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14/07/2025

MAHI ROAD 40, HELENSVILLE

STORMWATER MANAGEMENT PLAN - PRIVATE PLAN CHANGE

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Development of Mahi Road 40, Helensville | Stormwater Management Plan - Private Plan Change

Dear Richard,

Thank you for the opportunity for Civix to provide a Stormwater Management Plan - Private Plan Change for the Development of Mahi Road 40, Helensville.

The report and drawings contained in this document show infrastructure details for the Development of Mahi Road 40, Helensville.

Please do not hesitate to contact us if you have any questions on this report,

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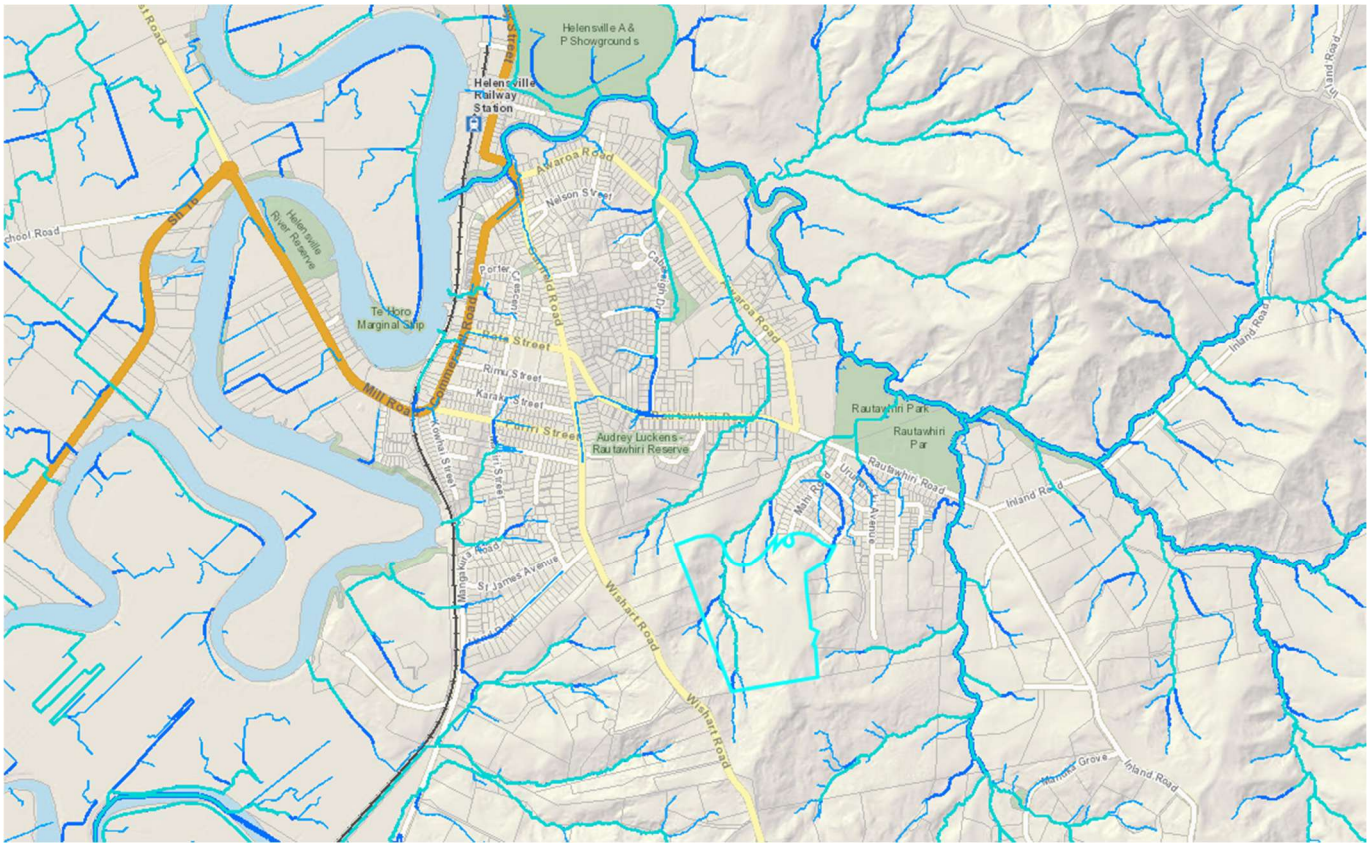
Contents

1. Executive Summary

The purpose of this Stormwater Management Plan is to support the 40 Mahi Road, Helensville Private Plan Change application and provide guidance on how the stormwater and existing freshwater systems are to be managed through development of the plan change area. This Stormwater Management Plan has been developed to achieve consistency with the objectives and policies of the Auckland Unitary Plan, Healthy Waters Network Discharge Consent, Auckland Council's guideline documents and industry best practice. Further detailed design and documentation will be provided during the resource consent stage of the development.



The Plan Change Area is located within the Awaroa Catchment which ultimately drains into the Kaipara River. The proposed development is located within Helensville, south of Rautawhiri Park and East of Helensville cemetery. This Stormwater Management Plan seeks to establish a cohesive approach to the management of stormwater runoff by specifying controls on the quality and quantity of runoff and requiring ecological enhancements where required including:

- Identify Best Practicable options for stormwater treatment for the development area
- Promote water sensitive design to mitigate adverse effects of development on the receiving environment
- Minimise discharge of contaminants into the receiving environment
- Protect and improve existing freshwater systems
- Eliminate adverse effects from the proposed development on downstream flooding

Proposed methodologies to achieve the above outcomes include:

- Use of Inert Roofing Materials on future dwellings
- Provide for stormwater quality treatment either at source or within a centralised wetland or communal scale raingarden.
- Provide for stormwater hydrology mitigation either at source or within a centralised wetland or communal scale raingarden.
- Reinstate natural habitat to degraded stream channels where applicable

The stormwater management strategy for the site has developed to meet the requirements in the Auckland Unitary Plan, specifically the provisions set out in the following sections:

- Section E1 – Water quality and integrated management,
- Section E8 – Stormwater discharge and diversion
- Section E9 – High contaminant generating carparks and high use roads
- Section E10 – Stormwater management area – Flow 1
- Section E36 – Natural hazards and flooding

Council's assessment criteria includes whether the relevant network discharge consent has been considered as part of the stormwater management strategy. Healthy Waters generally seeks this information at resource consent stage.

Per schedule 4 of the regionwide Network Discharge Consent (NDC), the development is classified as a greenfield development.

In accordance with the requirements of Schedule 4 of the NDC, this report demonstrates that the following outcomes can be achieved:

- No affected from flooding in 1% AEP event on new/additional buildings floor will be created and no increase in frequency of flooding existing buildings will be created
- No significant increase in risk to the operation and structural integrity of other infrastructure from a 1% AEP event will occur
- No increase in inundation that affects a building in the 10% AEP event
- No loss in overland flow path capacity will occur, though overland flow paths will now primarily be directed through the roading network.
- Appropriate erosion protection/mitigation will be provided for any new outfall in accordance with the Stormwater Code of Practice.
- No stormwater is directed to a different receiving environment

This report also outlines the management approach / key elements of the catchment and provides an assessment, which includes such detail as corresponds with the scale and significance of the effects of the proposal, of how an Integrated Stormwater Management Approach has been adopted in the design and associated stormwater management in accordance with the policies in the AUP Sections E1.3, B7 and B8 (See Annexure 1). This assessment shows how the SMP seeks to:

- Minimise the stormwater related effects of development;
- Retain/restore natural hydrology as far as practicable
- Minimise the generation and discharge of contaminants (including gross Stormwater pollutants) and stormwater flows at source
- Minimise temperature related effects
- Enhance freshwater systems including streams and riparian margins
- Minimise the location of engineered structures in streams

The stormwater management strategy for the site is summarised in Table 1.

Table 1 Stormwater Management Summary

Requirement	Design response
Water Quality	Treatment for all areas via a communal scale wetland located in the lower portion of the catchment.
SMAF1 - Retention (5 mm) and detention (95th percentile)	Roof areas for all dwellings via tanks with non-potable reuse. Retention is not feasible for public roads, COALs and driveways therefore shall be drained into the proposed communal scale wetland for detention (95th percentile). This solution has been chosen as it is the SMAF 1 specified outcome, which is the most restrictive outcome and will achieve equivalent hydrology (infiltration, runoff volume, peak flow) to predevelopment (grassed state) levels. Extended detention for the site to be provided via the communal scale wetland, this meets the NDC objectives and is the BPO.
Primary Drainage	The design will ensure that there is sufficient capacity within the pipe network to cater for stormwater runoff associated with the development in a 10% AEP event including incorporating flows from possible contributing catchments at maximum probable development.
Flood Hazard Management	The proposed form of the development will avoid the 100 year floodplain. A reticulated public stormwater network discharging to new outfalls will be provided to convey the 10% AEP event safely through the development. An overland flowpath network will be provided within the road corridors to ensure safe conveyance of the 1% AEP with CC through the development site and ensure no adverse effects to downstream properties in the catchment. 10 year and 100 year peak flow controls will be provided on site as required. Ann new dwellings to ensure floor level freeboard in line with the NZ building code.

2. Existing Site Description

The Plan Change Area totals approximately 17.37 hectares and is located within Helensville (refer to Figure 1 below). It is bound by CLZ properties 25, 69, 75, 141 Wishart Road to the west, Mahi Road to the North (SHZ) inclusive of the recently constructed Parkview Development and rural (CLZ) land to the south and east, noting that there is also FUZ land and Residential - Large Lot Zone land to the southeast.

Below is a table of the property affected by the Proposed Plan Change:

Table 2- Affected property(s)

Property Address	Legal Description	RT Number	Title Area	Register Owner(s)
40 Mahi Road	LOT 2 DP 586879	1164429	17.366 Ha	Hounslow Holdings

The site is currently vacant, consisting of large areas of grass, native and exotic scrub and bush, with watercourses and overland flow paths leading to the northeast.

2.1. Topography

The site sits on generally steep contours, falling from south to north with steeper areas in the northwestern part of the stie adjacent to existing overland flow paths. An intermittent stream traverses through the west of the proposed development acting as the primary conveyance for overland flow from the catchment upstream.

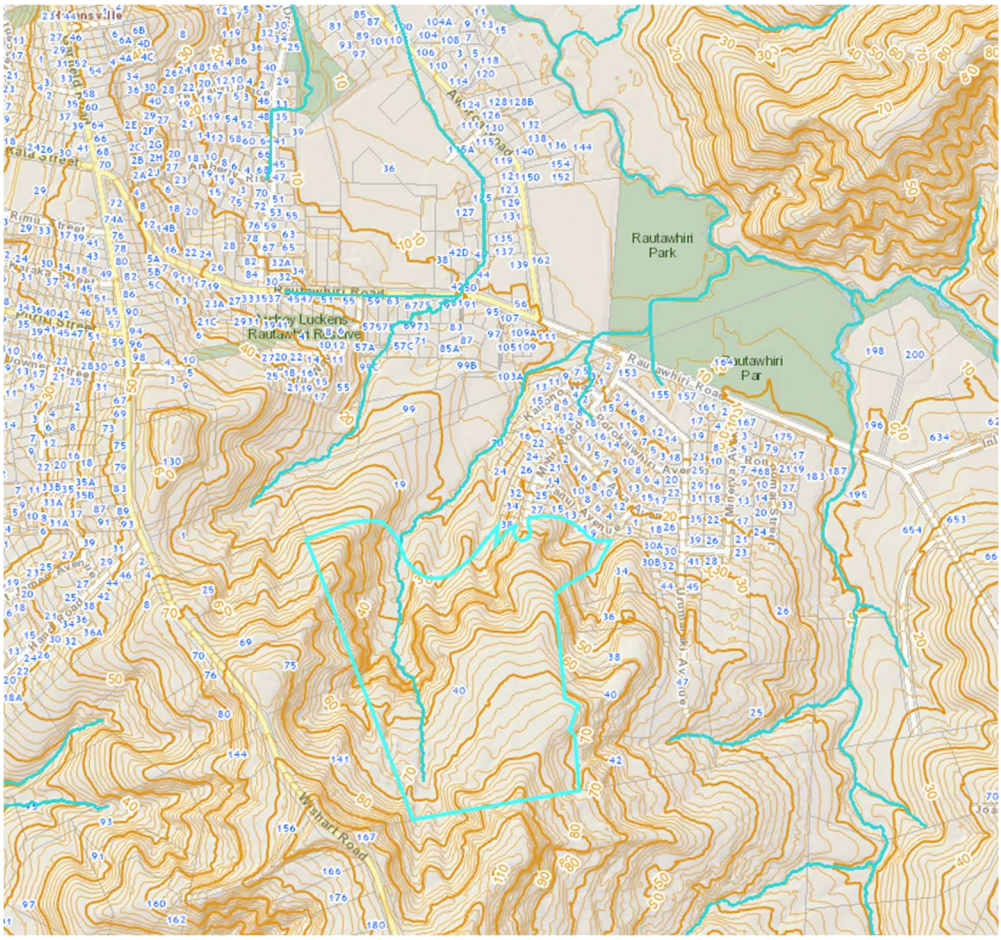


Figure 1: Site Location

2.1.1. Existing Stream

The intermittent stream that flows through the site is shallow, with the depth of the stream channel increasing towards the east. As the stream enters the site from the south, the water depth is less than 10cm and increases to approximately 30cm in the neighbouring property to the north. Stream width is between 30cm and 2m with the widest section at lowest point of the site. Smaller intermittent streams exist within the site that join this tributary.

The sub catchment for this stream extends southwest of the development, the highest point in the sub catchment at approximately 67m RL. This permanent stream discharges into the Awaroa Stream to the North of Rautawhiri reserve.

2.2. Geotechnical

An assessment of the in-situ soil has been based on the Geotechnical Investigation Report (GIR) undertaken by Soil and Rock consultants in September 2013 of the proposed development and neighbouring properties. The GIR notes the following:

The area geology based on the GNS soil maps is underlined by three separate soils, namely Alluvail deposits, Cornwallis Formation and Helensville Conglomerate. The northern area of the site comprises of alluvial soils approximately 33% and the remainder is covered by Cornwallis Formation with a small pocket of Helensville conglomerate located south west of the investigation site. Technical Publication (TP) 108 rainfall-runoff guidelines (Table 3-2 – Hydrological Soil Classifications for prevalent Auckland Soils) classify weathered mudstone and sandstone as Group C and alluvial soils as Group B.

TP108 describes the SCS hydrological groups as:

- Group A – Low runoff potential and high infiltration rates;
- Group B – Moderate infiltration rates;
- Group C – high runoff potential and low infiltration rates

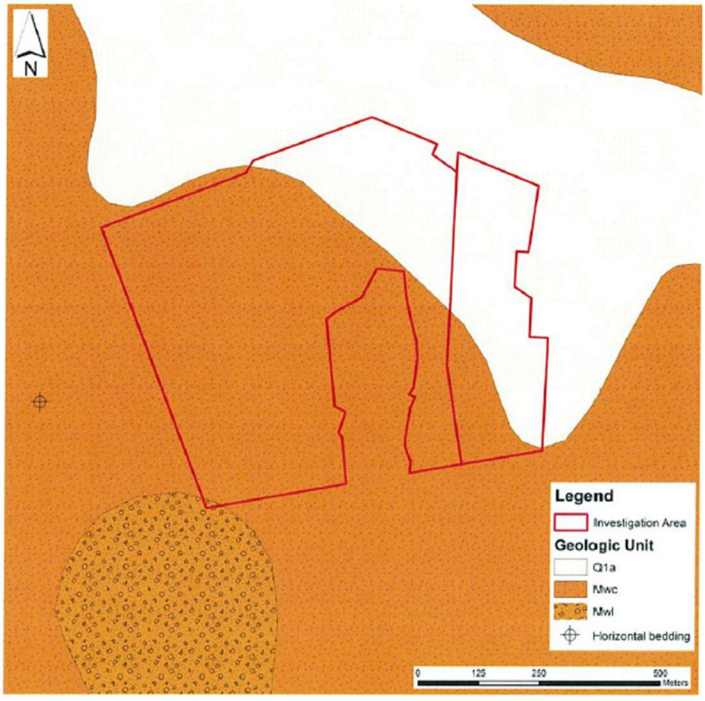


Figure 2: Site Geology

Several soil instabilities were identified within the site, in the form of soil creep, slope movement and erosion. Any site remedial works should be subject to further geotechnical investigation.

2.3. Existing Drainage Features and Stormwater Infrastructure

There are 2 existing stormwater connections laid into the subject as part of the downstream Parkview development. These were installed in 2023 with the intention of providing connection for the upstream catchment in align with the requirements Auckland Council stormwater code of practice. Further detail on the stormwater infrastructure will be provided at resource consent stage.

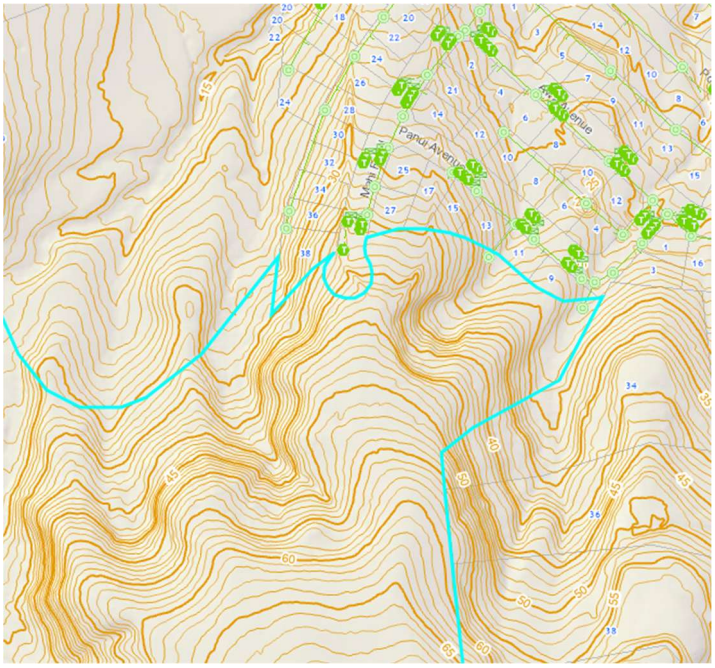


Figure 3: Existing Stormwater Infrastructure

2.4. Receiving environment

Stormwater will be discharged into a tributary of the Awaroa Stream which in turn discharges into the Kaipara River.

2.5. Existing Hydrological Features

Existing Hydrological Features on the site are the overland flow paths and an existing permanent stream. The stream shows connectivity to upstream areas and provides habitat for many fauna species, especially where it flows through the forest. The stream is small in terms of depth and width. Overall, the stream has not been modified from its original condition. There was no sign of erosion or channelization present and bank vegetation is still relatively intact, although weeds are present.

2.6. Flooding and Flow Paths

As indicated on Auckland Council Geomaps, there are several overland flow paths (OLFP), and an existing stream located within the extent of the site. A Flood plain associated with the existing stream is also present. As mentioned under Heading 2.3, the overland flow paths drain into the existing stream which in turns discharges into the Awaroa Stream located North of the Rautawhiri reserve.

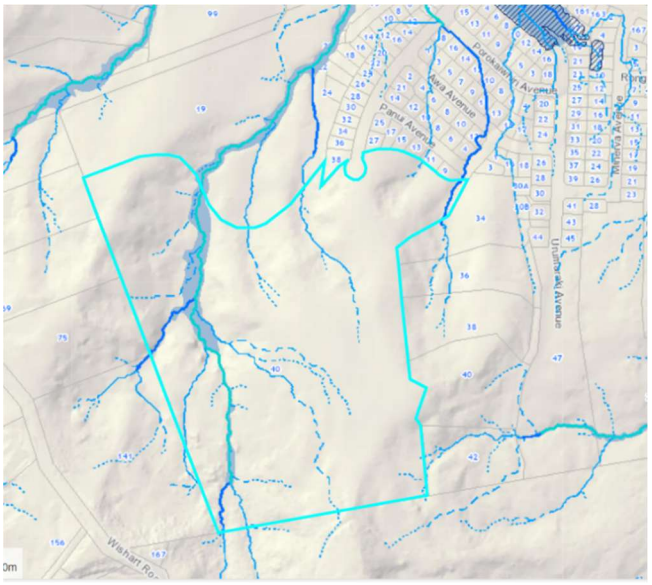


Figure 3: Existing OLFPs and Stream inclusive of the 1% AEP floodplain

2.7. Coastal Inundation

The site is not at risk of Coastal Inundation.

2.8. Biodiversity

The objectives of the Auckland Unitary Plan seek to protect areas of significant biodiversity value from subdivision and development. This is done through protection, restoration and enhancement of these areas. The protection of the VS2 Kanuka Scrub/Forrest as well as enhancement of affected riparian yards will likely result in a net gain of biodiversity.

2.9. Cultural and Heritage Sites

An archaeological assessment of the site has been carried out by CFH Heritage as part of the plan change process.

This assessment concluded that there is no reasonable cause to suspect any archaeology will be found within the development site.

2.10. Contaminated Land

A Preliminary Site Investigation (PSI) was carried out by Thomas Consultants. The investigation concluded that risks to human health and the environment from site soil relative to the proposed development are as follows:

- Review of site history and site walkover determined that the subject site has remained vacant and undeveloped since at least 1940.
- Based on a review of the available information, no potentially contaminated activities have been identified at the subject site.
- Based on the findings of this report, there is no evidence to indicate that potentially contaminating activities have occurred at the site. Therefore, in accordance with Regulation 5(7), the site is not considered to be land covered, and the regulations of the NESCS therefore do not apply to the site.
- The contaminated land rules of the AUP (OP) do not apply.
- In the context of the proposed plan change, there are no restrictions or additional requirements relating to soil contamination at the site.

3. Development Summary and Planning Context

A review of the relevant stormwater guidelines and policies were carried out to determine the appropriate stormwater and flooding requirements to adopt in the Stormwater Management Plan for this development. The relevant requirements are summarised in Table 3.

Table 3 Regulatory and design requirements

Requirement	Design response
Auckland Council Regionwide Network Discharge Consent	• Measures proposed comply with the NDC.
E1 Water quality and integrated management	• Inert roofing material • Water Quality Treatment via a communal scale wetland.
E8 Stormwater- discharge and diversion	• All stormwater runoff generated from the impervious areas within the proposed development shall be discharged into the proposed communal scale wetland, managed and treated followed by discharge into the existing stream
E9 High Contaminant Generating Areas	• Water Quality Treatment via a communal scale wetland.
E10 Unitary Plan – SMAF hydrology mitigation	• Retention (5mm) - Roof areas for all dwellings via tanks with non-potable reuse. • Retention is generally not feasible for public roads, COALs and driveways. • Where geotechnically suitable, permeable paving/porous concrete will be used to enhance retention. • Extended detention for the site to be provided by communal scale wetland, this meets the NDC objectives and is the BPO.
E36 Natural Hazards	• Flood modelling and assessment carried out. • Design of the site to ensure safe access and egress. • Proposed future floor levels have sufficient freeboard. • Ensure no adverse effects on downstream properties.
Auckland Unitary Plan Precinct	N/A
Existing Catchment Management Plan	N/A

4. Mana Whenua Values

Mana whenua values are intrinsic to the design, construction and management of stormwater devices in the Auckland region. A review been completed to ensure the stormwater design for the site aligns with Mana whenua values.

The stormwater design for the site aligns with mana whenua concerns around the responsibility to ensure that the mauri or life force of water which may be damaged, destroyed, or modified pollution of a stream, river, estuary, catchment or harbour.

Stream degradation has been mitigated using several methods. Water treatment through a communal wetland restores the Mauri of the water through land-based treatment. Washdown water from any refuse areas will run through gross pollutant traps to remove rubbish and debris prior to stormwater entering the network.

The design aligns with the principles of Taiao and Mauri Tu by utilising a communal wetland (quality treatment and detention) and reuse tanks (retention). Taiao and Mauri Tu are based around the protection, restoration and/or

enhancement of the natural environment and environmental health which is reflected through the use of stormwater treatment, retention and detention devices on site. Refer to section 6 of this report for details on the stormwater management devices proposed for the site.

Consultation with Mana Whenua has been implemented as set out in the planning Assessment of Effects Report, which includes comments from identified mana whenua for this location as set out in the Council's iwi facilitation guidance information.

5. Proposed Development

5.1. Location and Area

Refer to Section 2 of this report for details of the site.

5.2. Purpose of the Development

The site proposal is to create a local road network, private accessway's, carparking areas and pedestrian walkways to service approximately 110 residential units of mixed typology. The development connects to the existing Mahi Road. The purpose of the Plan Change is principally to rezone approximately 7.8 hectares of Future Urban zoned land and a small area of Countryside Living Zone land to Single House Zone to allow for development and use to occur within the Site, but as amended by the proposed 40 Mahi Road zoning amendments and Concept Master Plan. The proposed Private Plan Change is to enable a higher yield of dwellings and lots over the site than typically anticipated in the SHZ, and to provide options for housing choices suitable to the local housing market, including a mix of smaller more affordable sites and dwellings with larger sites.

5.3. Site layout and urban form

Refer to Concept Master Plan.

5.4. Earthworks

Earthworks will be consented with council after obtaining approval for the plan change application. Earthworks associated with the proposed development relate to an area of approximately 8.53 Ha within the subject site.

The proposed development of the plan change area will require bulk earthworks and recontouring of approximately 50% of the existing site area to improve contours to satisfy the design and layout requirements for the development. Bulk earthworks will be required for the construction of the proposed roading network and to provide suitable building platforms for the lots. The Cut Fill Plan(s) on drawing series 30000 show the extent of the proposed earthworks for the development based on the concept masterplan.

A geotechnical desktop assessment has been undertaken by Soil and Rock Consultants in support of the proposed plan change. The geotechnical assessment reviewed the suitability of the site for residential development and details the sites geology and subsurface conditions. The report identified a number of geotechnical considerations and concluded that the site is considered to be generally geotechnically suitable for the extent of development enabled by the proposed plan change. Further geotechnical design may be required for certain areas of the site subject to instability, however this will be addressed during the resource consent application.

A detailed geotechnical investigation should be carried out to further investigate hazards identified, and any recommendations stemming from this should be observed during all detailed design works.

Bulk earthworks will need to be undertaken in accordance with NZS 4404, and Auckland Council Standards. Regional and district Land Use Consents will need to be obtained from Auckland Council.

In accordance with industry best practice, implementation of erosion and sediment controls will be undertaken during the construction works for the development. Erosion and sediment controls will be carried out in accordance with the Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, June 2016 Guideline Document 2016/005 (GD05).

Works undertaken in accordance with this guideline will act to minimise and/or mitigate any adverse environmental effects of sediment discharge during the works through appropriate use and design of erosion and sediment control techniques and measures. The general principals to be used as part of the erosion and sediment control plan are likely to include the following items:

- Ensure the contractor undertaking the earthworks understands all requirements on the approved erosion and sediment control plan and approved resource consent decision prior to commencing works on site.
- Stage earthworks where possible to allow completed areas to be progressively stabilized.
- Divert all clean water runoff away from the site where possible to help reduce catchment sizes for the open earthwork catchments.
- Divert dirty water runoff from the works areas to the sediment control devices prior to discharging into the downstream environment. Consider a treatment train approach adjacent to high-risk environments like streams. Install appropriate stabilized construction entrances into the development to ensure sediment is not discharged onto the public roads.
- Undertake regular inspections and maintenance on all erosion and sediment control devices to ensure they are always performing to their maximum potential.
- Review the erosion and sediment control devices design, catchments, and appropriateness as the works progress, and make any changes (approved by Auckland Council) required to ensure they are performing as intended.

6. Stormwater management

A review of the relevant stormwater guidelines and policies was carried out to determine the appropriate stormwater and flooding requirements to adopt as part of this SMP. The relevant documents are as follows:

The general provisions set out in the Auckland Unitary Plan – Operative in Part:

- Section E1 – Water quality and integrated management,
- Section E8 – Stormwater discharge and diversion
- Section E9 – High contaminant generating carparks and high use roads
- Section E10 – Stormwater management area – Flow 1
- Section E36 – Natural hazards and flooding

Council's assessment criteria includes whether the relevant network discharge consent has been considered as part of the stormwater management strategy. Healthy Waters generally seeks this information at resource consent stage.

Per Auckland Council's regionwide network discharge consent, the development is classified as Greenfield.

6.1. Principles of stormwater management

The following principles will guide the management of stormwater for the site.

- Water Quality

    - Treatment of all impervious areas by a water quality device that removes contaminants and is approved by Auckland Council.
- SMAF1 Provisions
    - Retention (volume reduction) for the first 5mm of runoff for all impervious areas.
    - Detention (temporary storage) with a drain down period of 24 hours for the difference between the pre-development and post development runoff volumes from the 95th percentile, 24-hour rainfall event minus the retention volume for all impervious areas.
- Ensure that there is sufficient capacity within the proposed pipe network and any existing pipe network downstream of the connection point to cater for the additional stormwater runoff associated with the development in a 10% AEP event; or
- Demonstrate through an assessment that flows in excess of the pipe capacity in the 10% AEP event within the pipe network downstream of the connection point will not increase flooding or have adverse effects on any other property.

6.2. Proposed stormwater management

The proposed stormwater management strategy for the site is described in the following sections.

Table 4: NDC requirements and design response

Requirement	Design response
Water quality	• Inert roofing material • Water Quality Treatment via a communal scale wetland.
Conveyance/Network Design	• Design of a piped network to convey flows up to and including the 10% AEP event
SMAF1 Hydrology Mitigation	• Retention (5mm) - Roof areas for all dwellings via tanks with non-potable reuse. • Retention is generally not feasible for public roads, COALs and driveways. • Where geotechnically suitable, permeable paving/porous concrete will be used to enhance retention. • Extended detention for the site (including dwellings, COALs and public roads) to be provided by communal scale wetland, this meets the NDC objectives and is the BPO
Flooding 1% AEP	• Full flood model and assessment carried out. • 100 year detention in a communal wetland required where flooding effects are increased downstream of the development.
Public Assets	• New assets that are intended to become part of the Public Stormwater Network will be designed and constructed to be durable and perform to the required level of service for the design life of the asset, subject to reasonable asset maintenance. • Operation and Maintenance manual to be provided for all new private and public stormwater devices/facilities.

6.2.1. Water quality

Inert roofing and building cladding material are recommended for all new dwellings to prevent heavy metal contaminants such as zinc or copper leaching into stormwater.

Contaminants of concern for carparks are generally high levels of total suspended solids (TSS) and dissolved metals such as zinc and copper.

While the number of expected traffic movements do not class the area as a high contaminant generating activity, treatment of all new impervious surfaces is required under Schedule 4 of the NDC and Clause E.6.3.1 of the Auckland Unitary Plan.

Under Schedule 4 of the NDC, gross pollutant traps are required for runoff from communal waste storage areas. A LittaTrap (or similar approved) will be placed in catchpits capturing runoff from the waste storage areas.

Public roads are treated via the communal wetland which also provides extended detention mitigation for these road areas. The proposed indicative location and area required for the wetland are shown on the concept masterplan.

6.2.2. Stream hydrology

To protect stream hydrology, the following SMAF1 hydrology mitigation is proposed for the site:

- Reuse of the equivalent of 5mm of roof runoff by the proposed dwellings for non-potable use (laundry and toilet flushing purposes):
- This will include private stormwater tanks on each individual lot for capturing roof runoff and feeding these back into the dwellings for non-potable reuse.
- Detention (temporary storage) with a drain down period of 24 hours for the difference between the pre-development (grassed state) and post development runoff volumes from the 95th percentile, 24 hour rainfall event minus the retention volume for all impervious areas:
- This will include a communal wetland facility located within the lower portion of the catchment for the capture and slow release of runoff from the hardstand areas on the public roads and private accessways.
- Retention through permeable paving/porous concrete will be implemented where possible due to geotechnical constraints.

Post development areas and the proposed hydrology mitigation has been summarised in Table 5.

Table 5: Proposed mitigation

Location	Proposed Mitigation
Roof area on lots	Reuse Tanks
Roadways	Wetland
Private Accessways	Wetland
Landscaped Area	No mitigation required

6.2.3. Stormwater management device toolbox

Table 6 provides a toolbox outlining the GD01 stormwater device options that may be used within the plan change area to meet water quality treatment and hydrology mitigation requirements.

Table 6: Stormwater management device toolbox

	Quantity Control			Quality Control				
● Effective ○ Partially effective - Not effective Device	Flood Attenuation	95th percentile detention	Retention	Gross Pollutants	Sediment	Heavy Metals	Temperature	Suitability for PPC Area
Permeable pavement	-	●	●	-	●	-	-	●
Rain tank	-	●	●	-	●	○	○	●
Constructed Wetland	●	●	-	●	●	●	○	●

Notes:

1. All devices assume sizing, construction and maintenance are in accordance with GD01, with the exception of proprietary treatment devices.
2. Geotechnical testing has found soakage to ground is not a viable option for stormwater disposal, however testing is still required to confirm if permeable paving or similar is suitable for the site.
3. Devices that are to be vested to CCOs (Auckland Council or Auckland Transport) are subject to CCO approval.

6.2.4. Flooding

Rainfall

Existing rainfall depths do not include allowances for climate change. Future rainfall depths allow for a projected average temperature increase of 3.8°C, as prescribed by Chapter 4: Stormwater Version 4 (March 2024) of the Auckland Code of Practice for Land Development and Subdivision.

Curve Numbers

A curve number of 98 was used for all impervious areas. A curve number of 61 was used for pervious areas.

Impervious Coverages

Existing impervious coverages were calculated specific to delineated catchments based on known impervious coverages in the catchment. This includes road kerbs, building footprints and Auckland Council's GIS impervious surface data.

Future impervious coverages have been modelled at 60% of the catchment area.

Results

In summary, the approaches outlined above demonstrate that a suitable SMP can be prepared for the plan change, that meets the requirements to be included under the Auckland Council Regionwide Stormwater Network Discharge Consent.

As indicated on Auckland Council Geomaps, several overland flowpaths (OLFP) are located across the extent of the site. Flood plains associated with these OLFP are also present. A flood assessment evaluation has been undertaken to assess the flows within the site and upstream/downstream of the site. Flood modelling has been undertaken using TuFlow software. The assessment calculations are based on maximum probable development and are factored for climate change as indicated above. The extent of the flooding in the existing and proposed development scenarios are shown in drawing series 58000. The preliminary afflux results indicate the proposed development will not significantly affect water levels on downstream properties in the 100 year design event. There are some minor downstream water level changes which will be addressed via detailed design of the development levels and mitigation as required.

All finished floor levels for the proposed dwellings will be set a minimum of 150mm above flood levels where these are less than 100mm depth and a minimum 500mm above flood level where this is more than 100mm depth. Flow depths within the public road reserve are generally below 200mm. Flow depth x velocities are generally below 0.6 m2/s, which is considered acceptable.

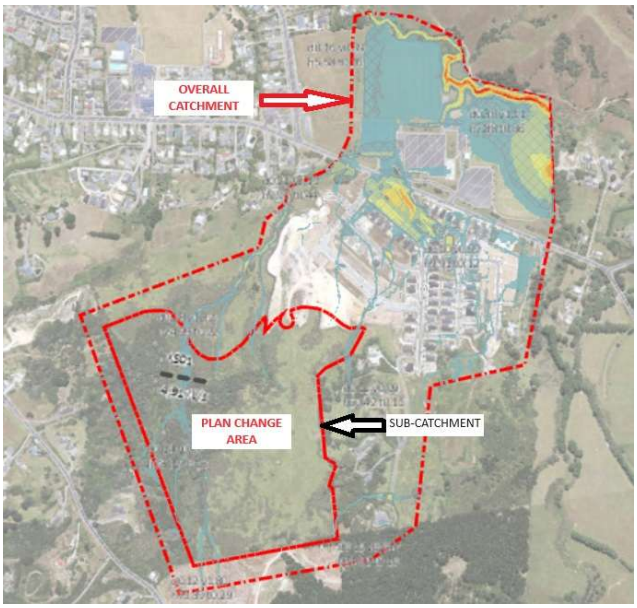


Figure 4: Catchment Areas

6.3. Development staging

Staging will be addressed during the resource consent phase of the project.

6.4. Hydraulic connectivity

The development is connected Hydraulically through a proposed public Stormwater network which ties into the existing overland flow paths and stream.

6.5. Asset ownership

Drainage assets that drain or treat more than 1 privately held title or any public space are proposed to be vest as public.

Mitigation systems for privately owned lots are proposed as private.

6.6. Ongoing maintenance requirements

Ongoing maintenance of the private drainage network and tanks on individually owned lots will be the responsibility of the private land owner.

Ongoing maintenance of the public drainage network and public treatment/management facilities will be the responsibility of Auckland Council.

7. Conclusions

- Sitewide Water Quality Treatment can be provided via a communal scale wetland.
- SMAF mitigation requirements for the site are met via rainwater tanks (5mm Retention) and a communal scale wetland (95th Percentile Detention).
- The 10-year event can be safely conveyed through the site via a new public stormwater network.
- The 100-year event can be safely conveyed through the site via the public roading network and proposed 3D form of the site.
- The proposed development will not increase flood risk for surrounding properties through the mitigation of peaks flows by 100-year detention within the communal scale wetland.
- Ecology of the high value ecological areas will be maintained/enhanced.

8. Limitations

- This assessment contains the professional opinion of Civix Staff relating to this development. Civix Staff used their professional judgement and acted in accordance with the standards of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.
- We have prepared this report in accordance with the brief provided and following our terms of engagement. The information contained in this report has been prepared by Civix for the client and is exclusively for its client use and reliance. It is not possible to make an assessment of this report without understanding the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Civix. The assessment will not address issues which would need to be considered for another party if that parties' particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of or reliance on this assessment by any third party.
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