Whangamata Stormwater Improvement Master Plan

Whangamata Stormwater Improvement Master Plan

	Prepared By	Approved By	Description	Date
1	K Selby Smith - TCDC	B Houston - TCDC	Updated	14 January 2025
2	K Selby Smith - TCDC	B Houston - TCDC	Updated	18 July 2025

Contents

1.0 INTRODUCTION

The Whangamata Stormwater Improvement Master Plan (WSIMP) has been developed in response to stormwater flooding issues experienced, particularly in the wake of the summer of 2023. In April 2023 the first Whangamata Stormwater meeting was held in Whangamata. In January 2024 Metis Consultants Ltd was engaged to produce the Whangamata Stormwater Improvement Master Plan.

The plan provides the basis for the stormwater capital works program for Whangamata for the 2024-2030 period. In the 2024-2034 there is $9.171million of available funding for stormwater improvement in Whangamata. The remaining options in the priority list will be utilised for forward planning for the Long-Term Plan.

This document is a summary of the work competed to date. The WSIMP is a dynamic plan responding to two governing factors. Firstly, the WSIMP involves stakeholder (including the Whangamata community) input, in which their needs and expectations are not static. Secondly, the WSIMP has to respond when further information obtained or policy or guidance document are updated during the plan implementation timeline.

For example, the Whangamata Stormwater Flood model will be reissued which may highlight sub-catchments which require further investigation. Or, as described Step 7 below, the information provided in detailed design could provide critical information that means the WSIMP requires changes.

The WSIMP is a working document with sections highlighted in yellow text indicating areas which require updating if changes are made.

2.0 OBJECTIVES

The objectives of the WSIMP are;

- Manage stormwater quantity to meet TCDC LOS
- Secondary focus on quality management: Accommodate requirements of current discharge consent, Waikato Regional Council guidance, and national requirements
- Accommodate climate change and sea level rise impacts in line with guidance from Waikato Regional Council and Ministry for Environment

3.0 OUTPUTS OF THE WSIMP

The desired outputs are:

- Prioritised stormwater works programme for Whangamata to inform Long-Term Plan development. The works programme will:
    - Address known current flooding issues as well as predicted future issues
    - Prioritise mitigation of habitable floor flooding over nuisance flooding
    - Address flood risk for critical infrastructure (medical facilities, transmission stations, pump stations, etc.) in addition to residential properties
    - Focus on the urban area only

4.0 LITERATURE REVIEW

The following guidance documents have been reviewed from TCDC, WRC, and relevant national sources to highlight important policies and strategies. These are used to confirm objectives and required outputs of the plan.

- Comprehensive discharge consent for Whangamata (Consent no. 105667 expiring 31st August 2031)
- TCDC Shoreline Management Plan (September 2022)
- Waikato Stormwater Management Guideline (May 2020)
- WRC Regional Plan (Amended June 2021)
- Proposed Waikato Regional Coastal Plan (August 2023)
- National Policy Statement – Freshwater Management (February 2023 amendment)

Note: Update this section as new documents are reviewed/issued.

5.0 DELINEATE CATCHMENTS

Whangamata has been delineated into 11 stormwater sub-catchments based on the stormwater reticulation as shown in Figure 1.

Each catchment is assessed at a catchment level flood risk, defined in terms of habitable floors and critical infrastructure. Types of infrastructure considered are shown in Table 1.

Table 1. Types of Critical Infrastructure

Category	Infrastructure
Energy & Communications	High-voltage transmission line structures Telecom exchange Critical telecoms routes (fibre etc)

	Transpower Hamilton comms centre Key fuel distribution infrastructure
Transportation	Critical roads (state highways / evacuation routes)
Wastewater	WWTP Interceptors Pump Stations Engineered Overflow Points
Water	WTP Reservoirs Bulk Main – Existing Bulk Main – Proposed Pump Stations
Flood control	Flood control structures
Welfare	Medical centres Civil defence centres Primary welfare locations (such as community centres or marae that may be used during civil defence emergencies)
Critical Community Services	Police Stations Fire Stations Ambulance Stations Key banking facilities Fast moving consumer goods
Environment	HAIL Sites Known Contaminated sites Closed landfills

Catchments have been prioritised based on known flood risk, informed by the datasets laid out in Table 2 and via stakeholder engagement. The priority catchment are shown in Figure 2.

Table 2. Flood risk assessment datasets to identify focus areas

Data	Source	Date	Details
Hydraulic modelling of Whangamata	HAL	Mar 2021	Properties at risk of habitable floor flooding in urban area
Door knock survey	Opus	2005	Reported property flooding from Opus survey of residents
Number of emergency callouts per road	FENZ	May 2023	Reported property flooding from 2007 to early 2023
Overland flow paths	GIS analysis	2023	Delineated through GIS analysis using 1m resolution LiDAR from 2021.

Note: Update this section as new datasets are provided/available. Update Priority catchments if required.

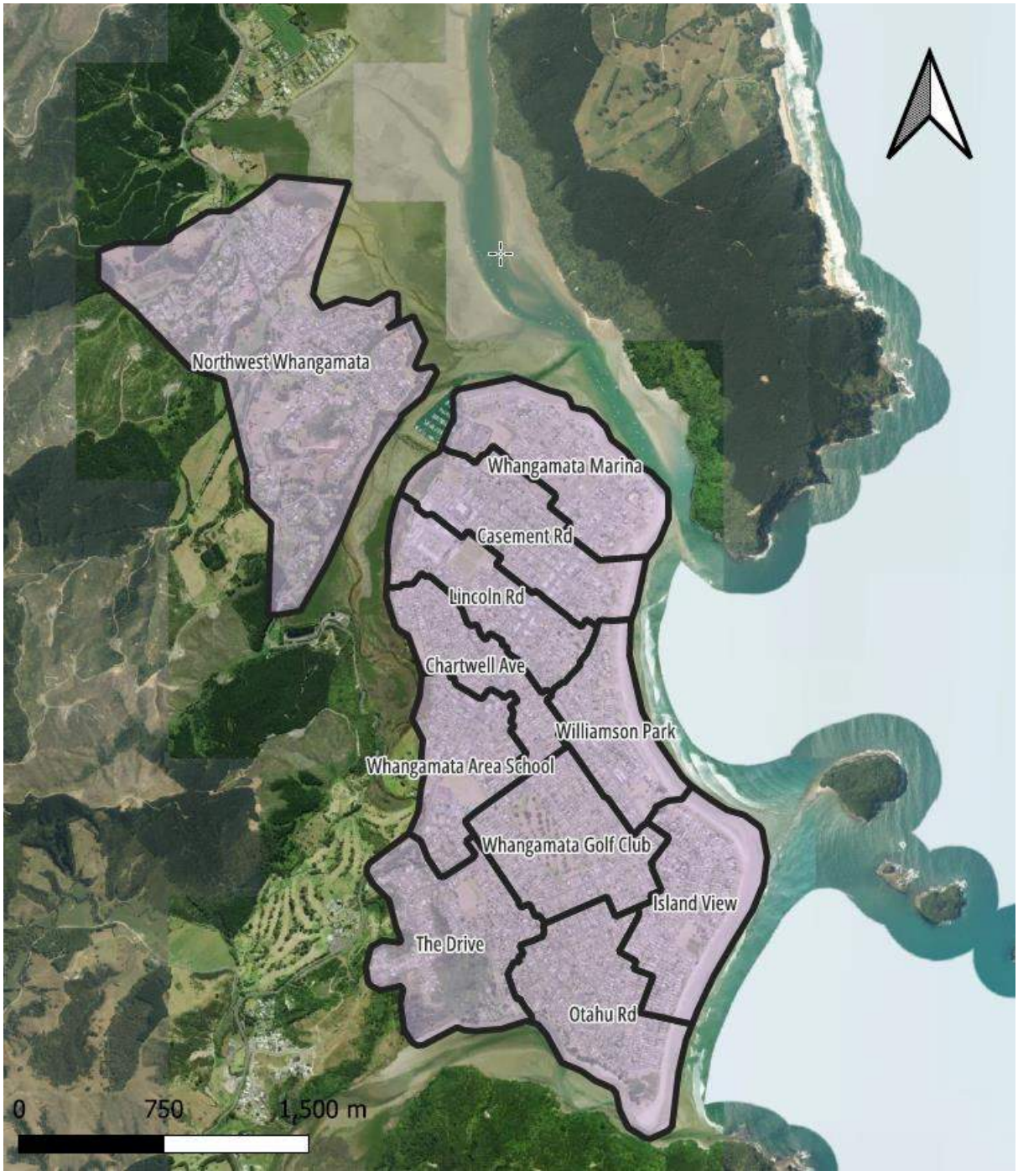


Figure 1. The eleven stormwater sub-catchments

Figure 2. Priority stormwater sub-catchment in Whangamata

6.0 STAKEHOLDER ENGAGEMENT

Stakeholder engagement includes;

- Community representatives and residents via the Whangamata Ratepayer Association, Councillors and Whangamata Community Board
- Council stakeholders
    - Water Services

- Roading
- Parks
- Asset Management
- Project Delivery
- Development Engineering

- Iwi
- WRC Planning / Consenting
- Maintenance and Local Contractors
- Specialist consultants in stormwater flood modelling and stormwater design (HAL and Metis Consultants Ltd)

Summary of Engagement

- 27 April 2023 – Whangamata Stormwater Project Meeting 1
- 15 June 2023 – Whangamata Stormwater Project Meeting 2
- 27 July 2023 – Whangamata Stormwater Project Meeting 3
- 13 October 2023 – Whangamata Stormwater Project Meeting 4
- 11 December 2023 - Whangamata Stormwater Project Meeting 5
- *Metis Consultants Ltd engaged to complete the WSIMP in January 2024*
- 12 February 2023 - Whangamata Stormwater Project Meeting 6 Stakeholder meeting - reviewed catchment-based options assessment approach.
- 15 March 2024: Walkabout 1 to look at key stormwater areas.
- 19 April 2024: Second walkabout (no residents turned up)
- 24 July 2024: Meeting to prioritise work for 24-25 Capital Programme. Ran through list of all options in top 5 priority catchments. Circulated options list and prioritisation matrix for residents to score.
- 13 August 2024: Results of prioritisation matrix completed by residents (Sheridan, Bruce, Ian, Terry and Dave). Shortlisted 6 options for further assessment (including Harbour View and Hetherington Rd)
- 16 September 2024: Metis Consultants Ltd issues a comparison spreadsheet to TCDC comparing all the shortlisted options.
- 21 February 2025: Stakeholder meeting to update on Capex programme 2024-25. Regarding change in capex program - upgrading Hetherington Rd only, not Harbour View. Further investigation requested to investigate Barbara Ave, Hunt Rd, and Port Rd options
- 2 April 2025: Memo by Metis Consultants to investigate Barbara Ave, Hunt Rd, and Port Rd options issued to stakeholder assessing options. Concluded that his options would not offer sufficient benefit

5.0 DRAFTING THE WSIMP CAPITAL WORKS PROGRAM

The aim of the draft capital works program is to generate a list of the top highest scoring options. These have been programmed based on the funds applied for in the 2024-27 LTP. The remaining options in the prioritised list will be converted into a capital works programme covering the next 25 years.

The process is summarised in the steps below.

STEP 1: ALL CATCHMENTS SW IMPROVEMENT OPTIONS (LONG LIST)

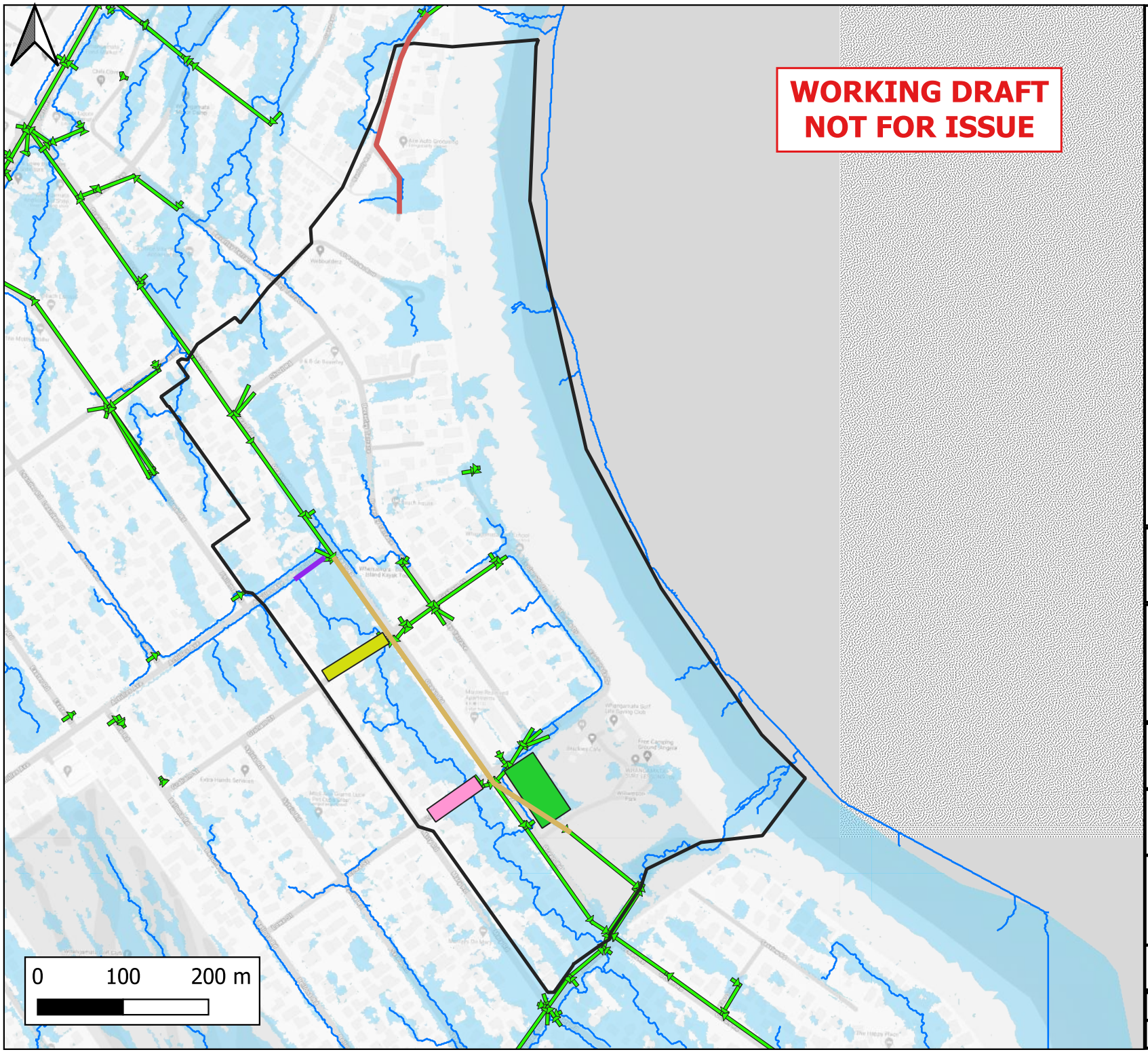
Metis Consultants Ltd generated the long list of stormwater improvement options for Whangamata using the information resources detailed in section 5.0. The walkabout on 15 March 2024 and input from Stakeholders was used to finalise the long list on 5 April 2024. The long list all catchments contains 58 stormwater improvement options. The option maps for each catchment are provided below.

Table 3. All catchment stormwater improvement options (long list)

Catchment	Option #	Description
1.0 Williamson Park	1.01	Divert runoff from Achilles Ave into Ocean Rd pipes
	1.02	Divert flow along Ranfurly Rd and discharge to beach outfall
	1.03	Increase network capacity along Ocean Rd and in Williamson Park
	1.04	Detention on Lowe St to capture OLFP
	1.05	Detention in Williamson Park
	1.06	Detention on Graham
2.0 Whangamata Marina	2.01	New SW pipe to capture flows from Mako Rd
	2.02	New SW pipe to capture runoff from swale near Harbour View Rd
	2.03	Increase network capacity and upgrade existing outfall on Beach Rd to capture runoff from Harbour View Rd
	2.04	Increase pipe capacity on Beach Rd to capture runoff on Harbour View Rd
	2.05	New SW pipe along Rutherford Rd to capture runoff from Tuck Rd
3.0 The Drive	3.01	Raise properties at bottom of hill on Apperly St
	3.02	Divert concrete channel into new wetland/pond in Park Avenue Reserve
	3.03	Engineered OLFP along SH25A discharging at Hilton Dr culvert
	3.04	Increase network capacity between concrete channels in Park Avenue Reserve
	3.05	Increase network capacity upstream of concrete channel in Park Avenue Reserve
4.0 Whangamata Area School	4.01	New SW Pipe to capture flows travelling down/across Ajax Rd
	4.02	New SW pipe on Tamaki Rd to divert flows from Exeter Rd
	4.03	New SW pipe to capture runoff from south of Exeter Rd
	4.04	Increase network capacity to capture runoff travelling through Whangamata RSA
	4.05	Increase network capacity Mayfair Ave to capture runoff on Port Rd

Catchment	Option #	Description
	4.06	New SW Pipe to capture runoff across Hampton Rd
	4.07	Engineered OLFP to capture flows from NE of Exeter Rd
	4.08	Detention / soakage in Whangamata school to capture upstream runoff
	4.09	Detention in berm on Port Rd to capture runoff crossing Port Rd
	4.10	Raise floor levels south of Exeter Rd to improve flood resilience
5.0 Lincoln Road	5.01	New SW pipe to capture flows west of Diana Ave
	5.02	New SW pipe to capture runoff crossing Beverley Terrace
	5.03	Increase network capacity to capture runoff from Port and Ocean Rds
	5.04	Increase network capacity to capture runoff from Lincoln Rd
	5.05	Detention on Lincoln Rd to capture runoff
	5.06	Partially remove speedbumps to contain runoff on Barbara Ave
	5.07	Engineered OLFP to capture runoff from Ranfurly Rd
	5.08	Engineered OLFP on Lincoln Rd to direct runoff to rugby field
	5.09	Detention in caravan park to capture runoff from Beverley Tce
	5.10	Detention in rugby field to capture diverted runoff from surrounding areas
6.0 Chartwell Ave	6.01	Underground detention in Whangamata Club parking lot
	6.02	Detention on Tamaki Rd to protect downstream properties on Ocean Rd
	6.03	Add inlets at low points on Philomel Road
	6.04	Increase network capacity along Chartwell Ave
7.0 Island View	7.01	Detention on Pipi Rd
	7.02	Raise properties between Rangi Ave and Given Ave
	7.03	Divert runoff along Tangaroa Rd, add new inlets at low points, and discharge to beach outfall
8.0 Casement Road	8.01	Increase network capacity on Hetherington Rd & upgrade outfall
	8.02	Upgrade outfall at Casement Rd
	8.03	Upgrade outfall at Aickin Rd
9.0 Otahu Road	9.01	Engineered OLFP on Hauturu St and Kaka St to protect low-lying properties
	9.02	Engineered OLFP on Otahu Rd to protect low-lying properties

Catchment	Option #	Description
	9.03	Increase network capacity along Kotuku St
	9.04	Raise floor levels for properties on Otahu Rd
10.0 Whangamata Golf Club	10.01	Detention in Williamson golf course to capture runoff from Bellona and Kiwi Rd
	10.02	Detention in berms to capture runoff from Tui Rd
	10.03	Detention in berms to capture runoff from Kiwi Rd
	10.04	New SW pipe and downstream upsizing to divert Kiwi Rd network to Park Ave channel
11.0 NW Whangamata	11.01	Reinforce posts to improve flood resilience of transmission line
	11.02	Resilience measures at wastewater pump station
	11.03	Further investigations required to determine appropriate measures for critical Sewer / Water mains
	11.04	Increase inlet capacity along Durrant Drive



Legend

- Catchment Boundary

Existing drainage

- Stormwater pipe network
- Major overland flow paths

Options

- 1.01: Divert runoff from Achilles Ave into Ocean Rd pipes
- 1.02: Divert flow along Ranfurly Rd and discharge to beach outfall
- 1.03: Increase network capacity along Ocean Rd and in Williamson Park
- 1.04: Detention on Lowe St to capture OLFP
- 1.05: Detention in Williamson Park
- 1.06: Detention on Graham St

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Catchment 1: Williamson Park
Flood Mitigation Options

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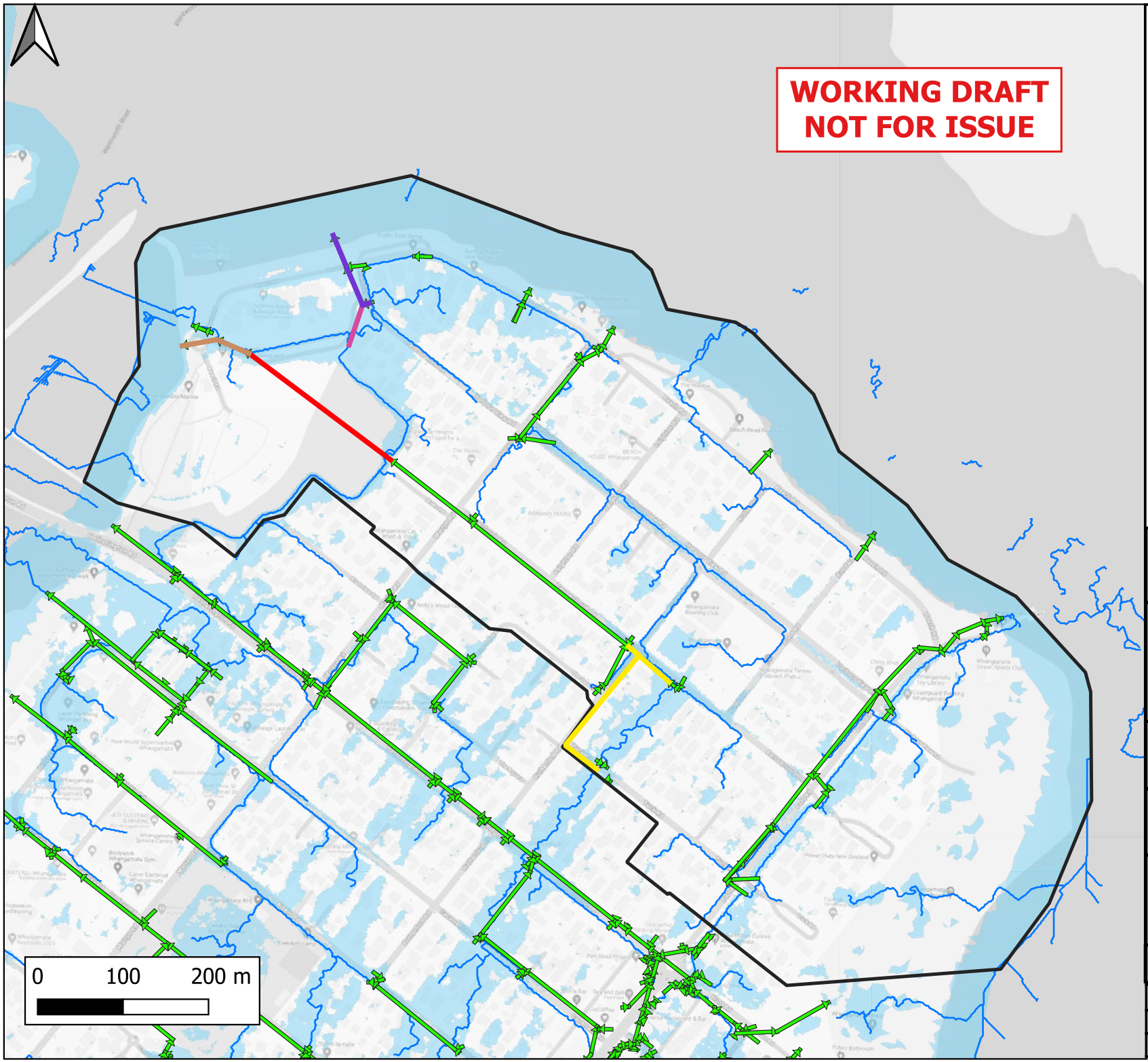

Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

2.01: New SW pipe to capture flows from Mako Rd

2.02: New SW pipe to capture runoff from swale near Harbour View Rd

2.03: Increase network capacity and upgrade existing outfall on Beach Rd to capture runoff from Harbour View Rd

2.04: Increase pipe capacity on Beach Rd to capture runoff on Harbour View Rd

2.05: New SW pipe along Rutherford Rd to capture runoff from Tuck Rd

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Catchment 2: Whangamata Marina Flood Mitigation Options

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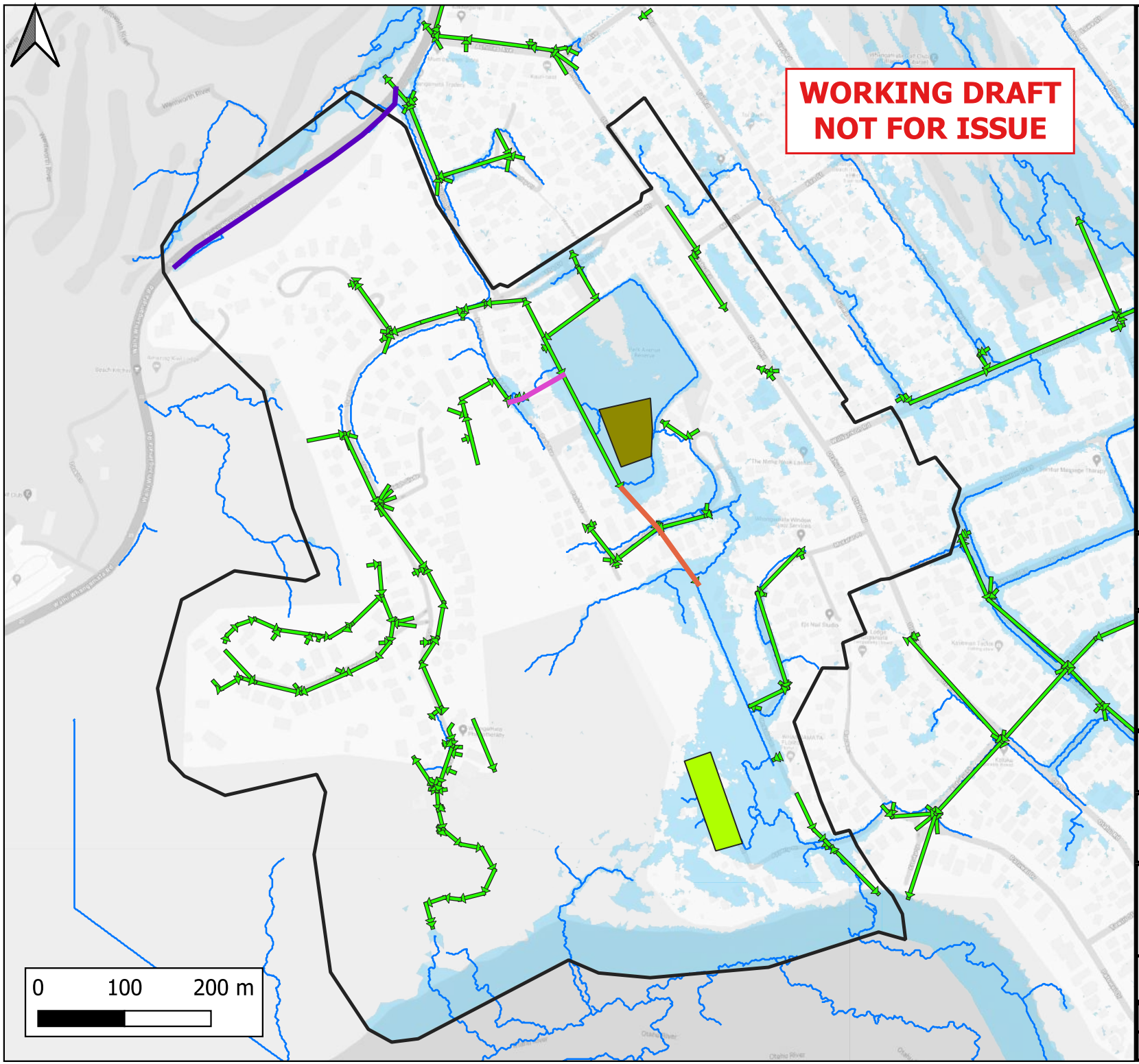

Legend

Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

3.01: Raise properties at bottom of hill on Apperly St

3.02: Divert concrete channel into new wetland/pond in Park Avenue Reserve

3.03: Engineered OLFP along SH25A discharging at Hilton Dr culvert

3.04: Increase network capacity between concrete channels in Park Avenue Reserve

3.05: Increase network capacity upstream of concrete channel in Park Avenue Reserve

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Catchment 3: The Drive
Flood Mitigation Options

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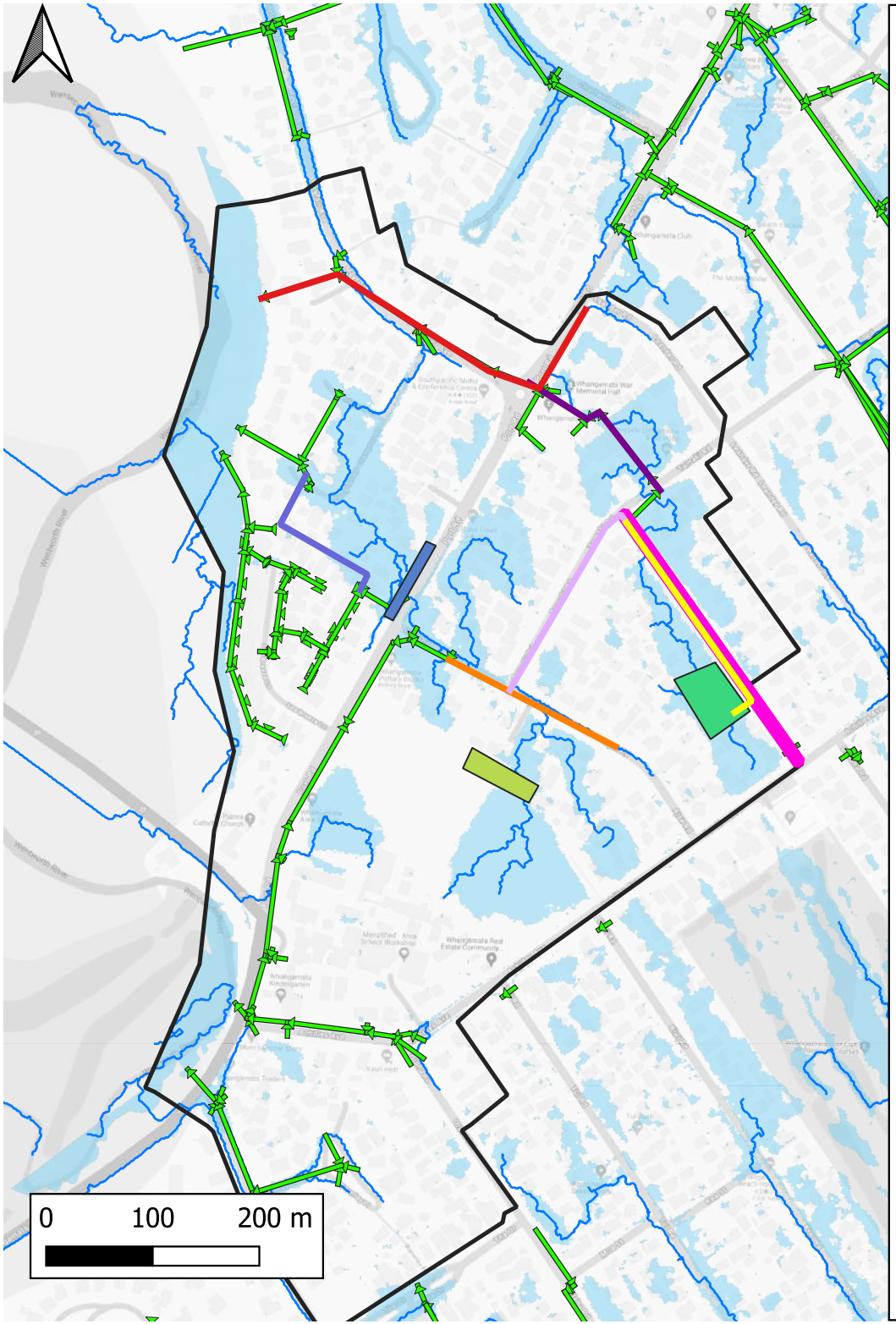

Legend

Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

- 4.01: New SW Pipe to capture flows travelling down/across Ajax Rd
- 4.02: New SW pipe on Tamaki Rd to divert flows from Exeter Rd
- 4.03: New SW pipe to capture runoff from south of Exeter Rd
- 4.04: Increase network capacity to capture runoff travelling through Whangamata RSA
- 4.05: Increase network capacity Mayfair Ave to capture runoff on Port Rd
- 4.06: New SW Pipe to capture runoff across Hampton Rd
- 4.07: Engineered OLFP to capture flows from NE of Exeter Rd
- 4.08: Detention / soakage in Whangamata school to capture upstream runoff
- 4.09: Detention in berm on Port Rd to capture runoff crossing Port Rd
- 4.10: Raise floor levels south of Exeter Rd to improve flood resilience

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Catchment 4: Whangamata Area School Flood Mitigation Options

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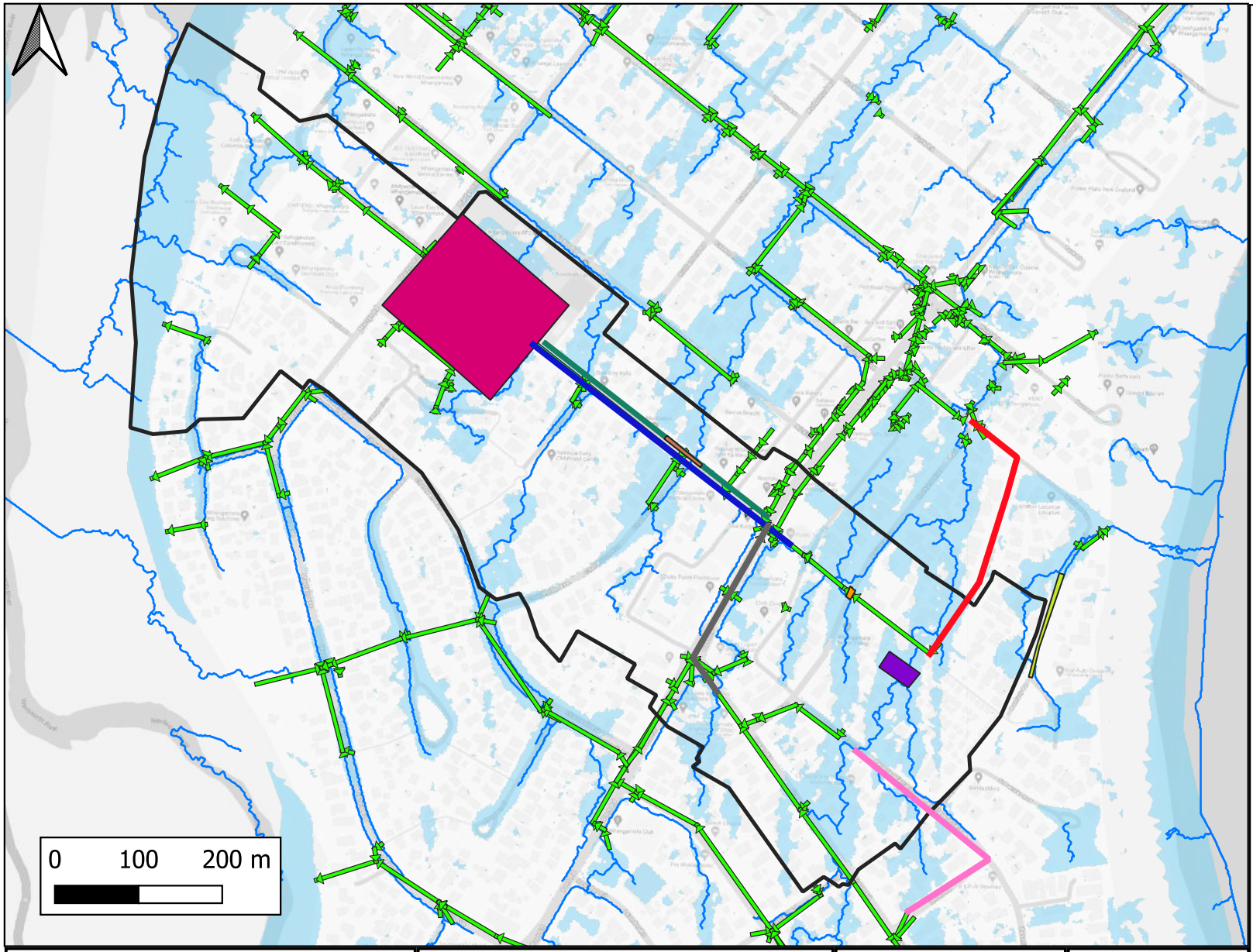

Legend

Catchment Boundary

Options

- 5.01: New SW pipe to capture flows west of Diana Ave
- 5.02: New SW pipe to capture runoff crossing Beverley Terrace
- 5.03: Increase network capacity to capture runoff from Port and Ocean Rds
- 5.04: Increase network capacity to capture runoff from Lincoln Rd
- 5.05: Detention on Lincoln Rd to capture runoff
- 5.06: Partially remove speedbumps to contain runoff on Barbara Ave
- 5.07: Engineered OLFP to capture runoff from Ranfurly Rd
- 5.08: Engineered OLFP on Lincoln Rd to direct runoff to rugby field
- 5.09: Detention in caravan park to capture runoff from Beverley Tce
- 5.10: Detention in rugby field to capture diverted runoff from surrounding areas

Existing drainage

- Stormwater pipe network
- Major overland flow paths

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Catchment 5: Lincoln Road
Flood Mitigation Options

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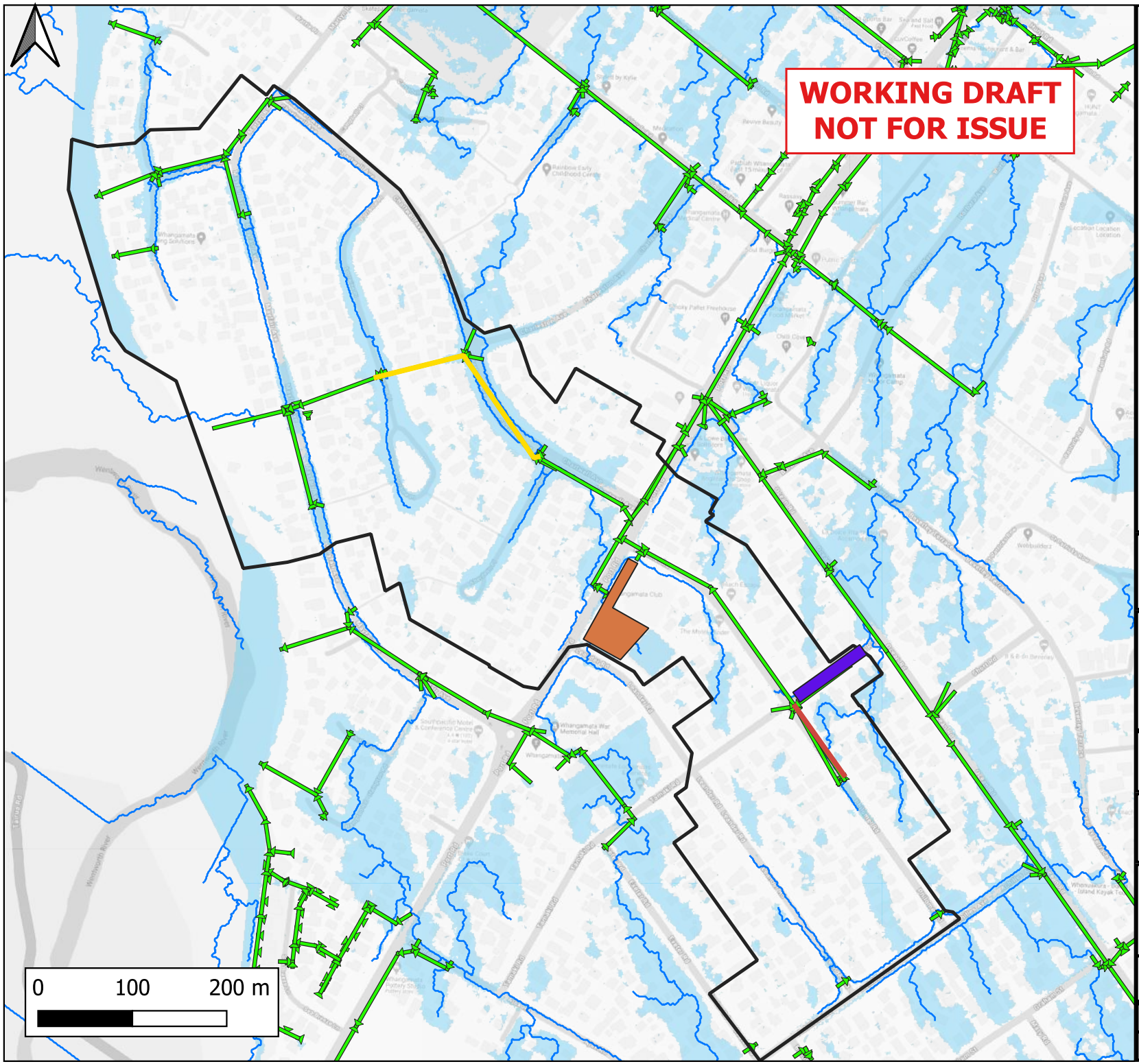

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Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

6.01: Underground detention in Whangamata Club parking lot

6.02: Detention on Tamaki Rd to protect downstream properties on Ocean Rd

6.03: Add inlets at low points on Philomel Road

6.04: Increase network capacity along Chartwell Ave

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Catchment 6: Chartwell Avenue
Flood Mitigation Options

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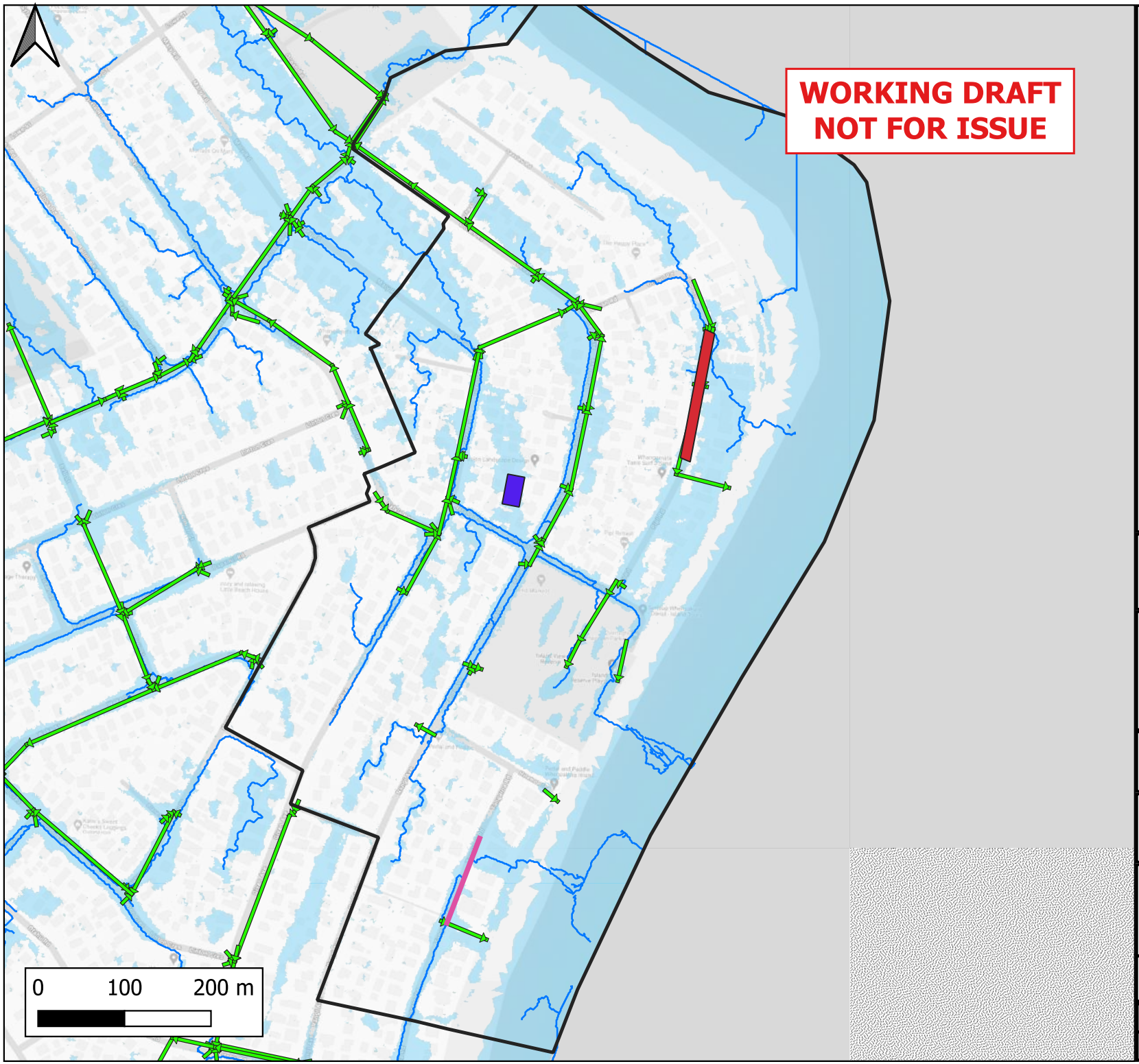

Legend

- Catchment Boundary

Existing drainage

- Stormwater pipe network
- Major overland flow paths

Options

- 7.01: Detention on Pipi Rd
- 7.02: Raise properties between Rangi Ave and Given Ave
- 7.03: Divert runoff along Tangaroa Rd, add new inlets at low points, and discharge to beach outfall

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Catchment 7: Island View
Flood Mitigation Options

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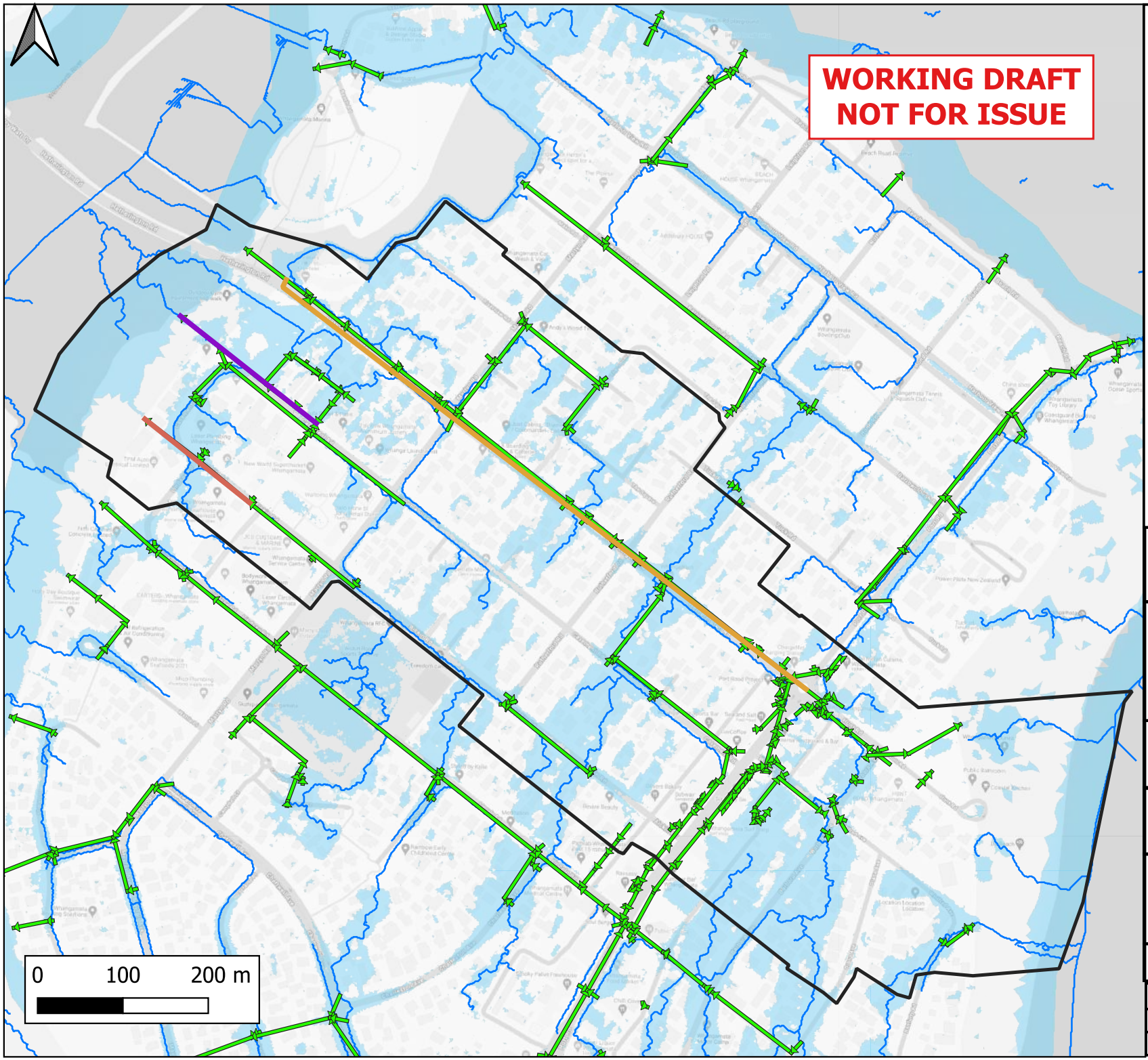

Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

8.01: Increase network capacity on Hetherington Rd & upgrade outfall

8.02: Upgrade outfall at Casement Rd

8.03: Updgrade outfall at Aickin Rd

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Catchment 8: Casement Rd Flood Mitigation Options

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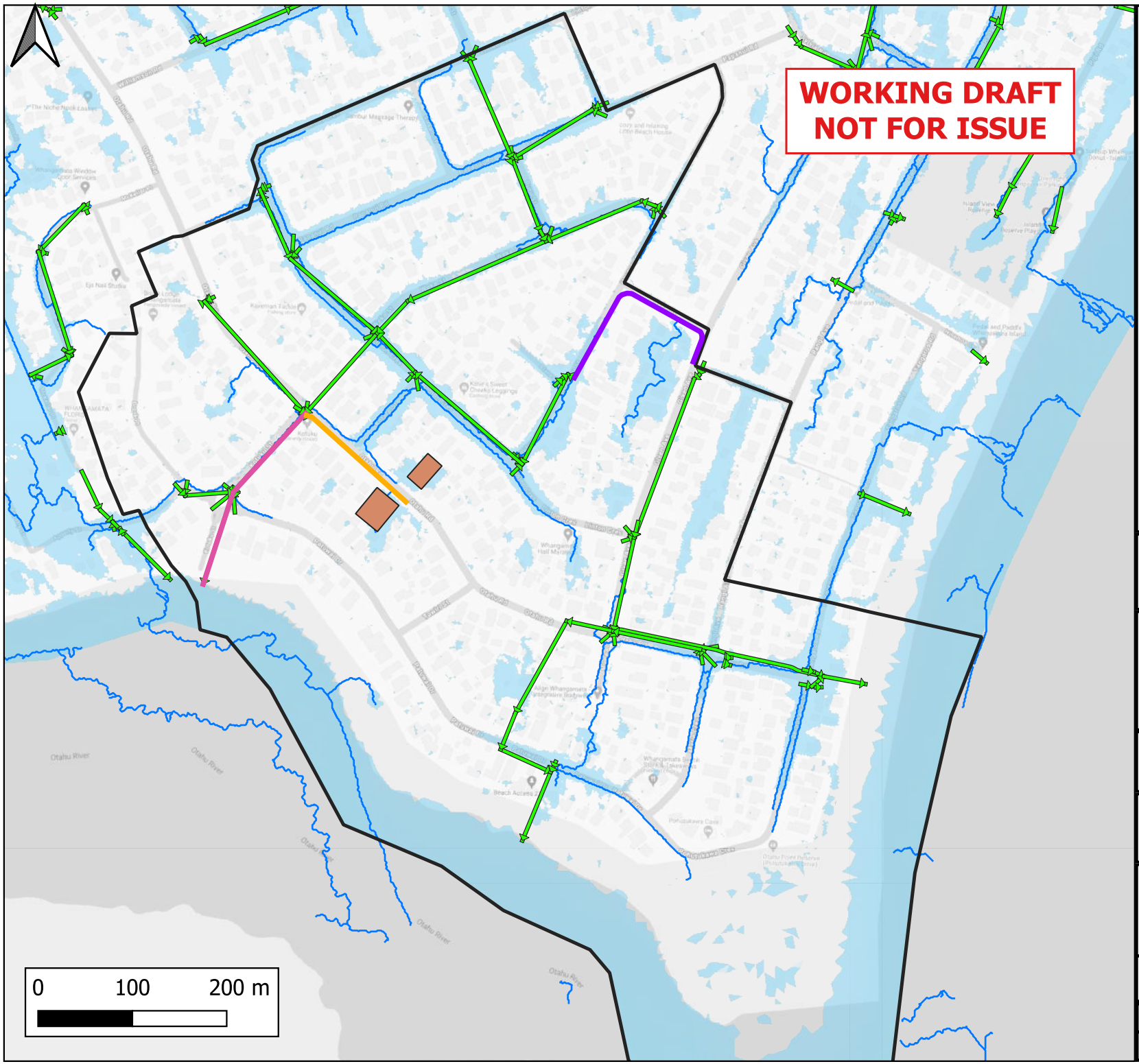

Legend

- Catchment Boundary

Existing drainage

- Stormwater pipe network
- Major overland flow paths

Options

- 9.01: Engineered OLFP on Hauturu St and Kaka St to protect low-lying properties
- 9.02: Engineered OLFP on Otahu Rd to protect low-lying properties
- 9.03: Increase network capacity along Kotuku St
- 9.04: Raise floor levels for properties on Otahu Rd

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Catchment 9: Otahu Road
Flood Mitigation Options

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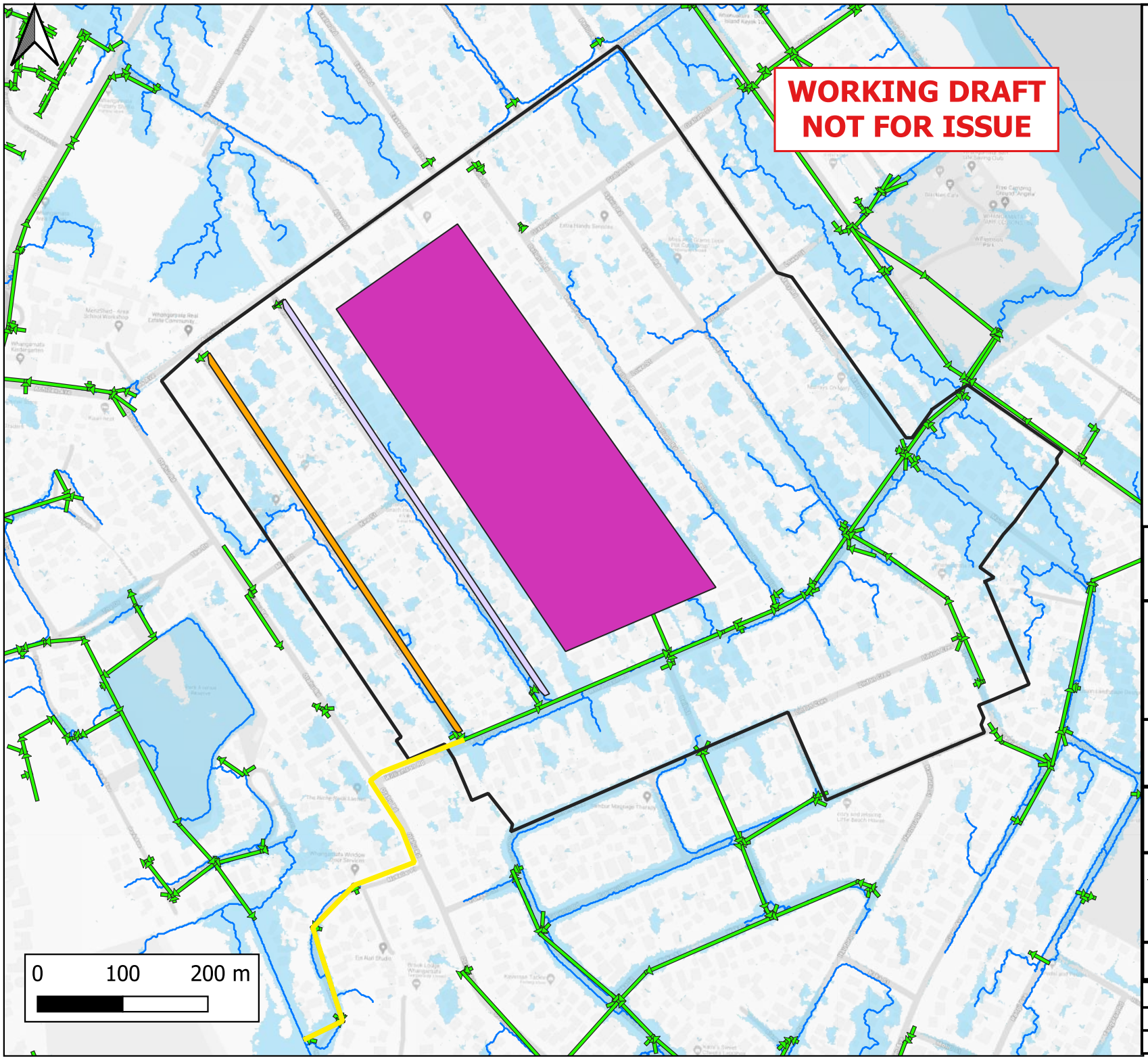

Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

10.01: Detention in Williamson golf course to capture runoff from Bellona and Kiwi Rd

10.02: Detention in berms to capture runoff from Tui Rd

10.03: Detention in berms to capture runoff from Kiwi Rd

10.04: New SW pipe and downstream upsizing to divert Kiwi Rd network to Park Ave channel

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Catchment 10: Whangamata Golf Club Flood Mitigation Options

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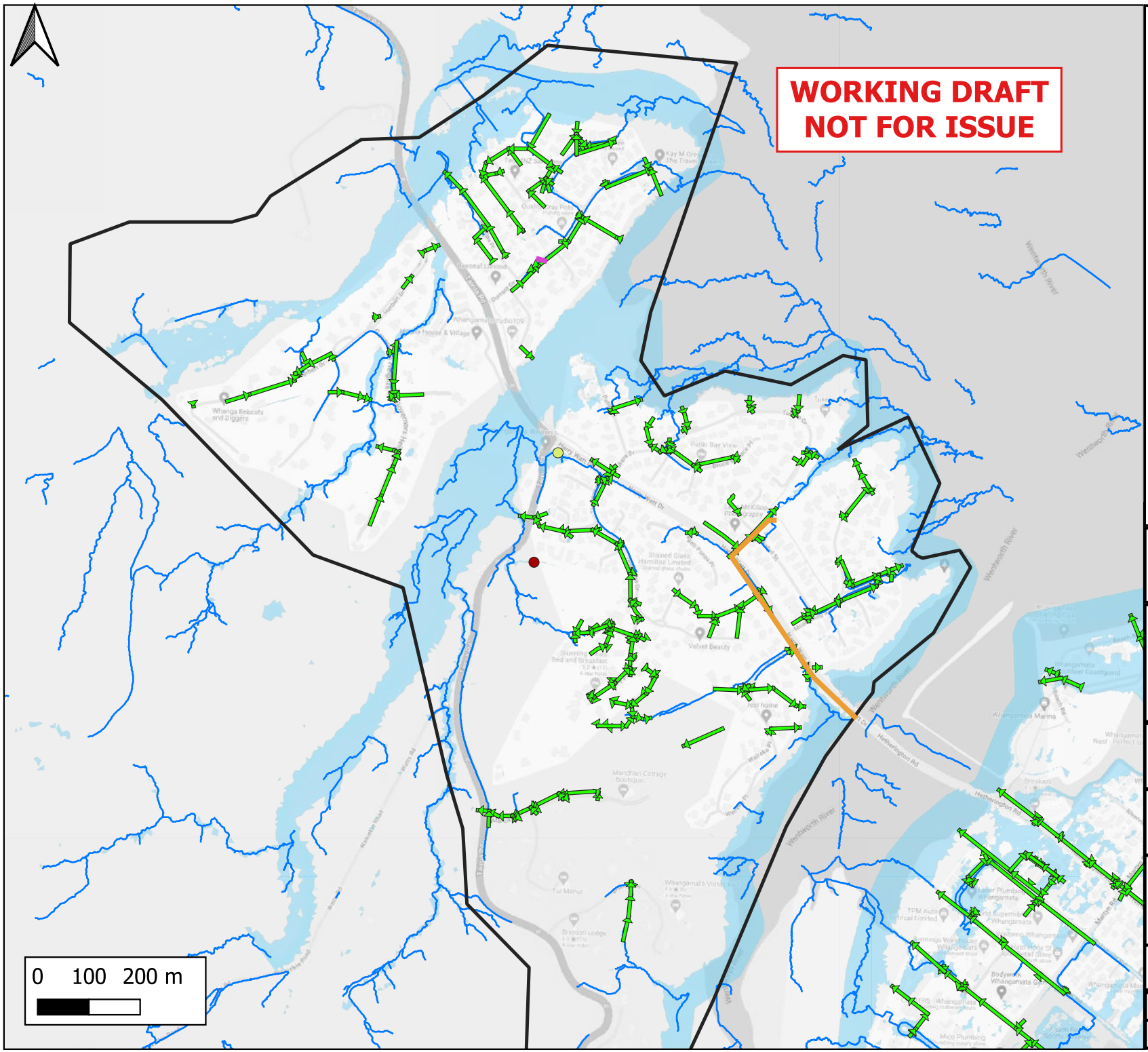

Legend

Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

11.01: Reinforce posts to improve flood resilience of transmission line

11.02: Resilience measures at wastewater pump station

11.03: Further investigations required to determine appropriate measures for critical Sewer / Water mains

11.04: Increase inlet capacity along Durrant Drive

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Whangamata Stormwater Master Plan

Catchment 11: Northwest Whangamata Flood Mitigation Options

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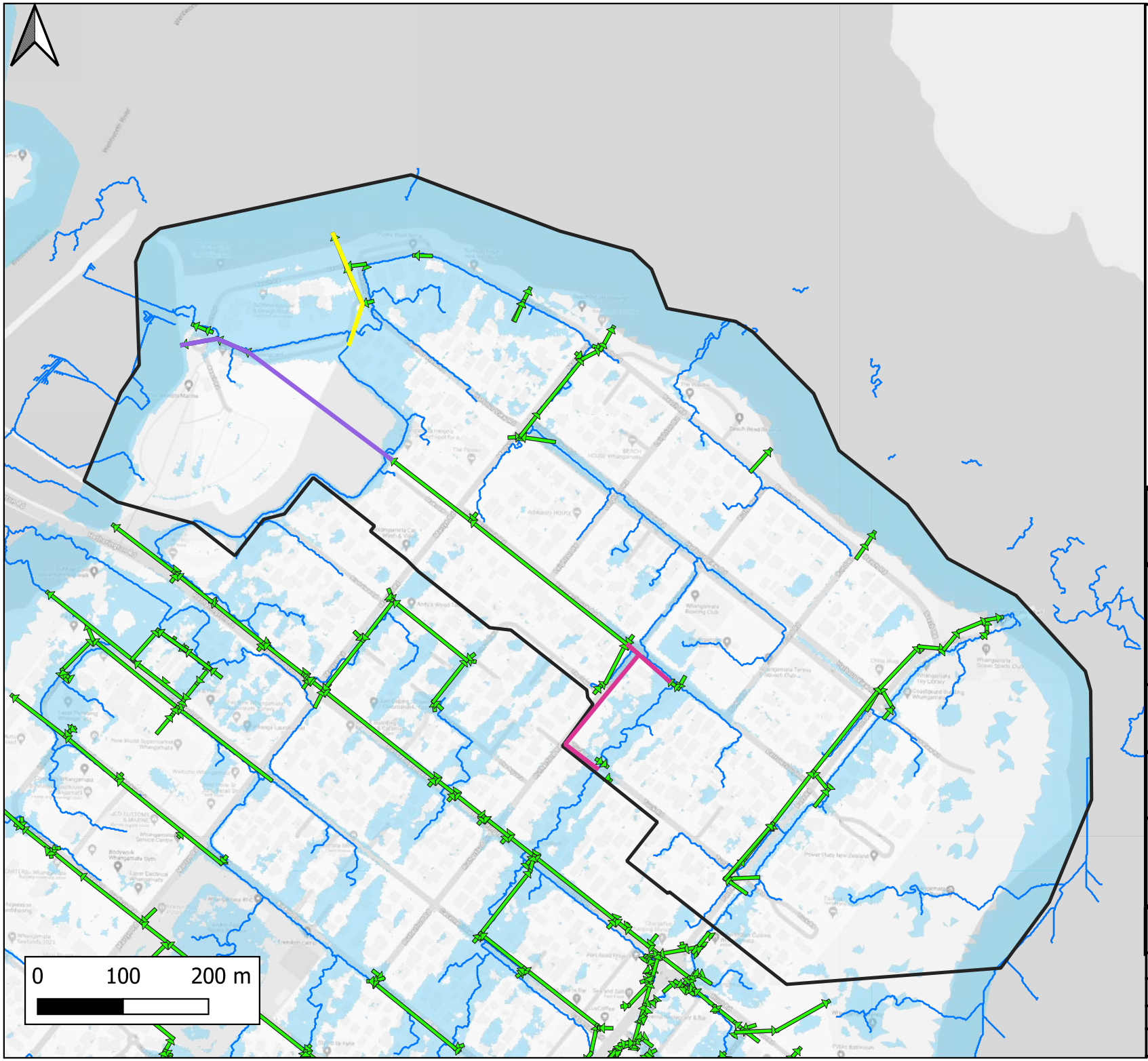
STEP 2: SW IMPROVEMENT OPTIONS SHORTLIST FOR PRIORITISATION IN PRIORITY CATCHMENTS

As a result of the walkover and further investigation the long list of options was reduced. The stormwater improvement options were shortlisted to 19 options in May 2024 from the priority catchments. Refer to the catchment maps and individual options maps below.

Table 4. Priority catchment stormwater improvement options (short list)

Catchment	Option #	Description
2.0 Whangamata Marina	2.01	Upgrade Harbour View outfall and connect to swale
	2.02	Connect Barrowclough Road pipe to Beach Road and upgrade outfall
	2.05	New SW pipe along Rutherford Road to capture runoff from Tuck Road
4.0 Whangamata Area School	4.01	New SW pipe to capture flows from Ajax Road
	4.05	Extend Mayfair Avenue pipe and upgrade outfall
	4.06	New SW pipe on Port Road connecting to Sea Breeze Lane outfall
	4.09	Detention in berm on Port Road to capture runoff
5.0 Lincoln Road	5.01	New SW pipe to capture flows on Barbara Avenue
	5.02	New SW pipe to capture runoff crossing Beverley Terrace
	5.04	Increase network capacity on Lincoln Road
	5.05	Upgrade Lindsay Road network and outfall
	5.10	Detention in rugby field to capture diverted runoff from surrounding areas
8.0 Casement Road	8.01	Upgrade outfall at Hetherington Road
	8.02	Upgrade outfall at Casement Road
	8.03	Upgrade outfall at Aickin Road
10.0 Whangamata Golf Club	10.01	Detention in Williamson Golf Course to capture runoff from Bellona and Kiwi Road
	10.02	Detention in berms to capture runoff from Tui Road
	10.03	Detention in berms to capture runoff from Kiwi Road
	10.04	Divert Kiwi Road network to Park Avenue channel via new and upsized pipes



Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

2.01: Upgrade Harbour View outfall and connect to swale

2.02: Connect Barrowclough Rd pipe to Beach Rd and upgrade outfall

2.05: New SW pipe along Rutherford Rd to capture runoff from Tuck Rd

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Whangamata Stormwater Master Plan

Catchment 2: Whangamata Marina Flood Mitigation Options

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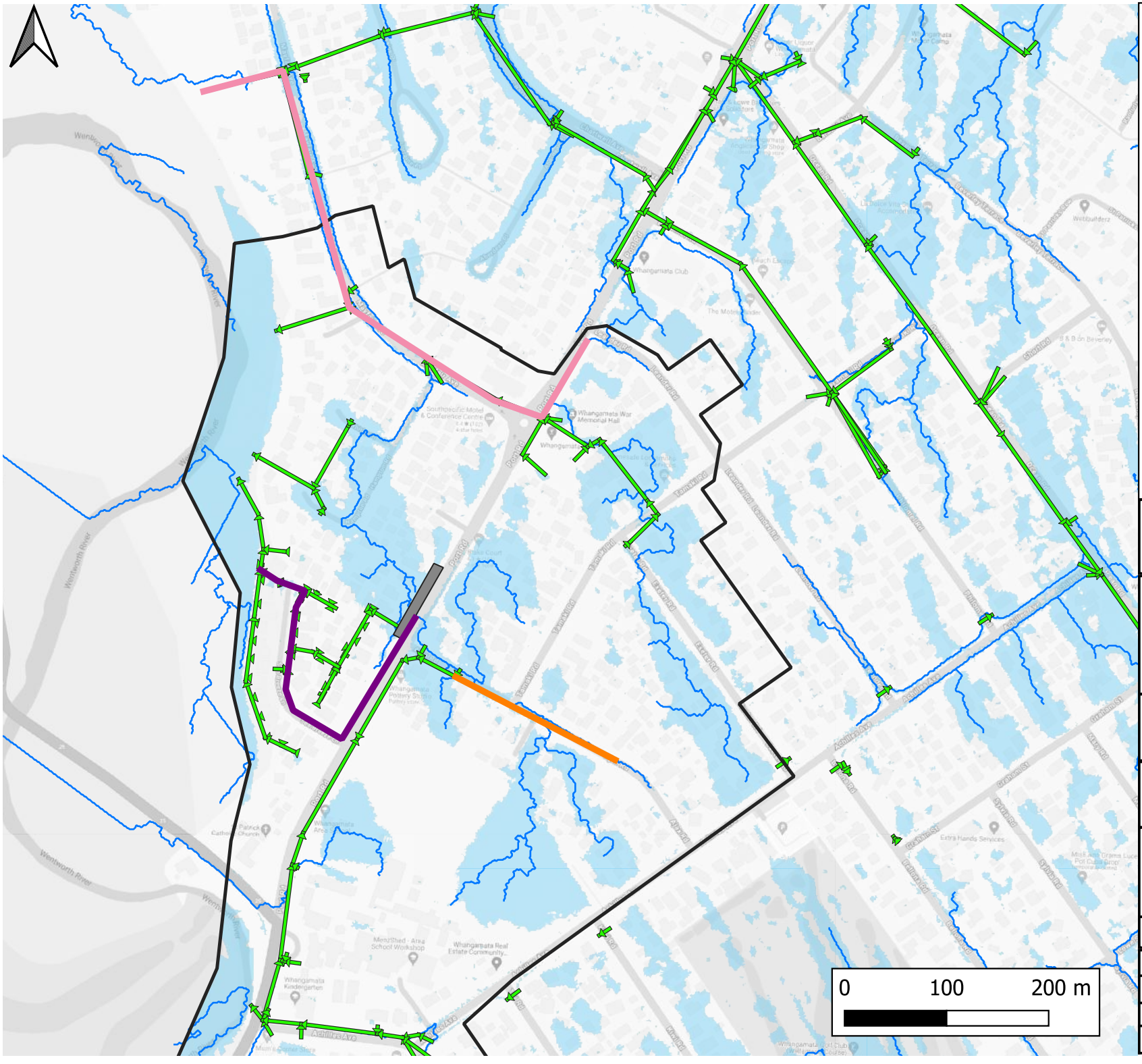
Page Size: A3

Revision	Date	Comment
v1	14 Mar 2024	Long list for resident review
v2	5 Apr 2024	Short list for resident review
v2.1	3 May 2024	Updated short list



Legend

Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

4.01: New SW Pipe to capture flows from Ajax Rd

4.05: Extend Mayfair Ave pipe and upgrade outfall

4.06: New SW pipe on Port Rd connecting to Sea Breeze Lane outfall

4.09: Detention in berm on Port Rd to capture runff crossing Port Rd

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Whangamata Stormwater Master Plan

Catchment 4: Whangamata Area School Flood Mitigation Options

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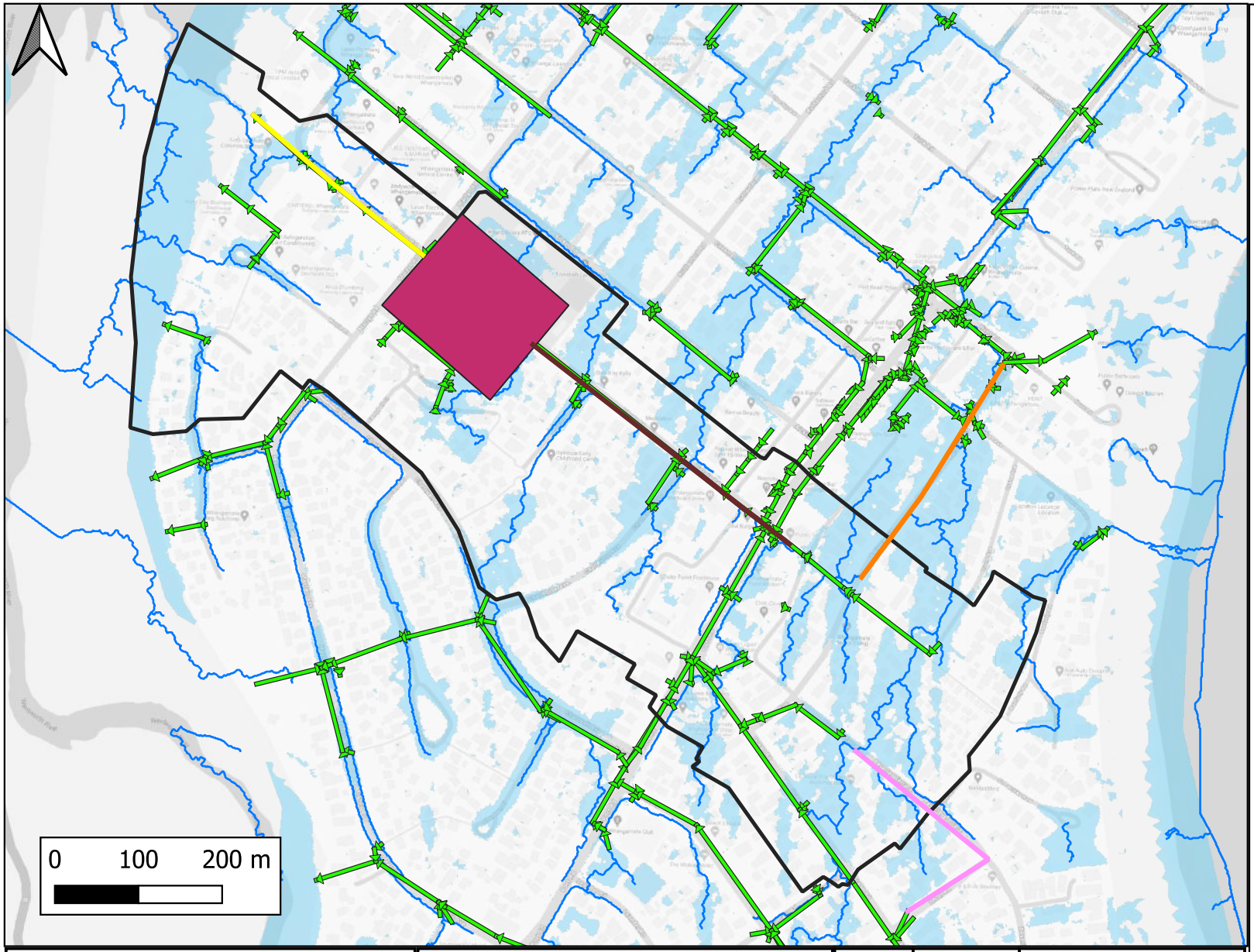
v2.0	2 May 2024	Short list



Legend

Catchment Boundary

Existing drainage

Stormwater pipe network

Major overland flow paths

Options

5.01: New SW pipe to capture flows on Barbara Ave

5.02: New SW pipe to capture runoff crossing Beverley Terrace

5.04: Increase network capacity to capture runoff from Lincoln Rd

5.05: Upgrade Lindsay Rd network and outfall

5.10: Detention in rugby field to capture diverted runoff from surrounding areas

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Whangamata Stormwater Master Plan

Catchment 5: Lincoln Road Flood Mitigation Options

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v1.1	5 Apr 2024	Updated long list
v2.0	2 May 2024	Short list

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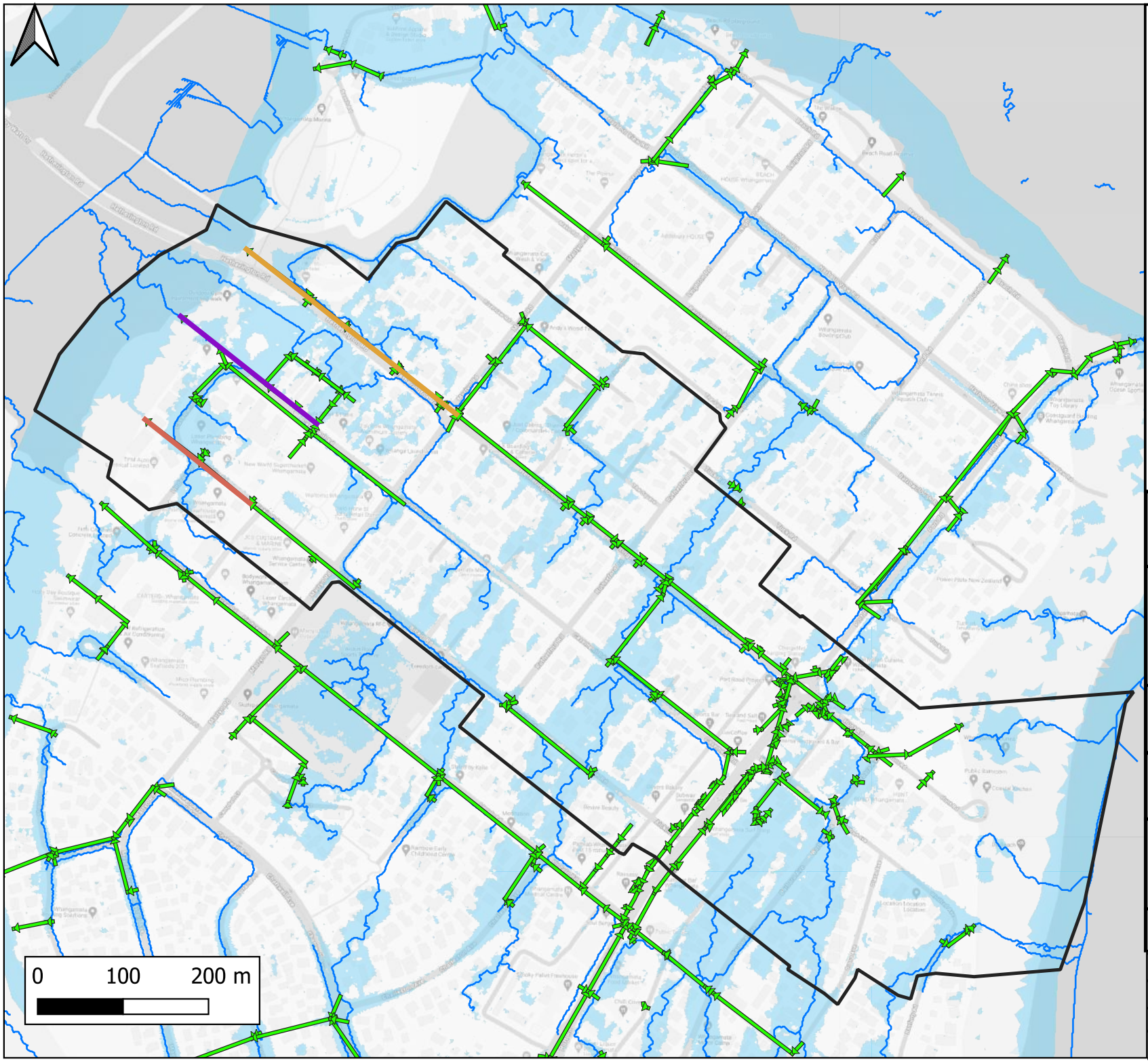

Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

8.01: Upgrade Hetherington Road outfall

8.02: Upgrade Casement Road outfall

8.03: Updgrade Aickin Road outfall

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Whangamata Stormwater Master Plan

Catchment 8: Casement Rd Flood Mitigation Options

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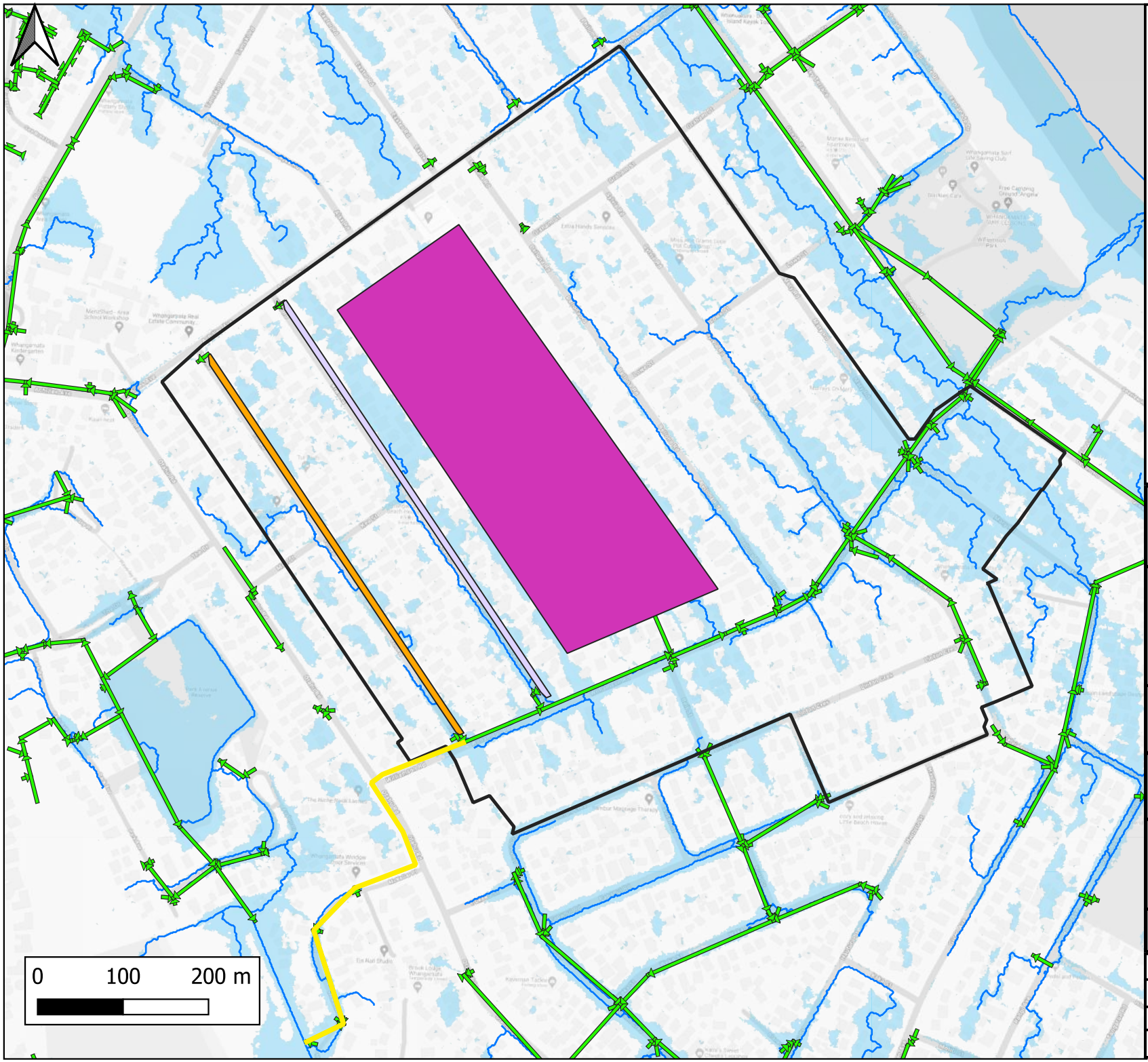

Legend

Catchment Boundary

Existing Drainage

Stormwater pipe network

Major overland flow paths

Options

10.01: Detention in Williamson golf course to capture runoff from Bellona and Kiwi Rd

10.02: Detention in berms to capture runoff from Tui Rd

10.03: Detention in berms to capture runoff from Kiwi Rd

Divert Kiwi Rd network to Park Ave channel via new and upsized pipes

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Whangamata Stormwater Master Plan

Catchment 10: Whangamata Golf Club Flood Mitigation Options

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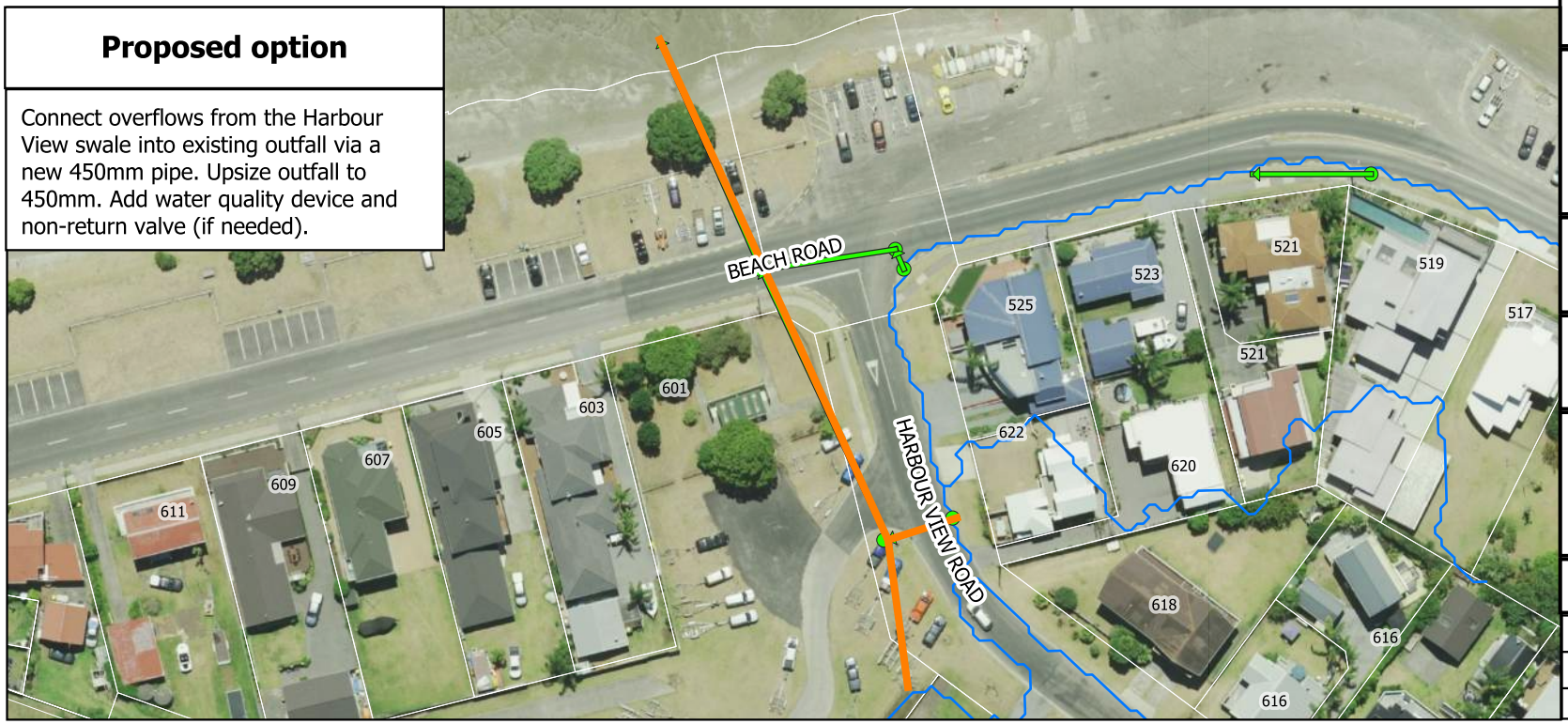
v2.1	3 May 2024	Updated short list

Existing scenario

Proposed option

Connect overflows from the Harbour View swale into existing outfall via a new 450mm pipe. Upsize outfall to 450mm. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 2.01: Upgrade Harbour View outfall and connect to swale

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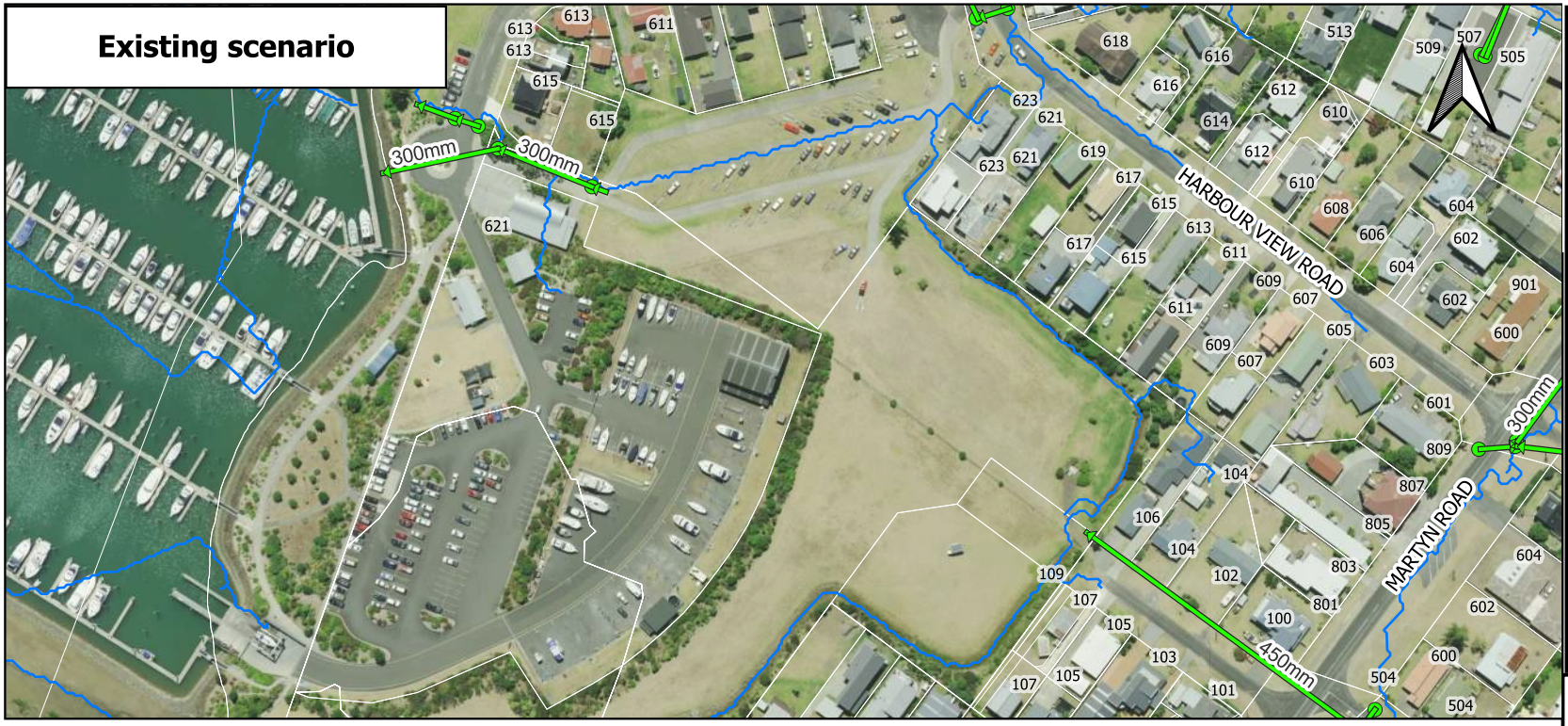
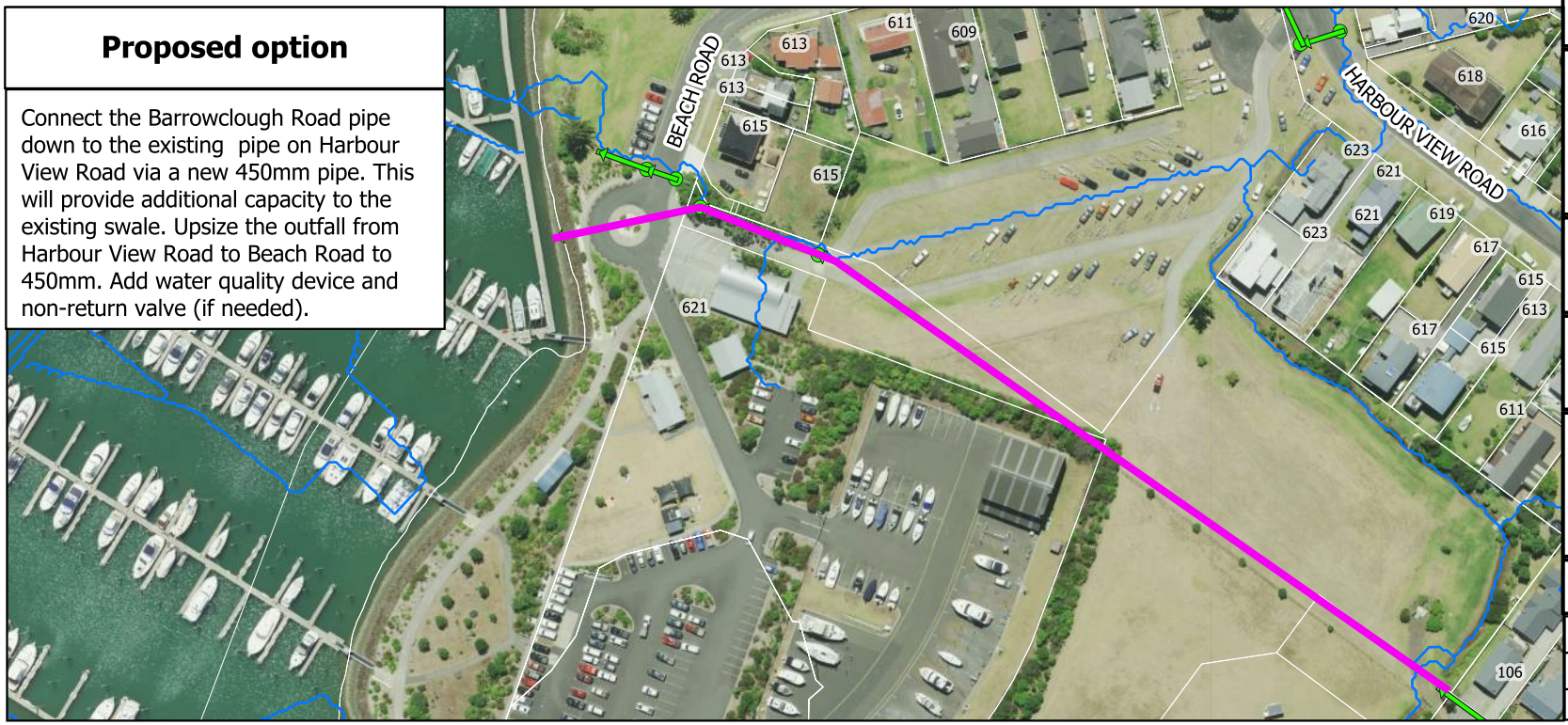
Revision	Date	Comment
v1	6 May 2024	Concept for TCDC Review

Existing scenario



Proposed option

Connect the Barrowclough Road pipe down to the existing pipe on Harbour View Road via a new 450mm pipe. This will provide additional capacity to the existing swale. Upsize the outfall from Harbour View Road to Beach Road to 450mm. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 2.02: Connect Barrowclough Road pipe to Beach Road and upgrade outfall

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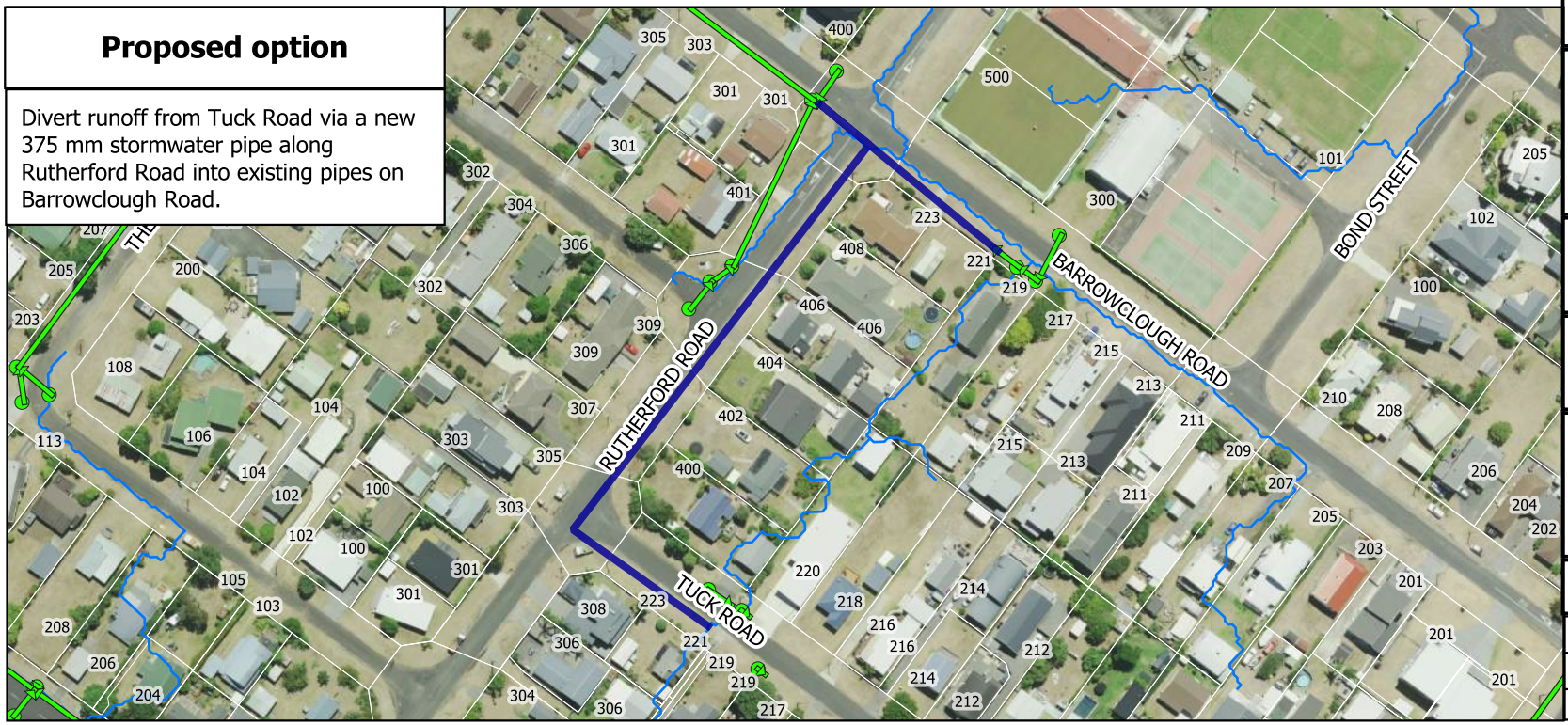
Revision	Date	Comment
v1	6 May 2024	Concept for TCDC Review

Existing scenario

Proposed option

Divert runoff from Tuck Road via a new 375 mm stormwater pipe along Rutherford Road into existing pipes on Barrowclough Road.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 2.05: New SW pipe along Rutherford Road to capture runoff from Tuck Road

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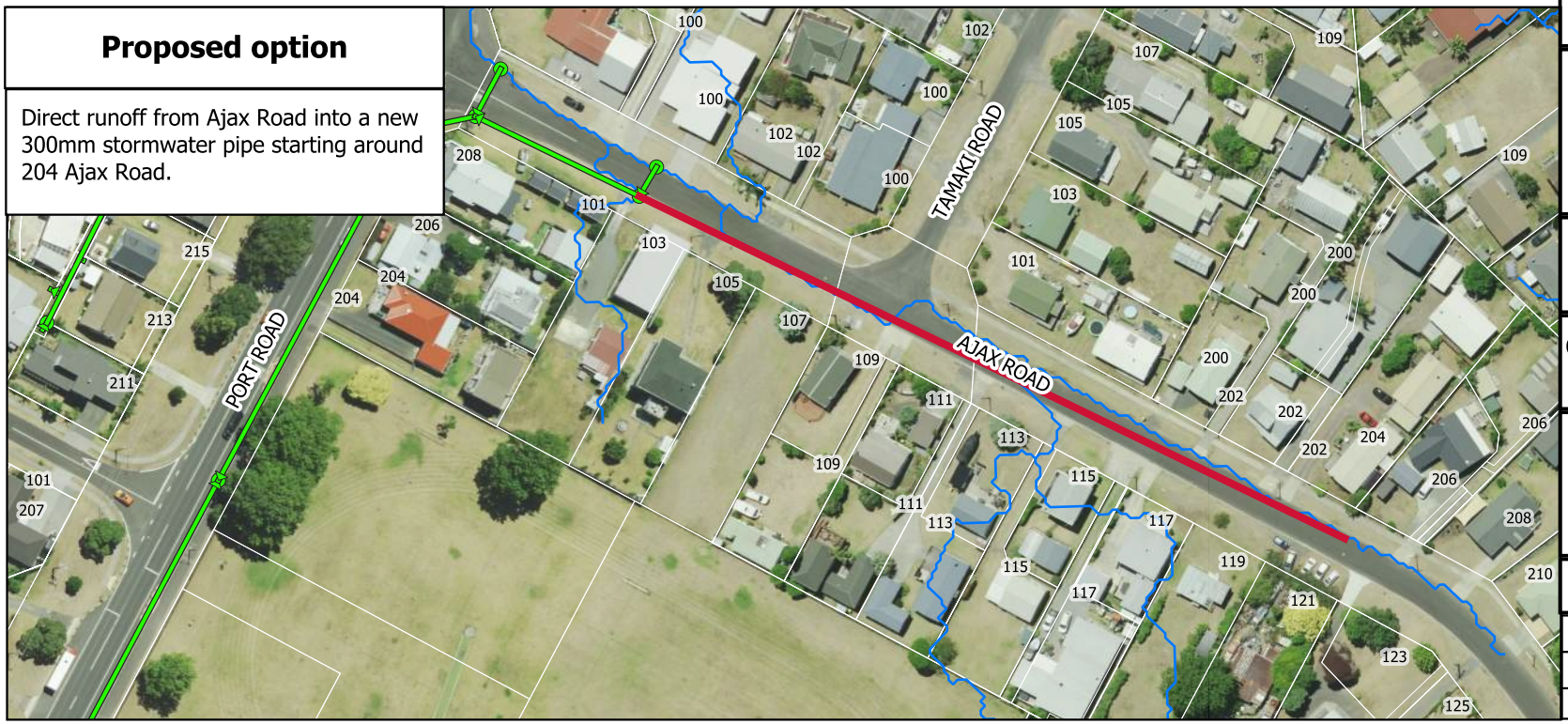
v1	6 May 2024	Concept for TCDC Review

Existing scenario

Proposed option

Direct runoff from Ajax Road into a new 300mm stormwater pipe starting around 204 Ajax Road.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 4.01: New SW pipe to capture flows from Ajax Road

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Revision	Date	Comment
v1	6 May 2024	Concept for TCDC Review

Existing scenario

Proposed option

Direct runoff from Port Road into Mayfair Avenue network via 450mm pipes. Extend network to join outfall at Mayfair Avenue Reserve. Upsize the 750mm outfall pipe to 1050mm. Add water quality device and non-return valve (if needed).

Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 4.05: Extend Mayfair Avenue pipe and upgrade outfall

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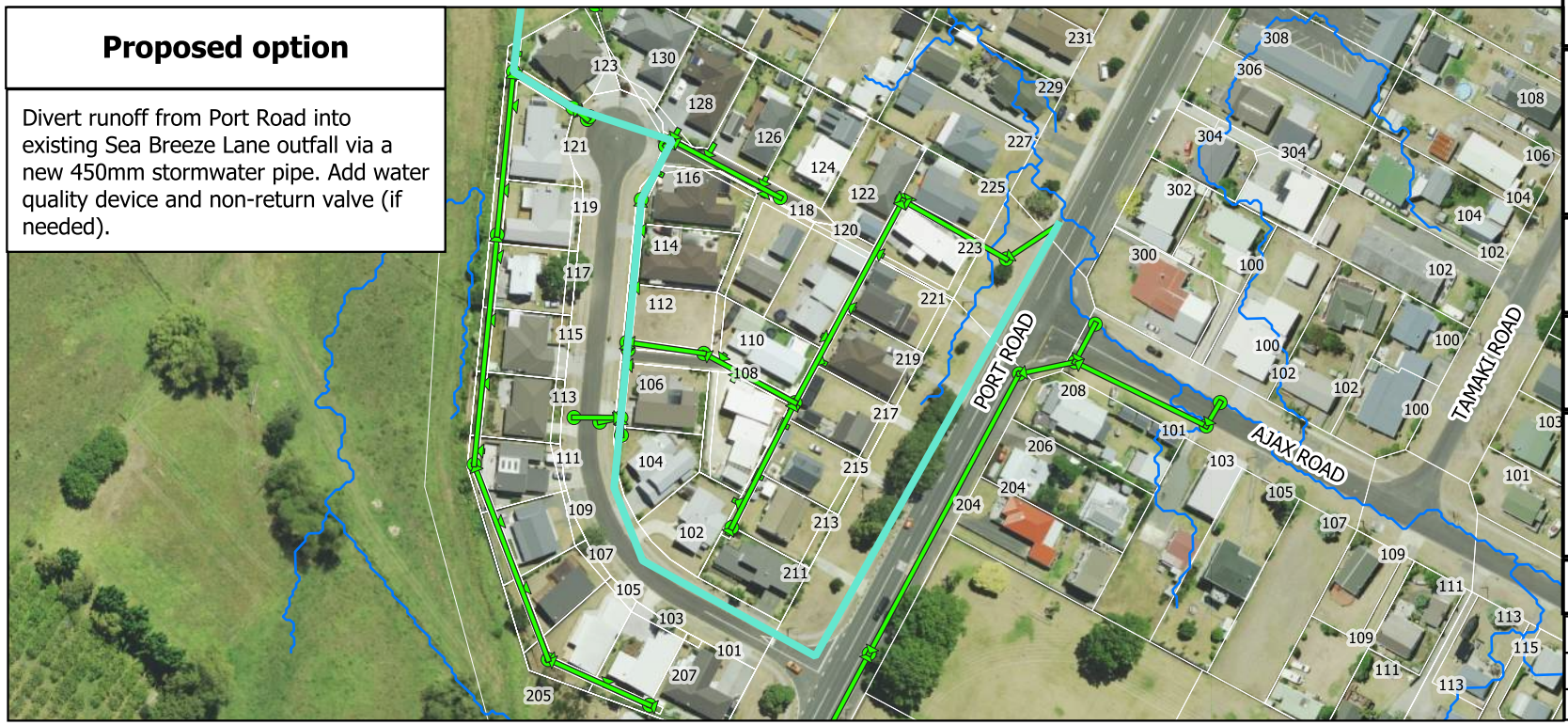
Revision	Date	Comment
v1	6 May 2024	Concept for TCDC Review

Existing scenario

Proposed option

Divert runoff from Port Road into existing Sea Breeze Lane outfall via a new 450mm stormwater pipe. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 4.06: New SW pipe on Port Road connecting to Sea Breeze Lane outfall

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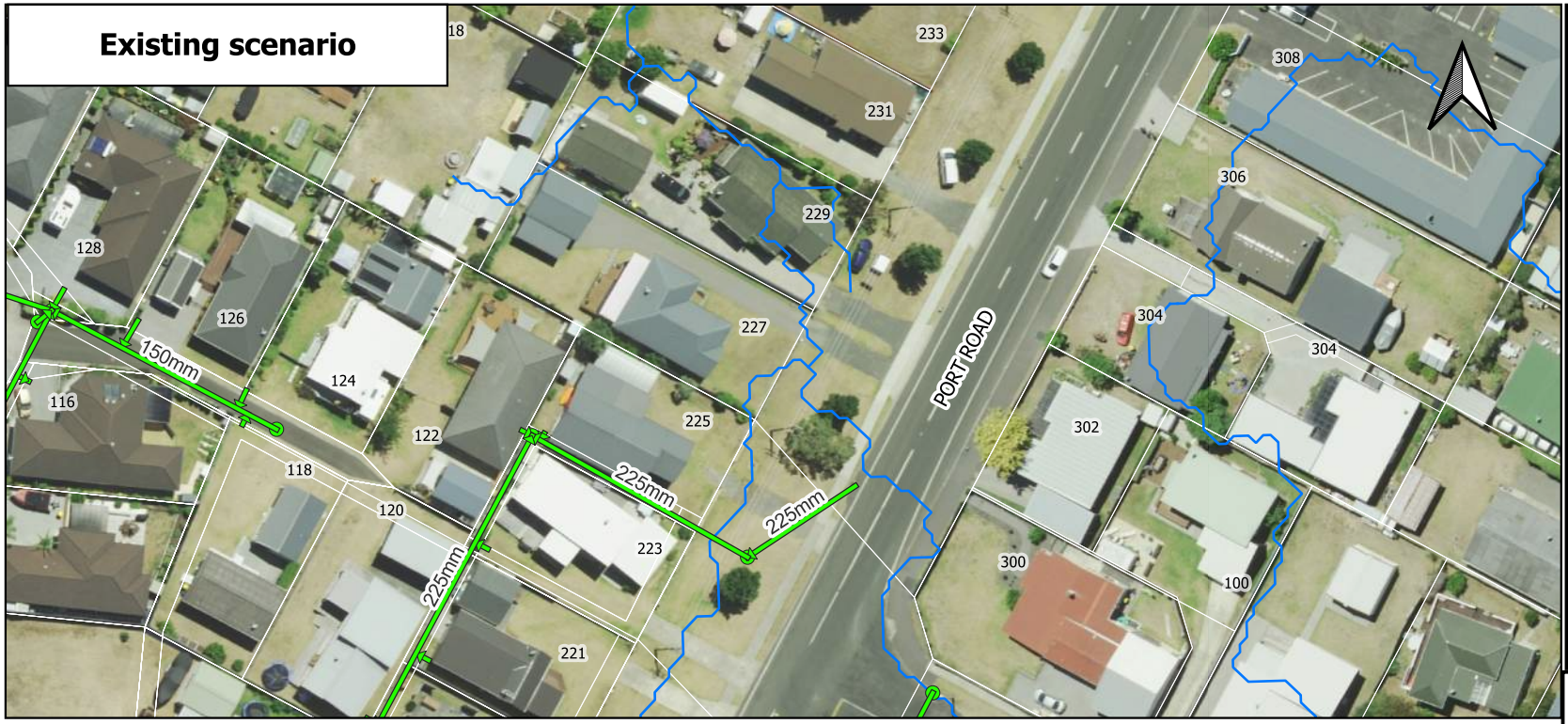
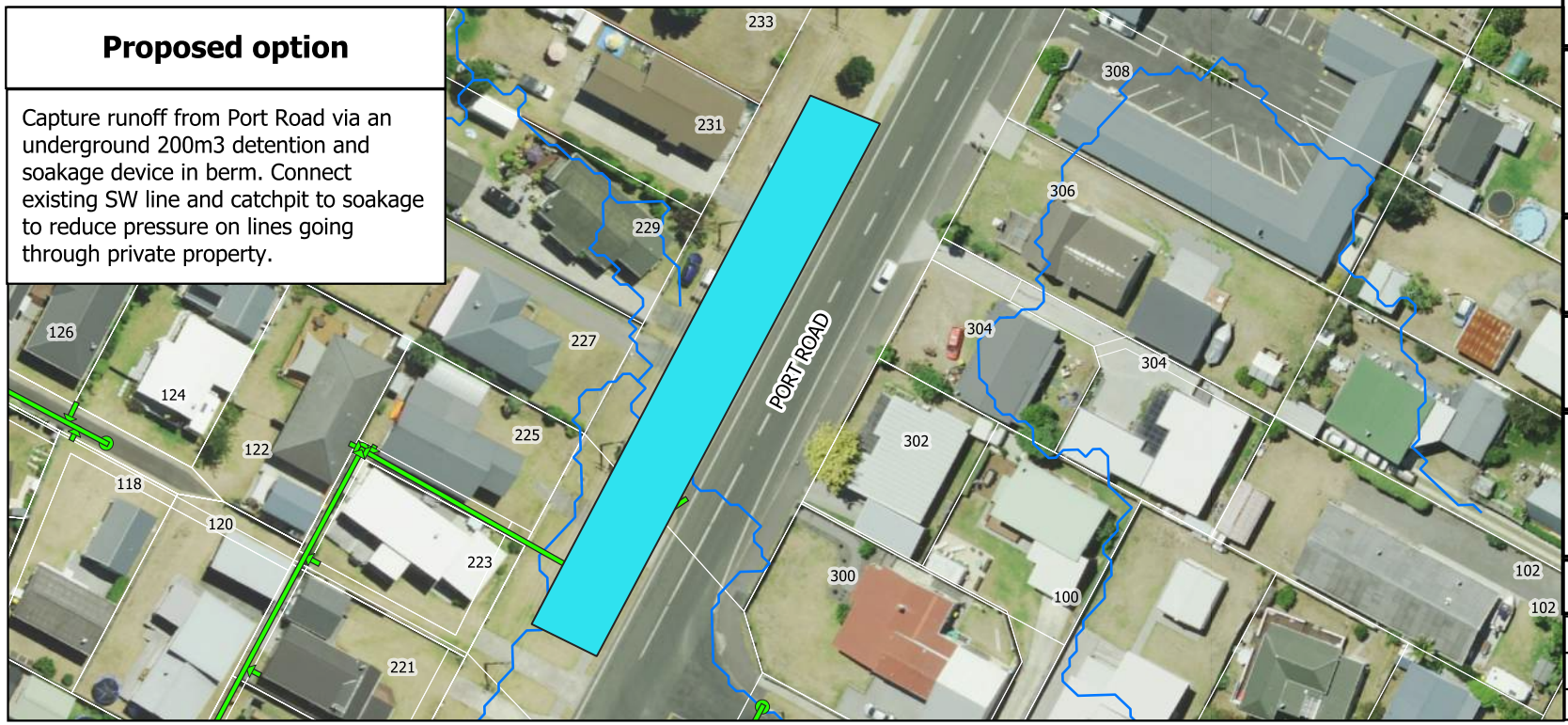
Existing scenario



Proposed option

Capture runoff from Port Road via an underground 200m3 detention and soakage device in berm. Connect existing SW line and catchpit to soakage to reduce pressure on lines going through private property.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 4.09: Detention in berm on Port Road to capture runoff

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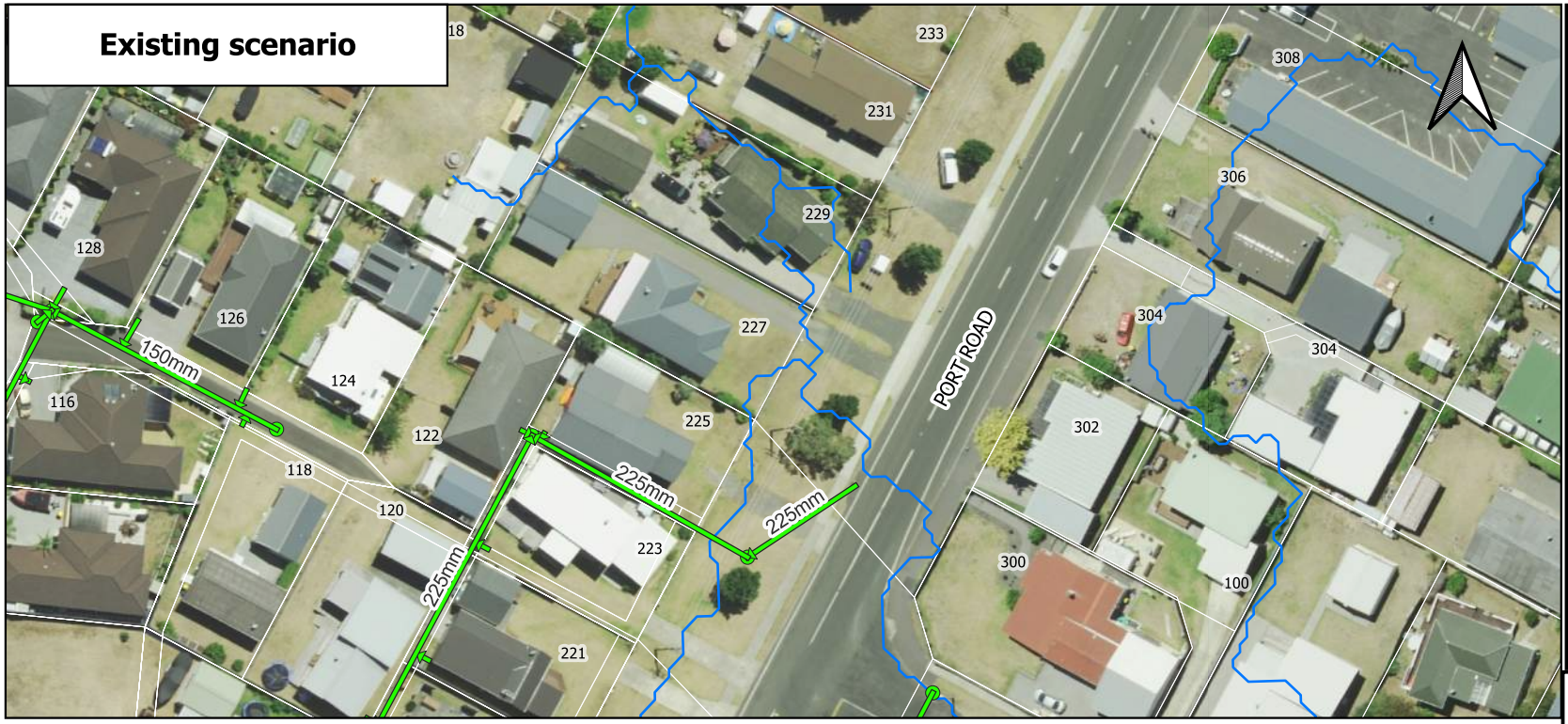
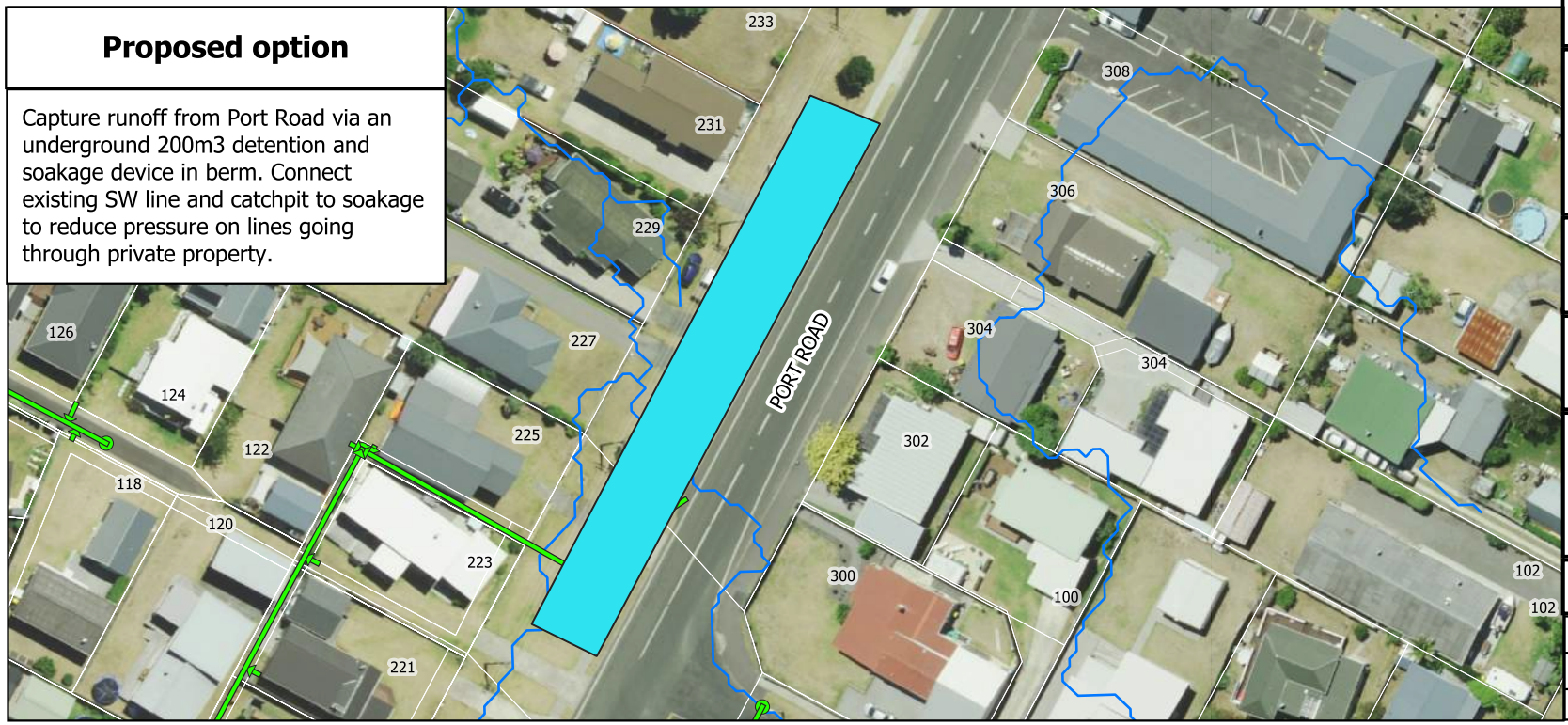
Existing scenario



Proposed option

Capture runoff from Port Road via an underground 200m3 detention and soakage device in berm. Connect existing SW line and catchpit to soakage to reduce pressure on lines going through private property.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 4.09: Detention in berm on Port Road to capture runoff

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Revision	Date	Comment
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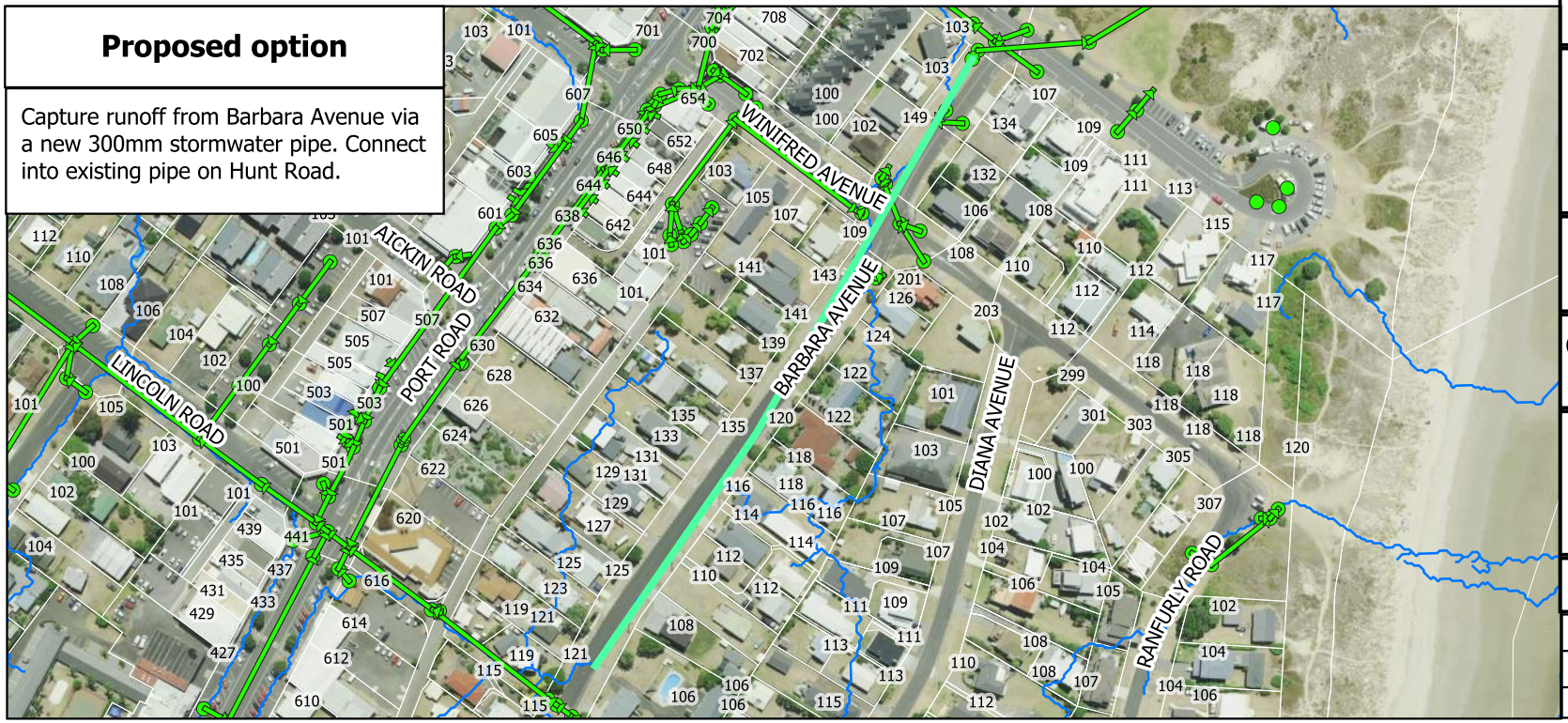
Existing scenario

Proposed option

Capture runoff from Barbara Avenue via a new 300mm stormwater pipe. Connect into existing pipe on Hunt Road.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 5.01: New SW pipe to capture flows on Barbara Avenue

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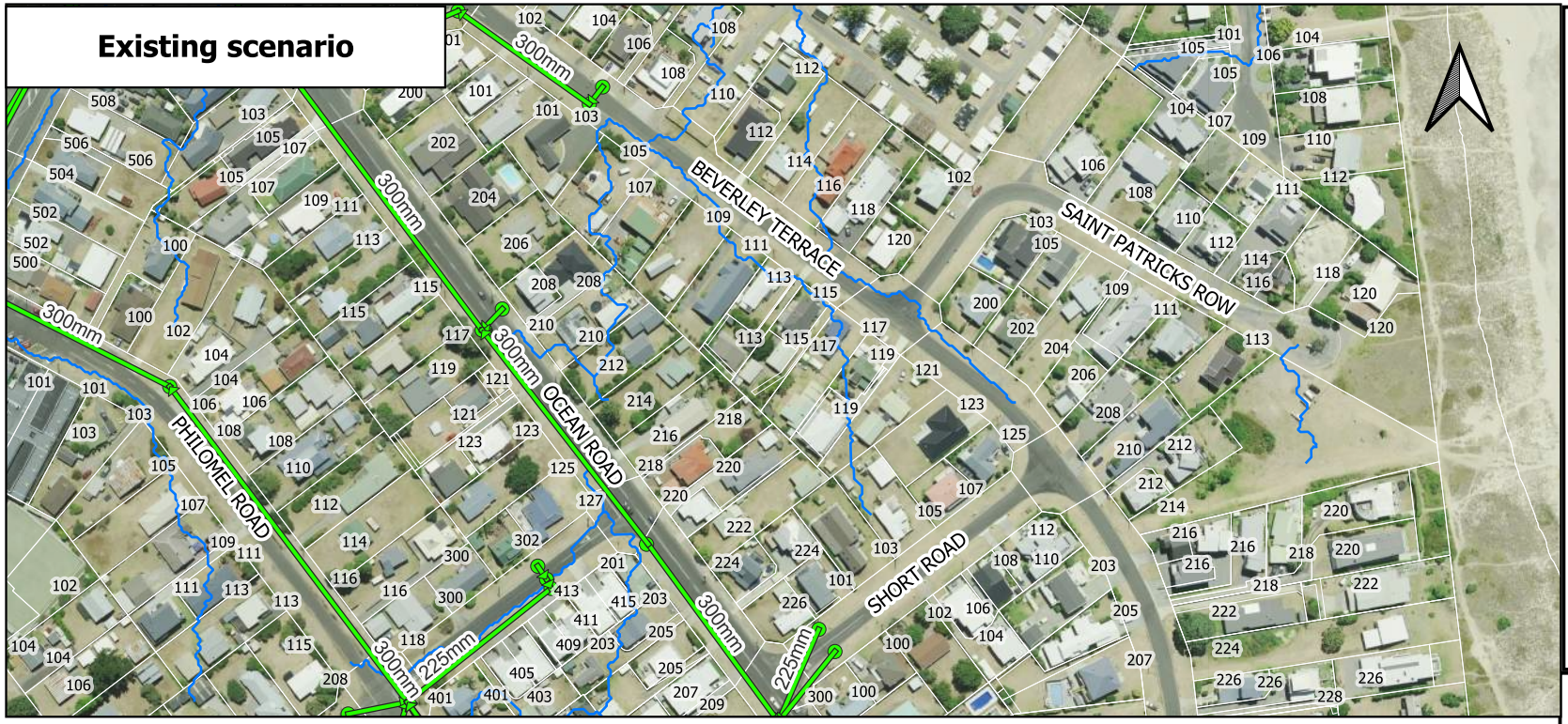
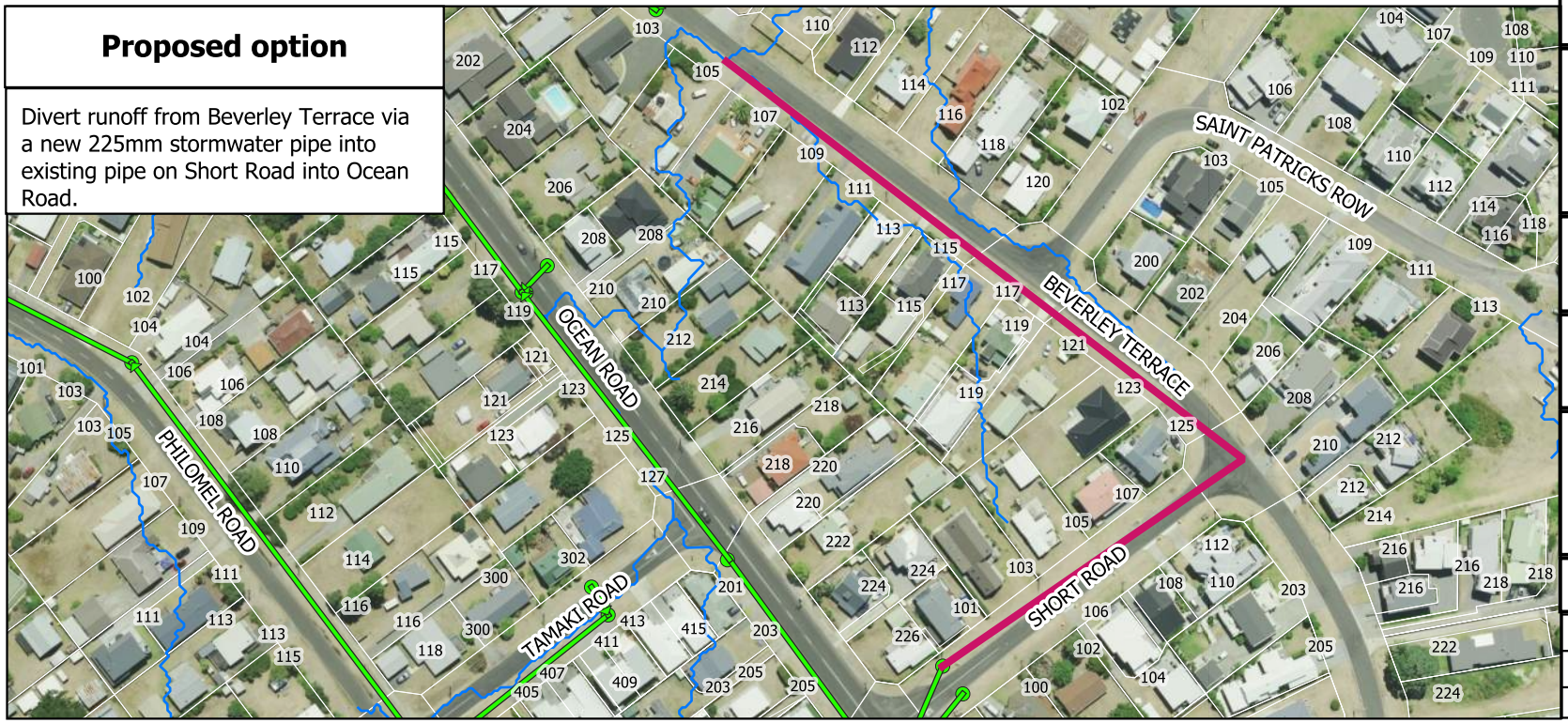


Proposed option

Divert runoff from Beverley Terrace via a new 225mm stormwater pipe into existing pipe on Short Road into Ocean Road.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Option 5.02: New SW pipe to capture runoff crossing Beverley Terrace

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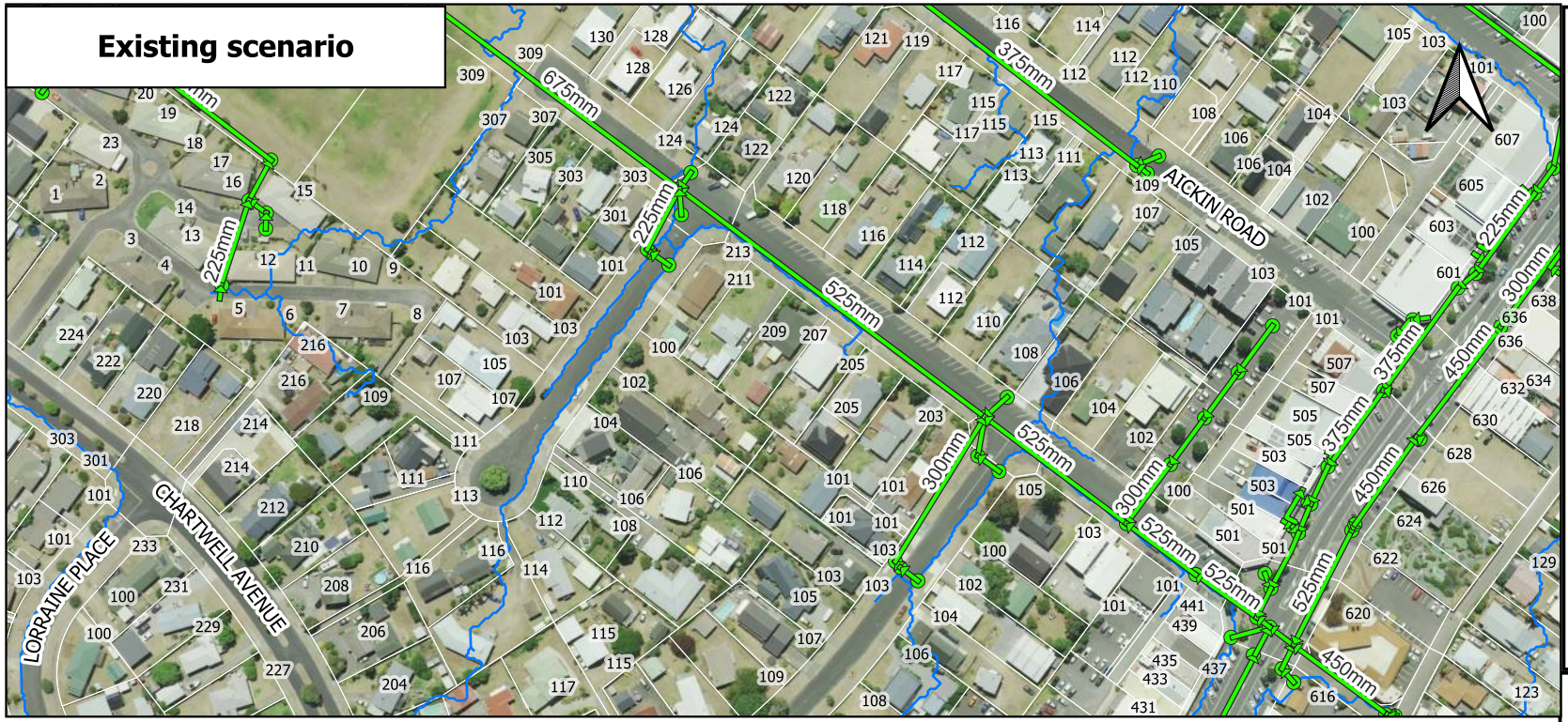
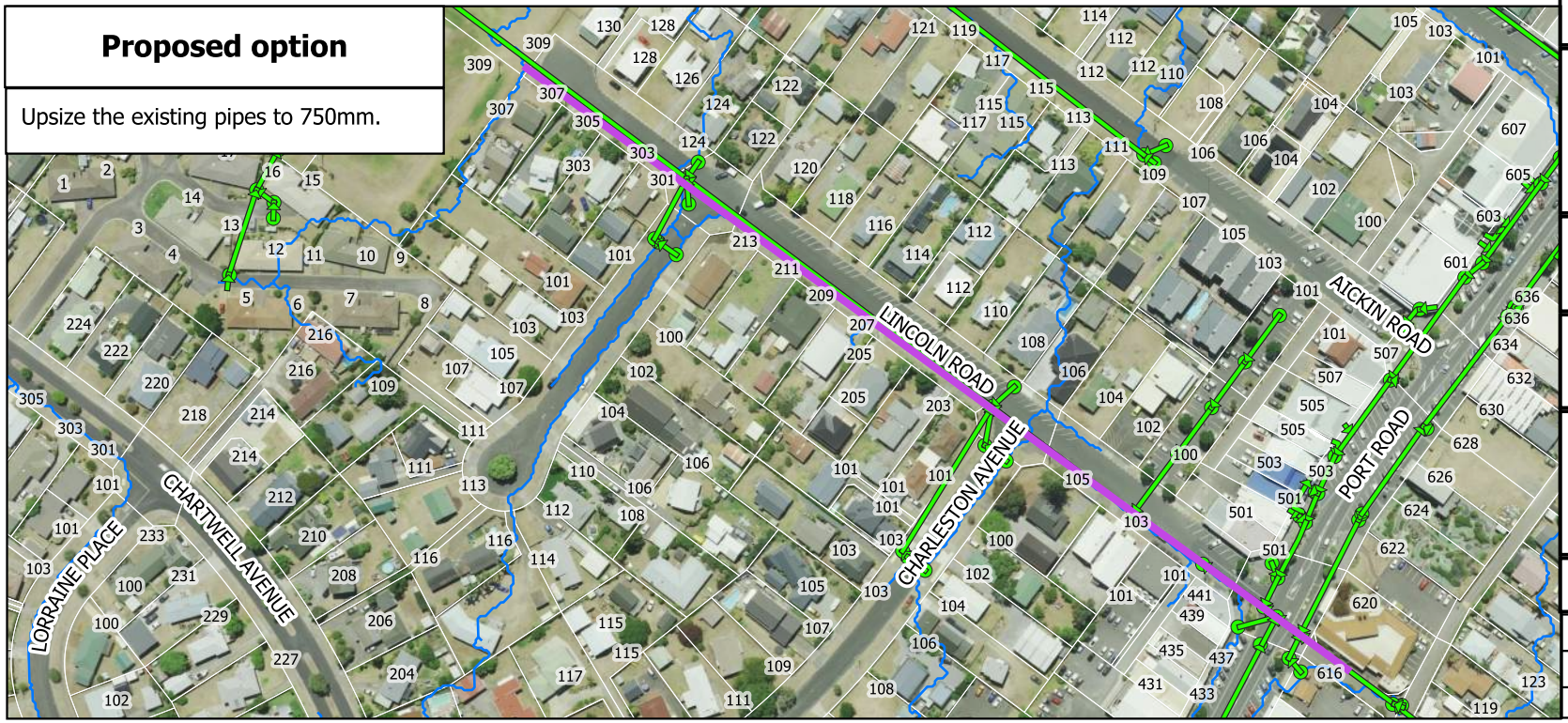


Proposed option

Upsize the existing pipes to 750mm.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 5.04: Increase network capacity on Lincoln Road

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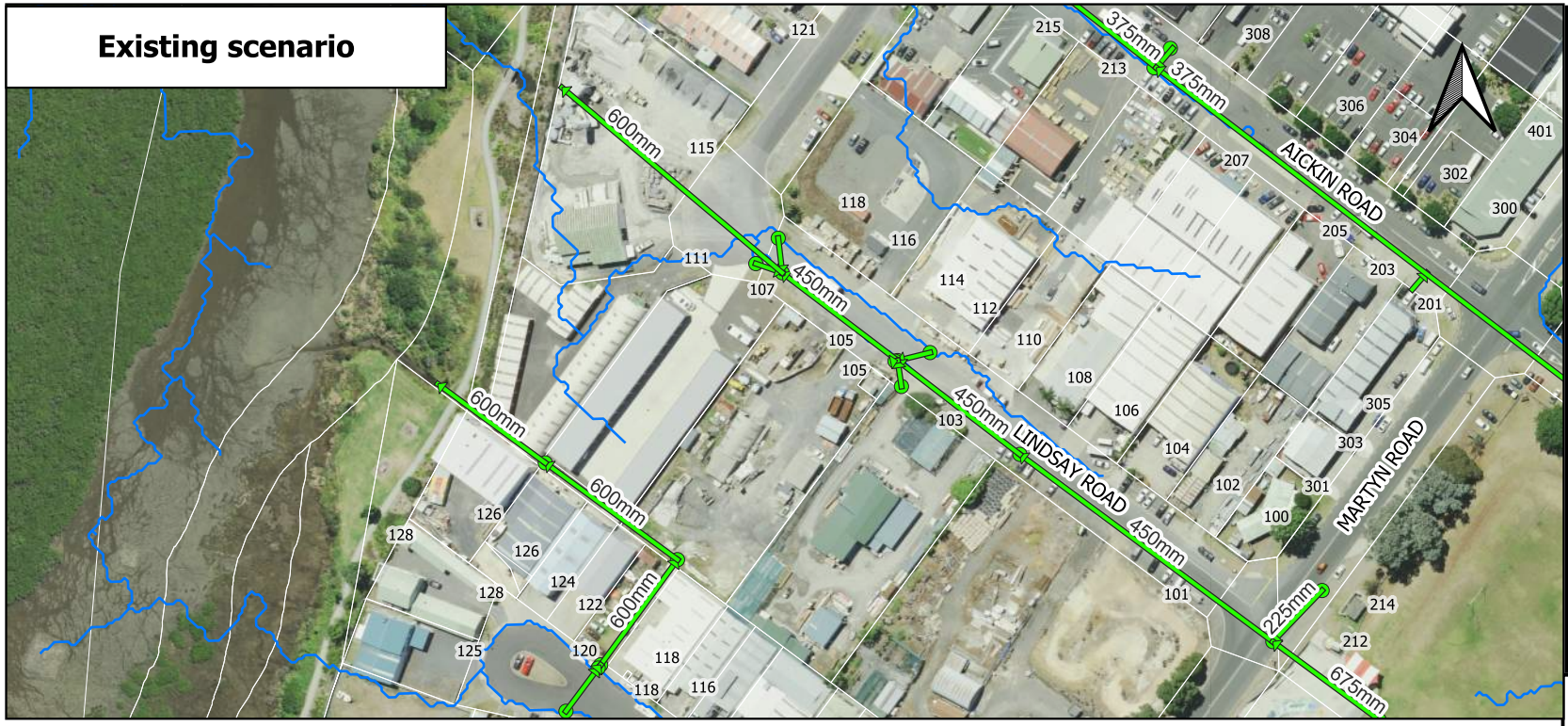
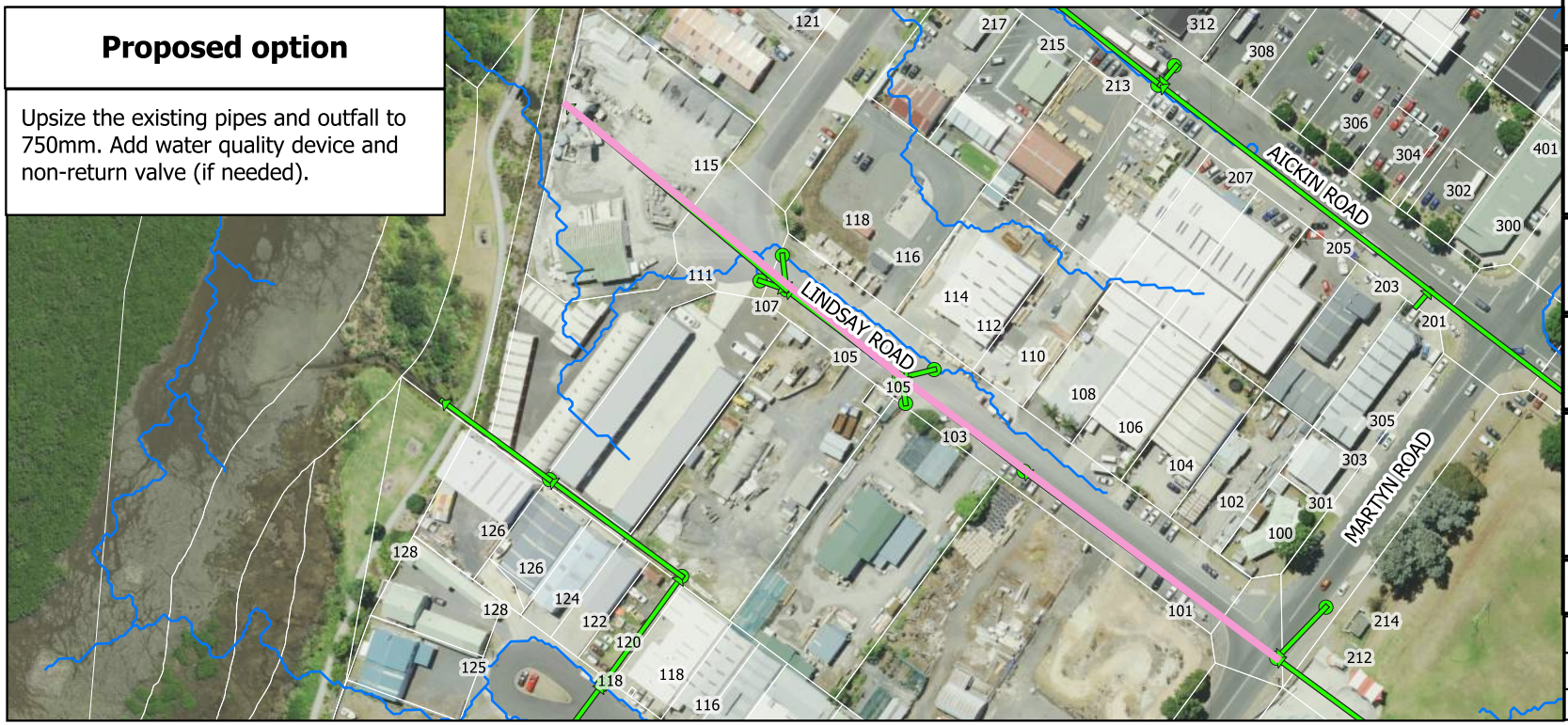


Proposed option

Upsize the existing pipes and outfall to 750mm. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 5.05: Upgrade Lindsay Road network and outfall

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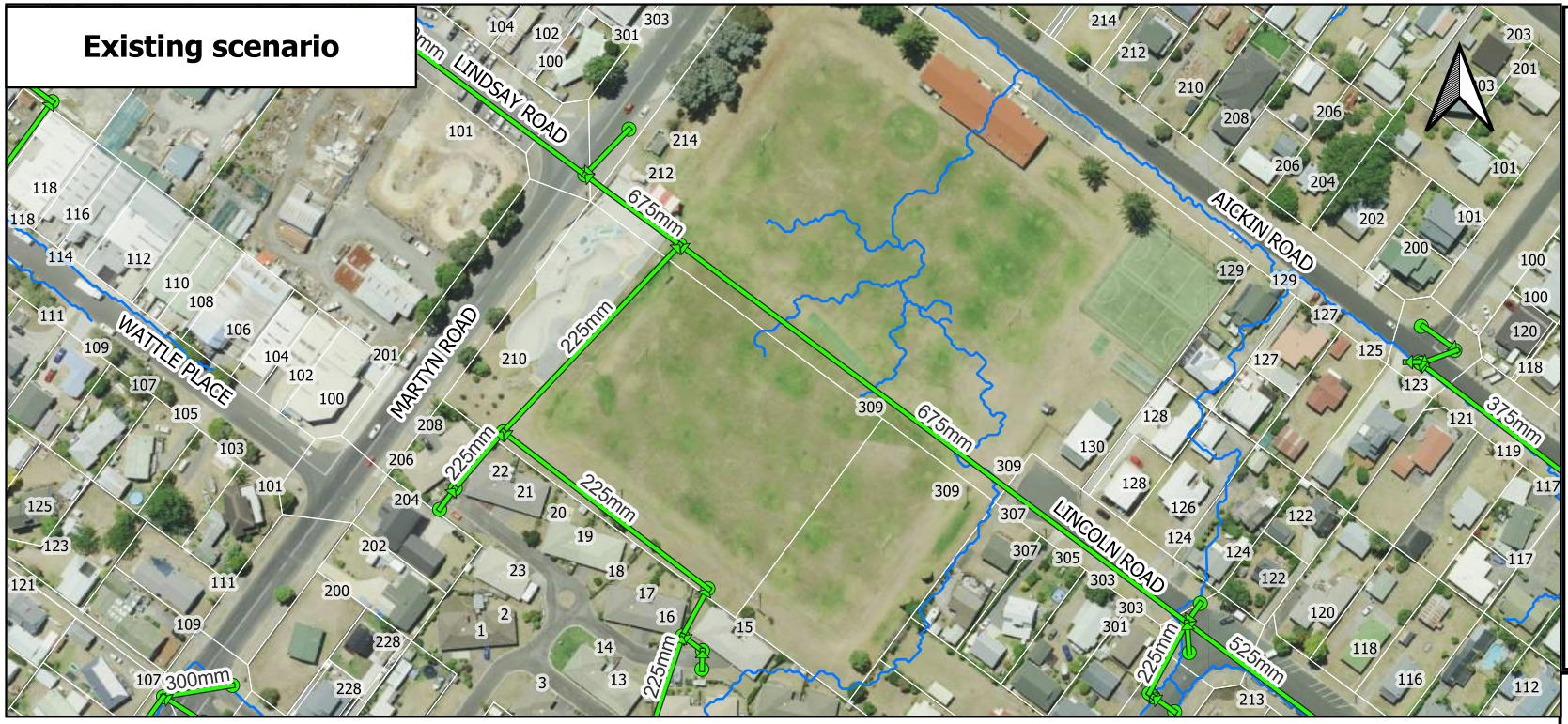

Proposed option

Use the rugby field as a temporary detention area to store runoff from Aickin, Lincoln, and Casement Road. Provide subsoil drains to improve drainage into field.

Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 5.10: Detention in rugby field to capture diverted runoff from surrounding areas

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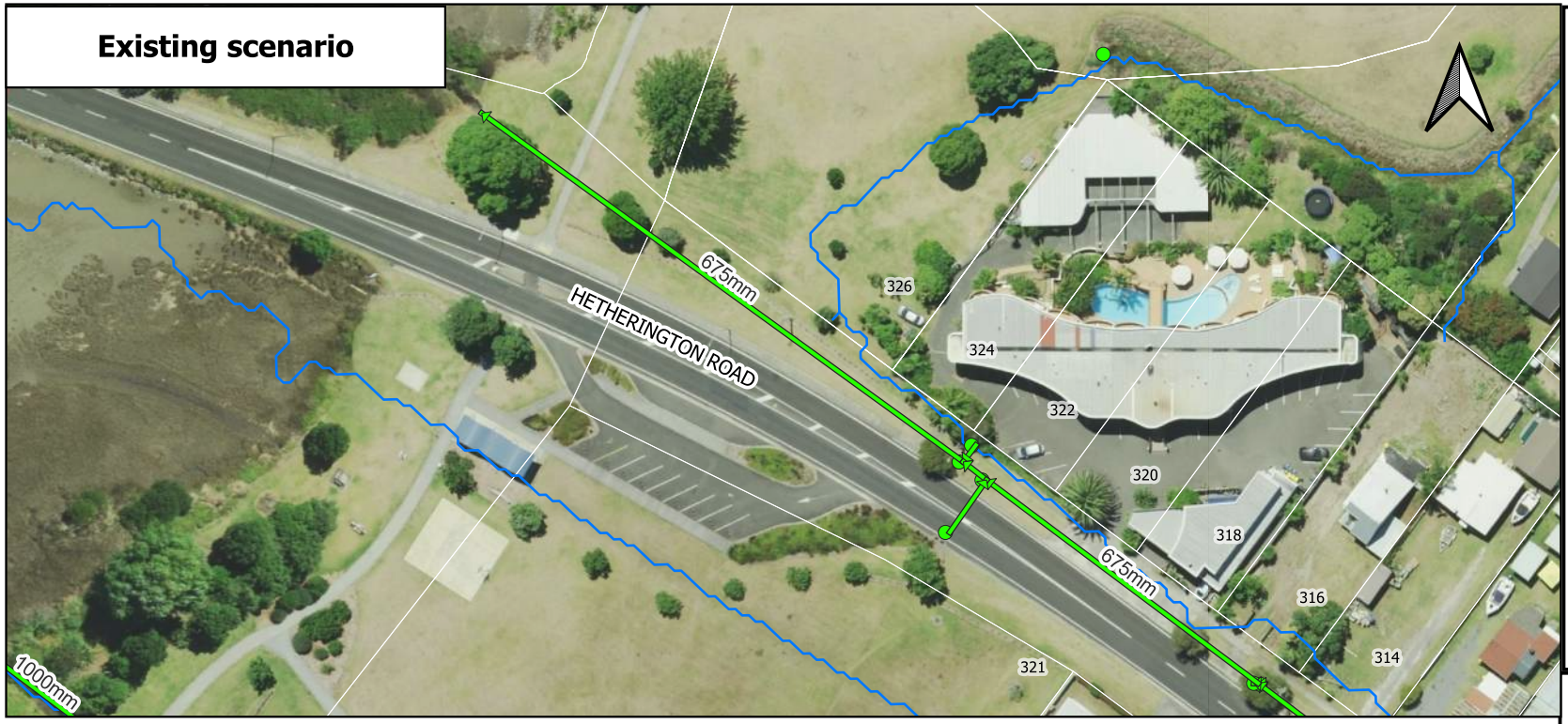
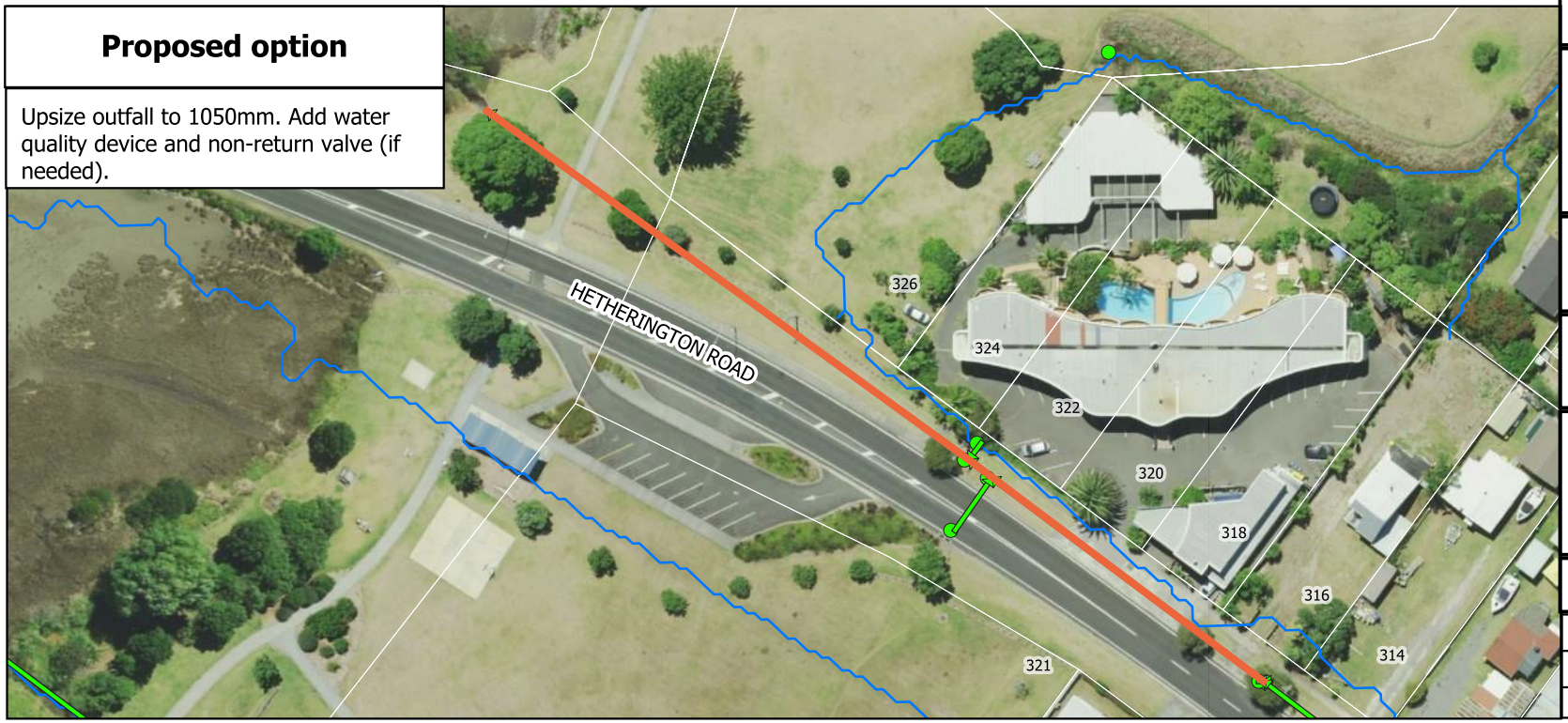


Proposed option

Upsize outfall to 1050mm. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 8.01: Upgrade outfall on Hetherington Road

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Existing scenario

Proposed option

Widen the Casement Road channel. Upsize the two existing walkway culverts to 1350mmx1000mm box culverts. Add non-return valve (if needed) and add water treatment.

Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 8.02: Upgrade outfall at Casement Road

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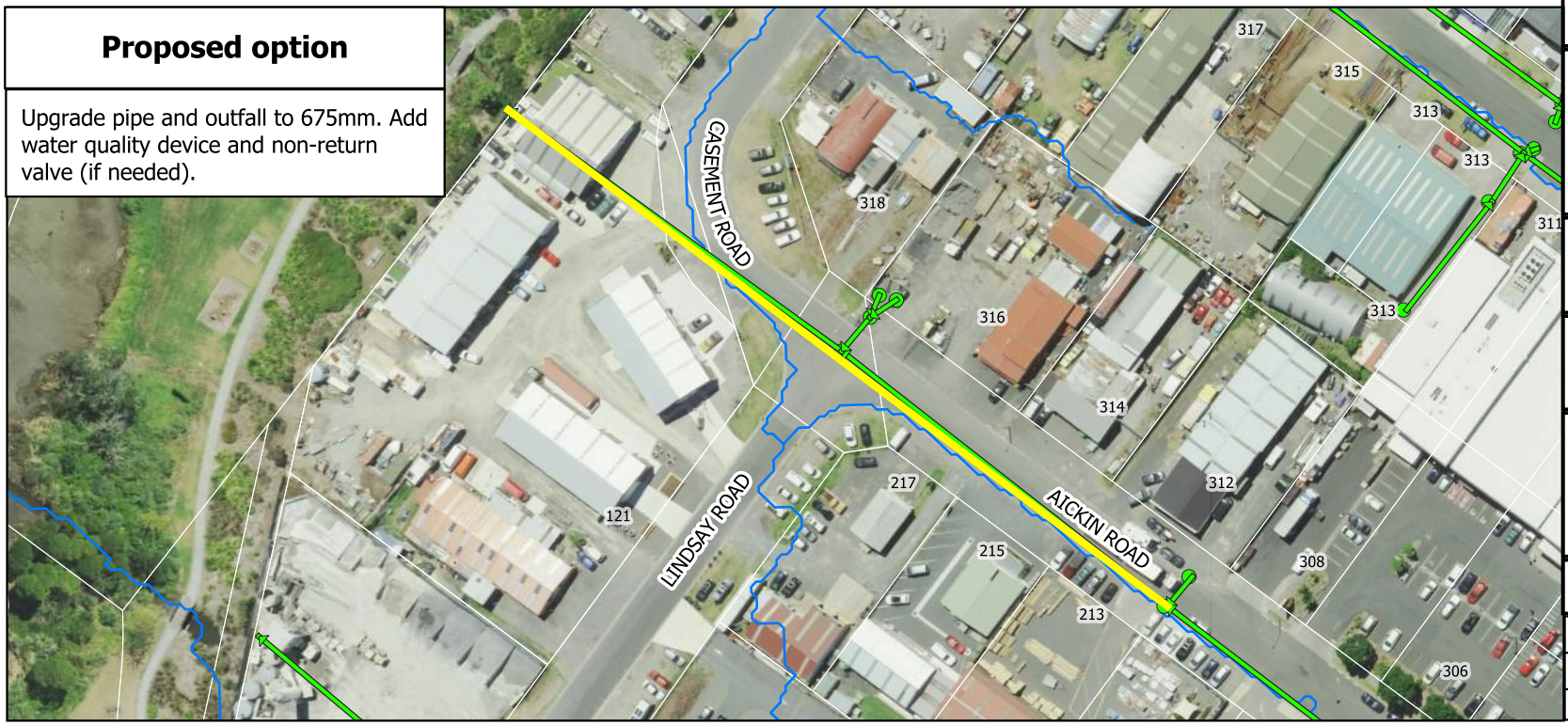
Existing scenario

Proposed option

Upgrade pipe and outfall to 675mm. Add water quality device and non-return valve (if needed).



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Whangamata Stormwater Master Plan

Option 8.03: Upgrade outfall at Aickin Road

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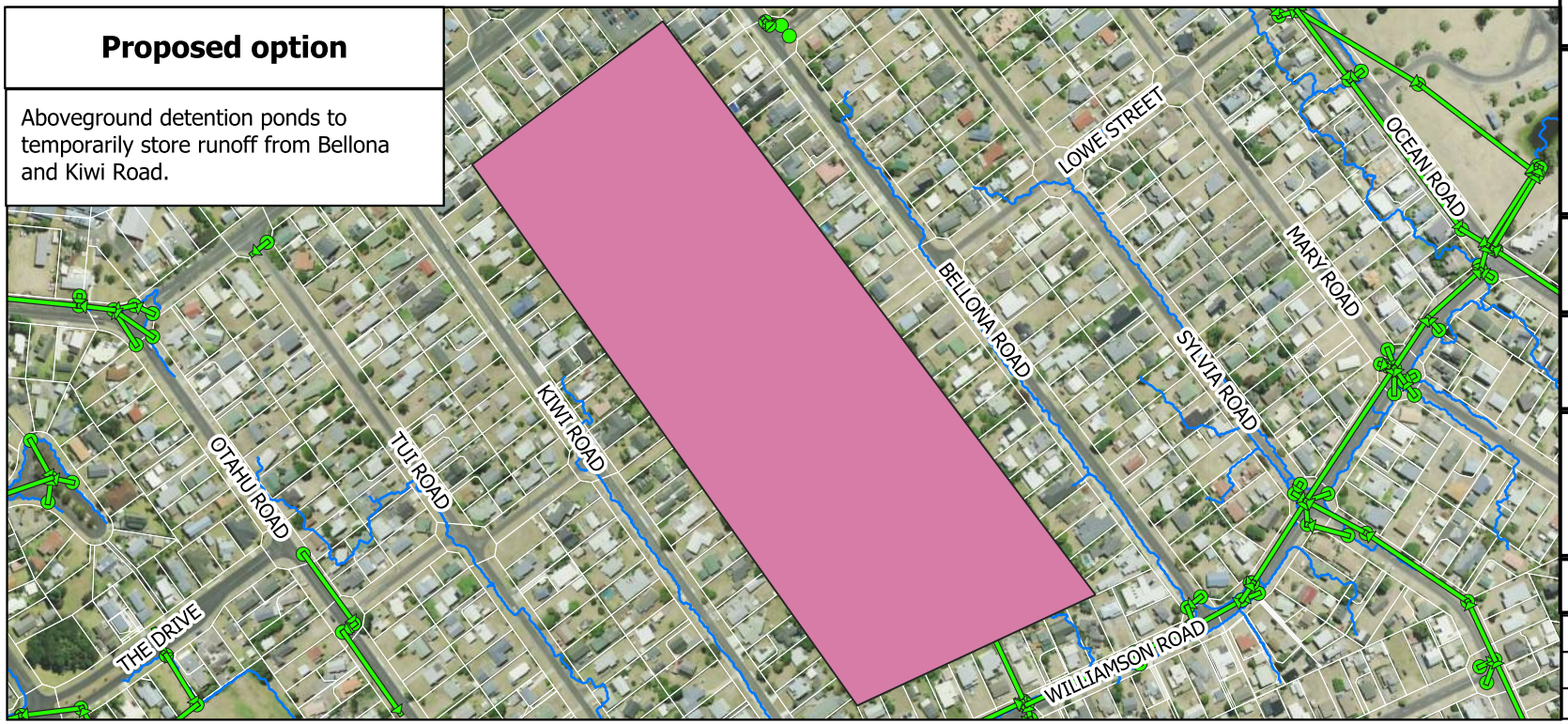
Page Size: A4

Revision	Date	Comment
v1	6 May 2024	Concept for TCDC Review

Existing scenario

Proposed option

Aboveground detention ponds to temporarily store runoff from Bellona and Kiwi Road.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

CONCEPT ONLY

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Whangamata Stormwater Master Plan

Option 10.01: Detention in Williamson Golf Course to capture runoff from Bellona and Kiwi Road

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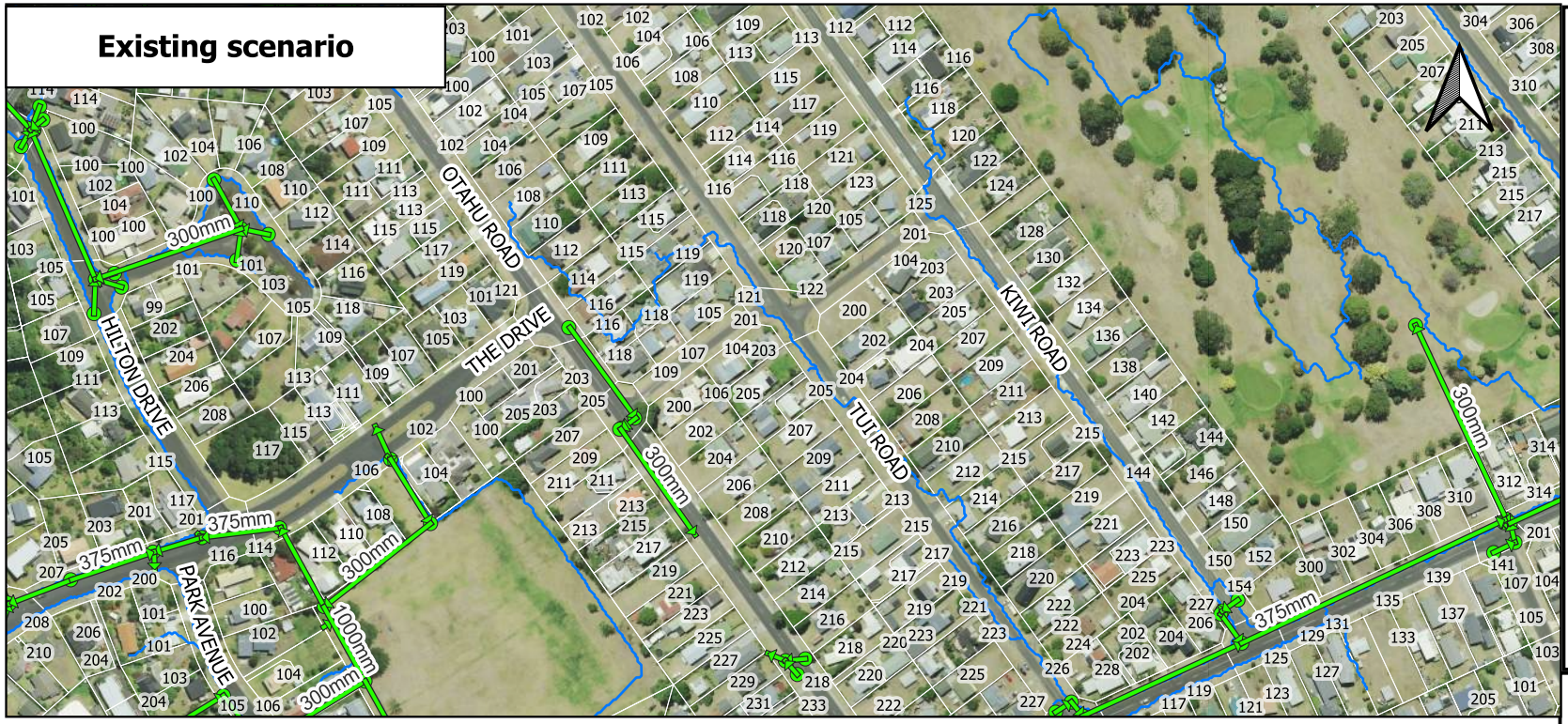
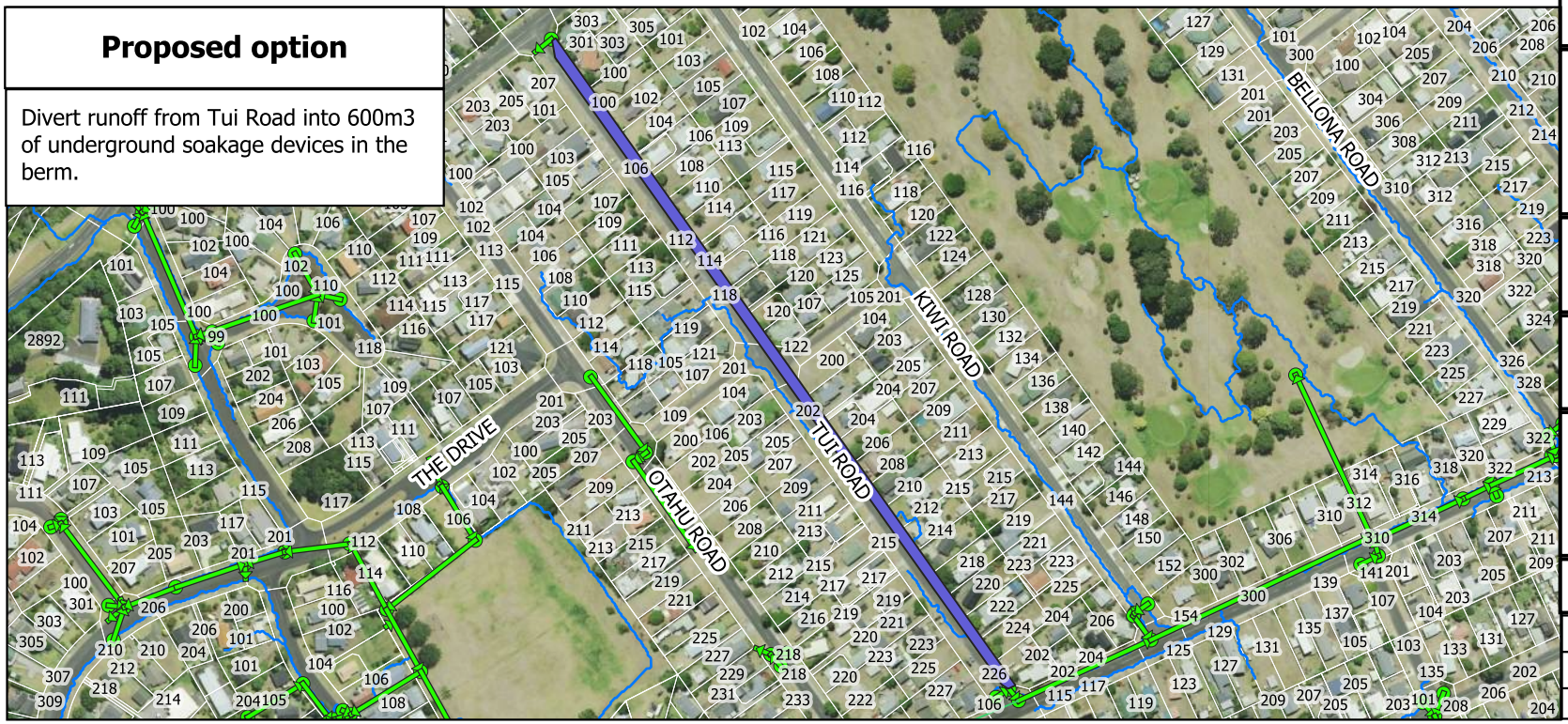
Existing scenario



Proposed option

Divert runoff from Tui Road into 600m3 of underground soakage devices in the berm.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Option 10.02: Detention in berms to capture runoff from Tui Road

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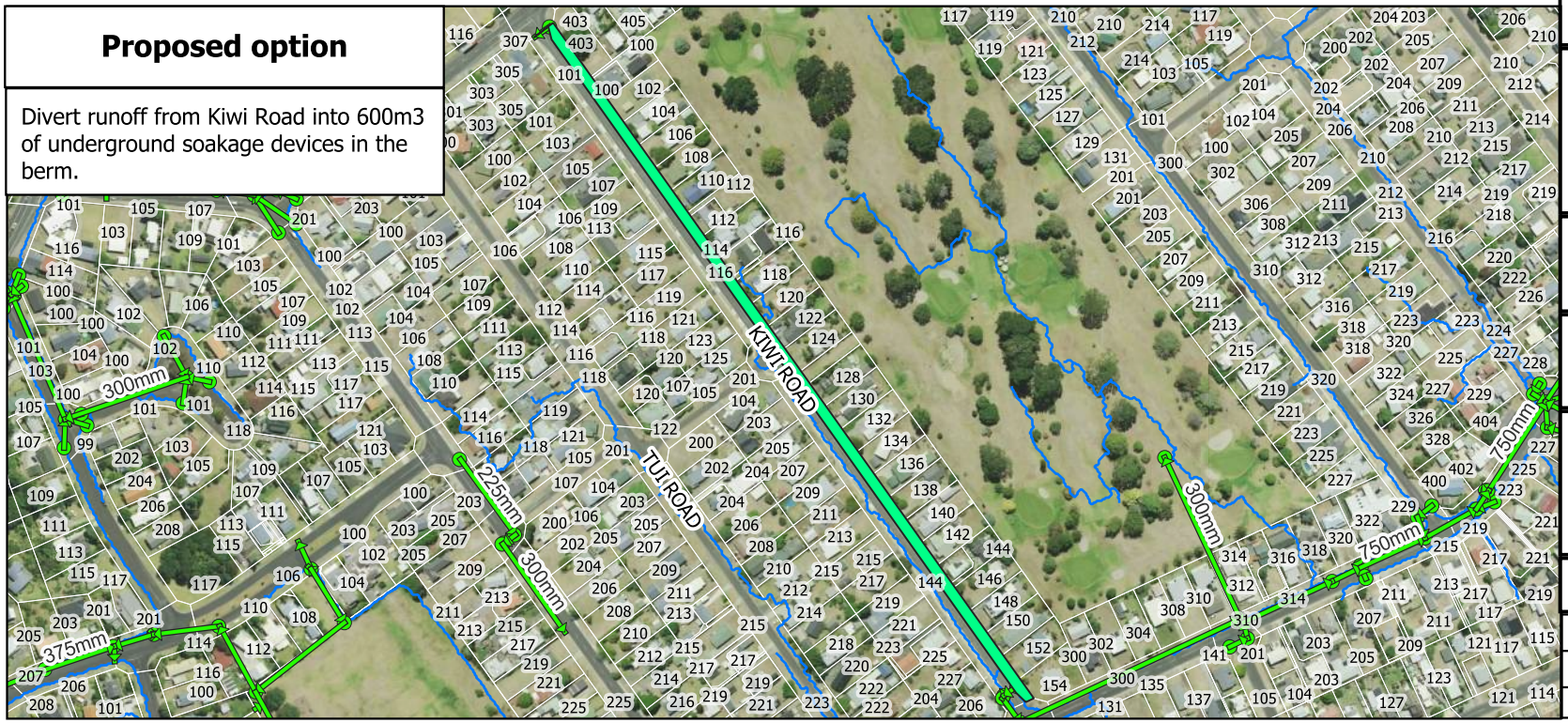
Existing scenario

Proposed option

Divert runoff from Kiwi Road into 600m3 of underground soakage devices in the berm.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Option 10.03: Detention in berms to capture runoff from Kiwi Road

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Revision	Date	Comment
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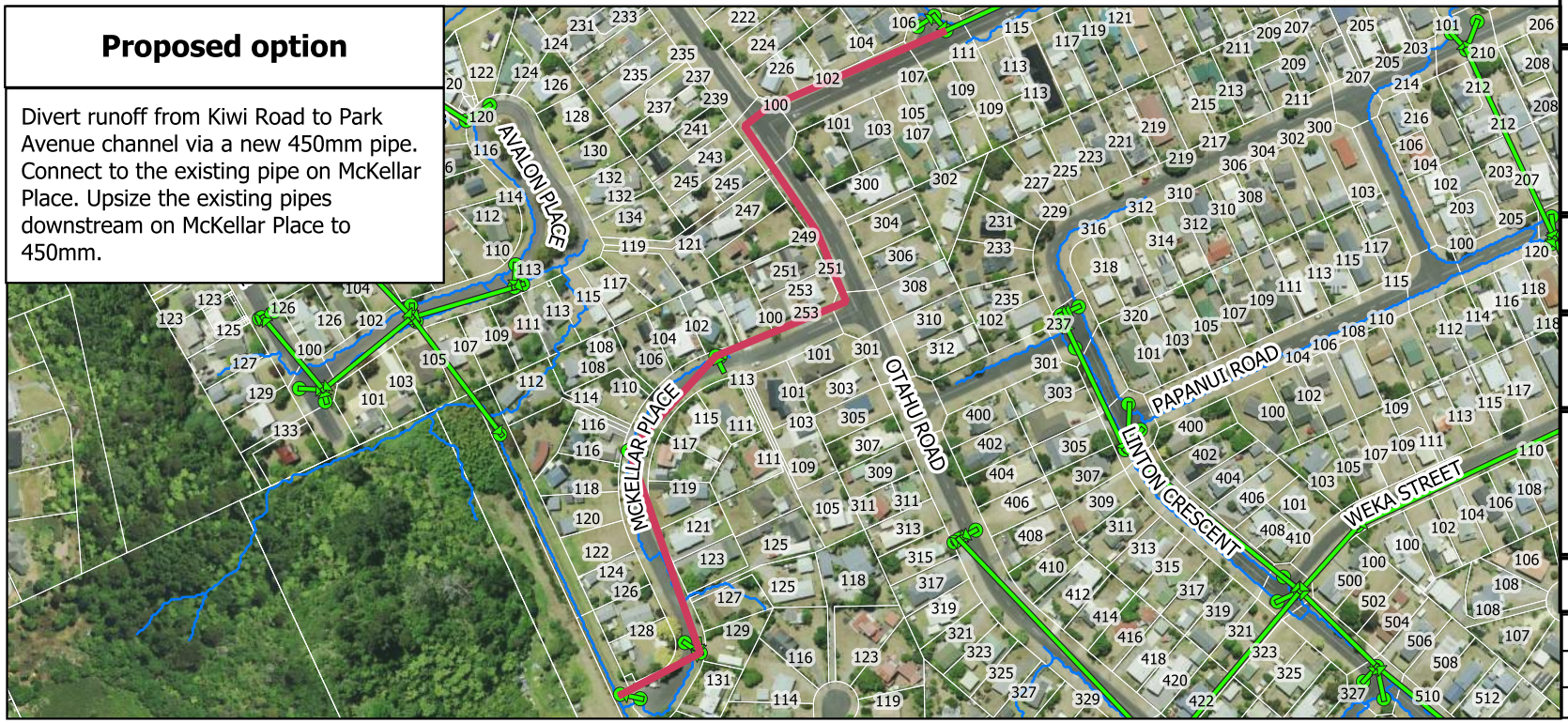
Existing scenario

Proposed option

Divert runoff from Kiwi Road to Park Avenue channel via a new 450mm pipe. Connect to the existing pipe on McKellar Place. Upsize the existing pipes downstream on McKellar Place to 450mm.



Legend

- Stormwater pipe network
- Major overland flow paths
- Proposed option alignment

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Option 10.04: Divert Kiwi Road network to Park Avenue channel via new and upsized pipes

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STEP 3: KEPNER TREGOE MATRIX TEMPLATE

Metis Consultants Ltd generated a Kepner Tregoe matrix using the following criteria and weighting over the 19 options. Metis provided the score for the first three options (objective measure) and the stakeholder group members provided the score for options 4-7 (subjective measures). The weighing score is based on 10 is the highest and 1 is the lowest.

Note: Update this section if new option prioritisation criteria are defined.

Table 5. Prioritisation criteria for infrastructure options

No.	Criteria	Details	Weight
1	Design	Can the option achieve target level of service (accommodate flows up to the 50-year ARI event)?	10
2	Benefits	What is the relative capital cost per property/critical infrastructure area?	10
3	Design	Does it discharge water at end of network rather than at start or mid network?	10
4	Feasibility	Can the option be practically designed, sourced, and constructed in one year?	7
5	Feasibility	Can the option be designed, sourced, and constructed without major technical constraints? (land ownership, health and safety, hydraulic feasibility, buildability)	5
6	Design	Can the option adapt to climate change? (Scoring guidance: Assess the options' ability to adapt climate change such as sea level rise. For instance, an existing outfall with non-return valve would score 1 as it is more likely to be affected by climate change, while soakage/detention located on the mainland would score 10 as they are less susceptible to these effects.)	4
7	Benefits	Does the option deliver additional benefit (amenity, recreation, biodiversity, water quality)?	3

STEP 4: SUMMARY OF KEPNER TREGOE MATRIX RESULTS

The summary of each stakeholder results per option for the Kepner Tregoe results are provided in the table below. This prioritised list can be used to inform the forward planning for the Long-Term Plan.

Whangamata Stormwater Improvement Project Master Plan - Kepner Tregoe Matrix Results Summary
NOTE: Stakeholders were only instructed to complete #4-7. The original matrix's that were submitted were required to have #1-3 modified.

Option	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6	Total Matrix Score
Option 10.01: Detention in Williamson Golf Course to capture runoff from Bellona and Kiwi Road	480	387	387	387	387	387	2415
Option 2.01: Upgrade Harbour View outfall and connect to swale	391	319	421	421	421	421	2394
Option 10.03: Detention in berms to capture runoff from Kiwi Road	392	287	382	382	382	382	2207
Option 8.02: Upgrade outfall at Casement Road	308	309	376	376	376	376	2121
Option 8.01: Upgrade outfall on Hetherington Road	361	270	371	371	371	371	2115
Option 4.06: New SW pipe on Port Road connecting to Sea Breeze Lane outfall	311	287	369	369	369	369	2074
Option 4.09: Detention in berm on Port Road to capture runoff	372	259	356	356	356	356	2055
Option 4.05: Extend Mayfair Avenue pipe and upgrade outfall	322	267	356	356	356	356	2013
Option 2.02: Connect Barrowclough Road pipe to Beach Road and upgrade outfall	296	272	361	361	361	361	2012
Option 5.05: Upgrade Lindsay Road network and outfall	288	264	354	354	354	354	1968
Option 10.04: Divert Kiwi Road network to Park Avenue channel via new and upsized pipes	308	274	338	338	338	338	1934
Option 5.10: Detention in rugby field to capture diverted runoff from surrounding areas	366	283	305	305	305	305	1869
Option 10.02: Detention in berms to capture runoff from Tui Road	332	235	322	322	322	322	1855
Option 8.03: Upgrade outfall at Aickin Road	249	242	331	331	331	331	1815
Option 2.05: New SW pipe along Rutherford Road to capture runoff from Tuck Road	251	213	325	325	325	325	1764
Option 5.01: New SW pipe to capture flows on Barbara Avenue	205	220	334	334	334	334	1761
Option 5.04: Increase network capacity on Lincoln Road	254	200	324	324	324	324	1750
Option 5.02: New SW pipe to capture runoff crossing Beverley Terrace	149	154	264	264	264	264	1359
Option 4.01: New SW pipe to capture flows from Ajax Road	169	147	251	251	251	251	1320

STEP 5: PRIORITY OPTIONS SUMMARY AND SELECTION

The top six options then underwent further investigation including;

- Full cost breakdown
- Rationale of option
- Number of buildings with potential reduced flood risk
- Upstream/Future Impacts
- Risks
- WRC considerations
- Design constraints/feasibility assessment
    - Hydraulic feasibility
    - Pipe cover/gradient
    - Service clashes
    - Land ownership
    - Outlet level
- Further investigations required

The following table provides a summary of the options.

The detailed information sheets for each options are included.

The analysis assumptions for each options are as follows;

Potential number of buildings with reduced flood risk

1. The assessment provided is high level only. It considers potential flood risk using modelled flood extents and GIS-derived overland flow paths. Detailed assessments of local levels and flood mechanism have not been conducted for each option.
2. A plinth height of 150mm to the habitable floor level has been assumed in accordance with the Building Code. Buildings with predicted water depths exceeding 150mm are considered as at flood risk.
3. Six modelled storm events have been assessed, with scenarios including various ARI events, existing climate (Ex), a climate change allowance (CC), existing development (existing development), and maximum probable development (MPD). Flood risk in the 2yr Ex ED scenario is the most severe level of risk.
4. The count considers all nearby flooded buildings along the option's flow path (either upstream or downstream).
5. Building counts exclude sheds and small structures (only buildings >= 50m2 footprint included)

Levels

Summary of Proposed Stormwater Capital Works 2024-2027

Option ID	Description	Rationale	Proposed implementation year	Cost estimate (Excl. GST)	No. buildings with potential reduced flood risk	Future upstream/downstream impacts	Risks
2.01	Upgrade swale and outfalls at Harbour View Road	Swales are poorly drained. Upgraded outfall can capture OLFP.	FY2024-25	$500,000	11	Creates capacity to enable future Option 2.05 (pipe OLFP on Tuck Road) - this could reduce risk for 3 more properties	High groundwater - dewatering needed WRC coordination for upgraded outlet to marina
8.01	Upgrade outfall on Hetherington Road	Improve outflow capacity and reduce potential tailwater issues in major pipe network.	FY2024-25	$1,100,000	0 in the immediate vicinity. Up to 10 properties upstream on Rutherford Rd.	Creates capacity to upgrade the rest of Hetherington Road SW network (including capacity restriction near Martyn Rd). Could reduce risk for 3 properties at 311-315 Hetherington Road, and upstream near Rutherford Road. May reduce nuisance ponding near Port Road.	Works adjacent to major road - traffic management. WRC consent may be required.
4.06	New SW pipe on Port Road connecting to Sea Breeze Lane outfall	Divert runoff from low-lying properties to Wentworth River.	FY2024-25 (design) FY2025-26 (construction)	$900,000	11	None anticipated.	Conflict with buried services and tree roots Access - proposed alignment is on private land with existing SW easements.
10.01	Detention in Williamson Golf Course to capture runoff from Bellona and Kiwi Road	Divert local runoff and store in existing green space.	FY2024-25 (stakeholder engagement) FY2025-26 (construction)	$200,000	11 in immediate vicinity. Up to 22 if runoff diversion is included.	Reduces catchment to Williamson Road, enabling future upgrades to the Williamson pipe network. Could protect up to 10 properties on Mary Road.	Potential resistance from golf club members Cost increase if diversion is added
8.02	Upgrade outfall at Casement Road	Upgrade existing open channel to reduce overtopping and mitigate potential tailwater issues.	FY2025-26	$400,000	5	Creates capacity to implement Aickin Road network upgrades (potential reduced risk to 6 properties) and / or pipe all runoff on Casement Road (potentially impacting 7 properties)	Access to private land needed non-return valve options limited on open channel
10.03	Detention in berms to capture runoff from Kiwi Road	Intercept road runoff in soakage and detention devices in berm	FY2026-27	$800,000	9	Reduces catchment to Williamson Road, enabling future upgrades to the Williamson pipe network. Could protect up to 10 properties on Mary Road.	Conflict with buried services High groundwater may impede soakage

Option 2.01: Upgrade Harbour View outfall and connect to swale - End of pipeline work

Option rationale:

This option has two aims:

1. **Provide an overflow outlet for the Harbour View swale drain**. The swale currently accepts runoff from a stormwater pipe on Mako Road and disposes it by soakage. Soakage is impeded by the high local groundwater level, which often breaches the base level of the swale (see Figure 1). An overflow outlet can create a safe discharge point for the swale and divert runoff away from nearby properties. It may also mitigate stagnant water within the swale.

Figure 1: Ponding within the Harbour View swale

2. **Capture the overland flow path along Harbour View Road.** Several properties along the road appear to be at a lower elevation than the crown of the road. During higher intensity rainfall events, runoff may overtop the kerb and channel to enter these properties. Upsizing the catchpit at the downstream end of the road may allow for more runoff to enter the pipe network, potentially reducing overtopping to nearby properties.

Potential number of buildings with reduced flood risk from Option 2.01:

11 buildings upstream of the upgraded pipe may have reduced flood risk from the option.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk from the option	0	8	1	0	0	2

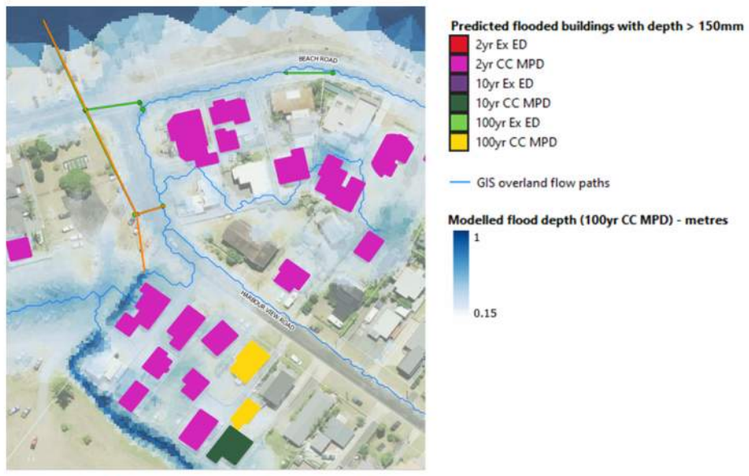


Figure 2: Buildings with modelled flood risk around Option 2.01

WRC Considerations:

As this is a coastal outfall, coordination with WRC will be required.

Erosion protection: Riprap may be required to protect the beach from the upsized pipe's increased flows.

New resource consent: Any new structures within the Coastal Marine Area (CMA) will likely require WRC consent. It appears that the outfall structure (pipe outlet and wingwall) can be built outside the CMA. However, riprap required for erosion protection may extend into the CMA, potentially triggering a resource consent requirement. WRC may be willing to exercise its discretion to permit riprap without consent, but early engagement is required to confirm.

Water quality: Treatment will likely be required in line with the Comprehensive Discharge Consent. The swale upstream may be vegetated to meet this. Alternatively, a gross pollutant trap may be installed on the pipe.

Design constraints / feasibility assessment:

1. Hydraulic feasibility:

If existing outfall level is retained, the pipe can be installed at approximately 0.6% gradient. This is considered to be acceptable given the flat topography.

The pipe may need protection from tidal backflows. GIS data on levels is unavailable, but the hydraulic model inferred the existing outfall level as 0.356m (AVD). This lies below MHWS (1.126m AVD). Accounting for sea level rise, estimated future MHWS = 1.786m (AVD). A non-return valve may be installed to protect against high tides.

2. Pipe Cover :

The existing surface along proposed pipe alignment is generally flat. As the start of the pipe is connecting to existing swale, first half pipe will have pipe cover <=500mm, and second half of the pipe will have 500 - 700mm cover. This is based on the assumption of retaining the existing outfall level. The portions of pipe under the roadway will require structural design to account for low cover under a trafficable surface.

Figure 3: Natural surface trend along proposed pipe alignment (red line, levels in NZVD). Start from pipe upstream to downstrear

3. Service Clashes:

As per TCDC 3 Waters GIS mapping, a water main crosses the proposed pipe alignment. Water mains pipes are generally small and can be accommodated within the design.

4. Conclusion:

Option 2.01 seems largely feasible. It may be challenging to keep the outfall unsubmerged. An appropriate non-return valve such as a WaStop should be included in the design.

Risks:

The following are the major risks for this option:

1. High groundwater level may necessitate dewatering of excavated areas.
2. Early and extensive coordination with WRC will be required to confirm RC requirements around outlet structure.

Further investigations needed:

To progress option design, the following investigations may be needed:

1. Runoff assessment to inform pipe sizing.
2. Topographic survey to confirm levels.
3. Services location survey to confirm depth and alignment of existing services.
4. CCTV and potholing to confirm swale end point: A culvert outlet is located at the end of the swale near Harbour View Road (Figure 4). It is anticipated that this leads to a soakage trench.

Figure 4: Culvert outlet to swale near Harbour View Road

Option 4.06: New SW pipe on Port Road connecting to Sea Breeze Lane outfall - 74m away from pipe outlet

Option rationale:

This option aims to divert runoff away from low-lying properties on Port Road into an existing outfall to the Wentworth River. It is not practical to upgrade the existing pipe network in the area as many pipes pass through private properties. Thus, it is proposed to create a secondary pipeline along Port Road to connect to existing pipes on Sea Breeze Lane. The Sea Breeze Lane pipes may require upgrade to accommodate increased flows. The design does not currently include an upgrade to the river outfall, but this may be incorporated if required.

Potential number of buildings with reduced flood risk:

11 buildings near the pipe's upstream end may have reduced flood risk from the option.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk from the option	2	1	0	2	6	0

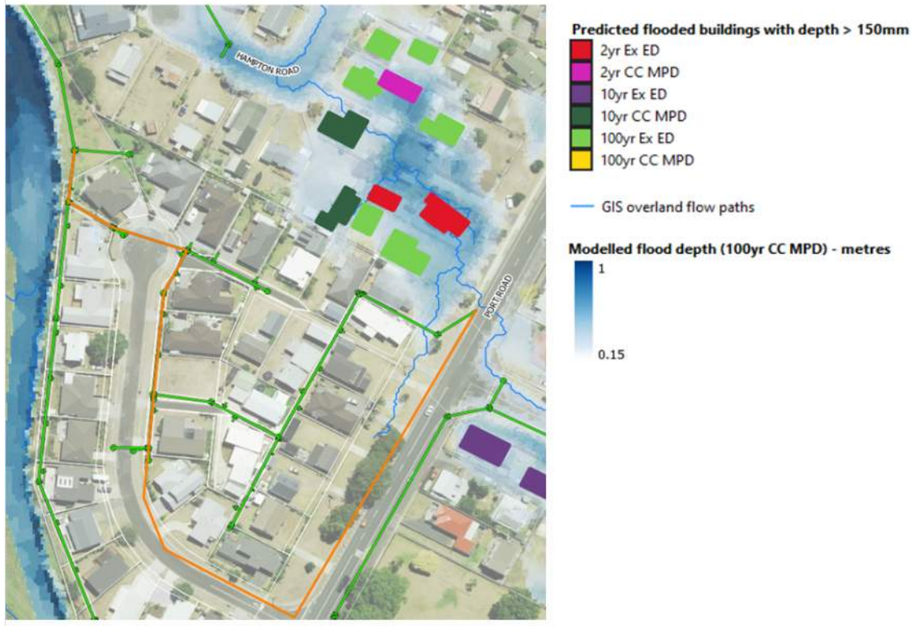


Figure 1: Buildings with modelled flood risk around Option 4.06

WRC Considerations:

The pipe increases discharge into an existing river outfall. Coordination with WRC will be required.

Erosion protection: Riprap may be required to protect the river from the pipe's increased flows.

New resource consent: As works are not being conducted on the existing outfall, no new RCs are anticipated.

Water quality: A gross pollutant trap or similar may be required to meet discharge quality requirements.

Design constraints / feasibility assessment for Option 4.06:

1. Hydraulic feasibility:

Given the required connection with an existing pipeline, a gradient of 0.7% can be achieved.

The discharge is into a relatively upstream section of the Wentworth River that is unlikely to be tidal. The outlet will however be subject to river flooding during severe storm events. A non-return valve may be required at the outfall to accommodate high river levels.

2. Pipe Cover :

>600mm pipe cover can likely be achieved. Structural reinforcement of the pipe may not be required.

Figure 2: Natural surface trend along proposed pipe alignment (red line, levels in NZVD). Start from pipe upstream to downstream

3. Service Clashes

The proposed pipeline alignment is within the berm on Port Road. Two water supply lines and one wastewater line lie within the bberm, running both parallel to and across the proposed SW pipe. There may also be tree root interference from mature trees along the proposed alignment.

4. Land Ownership:

The proposed alignment is on public land or following existing easements. Access to the downstream end of the proposed works may require coordination with the landowner at 123 Sea Breeze Lane.

5. Conclusion:

Potholing might be required to determine locations of existing services. Access through private properties may be required for works.

Risks:

The following are the major risks for this option:

1. Pipe alignment may conflict with services and tree roots.
2. Coordination with landowners may be required to acces easements for works.

Further investigations needed:

To progress option design, the following investigations may be needed:

1. Runoff assessment to inform pipe sizing.
2. Topographic survey to confirm levels.
3. Services location (either GPR or potholing)

Option 8.01: Upgrade outfall on Hetherington Road - End of pipeline works

Option rationale:

The Hetherington Road SW pipeline is a major component of the Whangamata pipe network, receiving runoff from the main commercial area of Port Road in addition to servicing properties along the road. Hydraulic modelling has shown that the full length of the pipe likely has insufficient capacity. TCDC would like to begin upgrading this pipe starting at the outfall. This option is aimed to increase outflow capacity and improve functioning. The works may be designed as either an open channel or a pipe.

Figure 1: Existing outfall on Hetherington Road

Potential number of buildings with reduced flood risk:

This option is not anticipated to directly benefit any adjacent properties. However, removing potential outlet controls on the network may improve flows upstream, potentially benefitting properties at risk near Rutherford Road and The Square. The outfall upgrade will also allow for the future upsizing of the rest of the Hetherington Road network.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk from the option	0	0	0	0	0	0

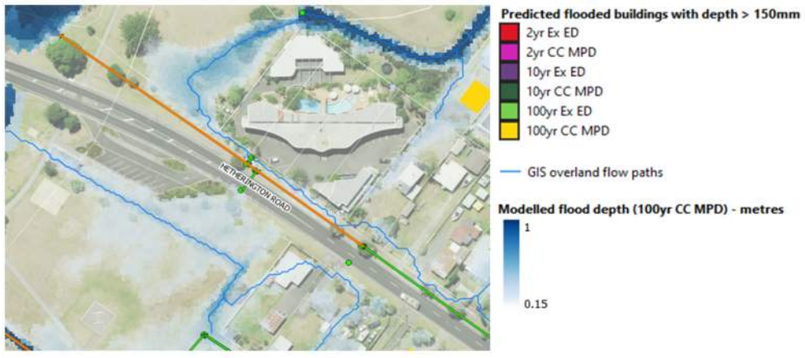


Figure 2: Buildings with modelled flood risk around Option 8.01

WRC Considerations:

The upgrade will increase discharge into the Wentworth Estuary. Coordination with WRC will be required.

Erosion protection: Riprap may be required to protect the river from the pipe's increased flows.

New resource consent: Coordination with WRC will be required to confirm RC requirements.

Water quality: A gross pollutant trap or similar may be required to meet discharge quality requirements.

Design constraints / feasibility assessment for Option 8.01:

1. Gradient and pipe cover:

Option 1: Open channel - no cover issues

Option 2: Upsized outfall pipe

If the existing upstream and outfall invert levels are maintained, the new outfall will likely have low gradient and cover issues. A 1050mm pipe will have 0.06% grade and less than 300mm cover. A 900mm pipe would have 0.07% grade and approx. 450mm cover. Concrete capping will likely be required. Alternatively, smaller twin pipes could be used instead of a single outlet.

Note that the natural surface is generally flat along the proposed pipe network alignment (see below)

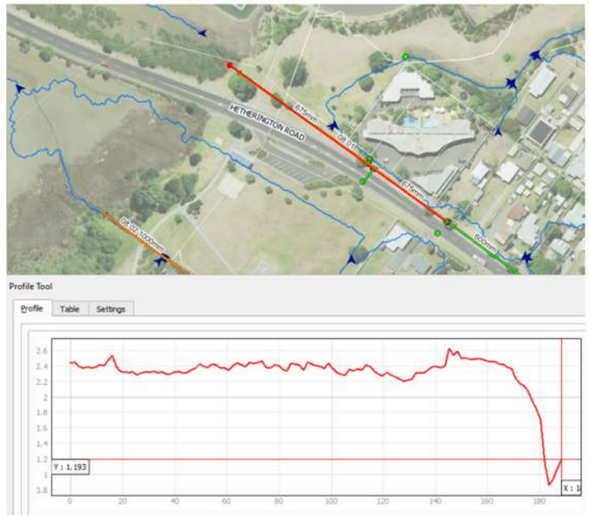


Figure 3: Natural surface trend along proposed pipe alignment (red line, levels in NZVD). Start from pipe upstream to downstream

2. Outlet level

The existing outfall invert lies below MHWS, as can be seen in Figure 1. The existing outlet invert is estimated at 0.85mRL (AVD). Present-day MHWS is at 1.12mRL, while future MHWS is estimated at 1.79mRL. A non-return valve will be required.

Option 1: Open channel - non-return valve is complex to design

Option 2: Upsized pipe - A WaStop valve may be used. Note that the maximum WaStop diameter currently on the market is 900mm.

3. Service Clashes:

TCDC 3 Waters GIS mapping shows a water supply pipeline running across the proposed SW pipeline. Water mains pipes are generally small and can be accommodated within the design. Two medium-sized trees may also need removal for the works.

4. Land ownership:

All works to be completed on public land.

5. Conclusion

Pipe cover and gradient might be major design constraints. A twin outlet pipe is recommended.

Risks:

The following are the major risks for this option:

1. Works are adjacent to major road (Hetherington Rd connects SH25 to Whangamata town). Complex traffic management will likely be required.
2. WRC consent may be required. Early and extensive engagement is recommended.

Further investigations needed:

To progress option design, the following investigations may be needed:

1. Runoff assessment to inform pipe sizing.
2. Topographic survey to confirm levels.
3. Services location (either GPR or potholing)

Option 8.02: Upgrade outfall at Casement Road - End of pipeline work

Option rationale:

The piped network on Casement Road discharges to the Wentworth estuary via an open channel at the downstream end of the road. Option 8.02 involves upgrading the open channel. Residents have noted that the channel overtops in heavy rainfall events. The channel also appears vulnerable to tidal backflows. Upgrades can improve the functioning of the channel, mitigating potential tailwater impacts on the upstream network.

Figure 1: Casement Road channel

Potential number of buildings with reduced flood risk:

Five buildings immediately upstream of the channel may have reduced flood risk from the option. Works may also benefit other buildings further upstream on the network.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk from the option	0	0	0	0	1	4

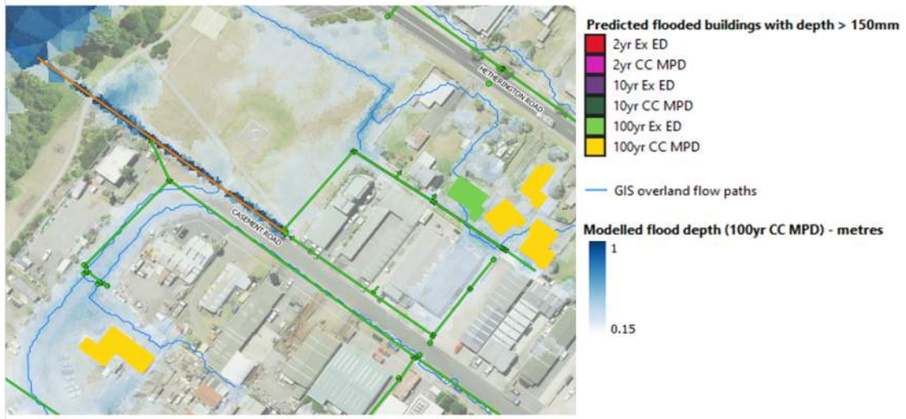


Figure 2: Buildings with modelled flood risk around Option 8.02

WRC Considerations:

This option involves works on an existing river outfall. Coordination with WRC will be required.

Erosion protection: Unlikely to be required, as flows to the river are not being increased.
New resource consent: Unlikely to need resource consent, but coordination with WRC is recommended to confirm.
Water quality: Treatment is likely required. The channel vegetation may be upgraded to provide treatment. Alternatively, a gross pollutant trap may be installed on the upstream network.

Design constraints / feasibility assessment for Option 8.02:

1. Hydraulic feasibility:

LiDAR data shows that the channel invert is currently at around the same level as current-day MHWS (1.12mRL AVD). Ground investigations are required to confirm.

Accounting for sea level rise, future MHWS is predicted to be 1.77mRL (AVD). A non-return valve will likely be required to protect against tidal backflows. This may be in the form of a tide gate for an open channel. Alternately, the channel can be piped with a flap gate or WaStop at the end.

2. Pipe Cover :
If the channel were to be a piped, a box culvert may be preferable due to low fall and available cover. LiDAR data for the area does not appear realistic (see Figure 3 below). Ground investigations are required to confirm levels.

Figure 3: Natural surface trend along proposed pipe alignment (red line, levels in NZVD). Start from pipe upstream to downstream

4. Service Clashes
As per TCDC 3 Waters GIS mapping, no existing services are present near proposed option.

5. Land ownership:
Access to an industrial property may be required for works (see Figure 4). It is unclear whether there is an existing easement for the channel.

Figure 4: Private land access for works

6. Conclusion:
Private property access is required. If using a box culvert, cover underneath the existing walkway needs to be investigated.

Risks:

The following are the major risks for this option:
1. Non-return valve design is likely to be sub-optimal - flap gates require more maintenance than WaStops
2. Access to private land may be needed for works. Coordination with landowner is recommended.

Further investigations needed:

To progress option design, the following investigations may be needed:
1. Runoff assessment to inform pipe / channel sizing.
2. Topographic survey to confirm levels.

Option 10.01: Detention in Williamson Golf Course - Located in the middle of catchment

Option rationale:

The golf course on Williamson Road is currently a natural ponding area. It may be possible to divert additional runoff into the course and formalise the ponding areas into temporary or permanent water features. This could improve usability of the golf course by restricting ponding to limited areas. It could also benefit surrounding properties at risk of flooding.

Potential number of buildings with reduced flood risk:

There are 11 at-risk buildings in the immediate vicinity of Williamson Golf Course that could benefit from this option. Of these, 9 buildings are on Kiwi Road and could also benefit from Option 10.03.

Runoff from the north of Achilles Ave could also be diverted into the golf course. This could benefit another 11 buildings on Exeter Road.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk - detention only	5	0	2	1	1	2
Potential number of flooded buildings with reduced risk - detention + diversion	10	3	5	1	1	2

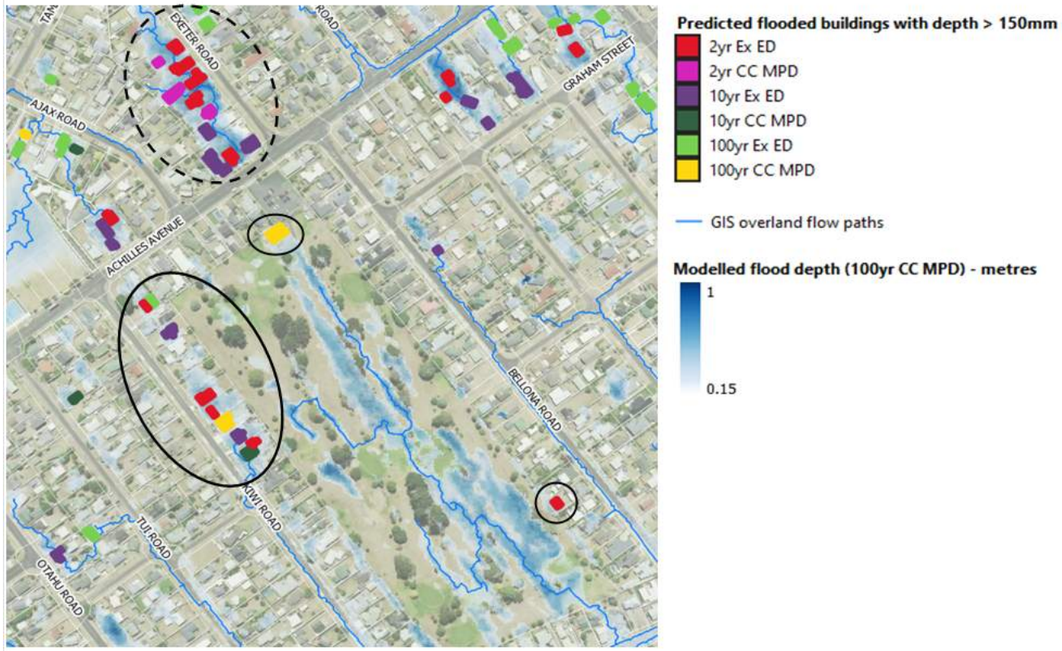


Figure 1: Buildings with modelled flood risk around option. Solid circles indicate buildings immediately around the golf course that may benefit from the option. Dashed circles indicate additional properties that may benefit from runoff diversion.

WRC Considerations:

As this option does not involve works near the river or beach, minimal input from WRC is anticipated.

Design constraints / feasibility assessment for Option 10.01:

1. Hydraulic feasibility:
Adequate space to construct detention or retention ponds. The Williamson Golf Course seems to have natural low points, which may make the construction of ponds easier. Subsoil drainage could be incorporated into other parts of the golf course to improve useability.

Diversion of runoff from Achilles Ave and Exeter Rd into the golf course seems hydraulically feasible due to the to the topography. The diversion pipe could enter the golf course via the parking lot on the north.

Figure 2: Topography along potential diversion pipe alignment (red line, levels in NZVD). Profile shown from north to south.

2. Service Clashes
No existing services present within Williamson Golf Course.

3. Land ownership
Williamson Golf Course is on public land but is privately managed. Liaison with golf club members is recommended to ensure acceptability to stakeholders.

4. Conclusion:
No major design constraints.

Risks:

The following are the major risks for this option:
1. Potential resistance from Williamson Golf Club members. Early and extensive engagement is recommended.
2. If diversion is included in the design, cost may be higher than scoped for.

Further investigations needed:

To progress option design, the following investigations may be needed:
1. Runoff assessment to inform detention area sizing.
2. Topographic survey to confirm levels.

Option 10.03: Detention in berms on Kiwi Road - Located in the middle of catchment

Option rationale:

Several properties on the northern end of Kiwi Road are at risk of flooding, as shown by modelling and reported by residents. Some of the properties at risk appear to be lower than road level. This option aims to intercept road runoff in detention / soakage devices in the berm.

Potential number of buildings with reduced flood risk:

There are 9 buildings on Kiwi Road at risk of flooding that may benefit from this option. These properties may also benefit from Option 10.01.

	2yr Ex ED	2yr CC MPD	10yr Ex ED	10yr CC MPD	100yr Ex ED	100yr CC MPD
Potential number of flooded buildings with reduced risk	4	0	2	1	1	1

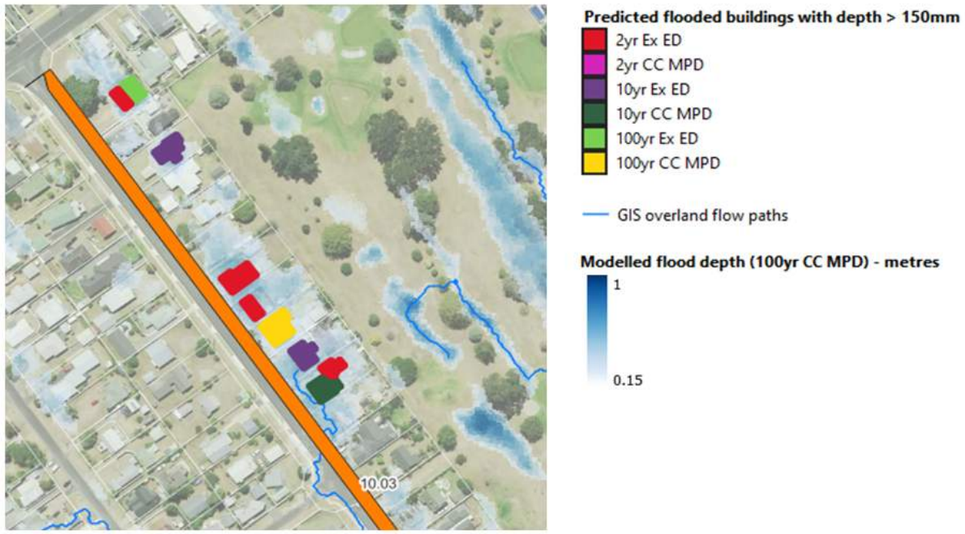


Figure 1: Buildings with modelled flood risk around option.

WRC Considerations:

As this option does not involve works near the river or beach, minimal input from WRC is anticipated.

Design constraints / feasibility assessment for Option 10.01:

1. Hydraulic feasibility:
Berm has limited space for soakage devices. Modules can be added vertically to make the detention / soakage field deeper, if groundwater levels permit.

Due to limited berm width, the soakage field may need to extend further south towards Williamson Rd.

2. Service Clashes
Existing water supply and wastewater pipelines are running parallel along the berm. There are also several power poles in the berm.

3. Land ownership
Detention / soakage devices will be installed in the berm between road and property boundaries. No private property access is required. Reinstatement of driveways may be required.

4. Conclusion:
No major design constraints.

Risks:

The following are the major risks for this option:
1. Conflict with buried services. Ground investigations are recommended to confirm.
2. Groundwater level may be high. This could impede soakage. Soakage testing is recommended.

Further investigations needed:

To progress option design, the following investigations may be needed:
1. Runoff assessment to inform device sizing.
2. Topographic survey to confirm levels.
3. Soakage testing
4. Services location (either GPR or potholing)

1. Pipe inverts were not always available from GIS. If required, levels inferred in the HAL hydraulic model were used as an alternative.
2. LiDAR data from LINZ is provided in terms of NZVD-2016 datum, while TCDC asset data has invert levels in terms of AVD-1946. This spreadsheet reports on available data without conducting the datum conversions. At design stage, all levels will be provided in terms of NZVD-2016. In Whangmata, the conversion is approximately: NZVD + 0.3m = AVD.

STEP 6: CHOSEN OPTIONS FOR WSIMP 2024-2025

The six options were then assessed by Metis Consultants, Water Services and Project Delivery team over a series of meetings/workshops with the results summarised to the General Manager of Infrastructure. The confirm the chosen projects for the 2024/2025 year as the 2.01 Upgrade swale and outfall at Harbour View Road and 8.012 Upgrade outfall on Hetherington Road.

STEP 7: RESULTS OF DETAILED DESIGN

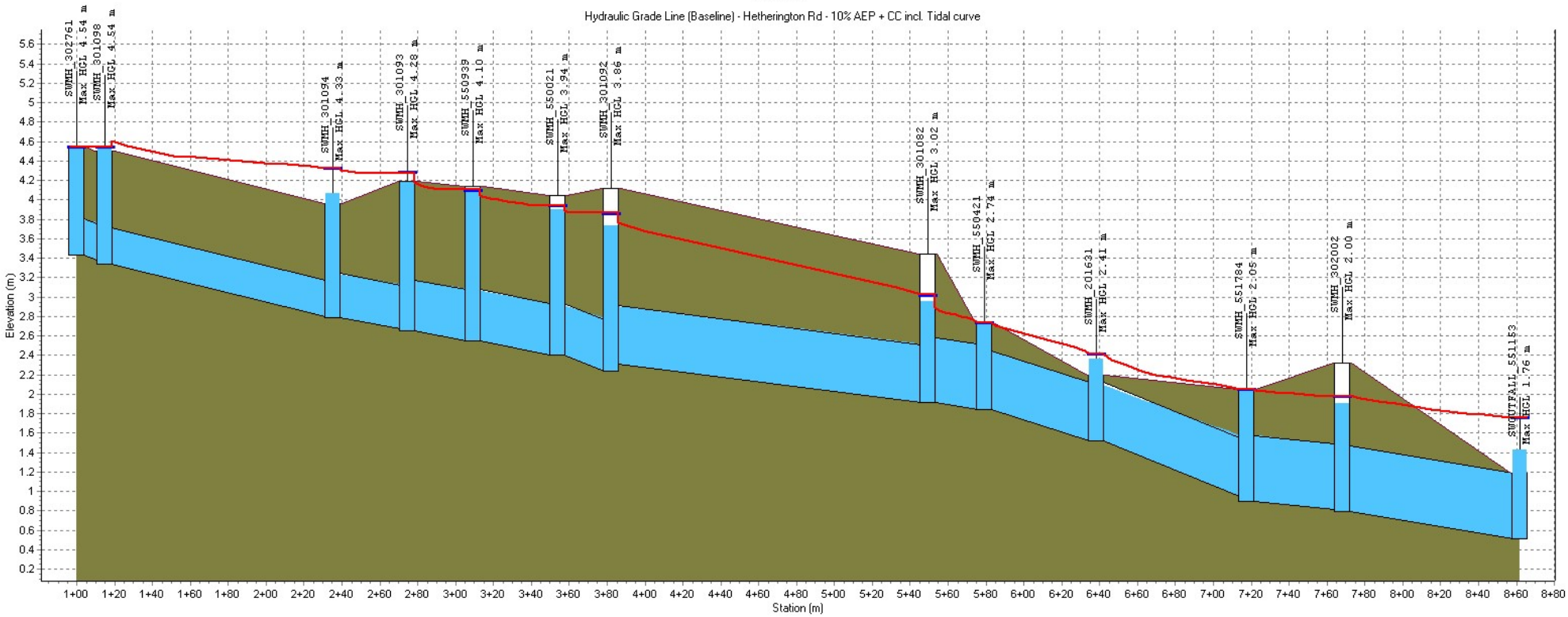
Survey was undertaken of the Hetherington Road and Harbour View Road catchments in January 2025. This confirmed the Harbour View Road stormwater catchment was localised and therefore the proposed improvement works affected a significantly smaller catchment the previously identified. Metis Consultants were tasked to provide an alternative option for 2024/25 capital works which fitting with the confirmed Hetherington Road outlet upgrade project.

Metis Consultants Ltd presented the option of a full upgrade of the Hetherington Road stormwater reticulation, which was presented at the 21 February 2025 stakeholder meeting. The full upgrade of the Hetherington Road stormwater reticulation from Port Road to the outlet presented significant benefits to reduce surface flooding in the catchment as per the hydraulic grade lines presented below.

This option was confirmed by the Stakeholders and presented to the Infrastructure General Manager with works commencing in July 2025.

Profile Plot

Hydraulic Grade Line (Baseline) - Hetherington Rd - 10% AEP + CC incl. Tidal curve

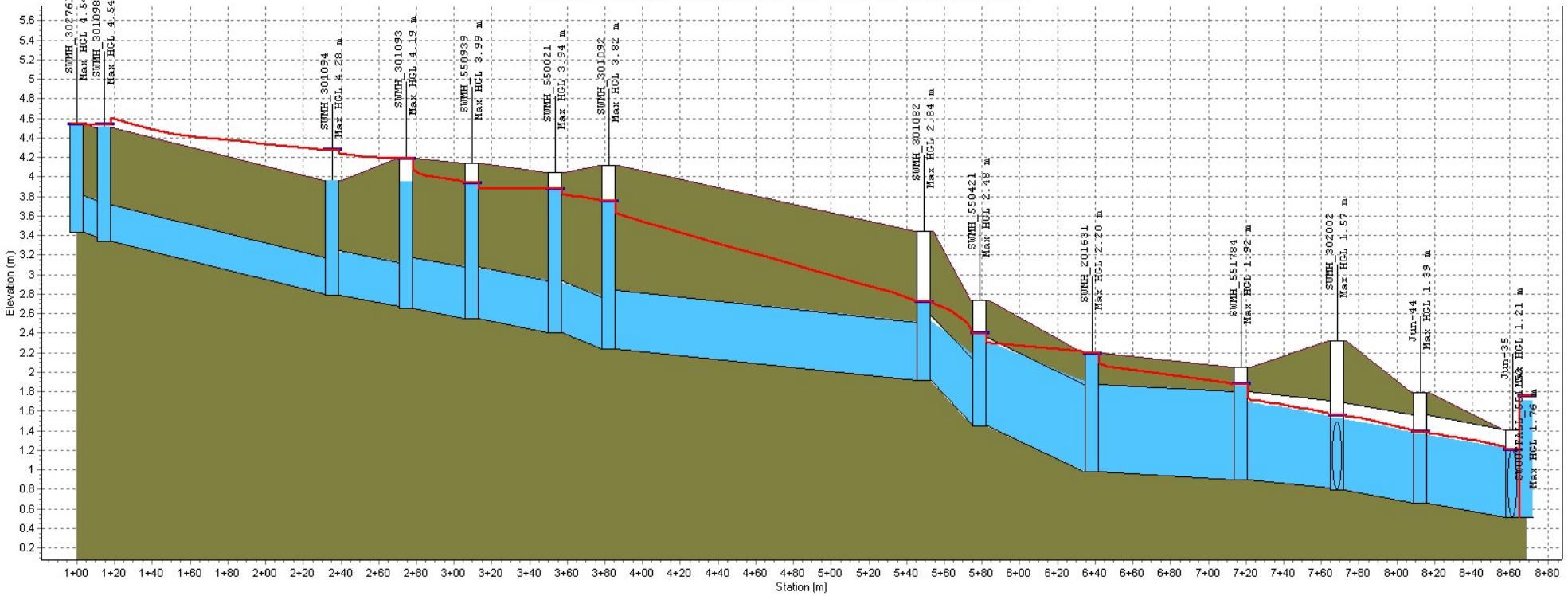


:	SWMH_301098		SWMH_301094	SWMH_301093	SWMH_550939	SWMH_550021	SWMH_301092	SWMH_301082	SWMH_550421	SWMH_201631	SWMH_551784	SWMH_302002	
Rim (m):	4.54	4.50	3.96	4.19	4.14	4.04	4.12	3.44	2.74	2.20	2.05	2.32	
Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.24	1.91	1.84	1.52	0.90	0.79	0.51
Min Pipe Cover (m):	0.74	0.75	0.72	1.02	1.07	1.11	1.21	0.86	0.23	0.08	0.47	0.84	
Max HGL (m):	4.54	4.54	4.33	4.28	4.10	3.94	3.86	3.02	2.74	2.41	2.05	2.00	1.76

Link ID:	SWMH_301099.1	SWMH_301098.1	SWMH_301094.1	SWMH_301093.1	SWMH_550939.1	SWMH_550021.1	SWMH_301092.1	Link-01	SWMH_550421.1	SWMH_201631.1	SWMH_551784.1	SWMH_302002.1	
Length (m):	14.66	120.70	39.20	34.90	44.38	28.50	167.10	29.50	59.30	79.10	51.00	93.49	
Dia (m):	0.38	0.38	0.45	0.53	0.53	0.53	0.60	0.68	0.60	0.60	0.68	0.68	
Slope (m/m):	0.0034	0.0045	0.0031	0.0029	0.0033	0.0058	0.0024	0.0024	0.0054	0.0072	0.0018	0.0030	
Up Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.31	1.91	1.84	1.52	0.90	0.79	
Dn Invert (m):	3.38	2.80	2.67	2.55	2.40	2.24	1.91	1.84	1.52	0.95	0.81	0.51	
Max Q (cms):	0.08	0.12	0.29	0.30	0.30	0.30	0.40	0.58	0.48	0.47	0.48	0.54	
Max Vel (m/s):	0.91	1.08	1.80	1.38	1.39	1.40	1.41	1.62	1.68	1.68	1.51	1.60	
Max Depth (m):	0.38	0.38	0.45	0.52	0.52	0.52	0.60	0.68	0.60	0.60	0.68	0.68	

Profile Plot

Hydraulic Grade Line - Hetherington Rd Upsized DS Pipes - 10% AEP + CC incl. Tidal curve + WaStop

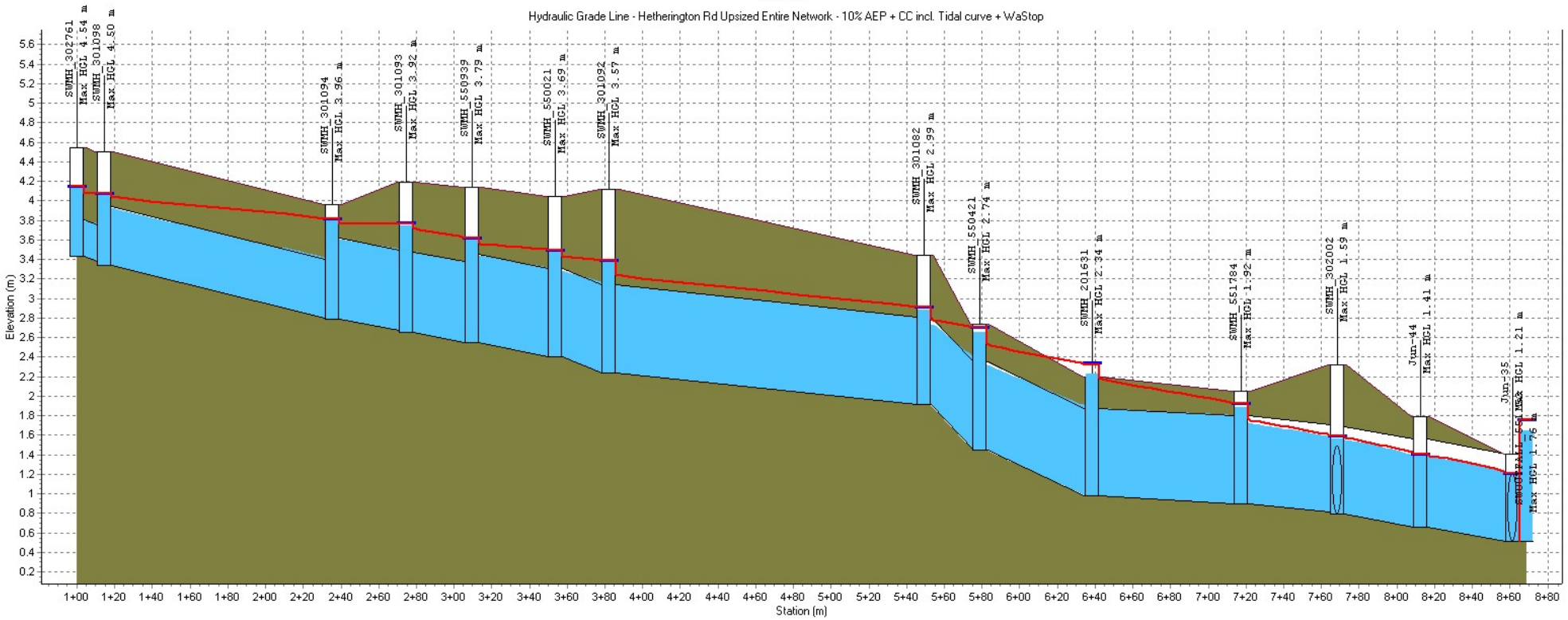


:	SWMH_301098		SWMH_301096	SWMH_301093	SWMH_550939	SWMH_550021	SWMH_301092	SWMH_301082	SWMH_550421	SWMH_201631	SWMH_551784	SWMH_302002	Jun-44	Jun-35
Rim (m):	4.54	4.50	3.96	4.19	4.14	4.04	4.12	3.44	2.74	2.20	2.05	2.32	1.79	1.21
Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.79	0.66	0.50.51
Min Pipe Cover (m):	0.74	0.75	0.72	1.02	1.07	1.11	1.28	0.86	0.39	0.33	0.25	0.61	0.23	
Max HGL (m):	4.54	4.54	4.28	4.19	3.99	3.94	3.82	2.84	2.48	2.20	1.92	1.57	1.39	1.21.76

Link ID:	SWMH_301099.1	SWMH_301098.1	SWMH_301094.1	SWMH_301093.1	SWMH_550939.1	SWMH_550021.1	SWMH_301092.1	Link-01	SWMH_550421.1	SWMH_201631.1	SWMH_551784.1	3	Link-05	Link-02
Length (m):	14.66	120.70	39.20	34.90	44.38	28.50	167.10	29.50	59.30	79.10	51.00	44.33	48.68	
Dia (m):	0.38	0.38	0.45	0.53	0.53	0.53	0.60	0.68	0.90	0.90	0.90	0.90	0.90	0.00
Slope (m/m):	0.0034	0.0045	0.0031	0.0029	0.0033	0.0058	0.0020	0.0156	0.0080	0.0009	0.0018	0.0029	0.0031	
Up Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.79	0.66	0.51
Dn Invert (m):	3.38	2.80	2.67	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.81	0.66	0.51	0.51
Max Q (cms):	0.08	0.13	0.28	0.33	0.33	0.34	0.46	0.65	0.84	0.95	1.00	0.71	0.71	0.60
Max Vel (m/s):	0.91	1.21	1.78	1.53	1.54	1.55	1.69	2.33	1.37	1.50	1.65	1.26	1.32	0.00
Max Depth (m):	0.38	0.38	0.45	0.52	0.52	0.52	0.60	0.68	0.90	0.90	0.83	0.75	0.71	0.00

Profile Plot

Hydraulic Grade Line - Hetherington Rd Upsized Entire Network - 10% AEP + CC incl. Tidal curve + WaStop



:	SWMH_301098		SWMH_301096	SWMH_301093	SWMH_550939	SWMH_550021	SWMH_301092	SWMH_301082	SWMH_550421	SWMH_201631	SWMH_551784	SWMH_302002	Jun-44	Jun-35
Rim (m):	4.54	4.50	3.96	4.19	4.14	4.04	4.12	3.44	2.74	2.20	2.05	2.32	1.79	1.21
Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.79	0.66	0.51
Min Pipe Cover (m):	0.74	0.56	0.34	0.70	0.69	0.74	0.98	0.63	0.39	0.33	0.25	0.61	0.23	
Max HGL (m):	4.54	4.50	3.96	3.92	3.79	3.69	3.57	2.99	2.74	2.34	1.92	1.59	1.41	1.21

Link ID:	SWMH_301099.1	SWMH_301098.1	SWMH_301096	SWMH_301093	SWMH_550939	SWMH_550021.1	SWMH_301092.1	Link-01	SWMH_550421.1	SWMH_201631.1	SWMH_551784.1	3	Link-05	Link-02
Length (m):	14.66	120.70	39.20	34.90	44.38	28.50	167.10	29.50	59.30	79.10	51.00	44.33	48.68	
Dia (m):	0.38	0.60	0.83	0.83	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.00
Slope (m/m):	0.0034	0.0045	0.0031	0.0029	0.0033	0.0058	0.0020	0.0156	0.0080	0.0009	0.0018	0.0029	0.0031	
Up Invert (m):	3.43	3.34	2.79	2.65	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.79	0.66	0.51
Dn Invert (m):	3.38	2.80	2.67	2.55	2.40	2.24	1.91	1.45	0.98	0.90	0.81	0.66	0.51	0.51
Max Q (cms):	0.11	0.31	0.50	0.67	0.72	0.74	0.91	1.05	1.19	1.06	1.08	0.74	0.74	1.05
Max Vel (m/s):	1.14	1.24	1.08	1.27	1.26	1.21	1.52	2.11	1.87	1.67	1.78	1.28	1.36	0.00
Max Depth (m):	0.38	0.60	0.82	0.82	0.90	0.90	0.90	0.90	0.90	0.90	0.84	0.77	0.72	0.00

STEP 10: NEXT STEPS FOR THE WSIMP

The full upgrade of the Hetherington Road pipeline is a modification to the WSIMP and results in other potential options for the master plan. Further options assessment will be undertaken in conjunction with updating the Whangamata Stormwater Flood Model to reassess options. These will be presented to the Whangamata Stormwater Engagement Group and the WSIMP reassessed for 2025/26 and ongoing.