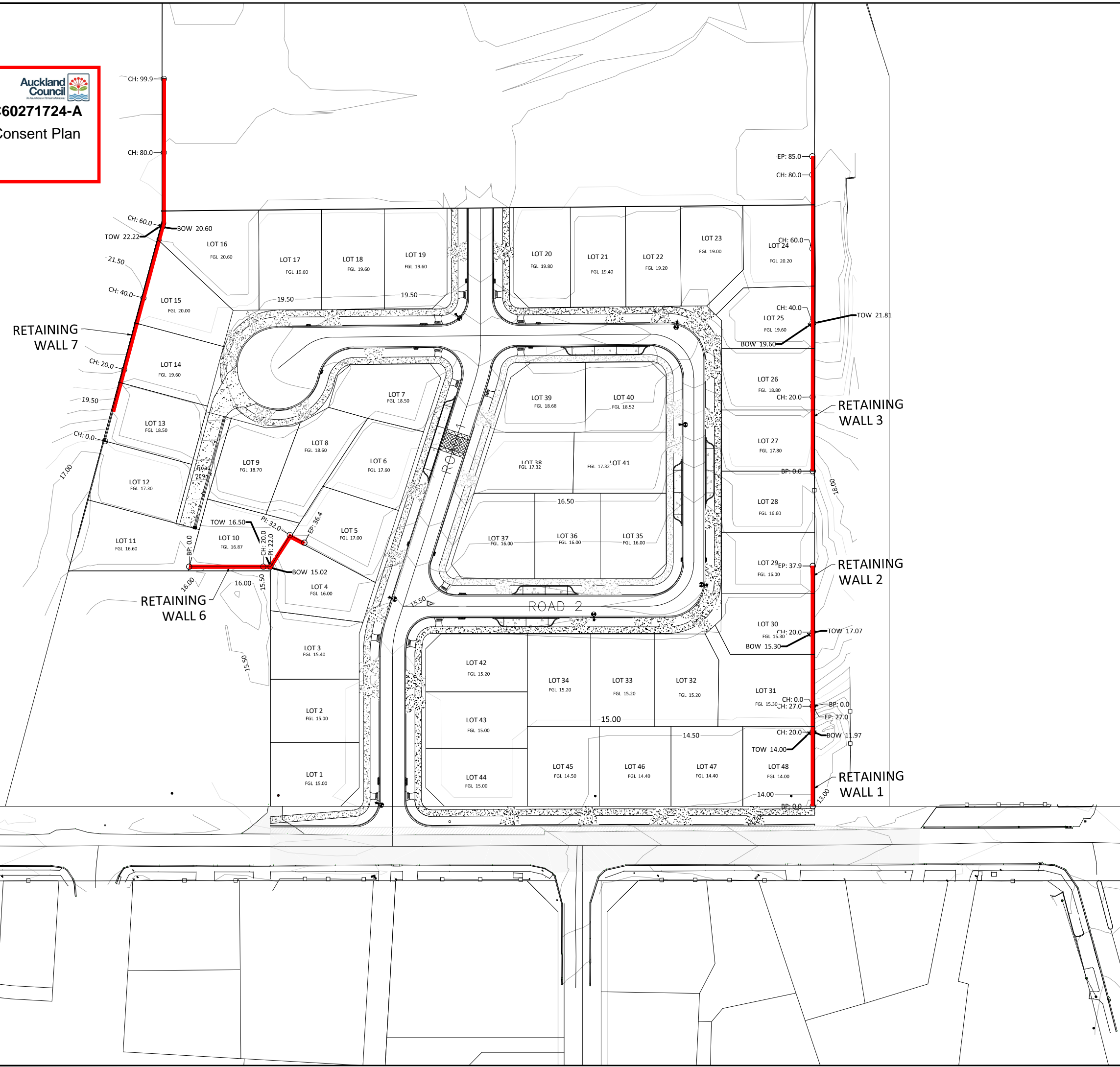
DATE	SCALE
DEC 2018	A1 1: 2000
DRAWN SH	A3 1: 1000
DESIGNED SH	REVISION 1
PROJECT No 1231	DRAWING No C222

Auckland Council
LUC60111076-A LUC60271724-A
 Approved Resource Consent Plan
 17/04/2019



LEGEND

- PROPOSED LOT BOUNDARY
- TIMBER RETAINING WALL
- PROPOSED VEHICLE CROSSING FOOTPATH/WALKWAY CONCRETE PAVEMENT



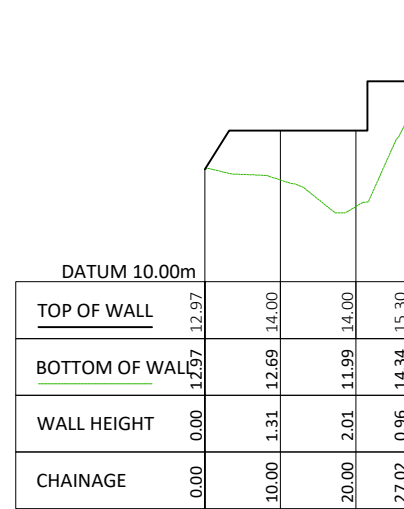
REVISION	CHANGES	CHECKED	DATE
4	RW 6 LOWERED		04/02/19
3	RW 4 & 5 REMOVED		14/01/19
2	WALL HEIGHTS REDUCED		05/12/18
1	RC QUERIES - WALL 5		18/11/18
0	ORIGINAL ISSUE		7/11/18

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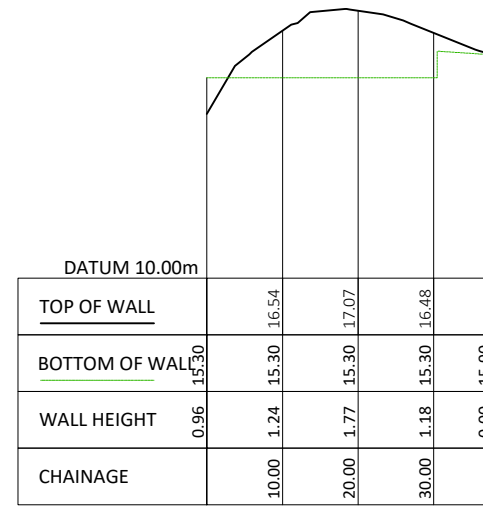
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CLIENT		POKORUA HOLDINGS LTD	
PROJECT		45 CONSTABLE ROAD WAIUKU	
TITLE		RETAINING WALL PLAN	
DATE	DEC 2018	SCALE	A1 1:500
DRAWN	SH		A3 1:1000
DESIGNED	SH		
PROJECT No	1231	DRAWING No	C230
		REVISION	4

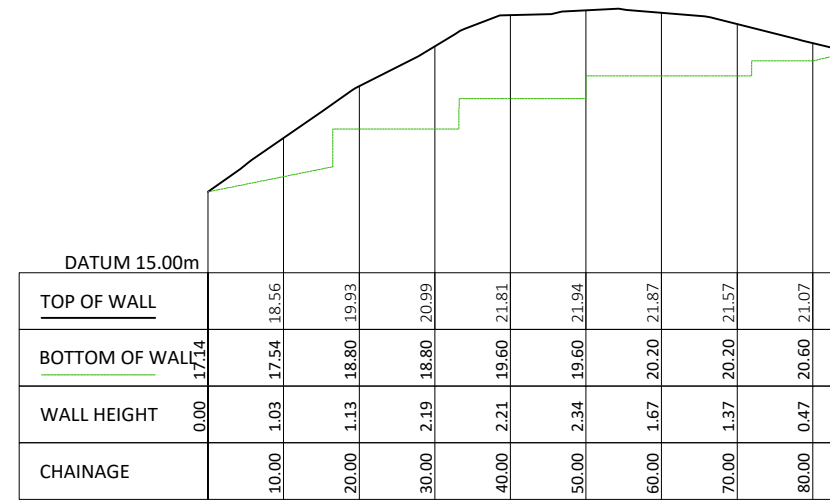
SAVED: P:\1231 - 45 Constable Road, Waiuku\Drawing\C230 RETAINING WALL PLAN.dwg - January 14, 2019. PRINTED: February 4, 2019



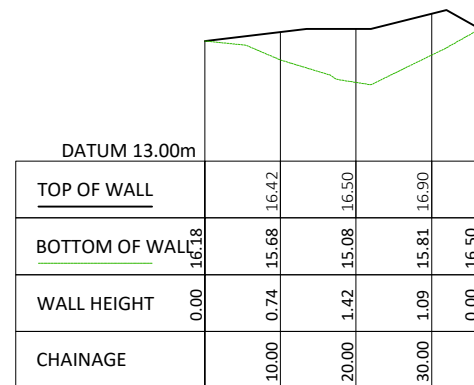
CL- RW 1
SCALE 1H:5V



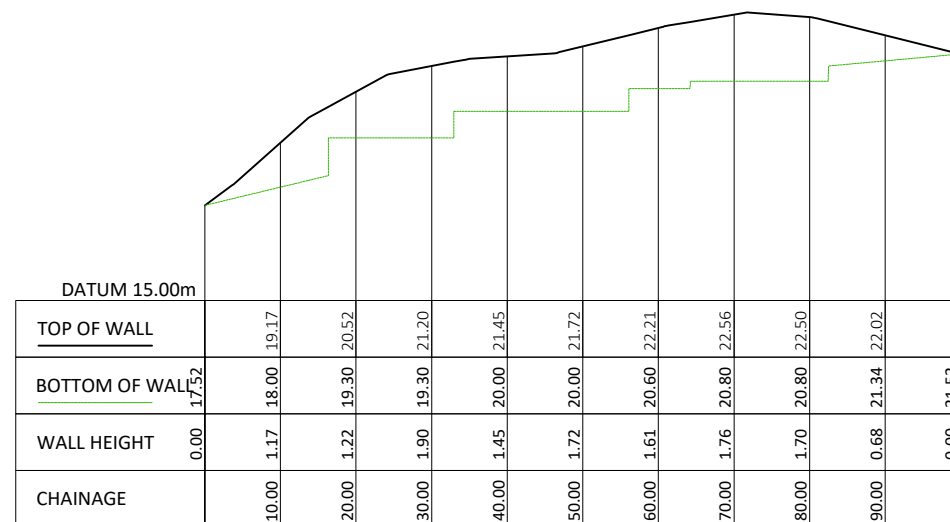
CL- RW 2
SCALE 1H:5V



CL- RW 3
SCALE 1H:5V



CL- RW 6
SCALE 1H:5V



CL- RW 7
SCALE 1H:5V

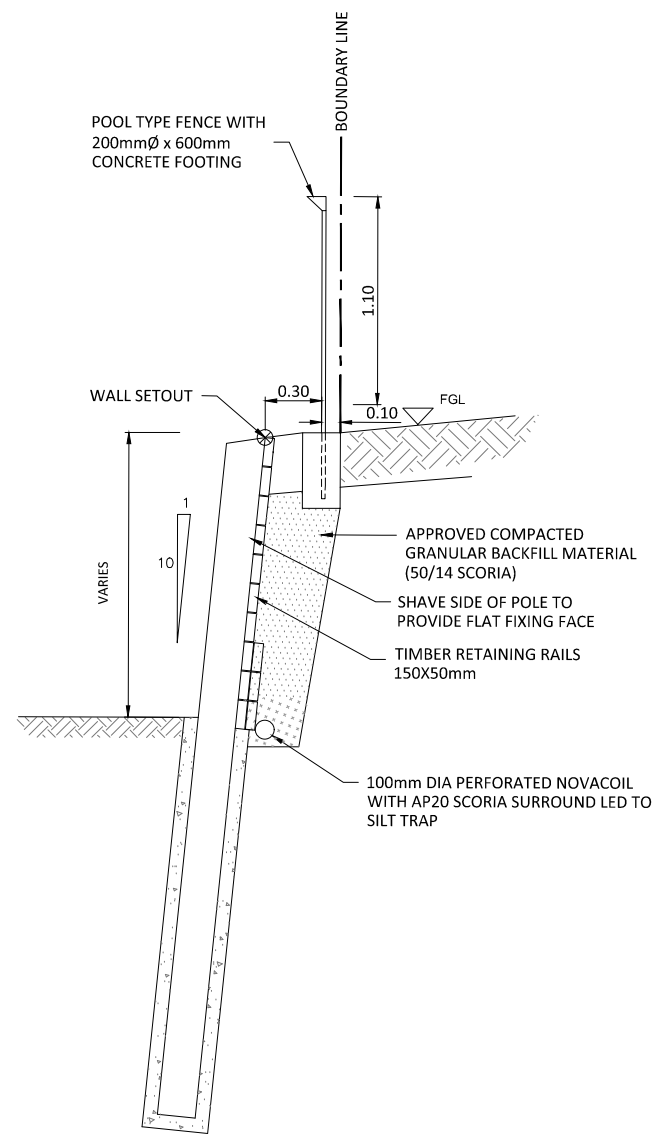
REVISION	CHANGES	CHECKED	DATE
4	RW 6 LOWERED		04/02/19
3	RW 4 & 5 REMOVED		14/01/19
2	WALL HEIGHTS REDUCED		05/12/18
1	RC QUERIES - WALL 5		18/11/18
0	ORIGINAL ISSUE		7/11/18

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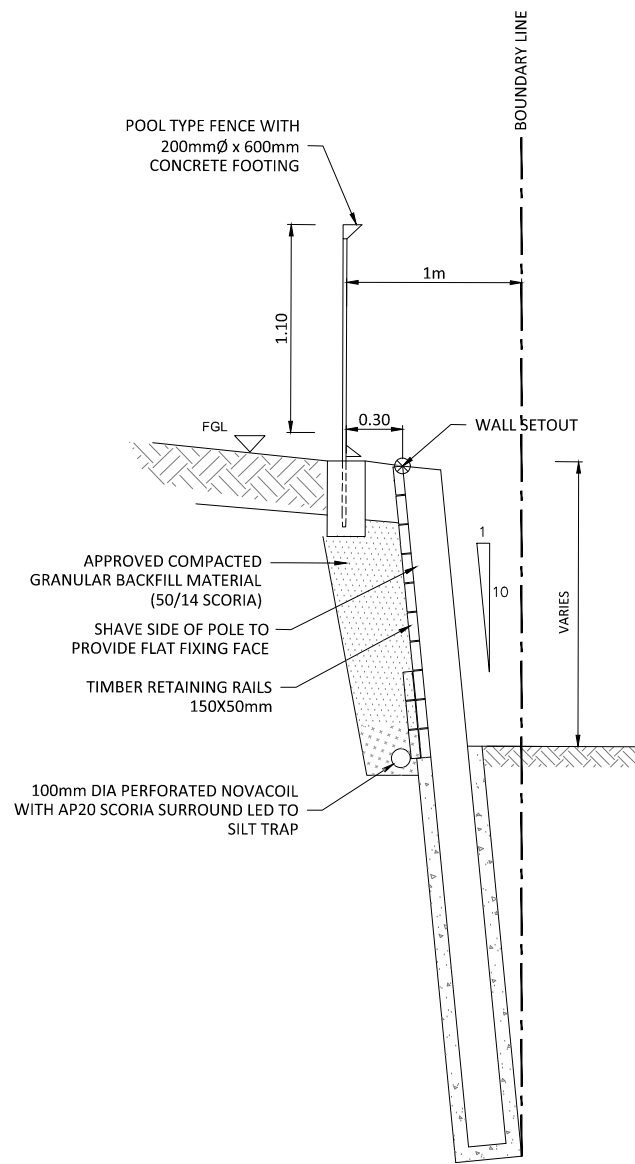
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CLIENT		POKORUA HOLDINGS LTD	
PROJECT		45 CONSTABLE ROAD WAIUKU	
TITLE		RETAINING WALL ELEVATIONS	
DATE	DEC 2018	SCALE	A1 1:500
DRAWN	SH		A3 1:1000
DESIGNED	SH		
PROJECT No	1231	DRAWING No	C240
		REVISION	4



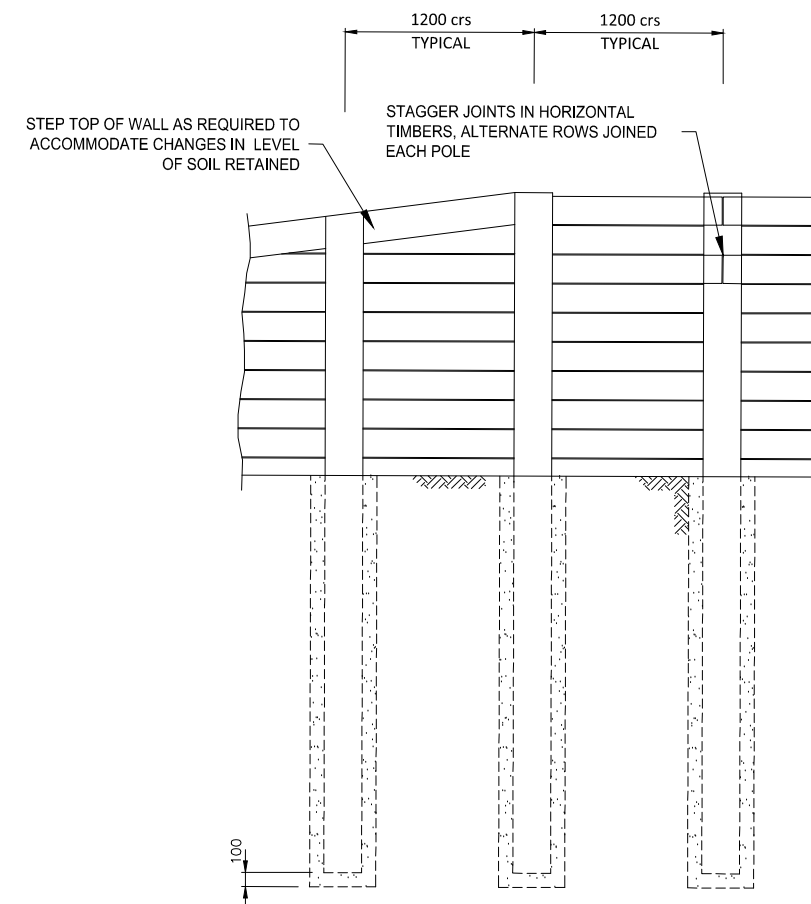
RETAINING WALL TYPICAL DETAIL
SCALE : A1 @ 1:20 & A3 @ 1:40




RETAINING WALL TYPICAL DETAIL
SCALE : A1 @ 1:20 & A3 @ 1:40

NOTES: (WALL)

- REFER SITE PLAN FOR THE LOCATION AND EXTENT OF THE TIMBER POLE RETAINING WALLS.
- CONSTRUCTION OF TIMBER POLE RETAINING WALL SHALL BE IN ACCORDANCE WITH THIS DRAWING UNLESS OTHERWISE APPROVED BY THE DESIGN ENGINEER.
- ALL TIMBER POLES SHALL BE H5 TREATED RADIATA PINE IN ACCORDANCE WITH NZS3603:1990 UNLESS OTHERWISE SPECIFIED.
- ALL TIMBER POLES SHALL HAVE CONCRETE ENCASEMENT BELOW THE GROUND LEVEL WITH A MINIMUM OF 75mm SIDE COVER AND 100mm AT THE BASE.
- THE TIMBER RAILINGS SHALL BE ex 150 x 50 OR ex 200 x 50 H5 TREATED RADIATA PINE AND SHALL BE FIXED TO THE POLES WITH GALVANISED NAILS. CUTTING OF TIMBERS SHALL BE AVOIDED WHEREVER POSSIBLE. IF CUTTING IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPHTHENATE TYPE OF WOOD PRESERVATIVE.
- THE MAXIMUM RETAINING HEIGHT SHALL BE AS SPECIFIED ON THE DRAWING AND SHALL NOT BE EXCEEDED UNLESS APPROVED BY THE DESIGN ENGINEER IN WRITING.
- THE CHARACTERISTIC COMPRESSIVE STRENGTH OF CONCRETE SHALL BE $f_c' = 17.5$ MPa UNLESS OTHERWISE NOTED. NOTE: $f_c' = 20$ MPa FOR CONCRETE WALLS AND STAIRS.
- THE CONCRETE ENCASEMENT SHALL BE ADEQUATELY VIBRATED WITH A PENCIL VIBRATOR TO AVOID "HONEY-COMBING".
- THE EXTENT OF EXCAVATION REQUIRED SHALL BE MARKED OUT ON THE GROUND HAVING REGARD TO THE POSITIONS OF POLES, WORKING SPACE FOR CONSTRUCTION, THE BACKFILL REQUIRED AND DRAINAGE PROVISIONS.
- EXCAVATIONS FOR FOUNDATIONS SHALL BE TAKEN OUT BY AUGURING TO THE DIMENSIONS DETAILED, WITH ALL SURPLUS SOLID BEING DISPOSED OFF AWAY FROM THE SITE. ALLOWANCE SHALL BE MADE IN POSITIONING AUGURED HOLES FOR THE SLOPE OF THE WALL AND FOR CONCRETE SURROUND TO POLES. DRIVING OF POLES IS NOT ACCEPTABLE AS AN ALTERNATIVE TO AUGURING, UNLESS OTHERWISE APPROVED BY THE DESIGN ENGINEER.
- A PERFORATED OR OPEN JOINTED SUBSOIL DRAIN SHALL BE LAID AND SURROUNDED IN FINE GRANULAR MATERIAL WITH INVERT BELOW GROUND LEVELS AND LED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE.
- REFER SPECIFICATION FOR DETAILS OF CONSTRUCTION AND MATERIAL SPECIFICATION.
- THE CONTRACTOR SHALL REFER TO THE DESIGN ENGINEER AS SOON AS POSSIBLE FOR FURTHER INSTRUCTION SHOULD ANY UNFORESEEN CIRCUMSTANCES OR ABNORMAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION.
- THE CONTRACTOR SHALL CHECK ALL SERVICES PLANS AND LOCATE ALL SERVICES ON SITE.
- WIND LOADING ON FENCE HAS NOT BEEN ASSESSED



WALL ELEVATION TYPICAL DETAIL
SCALE : A1 @ 1:20 & A3 @ 1:40


LUC60111076-A LUC60271724-A
 Approved Resource Consent Plan
 17/04/2019

REVISION	CHANGES	CHECKED	DATE
0	ORIGINAL ISSUE		1/11/18

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CLIENT	POKURUA HOLDING LTD		
PROJECT	45 CONSTABLE ROAD WAIUKU		
TITLE	RETAINING WALL DETAILS		
DATE	APRIL 2018	SCALE	A1 1:500
DRAWN	SH		A3 1:1000
DESIGNED	SH		
PROJECT No	1231	DRAWING No	C250
		REVISION	0

APPENDIX B:

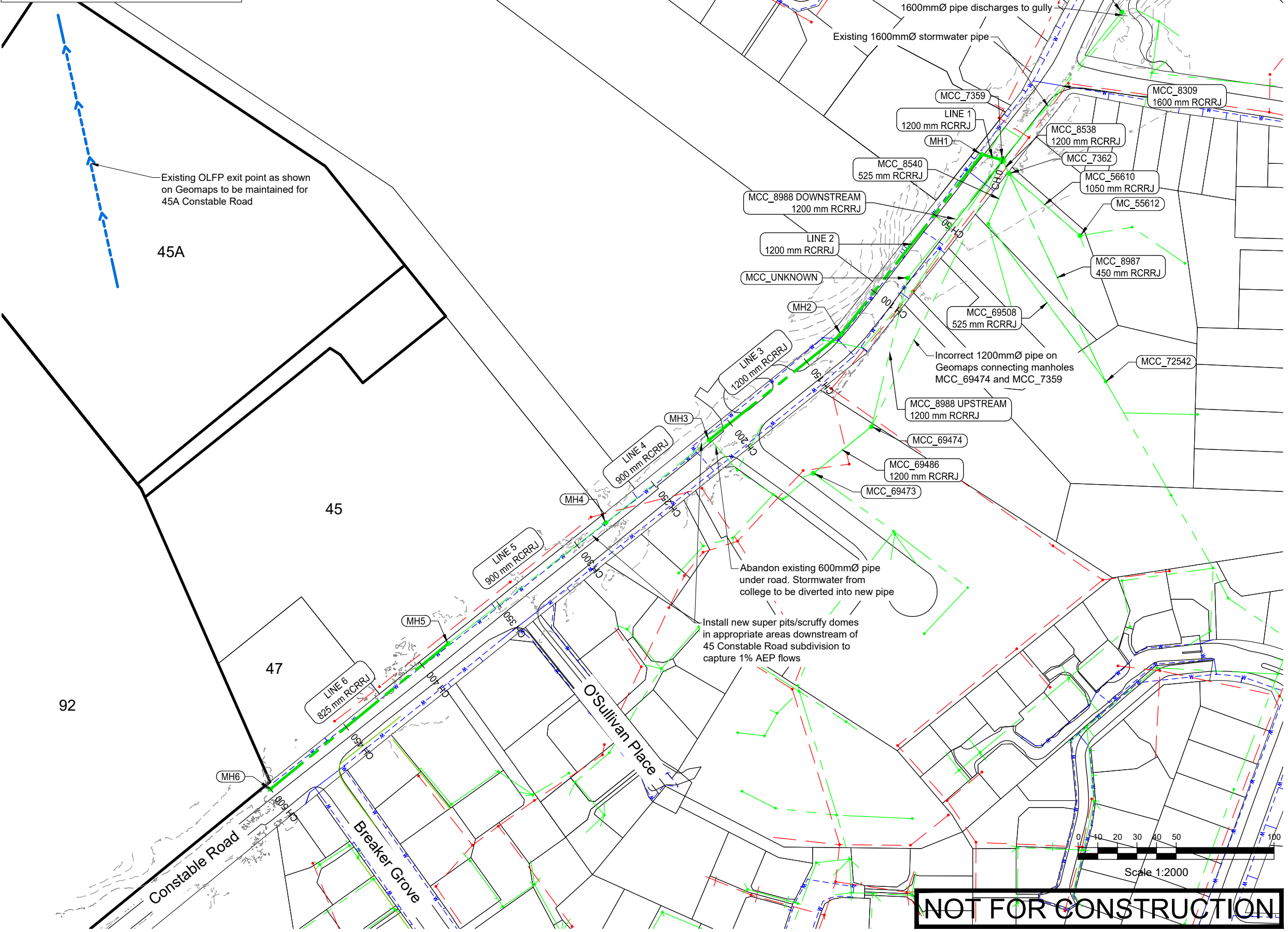
FRASER THOMAS LIMITED STORMWATER UPGRADE PLAN

Legend

- Proposed stormwater pipe
- - - Existing stormwater pipe
- - - Existing wastewater pipe
- - - Existing watermain
- - - Existing contours (@1m interval)

SURVEYED	TB	10/06/21	APPROVED	SF	DATE
DESIGNED	TB	10/06/21		SF	10/06/21
DRAWN	TB	10/06/21		SF	10/06/21
CHECKED	SF	10/06/21		SF	10/06/21

REVISION	CHANGES	CHECKED	DATE
A	SURVEYED PIPES ADDED	SF	25/06/21
B	ASBUILT PIPES ADDED	SF	07/07/21



NOTES

CLIENT
GARDON TRUST

PROJECT
**O'HARA WAIUKU PLAN CHANGE
45A, 92 & 130 CONSTABLE ROAD
WAIUKU**

TITLE
**PROPOSED CONSTABLE ROAD
STORMWATER UPGRADE PLAN**



Fraser Thomas
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND 09 278 7078
 NAPIER 06 211 2766
 CHRISTCHURCH 03 358 5936
 BLENHEIM 03 428 3293

www.fraserthomas.co.nz

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STATUS
PLAN CHANGE

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE	1:2000	(A3)
DRAWING No	32897/205	REVISION
		B

NOT FOR CONSTRUCTION

APPENDIX C:

WASTEWATER CAPACITY CALCULATIONS



LEGEND

- RESIDENTIAL LOTS TO MH 5
- RESIDENTIAL LOTS TO MH 10
- RESIDENTIAL LOTS TO MH 12
- RESIDENTIAL LOTS TO MH 14
- RESIDENTIAL LOTS TO MH 17
- RESIDENTIAL LOTS TO MH 22
- FUTURE RESIDENTIAL LOTS TO MH 5
- FUTURE RESIDENTIAL LOTS TO MH 10
- FUTURE RESIDENTIAL LOTS TO MH 12
- FUTURE RESIDENTIAL LOTS TO MH 14
- FUTURE RESIDENTIAL LOTS TO MH 17
- INDUSTRIAL BUILDING FOOTPRINT TO MH 0
- INDUSTRIAL BUILDING FOOTPRINT TO MH 1
- INDUSTRIAL BUILDING FOOTPRINT TO MH 5
- INDUSTRIAL BUILDING FOOTPRINT TO MH 6
- INDUSTRIAL BUILDING FOOTPRINT TO MH 8
- INDUSTRIAL BUILDING FOOTPRINT TO MH 10
- INDUSTRIAL BUILDING FOOTPRINT TO MH 11
- INDUSTRIAL BUILDING FOOTPRINT TO MH 12
- INDUSTRIAL BUILDING FOOTPRINT TO MH 12A
- INDUSTRIAL BUILDING FOOTPRINT TO MH 14
- INDUSTRIAL BUILDING FOOTPRINT TO MH 17
- FUTURE INDUSTRIAL LAND

FOR INFORMATION

A	MH B AND MH C ADDED	VC	29/06/21
0	ORIGINAL ISSUE	VC	24/06/21
REVISION	CHANGES	CHECKED	DATE

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POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT	KARIKARI EXPRESS LTD		
PROJECT	45 CONSTABLE ROAD, WAIUKU (LOT 101)		
TITLE	WASTEWATER CATCHMENT PLAN		
DRAWN	LG	SCALE	A1 1:2000
DESIGNED	LG		A3 1:4000
PROJECT No	1231	DRAWING No	C550
		REVISION	A

Wastewater Design Flow - 45 Constable Rd, Wiauku (Incl. future development)

COLEBROOK WHITE

COLEBROOK WHITE

Diameter in mm	Pipe Grade	k	Q in l/s	V in m/s
150	0.60%	1.5	11.95	0.7
k= 1.5 for wastewater				0.75

	THIS DEVELOPMENT	FUTURE DEVELOPMENT	COMBINED	
Commercial/Retail	DISCHARGE	DISCHARGE	DISCHARGE	
	Calculating discharge	Calculating discharge	Calculating discharge	
No. of Units (Office/Retail)	0	0	0	
Floor Area	0 m2	0 m2	0 m2	
Design Flow (Light Commercial)	4.5 L/m2/d	4.5 L/m2/d	4.5 L/m2/d	
ADWF (Light Commercial)	0.0 L/s	0.0 L/s	0.0 L/s	
Normal PDWF	5	5	5	
Self Clensing Flow	0.0 L/s	0.0 L/s	0.0 L/s	
PWWF	6.7	6.7	6.7	
Peak Design Flow	0.0 L/s	0.0 L/s	0.0 L/s	
Residential	DISCHARGE	DISCHARGE	DISCHARGE	
	Calculating discharge	Calculating discharge	Calculating discharge	
No. of Units	48	55	103	
No. of People / unit	3	3	3	Number of people per dwelling
Design Flow (Residential)	180 Litre/(person*day)	180 Litre/(person*day)	180 Litre/(person*day)	Average Dry Weather Flow (ADWF)
ADWF (Residential)	0.3 L/s	0.3 L/s	0.6 L/s	
Normal PDWF	3	3	3	Peak Dry Weather Flow (PDWF)
Self Clensing Flow	0.9 L/s	1.0 L/s	1.9 L/s	
PWWF	6.7	6.7	6.7	
Peak Design Flow	2.0 L/s	2.3 L/s	4.3 L/s	
Total PDWF	0.90 L/s	1.03 L/s	1.93 L/s	
Check percentage full	8% OK	9% OK	16% OK	Flow depth to be less than 50% full for PDWF
Peak Design Flow	2.01 L/s	2.30 L/s	4.31 L/s	
Full Capacity > PWWF	OK	OK	OK	
Spare Capacity	9.94 L/s	9.65 L/s	7.64 L/s	

1500 Litres per day per person
Peak Wet Weather Flow (PWWF)

45 Constable Rd, Waiuku

Existing Pipe Summary (taken from Auckland Council's GeoMaps)

Level 1 network assessment using Watercare Code of Practice Section 5.3.5.1.2

Date: 22/06/2021

Calcs by: LG

NOTES:

Pipe capacity calculations use Colebrook White Formula

$k_s = 1.5$

 = assumptions made, as stated

Existing Pipe Info												
Upstream MH ID	Downstream MH ID	Upstream IL (m)	Upstream MH Comments	Downstream IL (m)	Downstream MH Comments	Pipe length (m)	Pipe Dia (mm)	Pipe Material	Comments	approx. gradient (%)	Max Pipe Velocity (m/s)	Pipe Capacity (l/s)
MH 22	MH 21	14.02		13.69		28.70	150	PVC	Length measured on GIS	1.1%	0.94	16.7
MH 21	MH 20	13.69		12.30		85.50	150	PVC	Length measured on GIS	1.6%	1.12	19.8
MH 20	MH 19	12.30		11.49		53.20	150	PVC	Length measured on GIS	1.5%	1.09	19.2
MH 19	MH 18	11.49		9.17		58.90	150	PVC	Length measured on GIS	3.9%	1.75	30.9
MH 18	MH 17	9.17		8.41		32.46	150	PVC		2.3%	1.35	23.8
MH 17	MH 16	8.41		7.92	GIS IL=7.34 (impossible), therefore assumed at constant grade)	49.18	150	PVC		1.0%	0.88	15.6
MH 16	MH 15	7.92	GIS IL=7.34 (impossible), therefore assumed at constant grade between known MHs)	7.68		23.67	150	PVC		1.0%	0.88	15.6
MH 15	MH 14	7.68	Surveyed	7.56	Surveyed	21.95	200	AC	Surveyed	0.5%	0.79	24.8
MH 14	MH 13	7.53	Surveyed	7.16	Surveyed	74.28	200	AC	Surveyed	0.5%	0.75	23.6
MH 13	MH 12A	6.60	Surveyed	6.30	Surveyed	51.48	200	AC	Surveyed	0.6%	0.81	25.6
MH 12A	MH 12	6.28	Surveyed	5.70	Surveyed	47.28	200	AC	Surveyed	1.2%	1.18	37.1
MH 12	MH 11	5.64	Surveyed	5.44	Surveyed	34.60	200	AC	Surveyed	0.6%	0.81	25.5
MH 11	MH 10	5.39	Surveyed	4.88	Surveyed	102.58	200	AC	Surveyed	0.5%	0.75	23.6
MH 10	MH 9	4.85	Surveyed	4.72	Surveyed	19.18	200	uPVC	Surveyed	0.7%	0.88	27.6
MH 9	MH 8	4.67	Surveyed	4.53	Surveyed	79.68	200	uPVC	Surveyed	0.2%	0.45	14.0
MH 8	MH 7	4.48	Surveyed	4.36	Surveyed	25.28	225	uPVC	Surveyed	0.5%	0.79	31.6
MH 7	MH 6	4.31	Surveyed	4.21		20.47	250	RCRRJ	Surveyed	0.5%	0.86	42.4
MH 6	MH 5	4.21		3.77	Inlet invert assumed to be 50mm above outlet invert	58.24	250	RCRRJ	Surveyed	0.8%	1.07	52.7
MH 5	MH 3	3.72	Surveyed	3.23	Surveyed	88.67	250	RCRRJ	Surveyed	0.6%	0.92	45.1
MH 3	MH 2	3.19	No IL or DTI	2.90	no IL, DTI = 2.8, LL approx 5.7, IL therefore assumed	47.46	250	RCRRJ	GIS says 200 PVC, which must be incorrect.	0.6%	0.96	47.0
MH 2	MH 1	2.90	no IL, DTI = 2.8, LL approx 5.7, IL therefore assumed	2.35	no IL, DTI = 3.85, LL approx 6.2, IL therefore assumed	20.79	250	RCRRJ	GIS says 200 PVC, which must be incorrect.	2.6%	2.01	98.6
MH 1	MH 0	2.35	no IL, DTI = 3.85, LL approx 6.2, IL therefore assumed	1.80	no IL, DTI = 2.6, LL approx 4.4, IL therefore assumed	34.00	250	RCRRJ	GIS says 150 AC, which must be incorrect.	1.6%	1.57	77.1
MH 0	MH C	1.80	no IL, DTI = 2.6, LL approx 4.4, IL therefore assumed	0.35	no IL, DTI = 3.4, LL approx 3.75, IL therefore assumed	35.00	250	RCRRJ	Length measured on GIS. GIS says 200 AC, which must be incorrect.	4.1%	2.51	123.4
MH C	MH B	0.35	no IL, DTI = 3.4, LL approx 3.75, IL therefore assumed	-0.15	no IL, DTI = 4.8, LL approx 4.65, IL therefore assumed	47.00	250	RCRRJ	Length measured on GIS. GIS says 200 AC, which must be incorrect.	1.1%	1.27	62.5

Existing Capacity Workings (I.e Excluding Proposed Development Flows)

Upstream MH ID	Downstream MH ID	Residential									Industrial						School (Waiuku College)										
		New Residential Units	Cumulative Residential Units	Assumed Occupancy	Daily discharge (l/p/d)	ADWF (Residential) (l/s)	Normal PDWF	PWWF	Self Clensing Design Flow (l/s)	Peak Design Flow (l/s)	Approx New Industrial Building Area (m2)	Approx Cumulative Industrial Building Area (m2)	Daily discharge (l/m2/d)	ADWF (Commercial)	Normal PDWF	PWWF	Self Clensing Design Flow (l/s)	Peak Design Flow (l/s)	Student numbers from website	Student Demand per person (l/p/d)	Staff (assumed @ 25/student)	Staff Demand per person (l/p/d)	ADWF (School) (7hr day)	Normal PDWF	PWWF	Self Clensing Design Flow (l/s)	Peak Design Flow (l/s)
MH 22	MH 21	1	1	3	180	0.01	3	6.7	0.02	0.04	0	0	4.5	0.00	5	6.7	0.00	0.00								0.00	0.00
MH 21	MH 20	0	1	3	180	0.01	3	6.7	0.02	0.04	0	0	4.5	0.00	5	6.7	0.00	0.00								0.00	0.00
MH 20	MH 19	0	1	3	180	0.01	3	6.7	0.02	0.04	0	0	4.5	0.00	5	6.7	0.00	0.00								0.00	0.00
MH 19	MH 18	0	1	3	180	0.01	3	6.7	0.02	0.04	0	0	4.5	0.00	5	6.7	0.00	0.00								0.00	0.00
MH 18	MH 17	0	1	3	180	0.01	3	6.7	0.02	0.04	0	0	4.5	0.00	5	6.7	0.00	0.00								0.00	0.00
MH 17	MH 16	163	164	3	180	1.03	3	6.7	3.08	6.87	1590	1590	4.5	0.08	5	6.7	0.41	0.55								0.00	0.00
MH 16	MH 15	0	164	3	180	1.03	3	6.7	3.08	6.87	0	1590	4.5	0.08	5	6.7	0.41	0.55								0.00	0.00
MH 15	MH 14	0	164	3	180	1.03	3	6.7	3.08	6.87	0	1590	4.5	0.08	5	6.7	0.41	0.55								0.00	0.00
MH 14	MH 13	51	215	3	180	1.34	3	6.7	4.03	9.00	2076	3666	4.5	0.19	5	6.7	0.95	1.28								0.00	0.00
MH 13	MH 12A	0	215	3	180	1.34	3	6.7	4.03	9.00	0	3666	4.5	0.19	5	6.7	0.95	1.28	950	20	38	45	0.82	2	6.7	1.64	5.51
MH 12A	MH 12	0	215	3	180	1.34	3	6.7	4.03	9.00	739	4405	4.5	0.23	5	6.7	1.15	1.54								0.82	5.51
MH 12	MH 11	12	227	3	180	1.42	3	6.7	4.26	9.51	2716	7121	4.5	0.37	5	6.7	1.85	2.48								0.82	5.51
MH 11	MH 10	0	227	3	180	1.42	3	6.7	4.26	9.51	581	7702	4.5	0.40	5	6.7	2.01	2.69								0.82	5.51
MH 10	MH 9	44	271	3	180	1.69	3	6.7	5.08	11.35	7323	15025	4.5	0.78	5	6.7	3.91	5.24								0.82	5.51
MH 9	MH 8	0	271	3	180	1.69	3	6.7	5.08	11.35	0	15025	4.5	0.78	5	6.7	3.91	5.24								0.82	5.51
MH 8	MH 7	0	271	3	180	1.69	3	6.7	5.08	11.35	3328	18353	4.5	0.96	5	6.7	4.78	6.40								0.82	5.51
MH 7	MH 6	0	271	3	180	1.69	3	6.7	5.08	11.35	0	18353	4.5	0.96	5	6.7	4.78	6.40								0.82	5.51
MH 6	MH 5	0	271	3	180	1.69	3	6.7	5.08	11.35	5238	23591	4.5	1.23	5	6.7	6.14	8.23								0.82	5.51
MH 5	MH 3	3	274	3	180	1.71	3	6.7	5.14	11.47	4925	28516	4.5	1.49	5	6.7	7.43	9.95								0.82	5.51
MH 3	MH 2	0	274	3	180	1.71	3	6.7	5.14	11.47	0	28516	4.5	1.49	5	6.7	7.43	9.95								0.82	5.51
MH 2	MH 1	0	274	3	180	1.71	3	6.7	5.14	11.47	0	28516	4.5	1.49	5	6.7	7.43	9.95								0.82	5.51
MH 1	MH 0	0	274	3	180	1.71	3	6.7	5.14	11.47	1247	29763	4.5	1.55	5	6.7	7.75	10.39								0.82	5.51
MH 0	MH C	339	613	3	180	3.83	3	6.7	11.49	25.67	11095	40858	4.5	2.13	5	6.7	10.64	14.26								0.82	5.51
MH C	MH B	0	613	3	180	3.83	3	6.7	11.49	25.67	0	40858	4.5	2.13	5	6.7	10.64	14.26								0.82	5.51

Notes & Assumptions

Commercial buildings are generally warehouses, therefore for ease of calculations, all commercial property is assumed as Dry Industrial, light water use
 Unsure where the school connects into, so have assumed worst case scenario that it is in this network, and connects to MH 13

Summary

Upstream MH ID	Downstream MH ID	Actual Pipe Capacity (from earlier table) (l/s)	Daily Discharge (ADWF)						Self Clensing Design Flow (PDWF)						Peak Design Flow (PWWF)					
			Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)	Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)	Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)
MH 22	MH 21	16.68	0.01	0.00	0.00	0.01	16.68	100.0%	0.02	0.00	0.00	0.02	16.66	99.9%	0.04	0.00	0.00	0.04	16.64	99.7%
MH 21	MH 20	19.84	0.01	0.00	0.00	0.01	19.83	100.0%	0.02	0.00	0.00	0.02	19.82	99.9%	0.04	0.00	0.00	0.04	19.80	99.8%
MH 20	MH 19	19.20	0.01	0.00	0.00	0.01	19.19	100.0%	0.02	0.00	0.00	0.02	19.18	99.9%	0.04	0.00	0.00	0.04	19.16	99.8%
MH 19	MH 18	30.88	0.01	0.00	0.00	0.01	30.88	100.0%	0.02	0.00	0.00	0.02	30.86	99.9%	0.04	0.00	0.00	0.04	30.84	99.9%
MH 18	MH 17	23.81	0.01	0.00	0.00	0.01	23.80	100.0%	0.02	0.00	0.00	0.02	23.79	99.9%	0.04	0.00	0.00	0.04	23.77	99.8%
MH 17	MH 16	15.57	1.03	0.08	0.00	1.11	14.47	92.9%	3.08	0.41	0.00	3.49	12.08	77.6%	6.87	0.55	0.00	7.42	8.15	52.3%
MH 16	MH 15	15.57	1.03	0.08	0.00	1.11	14.47	92.9%	3.08	0.41	0.00	3.49	12.08	77.6%	6.87	0.55	0.00	7.42	8.15	52.3%
MH 15	MH 14	24.76	1.03	0.08	0.00	1.11	23.65	95.5%	3.08	0.41	0.00	3.49	21.27	85.9%	6.87	0.55	0.00	7.42	17.34	70.0%
MH 14	MH 13	23.63	1.34	0.19	0.00	1.53	22.10	93.5%	4.03	0.95	0.00	4.99	18.65	78.9%	9.00	1.28	0.00	10.28	13.35	56.5%
MH 13	MH 12A	25.56	1.34	0.19	0.82	2.36	23.21	90.8%	4.03	0.95	1.64	6.63	18.93	74.1%	9.00	1.28	5.51	15.79	9.78	38.2%
MH 12A	MH 12	37.10	1.34	0.23	0.82	2.40	34.70	93.5%	4.03	1.15	0.00	5.18	31.92	86.0%	9.00	1.54	5.51	16.05	21.05	56.7%
MH 12	MH 11	25.46	1.42	0.37	0.82	2.61	22.85	89.7%	4.26	1.85	1.64	7.75	17.71	69.5%	9.51	2.48	5.51	17.50	7.96	31.3%
MH 11	MH 10	23.61	1.42	0.40	0.82	2.64	20.97	88.8%	4.26	2.01	1.64	7.91	15.71	66.5%	9.51	2.69	5.51	17.70	5.91	25.0%
MH 10	MH 9	27.57	1.69	0.78	0.82	3.30	24.27	88.0%	5.08	3.91	1.64	10.64	16.93	61.4%	11.35	5.24	5.51	22.10	5.47	19.9%
MH 9	MH 8	14.03	1.69	0.78	0.82	3.30	10.73	76.5%	5.08	3.91	1.64	10.64	3.39	24.2%	11.35	5.24	5.51	22.10	-8.07	-57.5%
MH 8	MH 7	31.56	1.69	0.96	0.82	3.47	28.09	89.0%	5.08	4.78	1.64	11.50	20.06	63.5%	11.35	6.40	5.51	23.26	8.30	26.3%
MH 7	MH 6	42.36	1.69	0.96	0.82	3.47	38.89	91.8%	5.08	4.78	1.64	11.50	30.86	72.8%	11.35	6.40	5.51	23.26	19.10	45.1%
MH 6	MH 5	52.69	1.69	1.23	0.82	3.74	48.94	92.9%	5.08	6.14	1.64	12.87	39.82	75.6%	11.35	8.23	5.51	25.09	27.60	52.4%
MH 5	MH 3	45.06	1.71	1.49	0.82	4.02	41.04	91.1%	5.14	7.43	1.64	14.21	30.85	68.5%	11.47	9.95	5.51	26.93	18.13	40.2%
MH 3	MH 2	47.04	1.71	1.49	0.82	4.02	43.02	91.5%	5.14	7.43	1.64	14.21	32.84	69.8%	11.47	9.95	5.51	26.93	20.11	42.8%
MH 2	MH 1	98.61	1.71	1.49	0.82	4.02	94.59	95.9%	5.14	7.43	1.64	14.21	84.40	85.6%	11.47	9.95	5.51	26.93	71.68	72.7%
MH 1	MH 0	77.11	1.71	1.55	0.82	4.08	73.02	94.7%	5.14	7.75	1.64	14.53	62.57	81.2%	11.47	10.39	5.51	27.37	49.74	64.5%
MH 0	MH C	123.41	3.83	2.13	0.82	6.78	116.63	94.5%	11.49	10.64	1.64	23.78	99.63	80.7%	25.67	14.26	5.51	45.43	77.97	63.2%
MH C	MH B	62.52	3.83	2.13	0.82	6.78	55.74	89.2%	11.49	10.64	1.64	23.78	38.75	62.0%	25.67	14.26	5.51	45.43	17.09	27.3%

Capacity Workings (Including Proposed Development Flows)

		Residential									Industrial									School (Waiuku College)									
Upstream MH ID	Downstream MH ID	Residential Units	Cumulative Residential Units	Assumed Occupancy	Daily Discharge (l/p/d)	ADWF (Residential) (l/s)	Normal PDWF	PWWF	Self Cleansing Design Flow (l/s)	Peak Design Flow (l/s)	Approx Existing Industrial Building Area (m2)	Approx New Industrial Land Area (m2)	Approx. New Industrial Building Area (50% land area) (m2)	Approx Cumulative Industrial Building Area (m2)	Daily discharge (l/m2/d)	ADWF (Commercial)	Normal PDWF	PWWF	Self Cleansing Design Flow (l/s)	Peak Design Flow (l/s)	Student numbers from website	Student Demand per person (l/p/d)	Staff (assumed @ 25/student)	Staff Demand per person (l/p/d)	ADWF (School) (7hr day)	Normal PDWF	PWWF	Self Cleansing Design Flow (l/s)	Peak Design Flow (l/s)
MH 22	MH 21	1	1	3	180	0.01	3	6.7	0.02	0.04	0	0	0	0	4.5	0.00	5	6.7	0.00	0.00					0.00			0.00	0.00
MH 21	MH 20	77	78	3	180	0.49	3	6.7	1.46	3.27	0	0	0	0	4.5	0.00	5	6.7	0.00	0.00					0.00			0.00	0.00
MH 20	MH 19	3	81	3	180	0.51	3	6.7	1.52	3.39	0	0	0	0	4.5	0.00	5	6.7	0.00	0.00					0.00			0.00	0.00
MH 19	MH 18	23	104	3	180	0.65	3	6.7	1.95	4.36	0	0	0	0	4.5	0.00	5	6.7	0.00	0.00					0.00			0.00	0.00
MH 18	MH 17	0	104	3	180	0.65	3	6.7	1.95	4.36	0	0	0	0	4.5	0.00	5	6.7	0.00	0.00					0.00			0.00	0.00
MH 17	MH 16	221	325	3	180	2.03	3	6.7	6.09	13.61	1590	0	0	1590	4.5	0.08	5	6.7	0.41	0.55					0.00			0.00	0.00
MH 16	MH 15	0	325	3	180	2.03	3	6.7	6.09	13.61	0	0	0	1590	4.5	0.08	5	6.7	0.41	0.55					0.00			0.00	0.00
MH 15	MH 14	0	325	3	180	2.03	3	6.7	6.09	13.61	0	12966	6483	8073	4.5	0.42	5	6.7	2.10	2.82					0.00			0.00	0.00
MH 14	MH 13	54	379	3	180	2.37	3	6.7	7.11	15.87	2076	0	0	10149	4.5	0.53	5	6.7	2.64	3.54					0.00			0.00	0.00
MH 13	MH 12A	0	379	3	180	2.37	3	6.7	7.11	15.87	0	0	0	10149	4.5	0.53	5	6.7	2.64	3.54	950	20	38	45	0.82	2	6.7	1.64	5.51
MH 12A	MH 12	0	379	3	180	2.37	3	6.7	7.11	15.87	739	3567	1784	12672	4.5	0.66	5	6.7	3.30	4.42					0.82			1.64	5.51
MH 12	MH 11	15	394	3	180	2.46	3	6.7	7.39	16.50	2716	2611	1306	16693	4.5	0.87	5	6.7	4.35	5.83					0.82			1.64	5.51
MH 11	MH 10	0	394	3	180	2.46	3	6.7	7.39	16.50	581	1676	838	18112	4.5	0.94	5	6.7	4.72	6.32					0.82			1.64	5.51
MH 10	MH 9	50	444	3	180	2.78	3	6.7	8.33	18.59	7323	1705	853	26288	4.5	1.37	5	6.7	6.85	9.17					0.82			1.64	5.51
MH 9	MH 8	0	444	3	180	2.78	3	6.7	8.33	18.59	0	0	0	26288	4.5	1.37	5	6.7	6.85	9.17					0.82			1.64	5.51
MH 8	MH 7	0	444	3	180	2.78	3	6.7	8.33	18.59	3328	0	0	29616	4.5	1.54	5	6.7	7.71	10.33					0.82			1.64	5.51
MH 7	MH 6	0	444	3	180	2.78	3	6.7	8.33	18.59	0	0	0	29616	4.5	1.54	5	6.7	7.71	10.33					0.82			1.64	5.51
MH 6	MH 5	0	444	3	180	2.78	3	6.7	8.33	18.59	5238	0	0	34854	4.5	1.82	5	6.7	9.08	12.16					0.82			1.64	5.51
MH 5	MH 3	4	448	3	180	2.80	3	6.7	8.40	18.76	4925	0	0	39779	4.5	2.07	5	6.7	10.36	13.88					0.82			1.64	5.51
MH 3	MH 2	0	448	3	180	2.80	3	6.7	8.40	18.76	0	0	0	39779	4.5	2.07	5	6.7	10.36	13.88					0.82			1.64	5.51
MH 2	MH 1	0	448	3	180	2.80	3	6.7	8.40	18.76	0	0	0	39779	4.5	2.07	5	6.7	10.36	13.88					0.82			1.64	5.51
MH 1	MH 0	0	448	3	180	2.80	3	6.7	8.40	18.76	1247	0	0	41026	4.5	2.14	5	6.7	10.68	14.32					0.82			1.64	5.51
MH 0	MH C	339	787	3	180	4.92	3	6.7	14.76	32.96	11095	2958	1479	53600	4.5	2.79	5	6.7	13.96	18.70					0.82			1.64	5.51
MH C	MH B	0	787	3	180	4.92	3	6.7	14.76	32.96	0	0	0	53600	4.5	2.79	5	6.7	13.96	18.70					0.82			1.64	5.51

Notes & Assumptions

Commercial buildings are generally warehouses, therefore for ease of calculations, all commercial property is assumed as Dry Industrial, light water use
 Unsure where the school connects into. It is possible that it doesn't connect to this network, however we have assumed worst case scenario that it connects to MH 13

Summary

Upstream MH ID	Downstream MH ID	Actual Pipe Capacity (from earlier table) (l/s)	Daily Discharge (ADWF)					Self Cleansing Design Flow (PDWF)					Peak Design Flow (PWWF)							
			Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)	Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)	Residential Peak Design Flow (l/s)	Industrial Peak Design Flow (l/s)	School Peak Design Flow (l/s)	Combined Flow (l/s)	spare capacity (negative = over capacity) (l/s)	spare capacity percentage (negative = over capacity)
MH 22	MH 21	16.68	0.01	0.00	0.00	0.01	16.68	100.0%	0.02	0.00	0.00	0.02	16.66	99.9%	0.04	0.00	0.00	0.04	16.64	99.7%
MH 21	MH 20	19.84	0.49	0.00	0.00	0.49	19.35	97.5%	1.46	0.00	0.00	1.46	18.38	92.6%	3.27	0.00	0.00	3.27	16.57	83.5%
MH 20	MH 19	19.20	0.51	0.00	0.00	0.51	18.69	97.4%	1.52	0.00	0.00	1.52	17.68	92.1%	3.39	0.00	0.00	3.39	15.81	82.3%
MH 19	MH 18	30.88	0.65	0.00	0.00	0.65	30.23	97.9%	1.95	0.00	0.00	1.95	28.93	93.7%	4.36	0.00	0.00	4.36	26.53	85.9%
MH 18	MH 17	23.81	0.65	0.00	0.00	0.65	23.16	97.3%	1.95	0.00	0.00	1.95	21.86	91.8%	4.36	0.00	0.00	4.36	19.45	81.7%
MH 17	MH 16	15.57	2.03	0.08	0.00	2.11	13.46	86.4%	6.09	0.41	0.00	6.51	9.07	58.2%	13.61	0.55	0.00	14.16	1.41	9.0%
MH 16	MH 15	15.57	2.03	0.08	0.00	2.11	13.46	86.4%	6.09	0.41	0.00	6.51	9.07	58.2%	13.61	0.55	0.00	14.16	1.41	9.0%
MH 15	MH 14	24.76	2.03	0.42	0.00	2.45	22.31	90.1%	6.09	2.10	0.00	8.20	16.56	66.9%	13.61	2.82	0.00	16.43	8.33	33.7%
MH 14	MH 13	23.63	2.37	0.53	0.00	2.90	20.74	87.7%	7.11	2.64	0.00	9.75	13.88	58.7%	15.87	3.54	0.00	19.41	4.22	17.9%
MH 13	MH 12A	25.56	2.37	0.53	0.82	3.72	21.84	85.5%	7.11	2.64	1.64	11.39	14.17	55.4%	15.87	3.54	5.51	24.92	0.65	2.5%
MH 12A	MH 12	37.10	2.37	0.66	0.82	3.85	33.25	89.6%	7.11	3.30	1.64	12.05	25.05	67.5%	15.87	4.42	5.51	25.80	11.30	30.5%
MH 12	MH 11	25.46	2.46	0.87	0.82	4.15	21.31	83.7%	7.39	4.35	1.64	13.38	12.08	47.5%	16.50	5.83	5.51	27.83	-2.37	-9.3%
MH 11	MH 10	23.61	2.46	0.94	0.82	4.23	19.38	82.1%	7.39	4.72	1.64	13.75	9.86	41.8%	16.50	6.32	5.51	28.33	-4.71	-20.0%
MH 10	MH 9	27.57	2.78	1.37	0.82	4.97	22.61	82.0%	8.33	6.85	1.64	16.81	10.76	39.0%	18.59	9.17	5.51	33.27	-5.70	-20.7%
MH 9	MH 8	14.03	2.78	1.37	0.82	4.97	9.06	64.6%	8.33	6.85	1.64	16.81	-2.79	-19.9%	18.59	9.17	5.51	33.27	-19.24	-137.2%
MH 8	MH 7	31.56	2.78	1.54	0.82	5.14	26.42	83.7%	8.33	7.71	1.64	17.68	13.88	44.0%	18.59	10.33	5.51	34.43	-2.87	-9.1%
MH 7	MH 6	42.36	2.78	1.54	0.82	5.14	37.22	87.9%	8.33	7.71	1.64	17.68	24.68	58.3%	18.59	10.33	5.51	34.43	7.93	18.7%
MH 6	MH 5	52.69	2.78	1.82	0.82	5.41	47.27	89.7%	8.33	9.08	1.64	19.05	33.64	63.9%	18.59	12.16	5.51	36.26	16.43	31.2%
MH 5	MH 3	45.06	2.80	2.07	0.82	5.69	39.36	87.4%	8.40	10.36	1.64	20.40	24.65	54.7%	18.76	13.88	5.51	38.15	6.91	15.3%
MH 3	MH 2	47.04	2.80	2.07	0.82	5.69	41.35	87.9%	8.40	10.36	1.64	20.40	26.64	56.6%	18.76	13.88	5.51	38.15	8.90	18.9%
MH 2	MH 1	98.61	2.80	2.07	0.82	5.69	92.92	94.2%	8.40	10.36	1.64	20.40	78.21	79.3%	18.76	13.88	5.51	38.15	60.46	61.3%
MH 1	MH 0	77.11	2.80	2.14	0.82	5.76	71.35	92.5%	8.40	10.68	1.64	20.73	56.38	73.1%	18.76	14.32	5.51	38.58	38.52	50.0%
MH 0	MH C	123.41	4.92	2.79	0.82	8.53	114.88	93.1%	14.76	13.96	1.64	30.36	93.05	75.4%	32.96	18.70	5.51	57.17	66.24	53.7%
MH C	MH B	62.52	4.92	2.79	0.82	8.53	53.99	86.4%	14.76	13.96	1.64	30.36	32.17	51.4%	32.96	18.70	5.51	57.17	5.36	8.6%

☑ = Capacity issue (due to proposed development flows)

Based on the above summary, with consideration to the wastewater flows generated from the proposed development, capacity issues are shown in pipes between MH 12 and MH 7 for PWWF
 We also assumed that the commercial and residential flows peak at the same time when in reality this may not be the case.

APPENDIX D:

WATER SUPPLY PRESSURE TESTING



NOVA FLOWTEC SERVICES LTD
HYDRANT TESTING SPECIALISTS

E: info@novaflowtec.co.nz
T: 09 444 8375
PO Box 241, Albany Village, Auckland 0755
www.novaflowtec.co.nz

14th August 2018

Crang Consulting
PO Box 42-089
Orakei
Auckland

RE: Firefighting Water Supply at 45 Constable Road, Waiuku

Attention: Tom Henderson

Dear Tom

Nova Flowtec Services were engaged to conduct a FW2 hydrant flow test for the proposed development at the above address.

The testing was conducted on Monday 13th August at 9.32am.

The object of the testing was to prove that there is sufficient water for firefighting purposes.

Requirements:

In order to meet the FW2 minimum requirements of PAS 4509: 2008, 12.5Lps is required within 135m and an additional 12.5Lps is required within 270m of the development.

This being a total of 25Lps at a minimum residual pressure of 100kPa.

Results:

During testing the minimum requirement was exceeded with 32.8Lps at 450kPa being recorded. Please find the results table and the hydrant map on the following page.

Should you have any questions please do not hesitate to contact me.

Kind Regards

Jason Goodwin
Technical Manager

FW2 Water Classification Test

	Hydrant One	Hydrant Two	Total Flow (Lps)	Pressure (kPa)
			0	610
Flow (Lps)	32.8		32.8	450
Flow (Lps)	Not required	Not required	n/a	n/a
Date & Time:	13 th August 2018			
Site Address:	45 Constable Road, Waiuku			
Full Flow Result:	32.8Lps at 450kPa			

Hydrant Map



Report end