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Flood and Overland Flow Path Assessment Report

52 Kaurilands Road, Titirangi

Date: 27/09/2021

Rev: A

Prepared By: Osama Abdullatif
Civil Engineer, BE(Hons), CPEng.

A handwritten signature in blue ink, appearing to read 'Osama Abdullatif'.

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1.0 Introduction

LANDEV Consulting was engaged by MAQ Enterprises to undertake an overland flow path assessment for a new development at 52 Kaurilands Road, Titirangi. The purpose of this assessment is to provide an insight into the impact of the overland flow path through the site. This assessment will support applications for resource consent to enable the development.

2.0 Site Description

The property (legally described as PT LOT 1 DP 34220) has an area of 809 m² and is located in Titirangi, approximately 180 m northwest of Titirangi Baptist Church. It has an irregular shape and is occupied by a single residential dwelling.

Location: 52 Kaurilands Road, Titirangi

Legal Description: PT LOT 1 DP 34220

Size: 809 m²

Zoning: Residential - Mixed Housing Suburban Zone

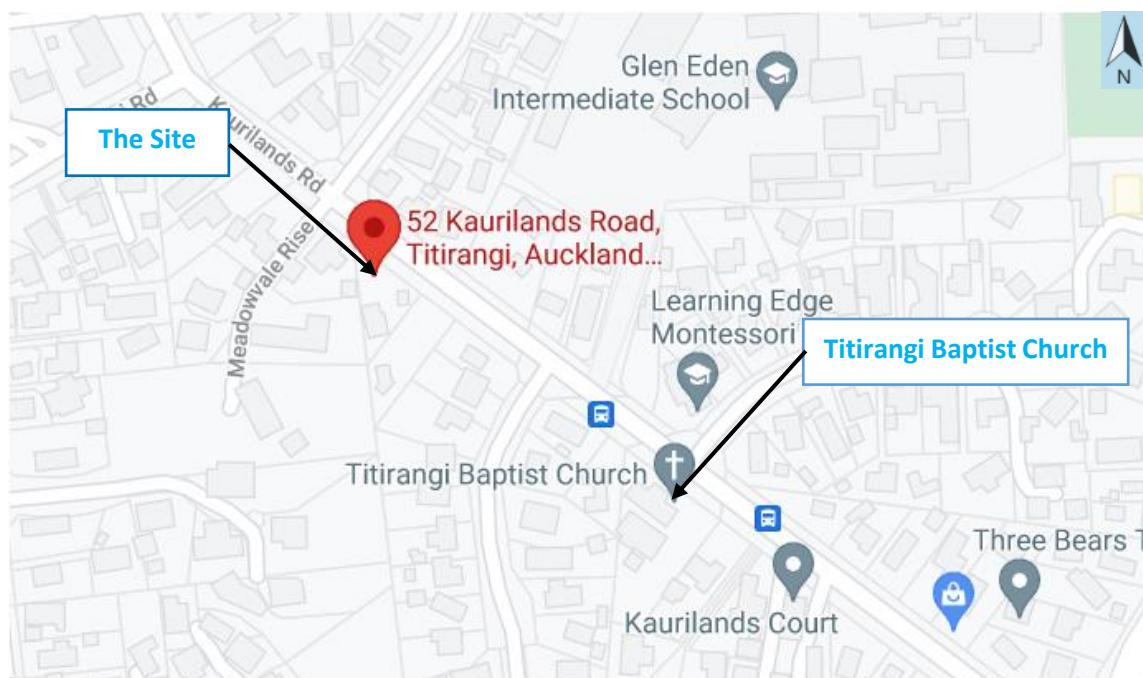


Figure 1: Locality Map (image source: Google Maps)

The site has a steep slope towards the east. The zone is classified as Residential - Mixed Housing Suburban Zone as per the Auckland Unitary Plan Operative in Part (AUP OiP).



Figure 2: Map of Site location and OLFP (image source: Auckland Council Geomaps)

3.0 Proposal Summary

The proposed development involves removing the existing dwelling and constructing three new dwellings in a 3-lot subdivision as shown in Figure 3. The existing vehicle crossing is to be removed and replaced with two new vehicle crossings. The new vehicle crossings and driveway are proposed to ensure compliance to Auckland Council standards.

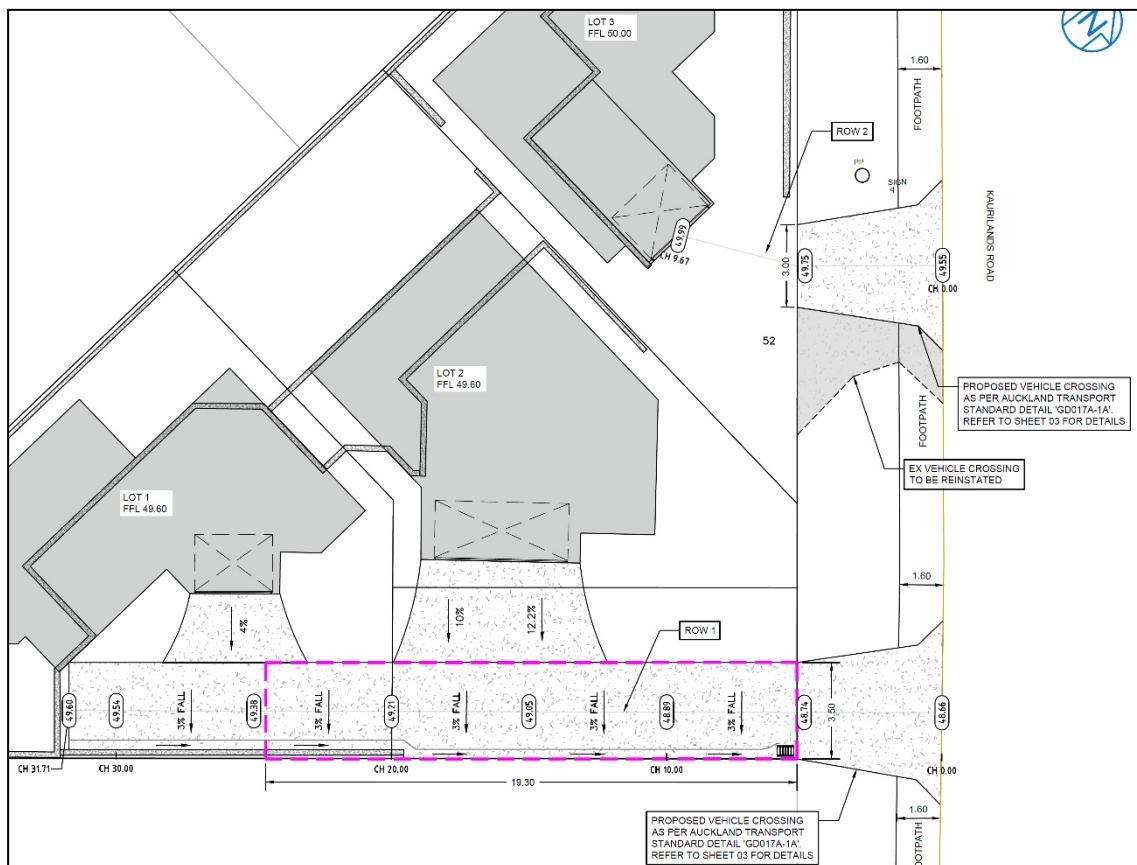


Figure 3: Proposal Scheme Plan

4.0 Flood Risk Assessment

The potential flood risk associated with the site has been identified by Auckland Council and shown within the Auckland Council Geomaps. The site is affected by both a flood plain and a flood prone area as shown in Figure 4.

4.1 Flood Plain and Flood Prone Area

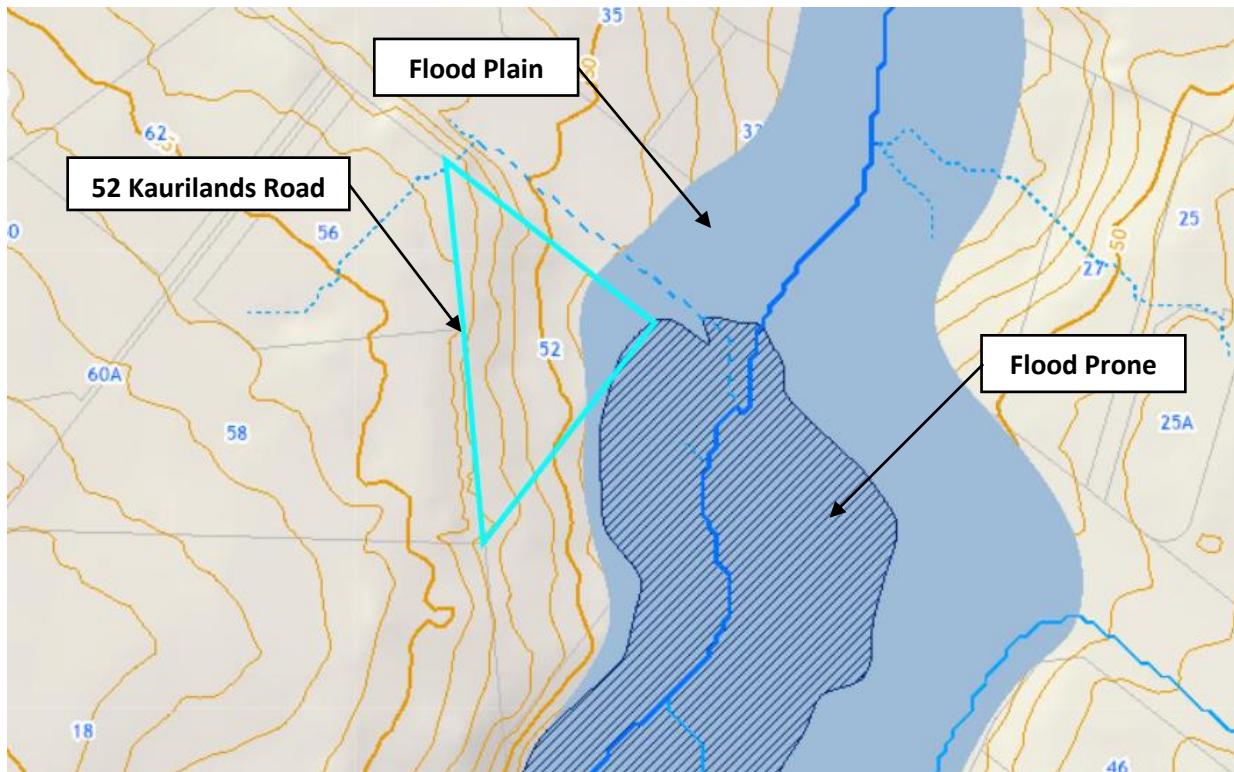


Figure 4: Extent of flood plain and flood prone area

Auckland Council Geomaps show that a small portion of the site is within a flood plain Area. This is the area predicted to be covered by flood water during 100yr ARI storm event. The stormwater runoff from the contributing catchment would be contained within a depression area containing the flood plain area. This area is shown to extend into the site as illustrated in Figure 4. According to FHM information, 100yr flood level for the flood plain area above this site is around RL49.10m.

4.2 Flood Prone Area

As shown in Figure 5, the site is located within a flood prone area. It has been identified by Auckland Council and shown within the Geomaps to have a flood prone level of RL48.37m. As it is lower than the flood plain water level, the latter will be the critical one for this site.

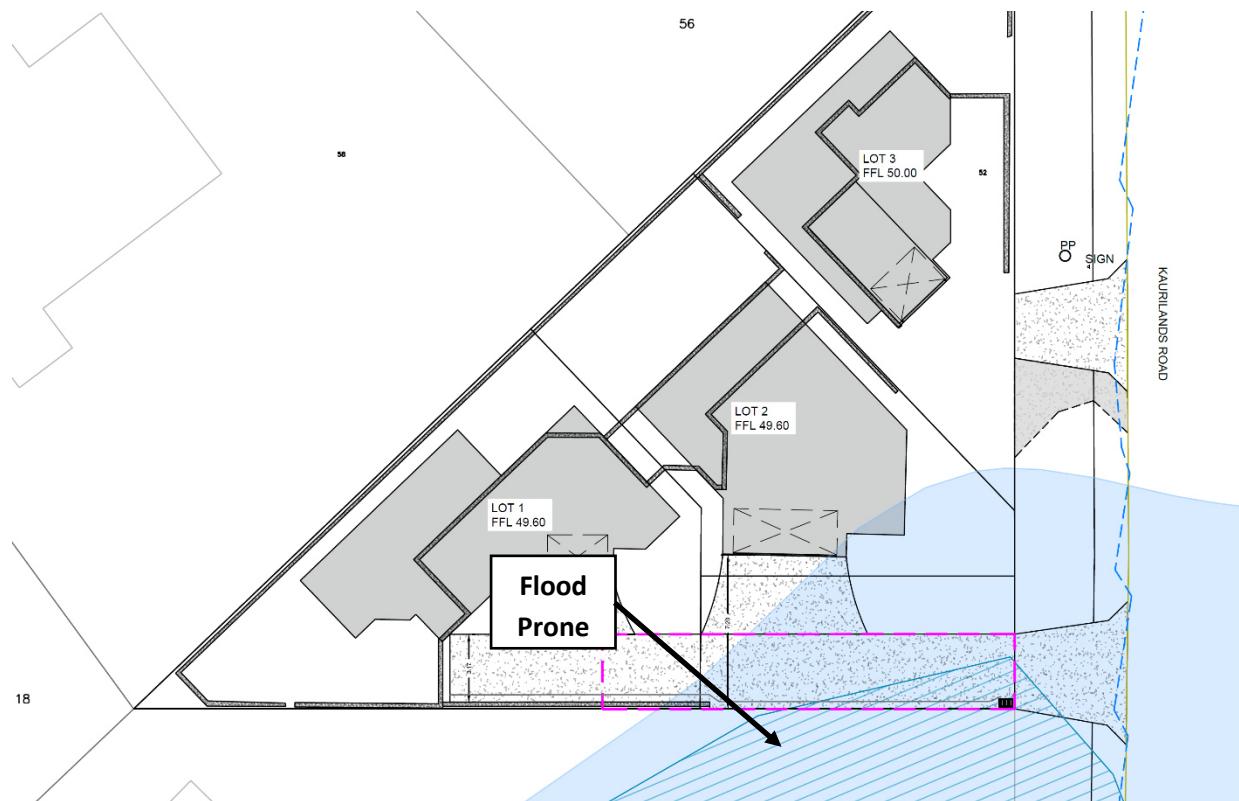


Figure 5: Extent of flood plain and flood prone area

5.0 Risk Mitigation

A freeboard of 500mm above the 100yr ARI flood level is required for habitable floor levels (Vulnerable Activities), while a freeboard of 300mm (Less Vulnerable Activities) is required for non-habitable floor levels, as per New Zealand Building Code standards and Auckland Council Stormwater Code of Practice (SWCoP) (See Table 4.5: Freeboard Requirements for the 1% AEP Event). This requires a minimum habitable and non-habitable floor levels of RL49.60m and RL49.40m respectively for the proposed development.

Table 4.5: Freeboard Requirements for the 1% AEP Event

Freeboard	Minimum height
Vulnerable Activities*	500mm
Less Vulnerable Activities*	300mm
Overland flow paths where flow is less than 2m ³ /s	500mm where surface water has a depth of 100mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling 150mm for all other cases
Overland flow paths, where flow is equal to or in excess of 2m ³ /s	500mm for Vulnerable Activities* 300mm for Less Vulnerable Activities*

* As defined in the PAUP

6.0 Conclusion

A flood risk assessment was undertaken for 52 Kaurilands Road, Titirangi. The site is potentially affected by a flood plain path, and an associated flood prone area. It was concluded that the flood plain area is the most critical for this development and hence will be the one to dictate the minimum finished floor level.

The top of water level of flood plain area during a 100yr ARI rainfall event is at RL49.10m. The minimum habitable floor level will be set at RL49.60m, while non-habitable floor levels will be set at RL49.40m. This will provide the minimum freeboard of 500mm above water level for vulnerable activities and 300mm freeboard of for less vulnerable activities to comply with Auckland Council's requirements and New Zealand Building Code standards.

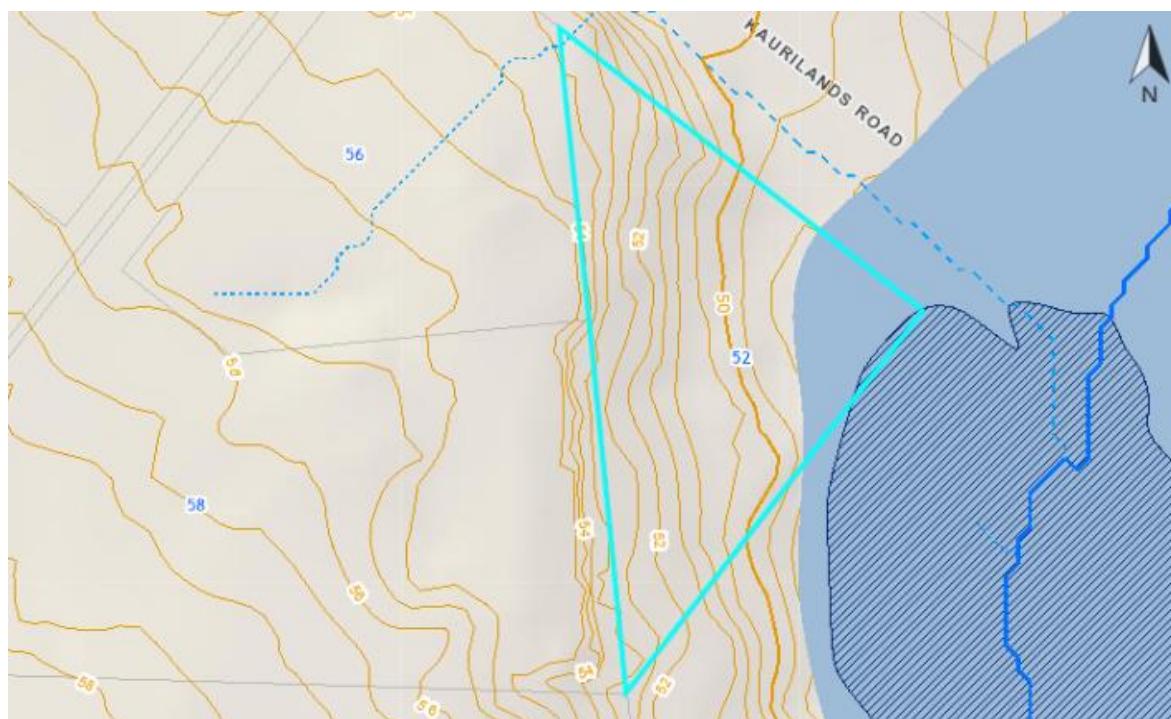
Appendix 1:
Flood Plain & Flood prone Information

Flood Prone Areas

Attribute	Value
Can fill in 100yr ARI Future Scenario rainfall event	Yes
Dam classification	Null
RecordStatus	Null
MaintenanceNotes	Null
Catchment Area	700288
Volume stored in 100yr ARI Future Scenario (m ³)	6782
Volume to spill elevation (m ³)	6782
Spill elevation (m RL)	48.37
Flood level in the 100yr ARI Future Scenario (m)	48.37
Minimum elevation of depression (m RL)	43.97
Ponding depth in 100yr ARI Future Scenario (m)	4.4

Item	Level	Unit
Flood Prone Level	48.37	m
500mm freeboard	0.5	m
FFL	48.87	m

Item	Level	Unit
Flood Plain Level	49.1	m
500mm freeboard	0.5	m
FFL	49.6	m



Appendix 2: 100 Year ARI – Daily Rainfall Depth

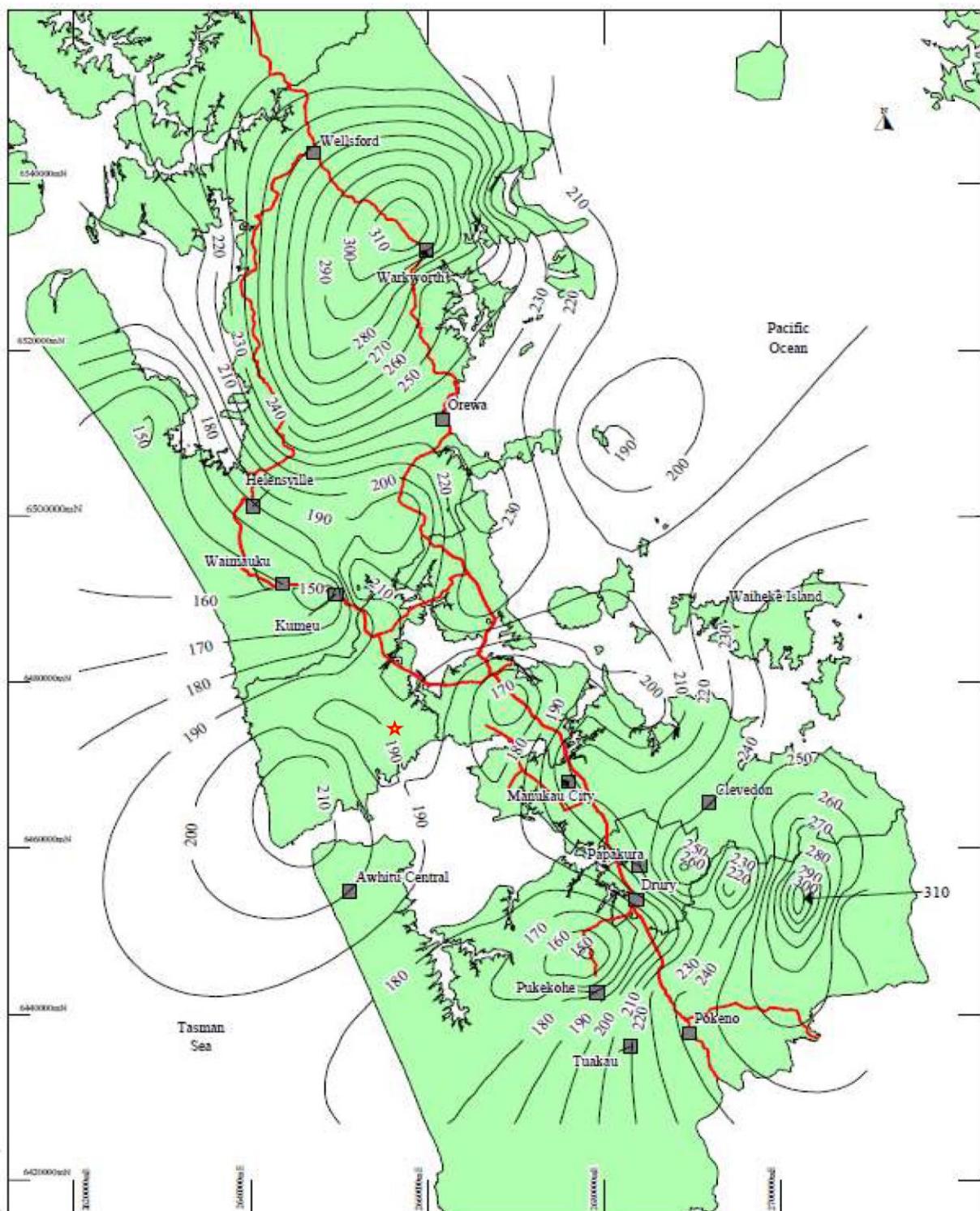


Figure A.6
100 Year ARI
Daily Rainfall Depth

Scale: 1:600,000 (at A4)
(Revised 25/08/1999)

A



Auckland Regional Council

Legend: — 90 — Rainfall Contour (mm)
— 200 — State Highways

100yr ARI 190 mm
+CC 221.92 mm

Appendix 3: Auckland Council GIS plan



Appendix 4: Flood and Channel Plan

NOTES:

1. All works to comply with Auckland Council Standards.
2. All dimensions (not to be obtained by scaling from drawings), levels and underground services etc shall be checked on site by the Contractor prior to commencement of construction works.

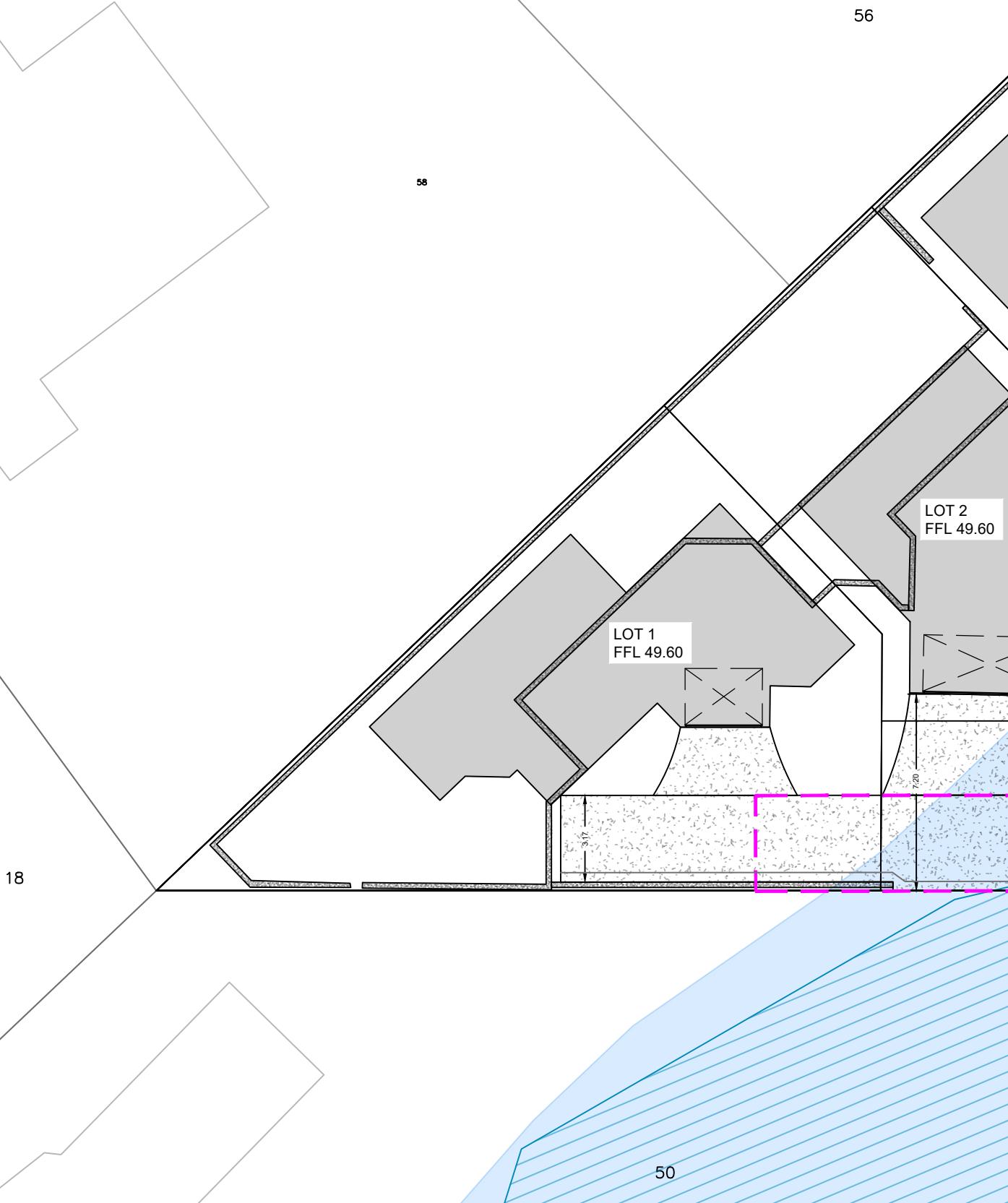
LEGEND:

- OVERLAND FLOW PATH
- FLOOD PLAIN (GIS)
- FLOOD PRONE AREAS
- EASEMENT



KAURILANDS ROAD

PP
SIGN



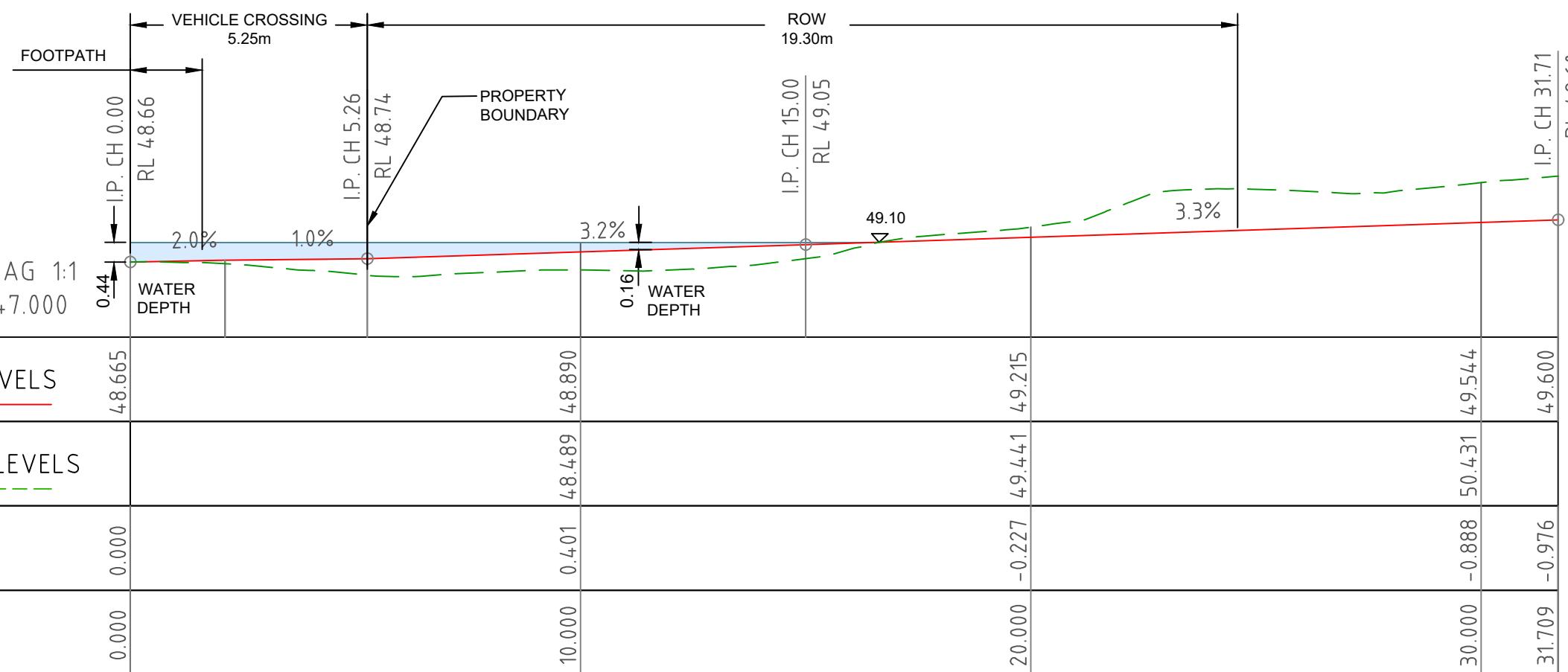
A	FOR RESOURCE CONSENT	OA	10.05.21
REV:	DESCRIPTION:	BY:	DATE:
STATUS: RC			



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CLIENT:			
52 KAURILANDS ROAD TITIRANGI AUCKLAND 0604			
SITE: 52 KAURILANDS ROAD TITIRANGI			
TITLE: OVERLAND FLOW PATH LAYOUT PLAN			
SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:200	07/05/21	MHS	OA
PROJECT NO:	DRAWING NO:	REVISION:	
21123	11	A	

NOTES:

**ROW 1 LONG SECTION**

A	FOR RESOURCE CONSENT	OA	10.05.21
REV:	DESCRIPTION:	BY:	DATE:
STATUS: RC			
 LANDDEV CONSULTING INFO@LANDDEV.CO.NZ (09) 889 1177 WWW.LANDDEV.CO.NZ			
CLIENT: 52 KAURILANDS ROAD TITIRANGI AUCKLAND 0604			
SITE: 52 KAURILANDS ROAD TITIRANGI			
TITLE: OVERLAND FLOW PATH LONG SECTION			
SCALE AT A3:	1:125	DATE:	10.05.21
PROJECT NO:	21123	DRAWN:	MHS
		CHECKED:	OA
		REVISION:	A
		12	

Appendix 5: Flood Report Assessment

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FLOOD REPORT

24/02/2021

**52 KAURILANDS ROAD
TITIRANGI
AUCKLAND**

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DOCUMENT CONTROL RECORD

PROJECT NAME	52 KAURILANDS ROAD, TITIRANGI	
CLIENT NAME	KAMRAN KHAN	
PROJECT REFERNCE NUMBER	LDC 19243	
<i>ACTION</i>	<i>AUTHOR</i>	<i>DATE</i>
REVISION 1	FELIX NGUYEN	24 FEBRUARY 2021
REVIEWED	DANIEL THOMAS	24 FEBRUARY 2021
APPROVED	DANIEL THOMAS	24 FEBRUARY 2021

LIMITATIONS

Land Development & Civil (LDC) has prepared this report for the exclusive use by **Kamran Khan** for the project at *52 Kaurilands Road, Titirangi*.

It is prepared in accordance with the scope of work and for the purpose outlined in the scope of works and terms of engagement.

LDC disclaims responsibility for any changes that may have occurred after this time. This report should be read in full and in reference to the scope of works. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this assessment by any third party.

LDC accepts no liability for inaccuracies in third party information used as part of this report. This report uses information available to the writer during the preparation. This includes Auckland Council information, specifically Geospatial Information and other information provided by third parties. Geospatial Information current to the site at the time of this document's production. Professional judgement and engineering standards have been adhered to in accordance with the usual care and thoroughness of the consulting profession.

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INTRODUCTION

Land Development and Civil Ltd (LDC) has been engaged by Kamran Khan to provide a Flood Report for the property at 52 Kaurilands Road, Titirangi.

The flood report is required to assist a consent application to Council to redevelop the property.

SITE CONTEXT

The subject site is located at 52 Kaurilands Road, Titirangi, Auckland. It is a triangular shaped property which is situated just off Kaurilands Road to the south west. The site falls towards the road verge from its rear boundary in a gentle manner. The legal description of the site is PT LOT 1 DP 34220 with a site area of 809m² more or less.

There is a single residential dwelling presently occupying the site's southern corner with a detached garage located toward the site's eastern corner. Access to the garage is currently obtained via an existing driveway directly off Kaurilands Road. An aerial image extracted from Council's Geomaps below describes general site profile, layout, features and public services.



Figure 1: Site Location – 52 Kaurilands Road (February 2021).

PROPOSED DEVELOPMENT

The applicant proposes to undertake a three-lot subdivision onsite. LDC was notified that the proposed scheme plan is still under development at the time of preparing this report. As therefore the Flood Report is solely aimed to provide a peak flood level during 100year ARI storm event for the site with a required freeboard proposed as specified within the Code of Practice for any future development onsite.

OVERLAND FLOWPATH FLOODING ISSUES

Auckland Council's GIS Viewer anticipates that the property is affected by 100year floodplain associated with an overland flow path (OLFP) traversing 50 Kaurilands Road property during 100year ARI storm event, as shown in Figure 2 below.

According to Council's Geomaps, a Flood Prone Area which is predictably resultant from historical construction of Kaurilands Road infringes a small portion of the site's eastern corner.



Figure 2: Inundation Information for 52 Kaurilands Road

As shown in Figure 2 above, the OLFP commences at the property of 3 The Drive Titirangi, from here the OLFP travels north. It enters 50 Kaurilands Road at its south east boundary. Council's Geomaps provide a catchment area of 69 hectares associated with the OLFP. A floodplain is anticipated to be formed during 100year ARI storm event that would potentially affect the subject site.

RAPID FLOOD MAPPING

The subject site is situated within the Oratia – Waitemata as indicated on Council’s Geomaps. In 2014 Auckland Council commissioned Jacobs to perform a catchment study for the Oratia Catchment. This study has produced inundation mapping with consideration for future climate change and Maximum Probable Development (MPD) scenario for the subject site. The Floodplain Map is retrieved from Council’s record and included in Appendix B.

It was predicted that the floodplain resultant from the OLFP infringes the eastern corner of the site. A peak flood level of **RL 49.10** was modelled across Section – 0180 of the study which shall be used as the peak flood level for the site.

Refer to Figure 3 below for details of the floodplain.

The peak flood as mentioned above was later imported into the topographical plan of the site provided by Trig Consultants dated December 2020 to point out the area potentially affected by the floodplain. As shown in Appendix C, the existing garage would be located within the floodplain whilst the existing dwelling is anticipated to be free from inundation.

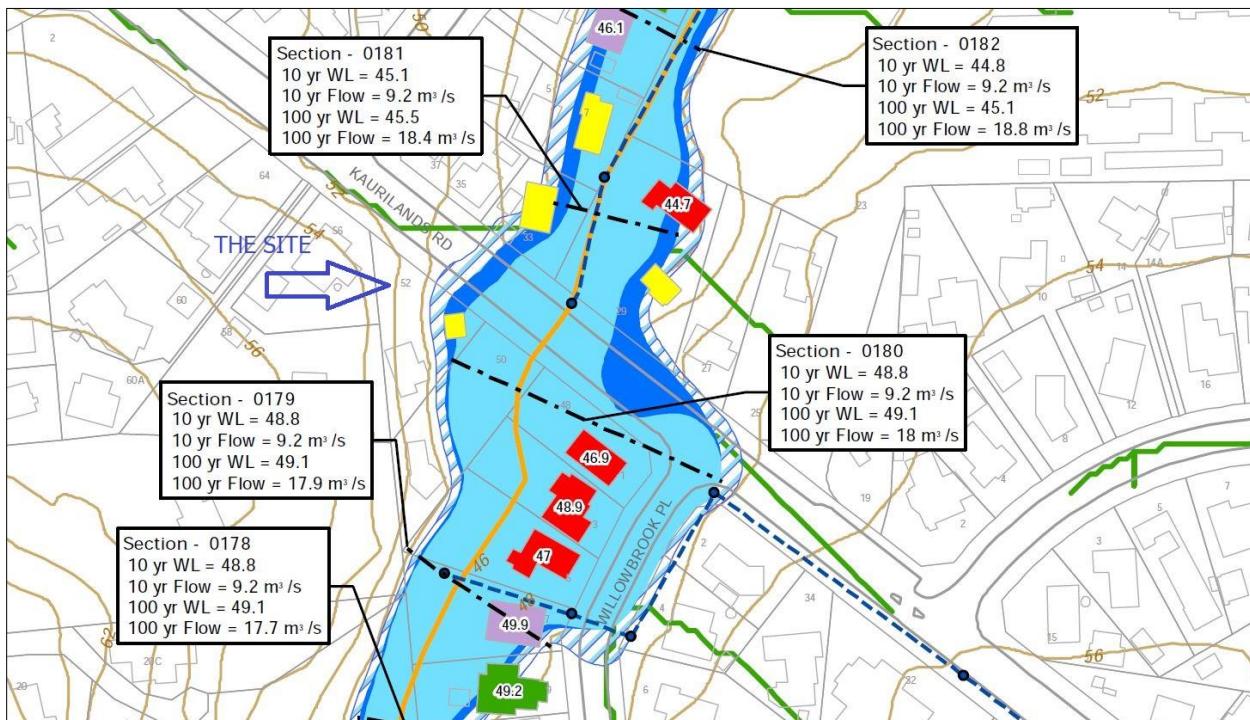


Figure 3: 100year ARI storm Floodplain at 52 Kaurilands Road, Titirangi.

FLOOD PRONE AREA

A Flood Prone Area (or ponding area) in a moderate size extending upstream from Kaurilands Road towards 40D Konini Road Titirangi property is expectedly formed in the event of failure of a public 1650mm culvert laid under Kaurilands Road. Figure 4 below shows the information

associated with the ponding area. It is anticipated that the flood prone area has a spill elevation of RL 48.34m.

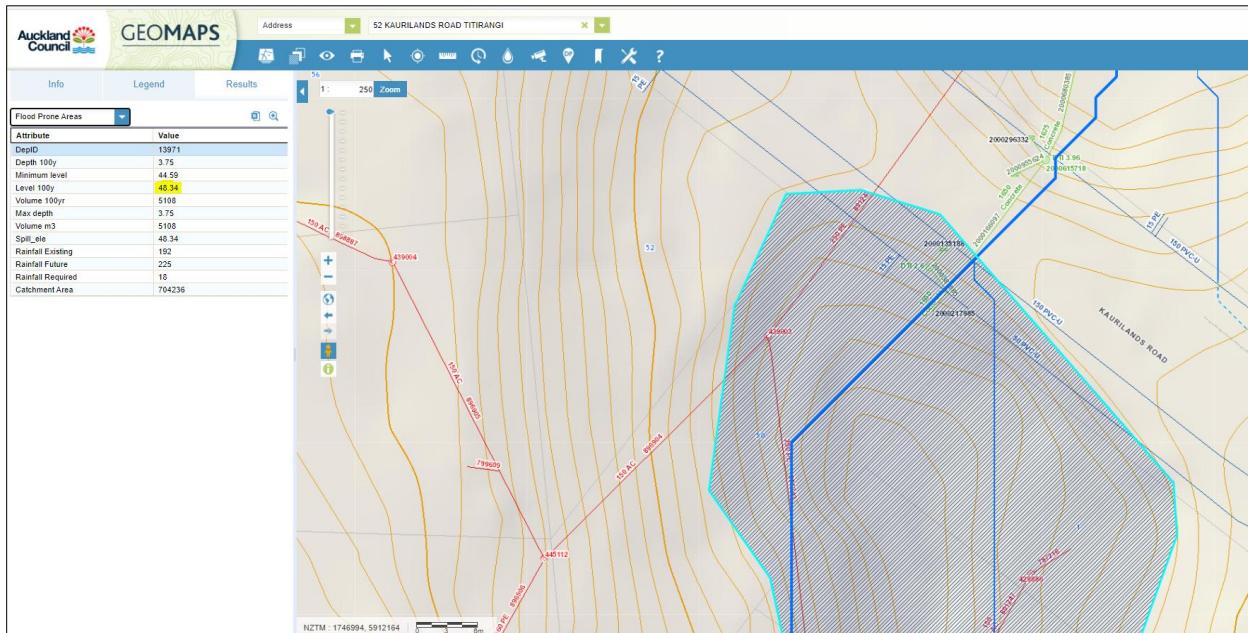


Figure 4: Flood Prone Area Information

MINIMUM FREEBOARD

Table 4.5: Freeboard Requirements for the 1% AEP Event

Freeboard	Minimum height
Vulnerable Activities*	500mm
Less Vulnerable Activities*	300mm
Overland flow paths where flow is less than 2m ³ /s	<ul style="list-style-type: none"> 500mm where surface water has a depth of 100mm or more and extends from the building directly to a road or car park, other than a car park for a single dwelling 150mm for all other cases
Overland flow paths, where flow is equal to or in excess of 2m ³ /s	<ul style="list-style-type: none"> 500mm for Vulnerable Activities* 300mm for Less Vulnerable Activities*

* As defined in the PAUP

Figure 5: Table 4.5 extracted from Stormwater Code of Practice - Auckland Council

As shown in Figure 5 above, the flow affecting 52 Kaurilands Road property exceeds 2m³/s, this normally would require a 500mm freeboard to be added on top of the peak flood level.

Specifically, the minimum habitable floor level should be:

100year ARI storm flood level	RL. 49.10m
Free board	0.50m
Minimum habitable Floor Level	RL. 49.60m

WORKS WITHIN FLOODPLAIN

Any works proposed to be undertaken in the 1 in 100-year floodplain must not increase adverse effects from flood hazards or increased flood depths and velocities, to other properties upstream or downstream of the site. This includes any earthworks, fencing, retaining walls and structures.

It is advisable that, once a proposed scheme plan is developed, a further assessment should be conducted to ensure no identified exacerbation on current inundation hazards resulting from the development on neighbouring properties as well as support the subdivision application to Council.

RECOMMENDATIONS AND CONCLUSIONS

1. The property at 52 Kaurilands Road, Titirangi is situated within Oratia Catchment. Council's Geomaps indicates that the property is affected by floodplain during 100year ARI storm event.
2. Auckland Council has published the Floodplain Map for the Oratia Catchment. The Map provides a peak flood level for the site.
3. The Finished Floor Level (FFL) of any proposed dwellings needs to be **minimum RL 49.60** (Auckland datum) to provide a minimum freeboard above the maximum flood level.
4. Any works proposed to be undertaken within the 1 in 100-year floodplain **must not** either reduce the flood basin storage capacity or increase the flood level on other properties.

Report Prepared by:



Date: 24/02/2021

Felix Nguyen
Civil Engineer
Land Development and Civil Ltd.

Report Reviewed and Approved by:

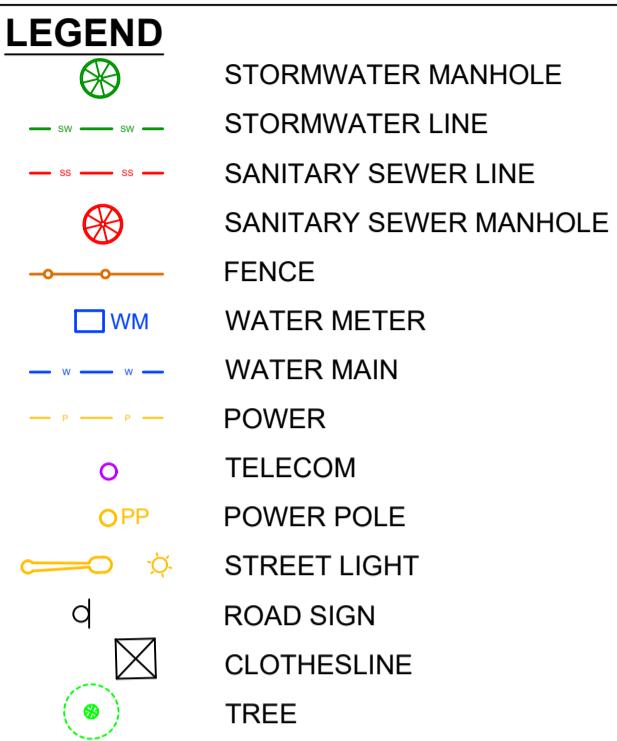


Date: 24/02/2021

Daniel Thomas
Director
Land Development and Civil Ltd.

APPENDICES

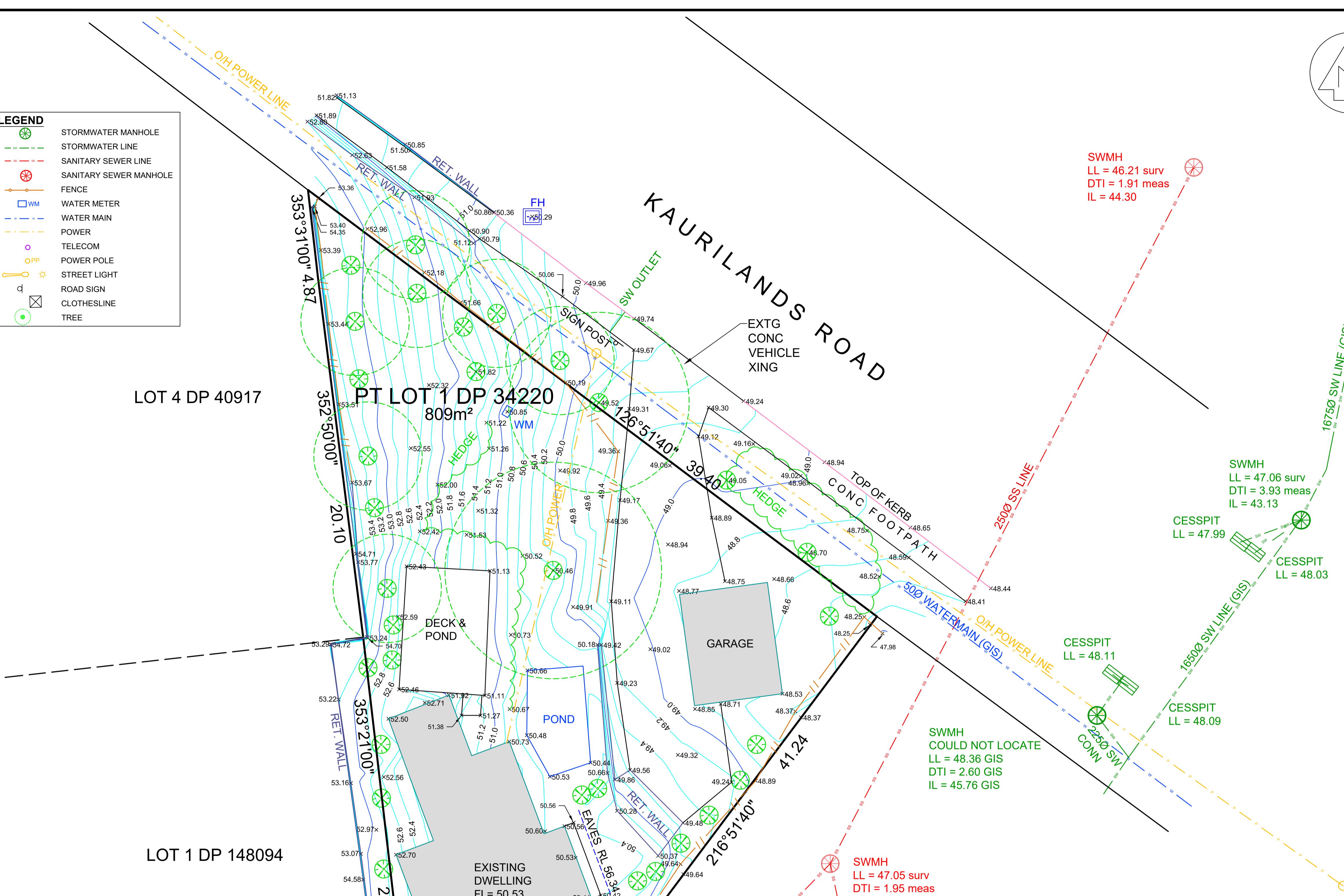
**Appendix A: TOPOGRAPHICAL INFORMATION BY TRIG
CONSULTANTS DATED 12/2020**



LOT 4 DP 40917

LOT 1 DP 148094

LOT 1 DP 43787



SURVEYED	CM	12/20	APPROVED
DRAWN	HB	12/20	
DESIGNED			
CHECKED			DATE
REVISION		CHANGES	CHECKED DATE
0	ORIGINAL ISSUE	CM	16/12/20
1	spot heights added along E. bdy	NB	20/01/21

- NOTES:
- (1) COORDINATES AND BEARINGS ARE IN TERMS OF THE NEW ZEALAND GEODETIC 2000 DATUM BASED ON THE MT EDEN CIRCUIT.
 - (2) THE ORIGIN OF COORDINATES FOR THIS PROJECT IS:
SM 121 SO 51321
794908.11mN 390036.23?mE
 - (3) LEVELS/HEIGHTS ARE IN TERMS OF THE LINZ DATUM "AUCKLAND VERTICAL DATUM 1946".
 - (4) THE ORIGIN OF LEVELS FOR THIS PROJECT IS:
RM III DP 60242 LINZ CODE: ERH7 RL = 54.10m
 - (5) THE BOUNDARIES SHOWN WAS PLOTTED USING DATA FROM DP 34220.
 - (6) STORM WATER, SANITARY SEWER AND WATER MAIN SERVICE LINE - DIRECTION AND DEPTHS TO BE CONFIRMED BY CONTRACTOR
 - (7) MANHOLE DEPTHS TO INVERT OBTAINED FROM COUNCIL RECORDS UNLESS SHOWN AS MEASURED
 - (8) CONTOUR INTERVAL
MAJOR: 1.00m
MINOR: 0.20m

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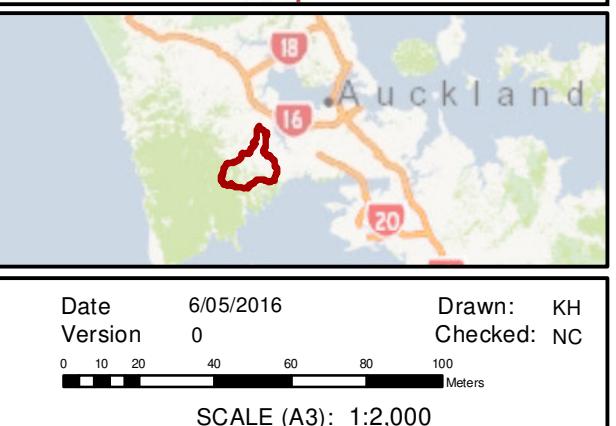
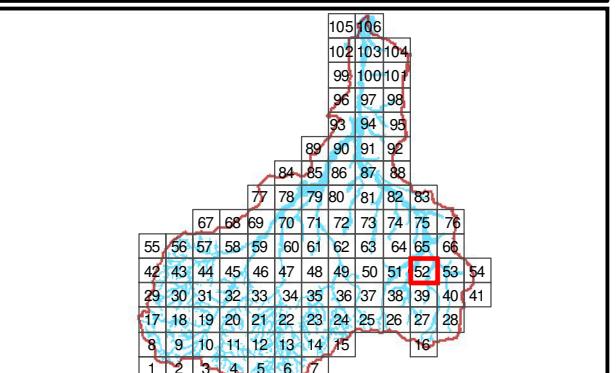
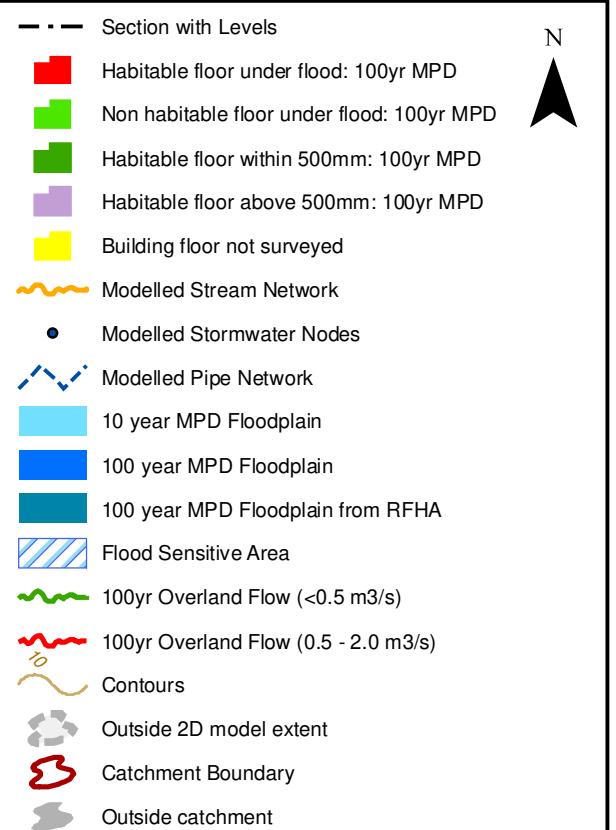
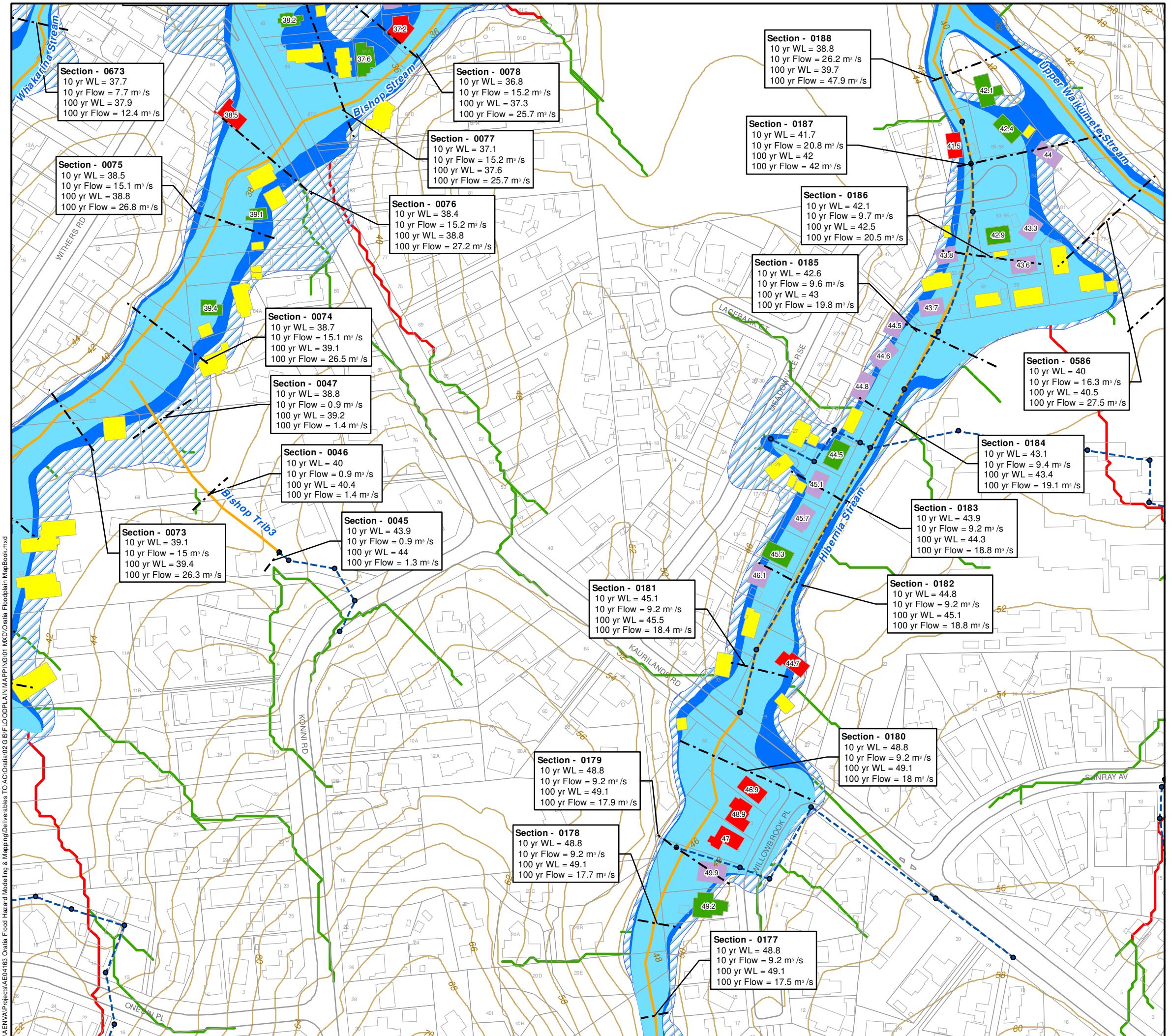
CLIENT

PROJECT
52 KAURILANDS ROAD
TITIRANGI

TITLE
TOPOGRAPHICAL SURVEY
OF
PT LOT 1 DP 34220

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	1 of 1	REVISION
	1	

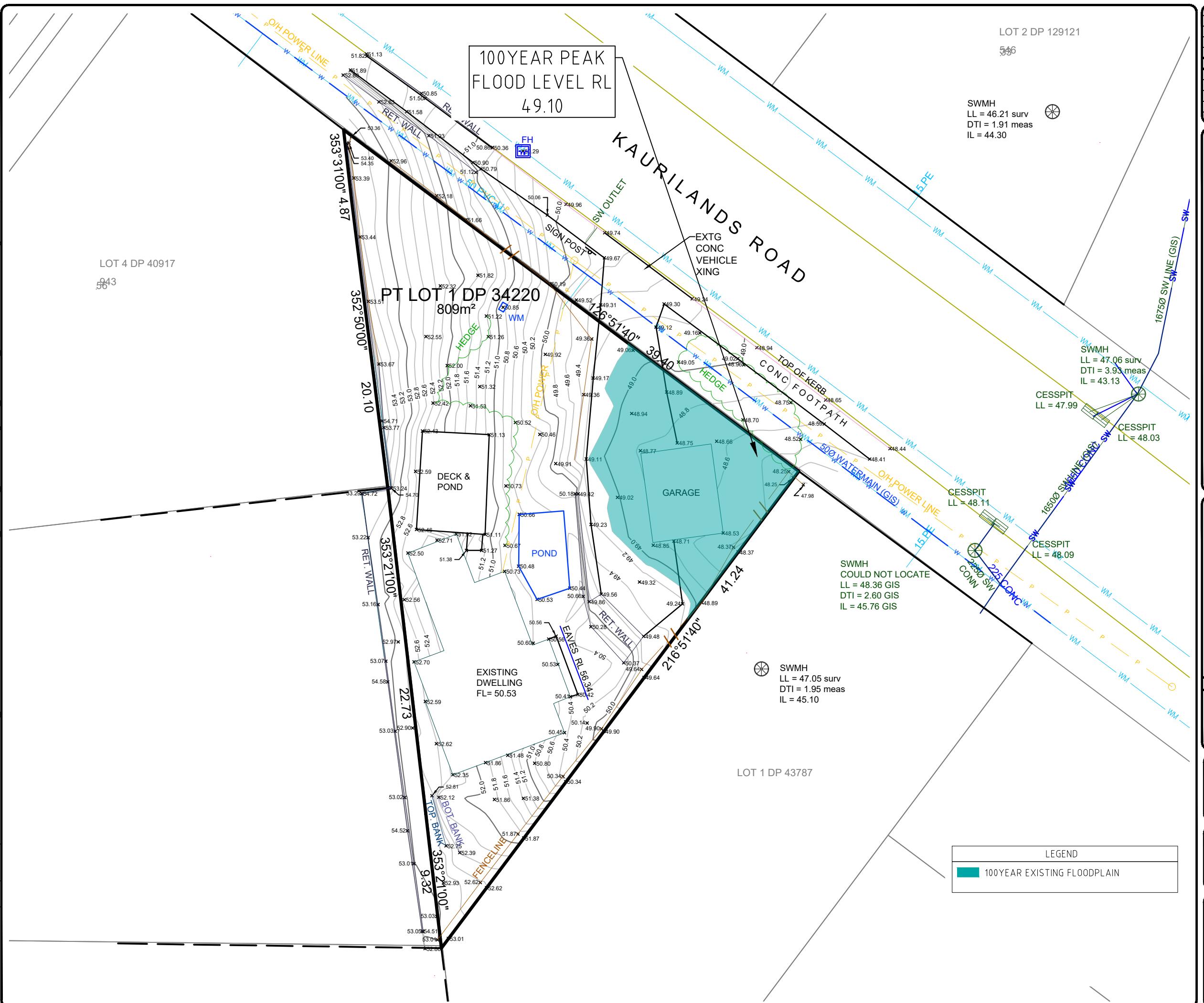
**APPENDIX B: ORATIA SYSTEM PERFORMANCE ASSESSMENT
– FIGURE H.1 FLOOD MAP (MPD SCENARIO).**



ORATIA
SYSTEM PERFORMANCE ASSESSMENT
Sheet 52 of 106

Figure H.1 Floodplain Map (MPD Scenario)

**APPENDIX C: EXISTING SITE PLAN WITH PROPOSED
FLOODPLAIN – 52 KAURILANDS ROAD, TITIRANGI**



IRVEYED			APPROVED	DATE
SIGNED	FN	24/02/2021		
AWN				
D				
HECKED	DT	24/02/2021		
EVISION	CHANGES		CHECKED	DATE
A	ORIGINAL ISSUE		DT	24/02/2021

GENERAL

GENERAL:
LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM
946.

WORKS TO BE CARRIED OUT IN ACCORDANCE WITH NEW
ZEALAND BUILDING CODES AND AUCKLAND COUNCIL'S
CODE OF PRACTICE.

ANY PROPOSED WORKS TO BE UNDERTAKEN IN A
MANNER THAT WILL NOT EXACERBATE INUNDATION
PRESSURES ON NEIGHBOURING PROPERTIES NOR REDUCE
THE RIVER BASIN CAPACITY OF THE OVERLIEF FLOW -

ANY VARIATIONS OR DISCREPANCIES BETWEEN DRAWINGS AND ON THE SITE ARE TO BE REFERRED TO THE ENGINEER FOR RESOLUTION.

LAND
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& CIVIL

Engineered solutions for people & environments

SCALE 1:250 (A3)

CLIENT

PROJECT
52 KAURILANDS ROAD
TITIRANGI
PT LOT 1 DP 34220

**PROPOSED
100YEAR FLOODPLAIN
EXISTING SITE
FOR RESOURCE CONSENT**