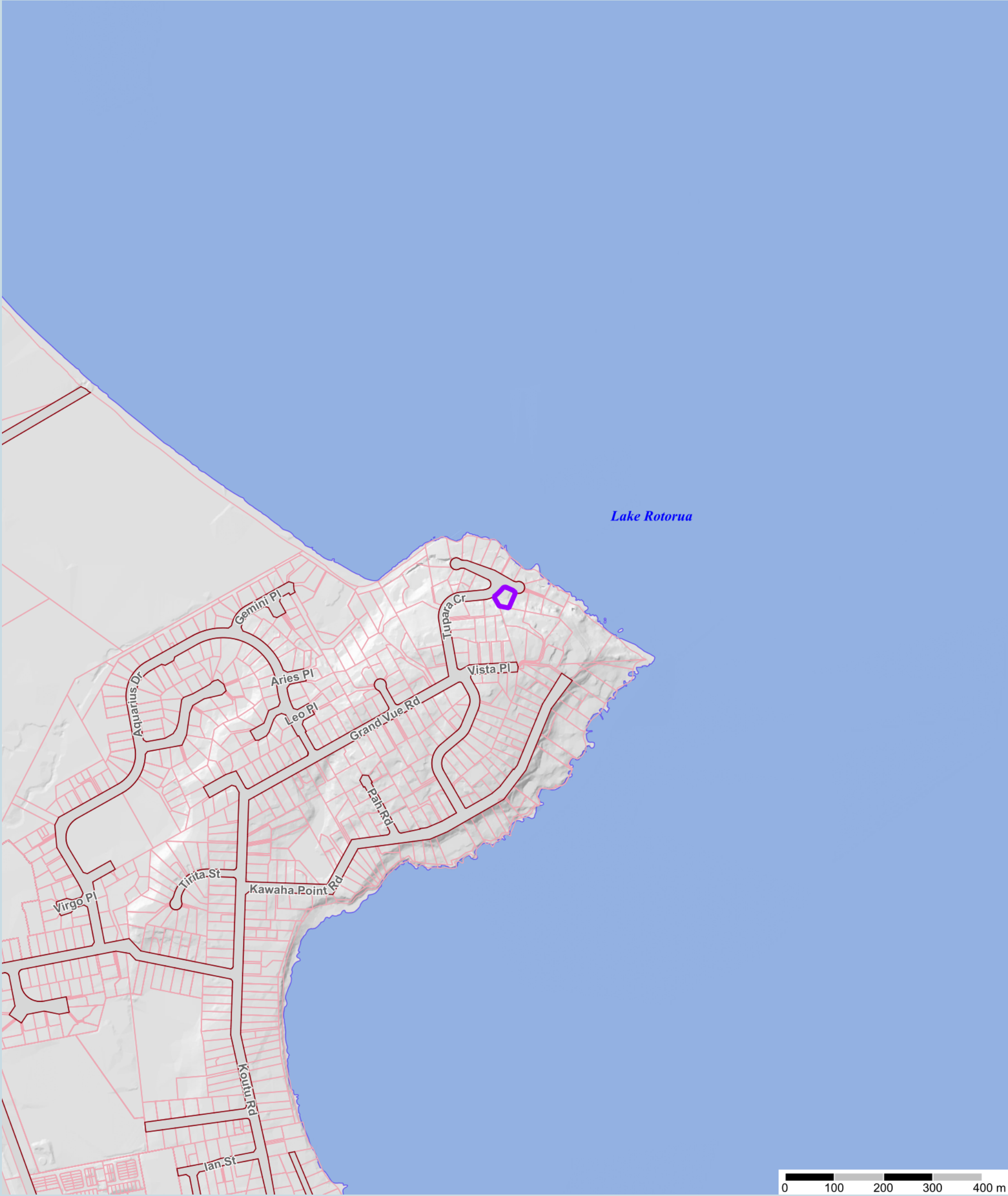


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Geothermal Systems

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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 Small Scale Commercial Use	 Limited / Conditional Development	 Development	 Protected	 Urban Use
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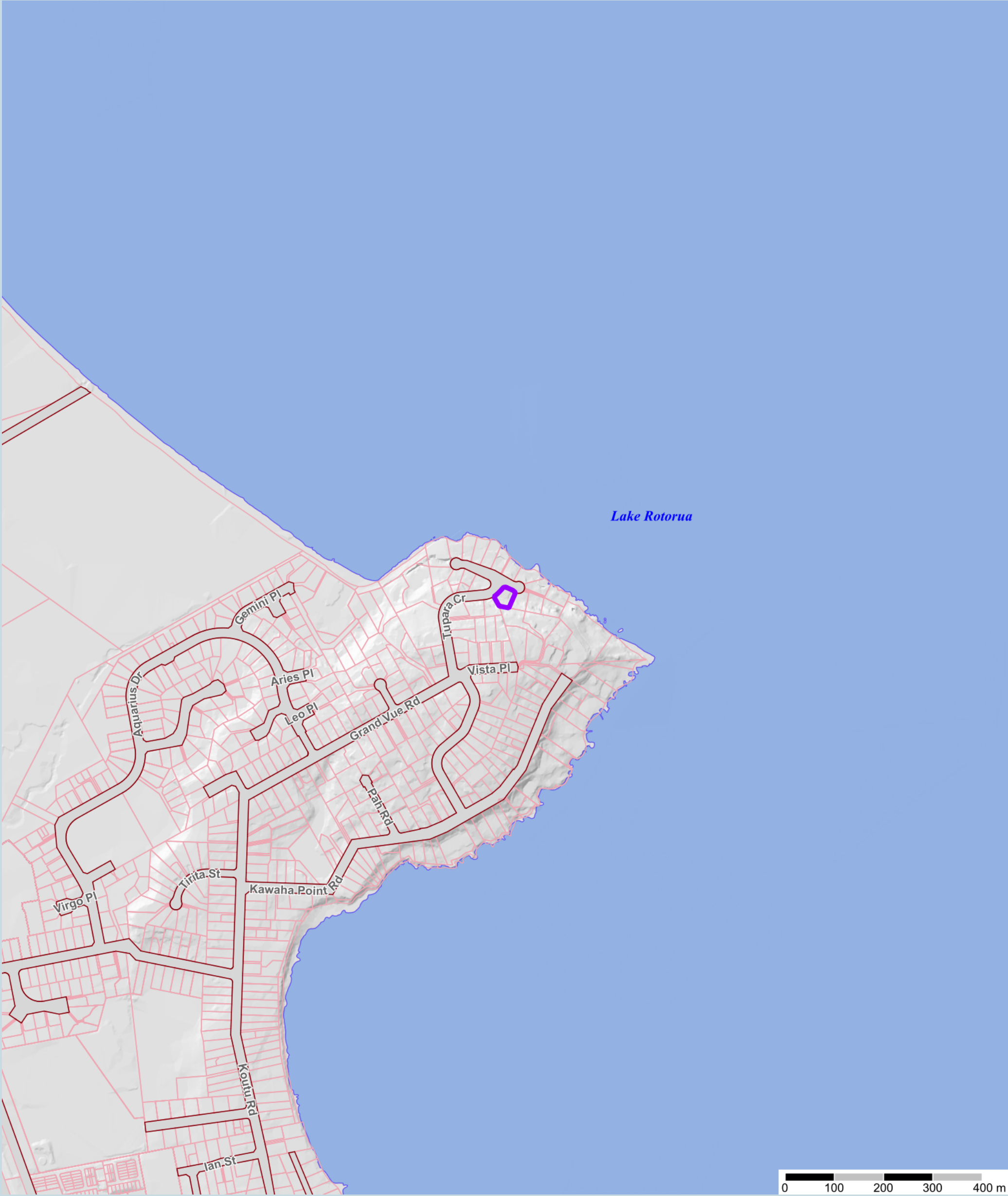
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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For further details on how data was derived and limitations for use refer to the following report: GNS 2010-67 Volcano and Geothermal Hazards Part 1.



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Fault Avoidance Zone

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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 Fault Avoidance Zone (District Plan 2010)	 Fault Avoidance Zone (2018)	 Fault Avoidance Zone (Eastside 2021)
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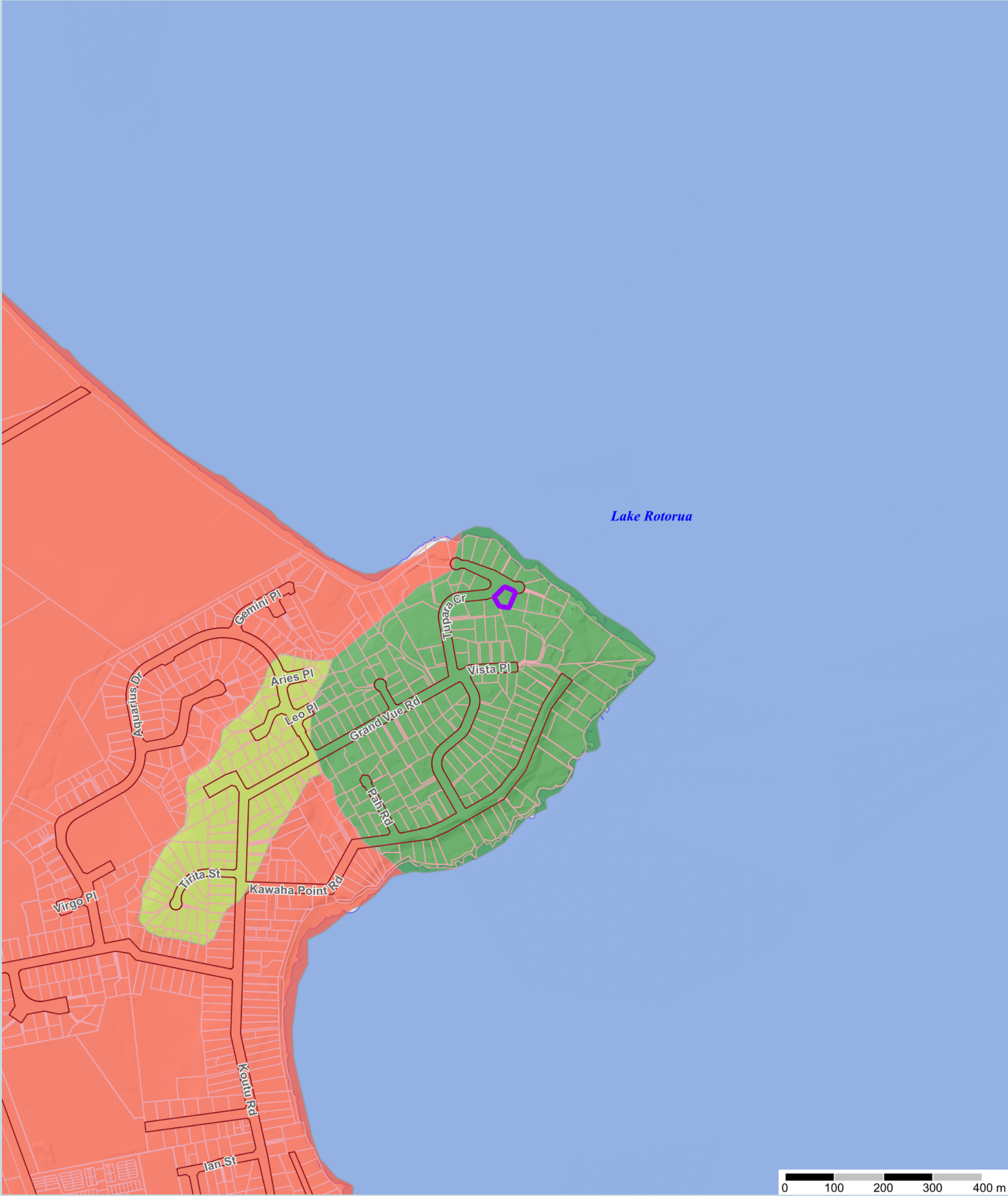
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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For further details on how data was derived and limitations for use refer to the following report: GNS Report 2010-182.



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Soft Ground Potential

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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A: Areas of volcanic-derived rocks and soils	B: Huka Group sediments and Hinuera Formation (older sediments)
C: Undifferentiated Holocene alluvium (<10,000 years old)	D: Holocene (last 10,000 years) swamp deposits and Holocene lake or delta sediments

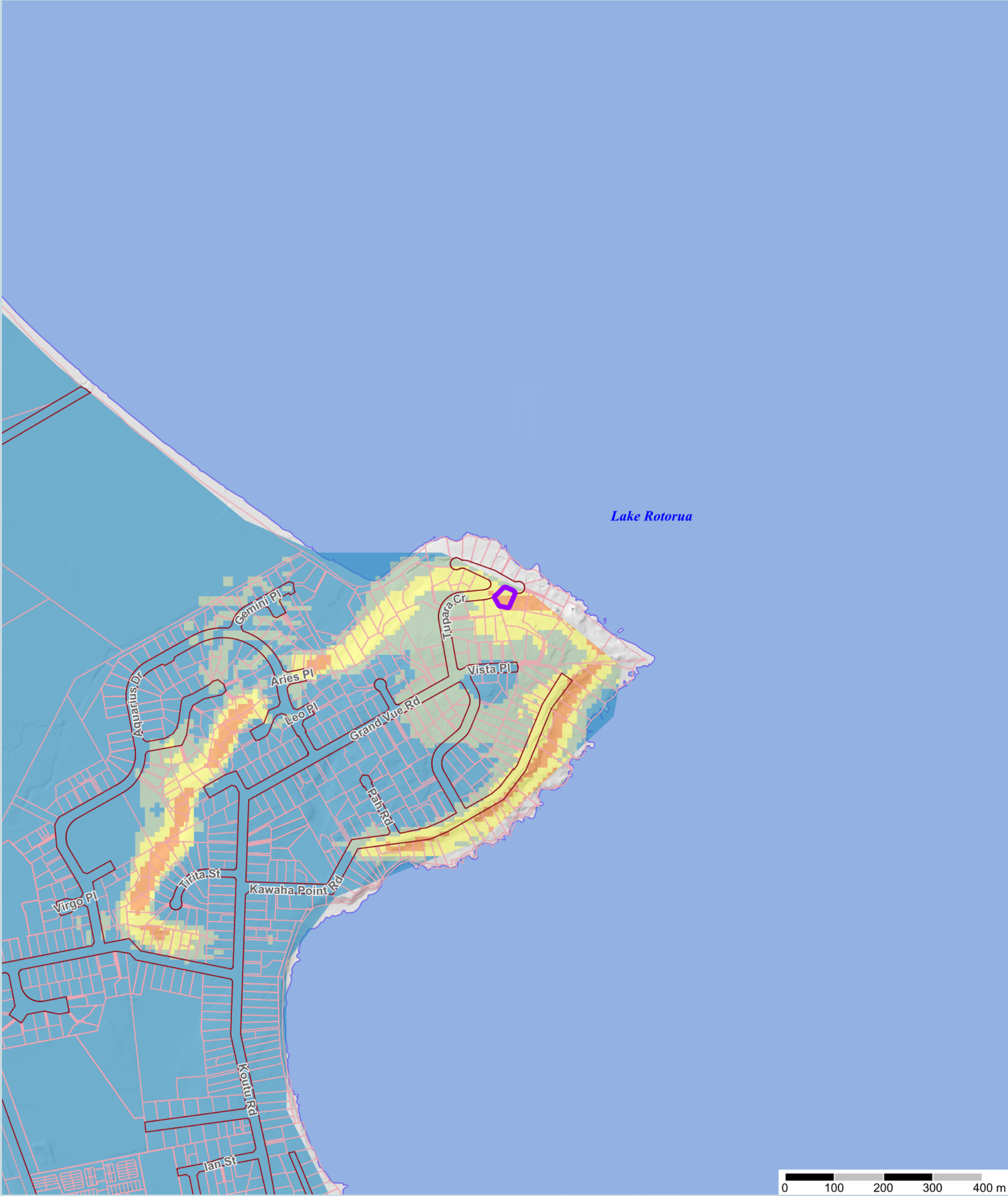
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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For further details on how data was derived and limitations for use refer to the following report: GNS Report 2010/81.



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Landslide Susceptibility (2010 study)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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Very Low	Low	Moderate	High	Very High
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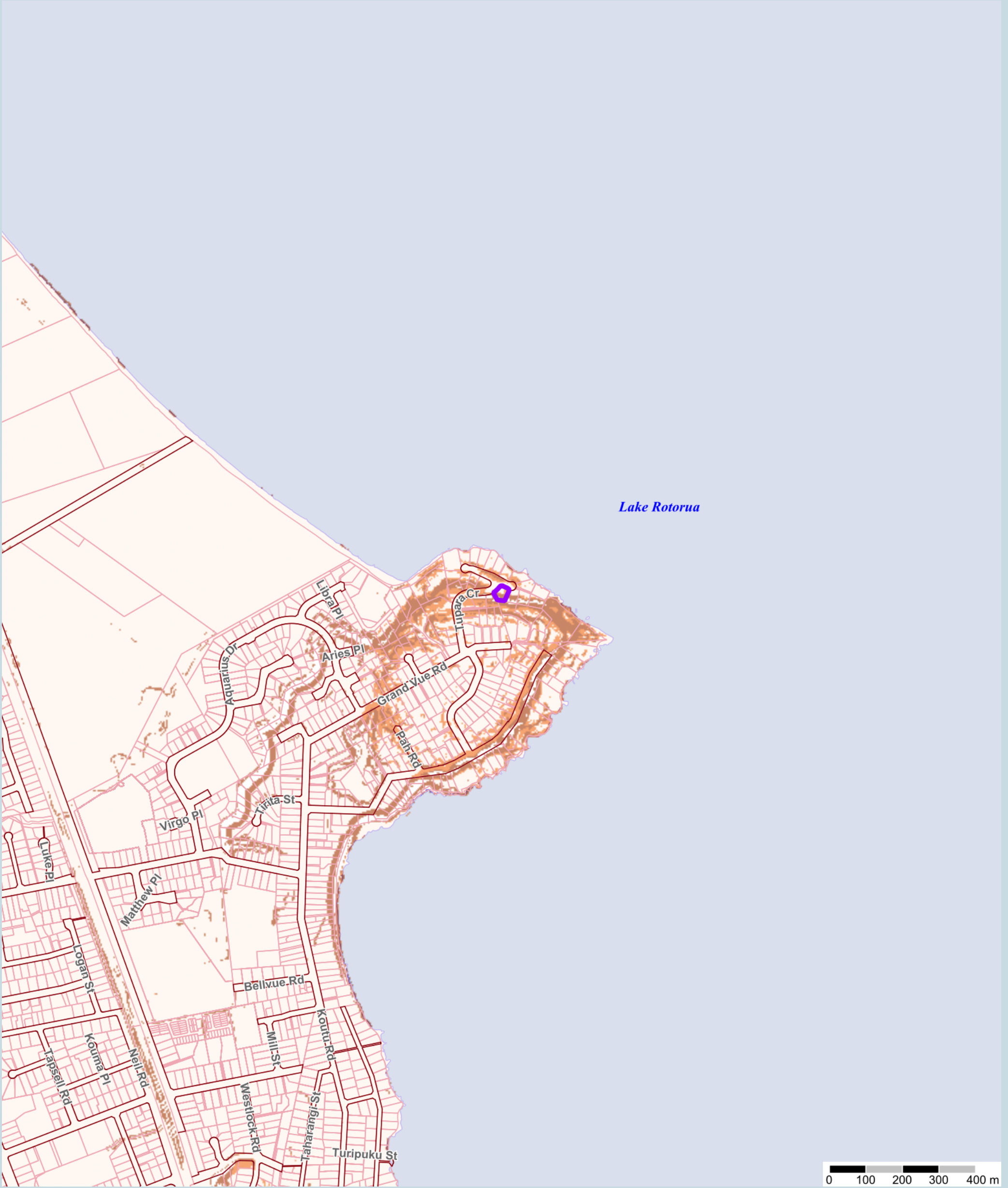
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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For further details on how data was derived and limitations for use refer to the following report: GNS Report 2010/82.



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Landslide Susceptibility - Rainfall Triggered (2024 study)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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Very low	Low	Moderate	High
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DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ. LINZ licenses. CROWN COPYRIGHT RESERVED. Council does not warrant the accuracy of the information represented by this map. For further details on how data was derived and limitations for use refer to the following report: WSP (2024). Bay of Plenty Regional Landslide Susceptibility Study. (Report for BOPRC.)



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Landslide Susceptibility - Earthquake Triggered (2024 study)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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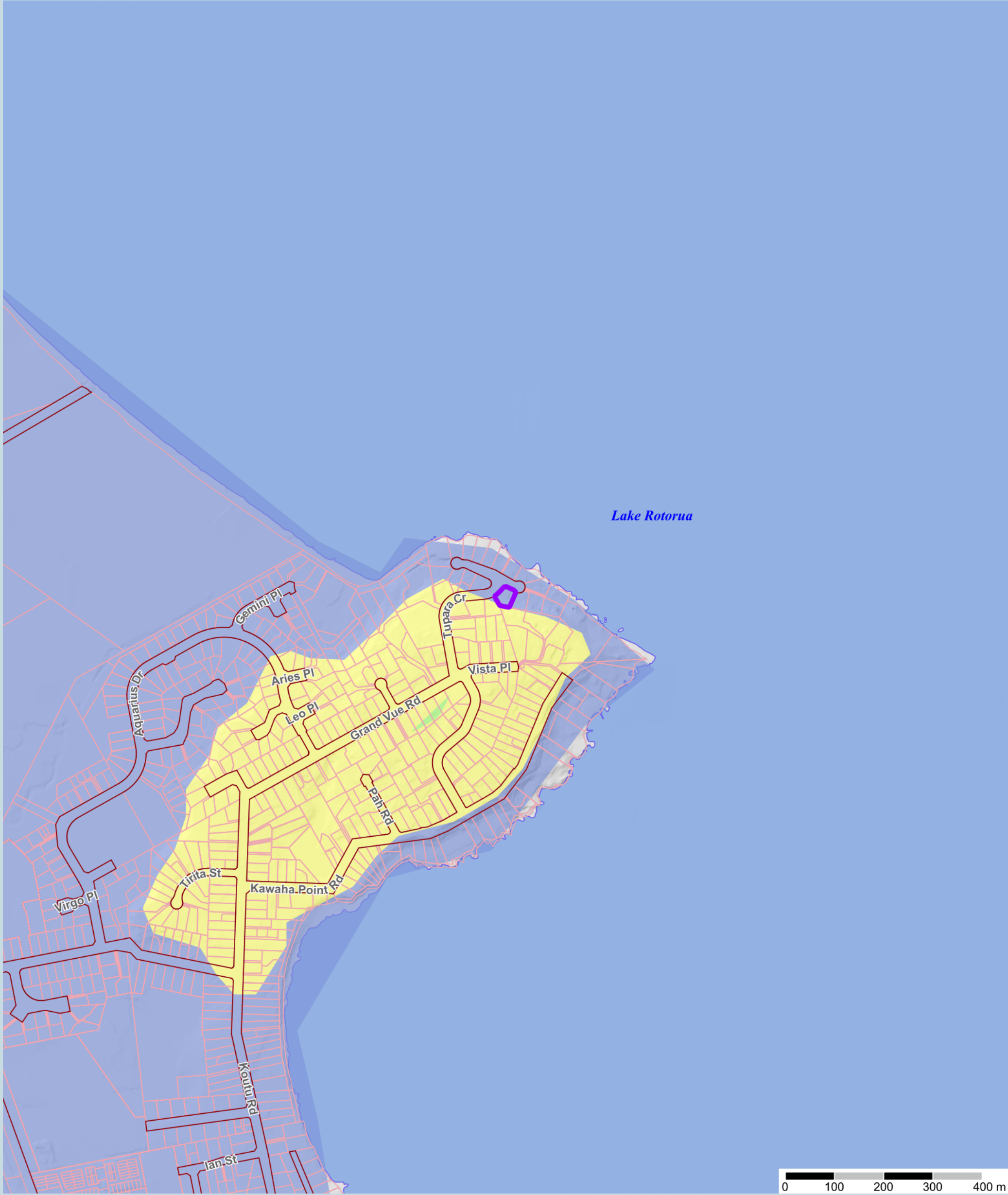
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ. LINZ licenses. CROWN COPYRIGHT RESERVED. Council does not warrant the accuracy of the information represented by this map. For further details on how data was derived and limitations for use refer to the following report: WSP (2024). Bay of Plenty Regional Landslide Susceptibility Study. (Report for BOPRC.)



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Liquefaction Vulnerability

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Possible

Undetermined

Unlikely

DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ. LINZ licenses. CROWN COPYRIGHT RESERVED. Council does not warrant the accuracy of the information represented by this map. For further details on how data was derived and limitations for use refer to map/page 13 of this map series.



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Design Lake Flood Level

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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1% AEP Level with Freeboard

Water Body/Stream

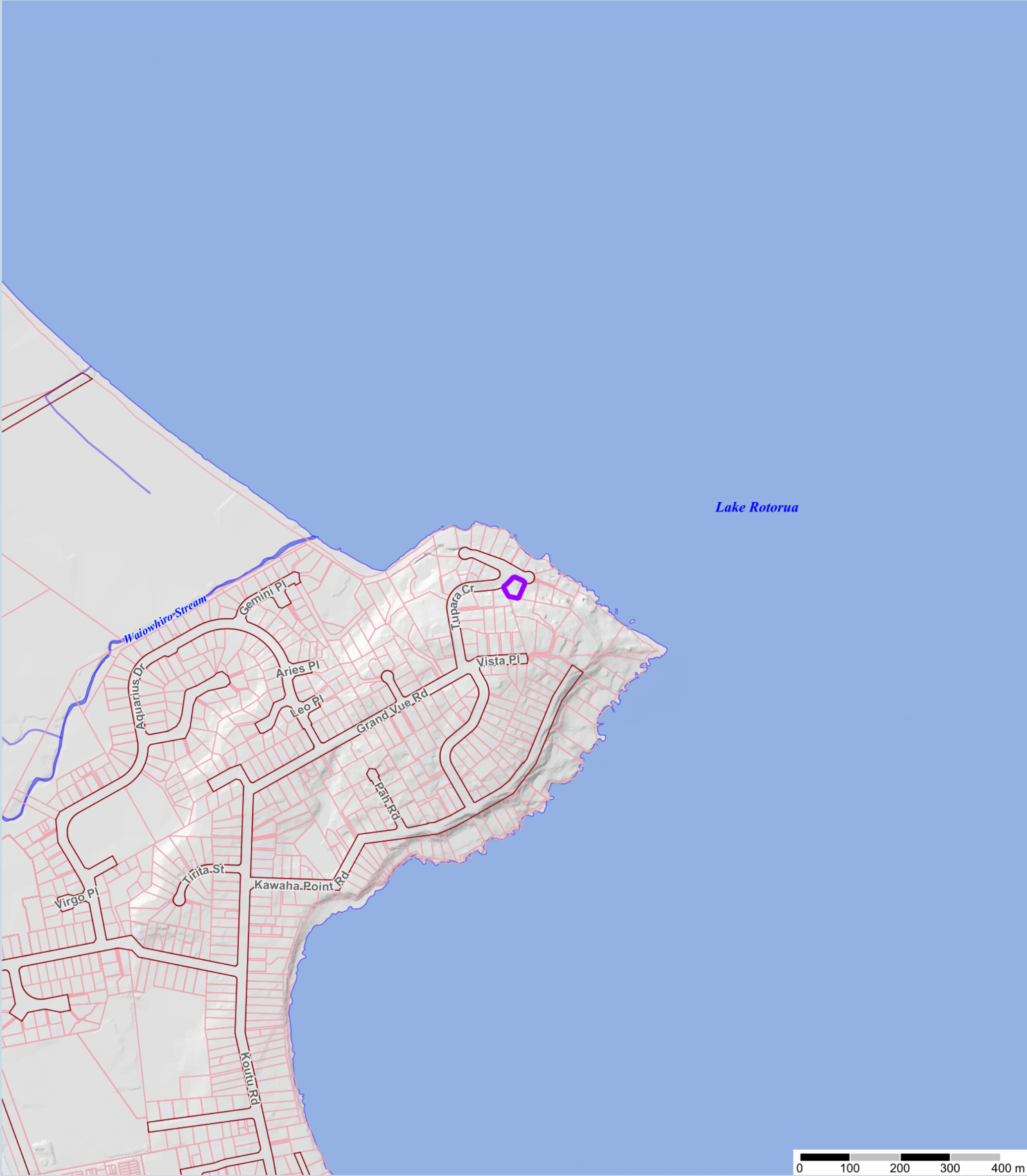
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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River/Stream Flood Modelling (1% AEP 2130)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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1% AEP 2130 Depth:

- 0.1 < Depth (m) ≤ 0.3
- 0.3 < Depth (m) ≤ 0.5
- Depth (m) > 0.5

- Modelling Boundary
- Outside Modelled Area

Water Body/Stream

DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
LINZ licenses. CROWN COPYRIGHT RESERVED. Council does not warrant the accuracy of the information represented by this map.
1% AEP maximum flood depth with climate change to 2130 and allowance for freeboard. For further details on how data was derived and limitations for use refer to map/page 13 of this map series.



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Storm Water Catchment Flood Modelling (1% AEP)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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1% AEP Depth:	Modelling Boundary:	
0.1 < Depth (m) ≤ 0.3	Catchment 3	Ngongotahā Catchment
0.3 < Depth (m) ≤ 0.5	Catchment 4	Outside Modelled Area
Depth (m) > 0.5	Catchment 5	Water Body/Stream

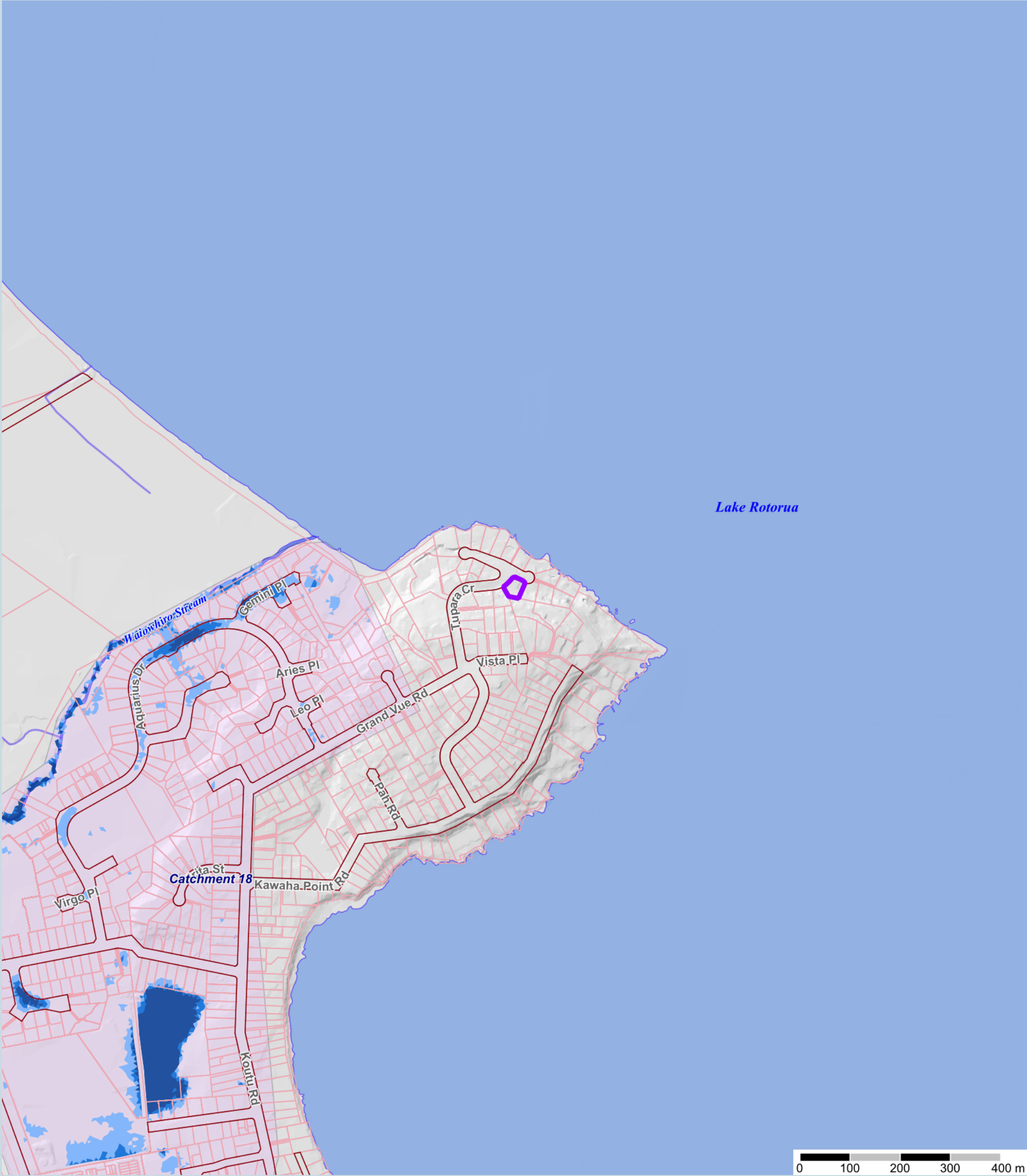
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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1% AEP flood depth. For further details on how data was derived and limitations for use refer to map/page 13 of this map series.



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Storm Water Catchment Flood Modelling (1% AEP 2100)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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1% AEP 2100 Depth:	Modelling Boundary:	
0.1 < Depth (m) ≤ 0.3	Catchment 6	Catchment 14
0.3 < Depth (m) ≤ 0.5	Catchment 8	Catchment 18
Depth (m) > 0.5	Catchment 12	Outside Modelled Area
		Water Body/Stream

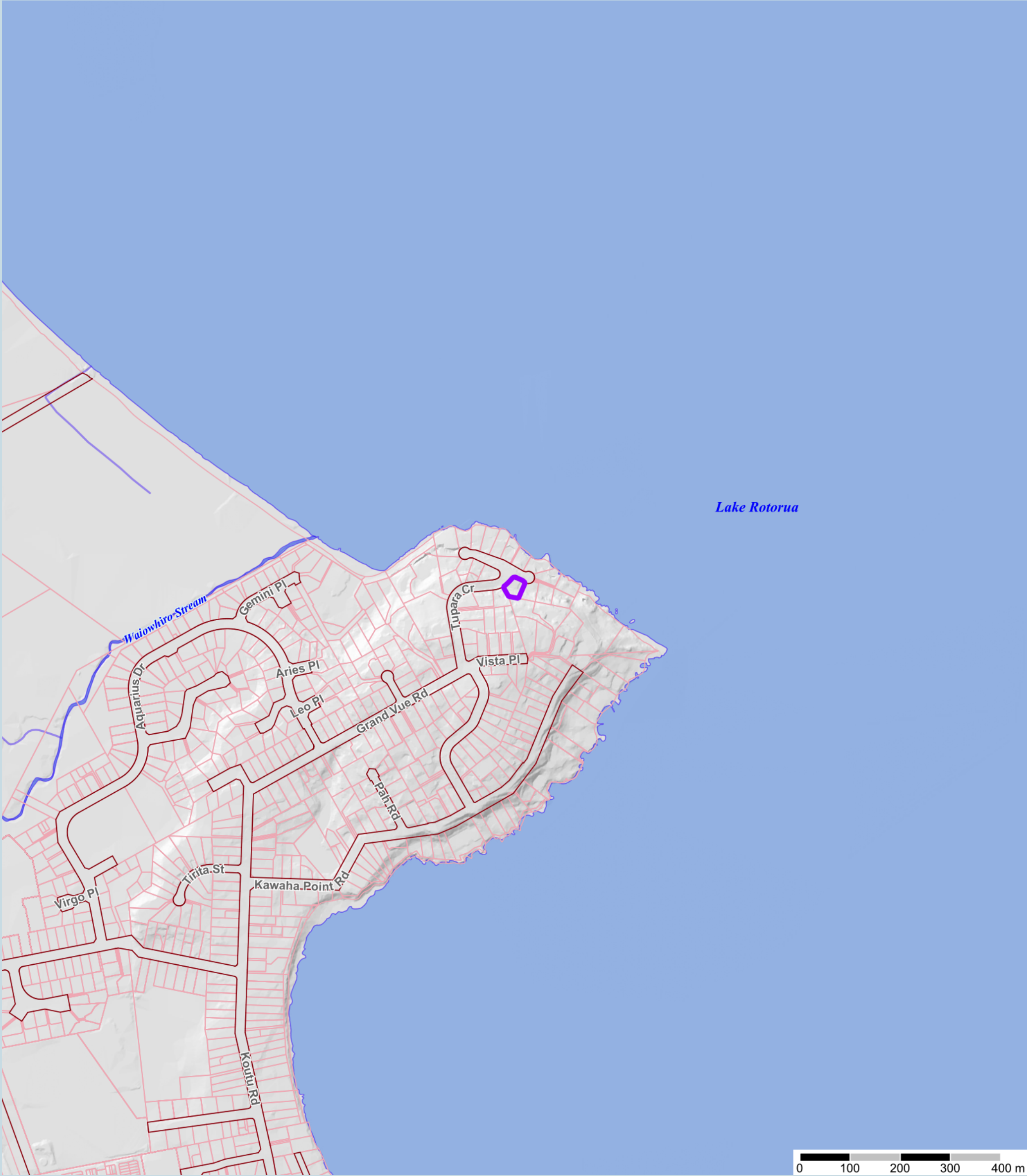
DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
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1% AEP flood depth with climate change to 2100. For further details on how data was derived and limitations for use refer to map/page 13 of this map series.



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Storm Water Catchment Flood Modelling (1% AEP 2130)

Address:	8 Manahi Avenue Kawaha Point Rotorua 3010	Valuation:	06542 550 00
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1% AEP 2130 Depth:	Modelling Boundary:	
0.1 < Depth (m) ≤ 0.3	Catchment 3	Ngongotahā Catchment
0.3 < Depth (m) ≤ 0.5	Catchment 4	Outside Modelled Area
Depth (m) > 0.5	Catchment 5	Water Body/Stream

DATA SETS: Accuracy of property boundaries +/- 0.2m – 0.3m in urban areas and up to +/- 50m in rural areas. Property boundaries, titles, legal descriptions and legal areas sourced from LINZ.
LINZ licenses. CROWN COPYRIGHT RESERVED. Council does not warrant the accuracy of the information represented by this map.
1% AEP flood depth with climate change to 2130. For further details on how data was derived and limitations for use refer to map/page 13 of this map series.



Geothermal Systems

Geothermal system mapping is based on the estimated extent of geothermal aquifers. It provides a general indication of where geothermal hazards may be present. However, there may be geothermal processes and hazards occurring in other areas that have not been identified. Hazards can also be associated with unmapped relic geothermal systems that are no longer active.

Source: B J Scott (2010). Rotorua District Council Hazard Studies, Part 1 Volcano and Geothermal Hazards, [GNS Science Consultancy Report 2010/67](#), Report for Rotorua District Council.

Fault Avoidance Zone

Sources: K J Clark, et al. (2019). Bay of Plenty Active Fault Mapping for Growth Areas. [GNS Science Consultancy Report 2018/143](#), Report for Rotorua Lakes Council.

P Villamor, et al. (2010). Rotorua District Council Hazard Studies: Active Fault Hazards. [GNS Science Consultancy Report 2010/182](#), Report for Rotorua District Council.

For properties in the Eastside area, see also the following letter that discusses a re-evaluation of the faults: K Clark, et al. (2021). [Letter to Bay of Plenty Regional Council from GNS Science](#).

Soft Ground Potential

The mapping of soft ground undertaken by GNS was based on a desktop study. The following descriptions of the mapped zones are provided in the report:

- Zone A: Areas of volcanic-derived rocks and soils. No soft ground is expected in zone A as the dominant high-energy volcanic processes preclude the development of soft to very soft soils.
- Zone B: Huka Group sediments and Hinuera Formation (older sediments). These sediments were formed in a range of environments. Sediments with soft and very soft strengths at the time of formation are likely to have consolidated over time.
- Zone C: Undifferentiated Holocene alluvium (<10,000 years old). Sites from a range of environmental conditions are present within this zone. Small areas of soft to very soft ground may be present as a surficial layer in some places.
- Zone D: Holocene (last 10,000 years) swamp deposits and Holocene lake or delta sediments between the 9000 ka and modern Lake Rotorua shorelines. Contains extensive areas of soft ground, but probably also contains areas of better ground.

Source: G D Dellow (2010). Rotorua District Council Hazard Studies: Distribution and Identification of Soft Soils. [GNS Science Consultancy Report 2010/81](#), Report for Rotorua Lakes Council.

Landslide Susceptibility

Landslide susceptibility studies were completed in 2010 and 2024 to map the relative susceptibility of land in the Rotorua district to landslides. Both studies are high-level district or regional studies and do not identify where landslide hazards are present at a property level. Rather, they delineate land into categories of susceptibility based on a set of conditions assumed from desktop information. The assessments also do not map areas subject to regression or runout from landslides. The latter study used more recent base data and considers a more comprehensive set of potential contributing factors. The latter study provides susceptibility mapping separately for earthquake and rainfall triggers.

Sources: G D Dellow (2010). Rotorua District Council Hazard Studies: Landslide hazards. [GNS Science Consultancy Report 2010/82](#), Report for Rotorua District Council.

WSP (2024). [Bay of Plenty Regional Landslide Susceptibility Study](#), Report for Bay of Plenty Regional Council.

Liquefaction Vulnerability

This liquefaction mapping was prepared for the Bay of Plenty Regional Council. The assessment was prepared in accordance with the Ministry for Environment and Ministry for Business, Innovation and Employment’s guidance: ‘Planning and Engineering Guidance for Potentially Liquefaction Prone Land’ (2017) to a Level A (basic desktop) level of detail. Questions about the mapping should be directed to the Bay of Plenty Regional Council.

Source: Tonkin and Taylor Limited (2021). [Bay of Plenty Liquefaction Vulnerability Assessment](#), Report for Bay of Plenty Regional Council.

Design Lake Flood Levels

The levels displayed are simply a representation of the ground level (taken from a digital elevation model) that correspond to the design lake flood levels for the 1% AEP event with an allowance for freeboard, which were advised by the Bay of Plenty Regional Council. These design lake flood levels are based on a frequency analysis of the twelve Rotorua lakes.

An interim allowance for climate change has been included for lakes Rotorua, Rotoiti and Tarawera only and the Bay of Plenty Regional Council has yet to provide final advice on the impact of climate change.

Source	Notes	Key Assumptions
I Pak (2022). Rotorua Lakes Design Levels Technical Report 2022. Bay of Plenty Regional Council Operations Publication 2022/03 .	Please refer to BayHazards - Bay of Plenty Natural Hazards Viewer webpage - for general information on natural hazards. For questions about how the lake flooding design levels are produced please make an online request to the Regional Council or call on 0800 884 880	The levels include an allowance for freeboard for estimate precision, local wind set up, wave run up, construction tolerances and the likely joint probability of the above factors.

River/Stream Flood Modelling

Currently, Rotorua Lakes Council has only been provided spatial mapping from fluvial (river/stream) hazards for the Greater Utuhina catchment. For information about flooding from other rivers/streams, please contact the relevant regional council.

The mapping is for a climate change scenario, based on the IPCC RCP 8.5 high emissions scenario and, in terms of today’s climate, would have an annual exceedance probability (AEP) significantly less than 1%. The depths include an allowance for freeboard of 500mm to 700mm.

There are multiple sources of uncertainty in these flood maps. The flood maps are fluvial (riverine) flooding maps only, i.e., flooding from the streams, but do not explicitly show flooding from direct localised rainfall or pipe surcharges. No allowance has been made for waves generated by vehicles and other factors such as post-development settlements and required construction tolerances. In addition, the Rotorua Lake Levels Assessment has not been completed and design surface levels in the vicinity of the lake are subject to change.

Catchment	Source	Notes
Greater Utuhina	Greater Utuhina Catchment Model (2022), Bay of Plenty Regional Council (1) DHI (2021). Utuhina Phases 2 and 3 Numerical Modelling , Report for BOPRC. (2) DHI (2022). Utuhina Hydraulic Model: Additional Modelling and Mapping , Addendum Report for BOPRC.	Please refer to BayHazards - Bay of Plenty Natural Hazards Viewer webpage - for general information on natural hazards. For specific questions on fluvial flooding within the Utuhina Catchment please make an online request to the Regional Council under Flood level report or call on 0800 884 880

For information about flooding from other fluvial (river/stream) sources please contact the Bay of Plenty Regional Council.

Stormwater Catchment Flood Modelling

The flood modelling results are indicative only. The models were developed at a catchment, rather than a property-specific level, and incorporate a range of assumptions and limitations. For example, fine features that may influence the direction of flow, such as kerbs, fences and walls, have not been included in the models. Drainage works that affect the flooding may also not be taken into account. In most cases, there was limited data from actual events against which the models could be validated or calibrated. Particular caution should be taken in interpreting the results in and around building footprints. In some models, buildings are treated as elevated areas of land to approximate their impacts on flows but actual building floor levels are generally not incorporated into the models and potential inundation of building footprints may not be shown. In other models, buildings are essentially removed, which may imply flooding of building footprints that may actually be raised above the modelled flood level.

The climate change scenarios are based on the IPC RCP 8.5 high emissions scenario and, in terms of today’s climate, would have an annual exceedance probability (AEP) significantly less than 1%. Modelling for different annual exceedance period or other scenarios may be available - refer to the associated reports for other model outputs. Boundaries shown are modelling boundaries only, not stormwater catchments.

Rotorua Lakes Council and its consultants accept no responsibility for the accuracy of the mapping or any decisions based on it.

Continued on next page.

Stormwater Catchment Flood Modelling (continued)

Catchment	Related Reports	Updated Assumptions
3	Under development	
4	Opus International Consultants Ltd (2017), Catchment 4 Stormwater Model Build and System Performance Report , RDC-772974; Opus International Consultants Ltd (2018), Memorandum on Catchments 4 and 6: Additional results for 1% AEP event , RDC-797296.	Original report based on HIRDS v3 rainfall including climate change to 2090 with a temperature increase of 2.1°C. The flood map is updated using the building outline layer from LINZ and HIRDSv4 rainfall with climate change to 2130 IPCC scenario RCP8.5.
5	Opus International Consultants Ltd (2016), Catchment 5 Stormwater Model Build and System Performance Report , RDC-687530.	Original report based on HIRDS v3 rainfall including climate change to 2090 with a temperature increase of 2.1°C. The flood map is updated using HIRDSv4 rainfall with climate change to 2130 IPCC scenario RCP8.5.
6	Opus International Consultants Ltd (2017), Catchment 6 Stormwater Model Build and System Performance Report , RDC-772471; Opus International Consultants Ltd (2018), Memorandum on Catchments 4 and 6: Additional results for 1% AEP event , RDC-797296.	Original report based on HIRDS v3 rainfall including climate change to 2090 with a temperature increase of 2.1°C. The flood map is updated using the building outline layer from LINZ and HIRDSv4 rainfall with climate change to 2130 IPCC scenario RCP8.5.
8	Under development	Original modelling was based on HIRDS v3 rainfall including climate change to 2090 with a temperature increase of 2.1°C. The flood map is updated using HIRDSv4 rainfall with climate change to 2100 IPCC scenario RCP8.5.
12	Under development	
14	Opus International Consultants Ltd (2018), Catchment 14 Stormwater Model Build and System Performance Report , RDC-828920.	Original report based on HIRDS v3 rainfall including climate change to 2090 with a temperature increase of 2.1°C. The flood map is updated using HIRDSv4 rainfall with climate change to 2100 IPCC scenario RCP8.5.
18	Jeff Booth Consulting Ltd (2018), SW Catchment 18 Model Development Memo and System Performance Report , RDC-876679.	
Ngongotahā catchments (to Awahou Stream)	Awa Environmental Limited (2024), Ngongotahā Flood Modelling: Model Build and Design Scenarios Report , RDC-20248149.	