

INFRASTRUCTURE REPORT



Tuakiri Dairy Flat – Fast-Track Approvals Application

PROJECT INFORMATION

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1.0 INTRODUCTION

1.1 EXECUTIVE SUMMARY

Tuakiri Property seeks resource consent for the development of an approximately 77.9-hectare site in Dairy Flat into a residential community, to be known as Tuakiri Dairy Flat. At a high level, the proposed servicing strategy is to provide an integrated package of roading, earthworks, stormwater, wastewater, water supply, and utility infrastructure that can be delivered in stages to support the development of the Site.

- Roothing infrastructure is proposed to support staged development delivery, including a new collector road connection, internal local roads, and integration with the surrounding transport network.
- Earthworks will be undertaken to establish development platforms, roads, and service corridors, and will be staged and managed to address geotechnical, erosion and sediment control, and flood-related considerations.
- Stormwater servicing is proposed through a combination of treatment wetlands, attenuation, hydrological mitigation, and formalised primary and secondary conveyance systems to manage runoff quantity, quality, and flood effects.
- Wastewater servicing is proposed through a private on-site reticulation and treatment solution, with gravity, low-pressure sewer, and hybrid network configurations identified as viable options.
- Water supply can be provided through a private bore-fed system, a public connection from the Orewa 2 trunk main, or a hybrid approach combining private supply with public top-up.
- Utilities servicing will be coordinated with the relevant network providers, with key services extended to support staged development delivery.

These servicing options have been assessed with regard to technical feasibility, regulatory compliance, flood and environmental performance, operational resilience, and compatibility with staged development delivery.

The preferred approach is intended to enable early development while retaining flexibility to integrate with future public infrastructure upgrades and approvals as they become available.

In summary, the investigations undertaken to date indicate that viable roading, earthworks, stormwater, wastewater, water supply, and utility servicing solutions are available for the Site. Subject to detailed design and subsequent approvals, no infrastructure constraints have been identified that would preclude the proposed development proceeding.

1.2 PROPOSED DEVELOPMENT

The Project is to subdivide, construct and operate a residential village development over approximately 77.9 hectares of land located between Horseshoe Bush Road and Kahikatea Flat Road in Dairy Flat, Auckland (**Site**) comprising approximately 1020 residential units, a village centre (with a Gross Floor Area of approximately 1,200m²) and approximately 18.5 hectares of open space. The Project includes all associated activities and infrastructure necessary to enable the development including earthworks, roading, creation of open space areas, stream works, and on-site stormwater, wastewater, and water supply facilities.



Figure 1: Tuakiri Dairy Flat Masterplan. Source: Isthmus Group

2.0 ROADING

The proposed roading infrastructure is set out in the Traffic Assessment prepared by Traffic Planning Consultants (TPC) and is summarised below.

- The proposed roading infrastructure is set out in the Traffic Assessment prepared by Traffic Planning Consultants (TPC) and is summarised below:
- The proposal includes the formation of a new collector road connection linking Horseshoe Bush Road (south) and Kahikatea Flat Road (north), providing the primary internal vehicular spine through the development site and facilitating connectivity between the site and the surrounding network.
- A hierarchy of internal public local roads will be established to serve residential neighbourhoods within the site. These local roads are intended to operate as low-speed environments and are anticipated to carry no more than approximately 500 vehicle movements per day, consistent with typical local road function and residential amenity expectations.
- Primary external access to the wider network will be via Dairy Flat Highway, utilising Horseshoe Bush Road and Kahikatea Flat Road as frontage connections. Dairy Flat Highway is identified as the key strategic north–south route linking the site to Silverdale, Albany, and the Northern Motorway.
- To accommodate traffic generated by the development, it is anticipated that the intersections of Dairy Flat Highway with Horseshoe Bush Road and Kahikatea Flat Road will be upgraded and signalised. There is sufficient existing road reserve to accommodate signalised intersections at both locations, which are expected to be designed in accordance with Auckland Transport requirements and to operate at an appropriate level of service (targeting LOS D or better).
- The roading layout has been planned to integrate with future planned upgrades to Dairy Flat Highway under the Supporting Growth programme, while not relying on the timing or delivery of those future projects for the development to function.
- The proposal also incorporates active mode provision through the development, including:
 - footpaths along internal roads and site frontages to Horseshoe Bush Road and Kahikatea Flat Road;
 - improved pedestrian connections to existing and future public transport stops on Dairy Flat Highway; and
 - pedestrian crossing facilities incorporated into upgraded intersection layouts, to support walking and cycling and improve overall transport accessibility.
- The internal road network and layout also provides for future integration with adjacent land use and transport networks, including connections to planned walking, cycling, and public transport infrastructure in the wider Dairy Flat and Pine Valley area.

It is anticipated that all public roads will be designed and constructed in accordance with Auckland Transport's Transport Design Manual (TDM), with detailed roading design to be developed at the substantive application stage.

3.0 EARTHWORKS

Proposed Earthworks Overview

Earthworks are required to enable the proposed development by forming suitable building platforms, providing compliant access and service corridors, and integrating site levels with the surrounding road and infrastructure network. Earthworks are proposed over an area of approximately 77.9 ha and will involve cut and fill operations to achieve finished ground levels across the Site. The works will result in a stable final landform that responds to the existing site topography and underlying geotechnical conditions.

Earthworks will be designed to optimise the balance of cut and fill across the Site as far as practicable, minimising the need for off-site disposal or importation of material. The works will be appropriately staged to align with servicing and construction activities, thereby limiting the extent and duration of exposed areas and reducing the potential for sediment generation and associated environmental effects.

Erosion and Sediment Control

Earthworks design and implementation will comply with the requirements of Auckland Council's GD05 – Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, including controls on exposed areas and the provision of appropriate temporary and permanent erosion and sediment control measures. Runoff generated during construction will be managed to protect downstream receiving environments. Conditions of consent will require that erosion and sediment control measures are implemented and maintained in accordance with GD05, the approved Earthworks Plans, and associated management documentation.

Earthworks within Flood Hazard Areas

Where earthworks are proposed within flood prone areas, floodplain areas and major overland flow paths, these flood hazards will be appropriately managed during construction. Upstream flows will be diverted around works areas, and all disturbed areas will be provided with suitably sized control measures to manage runoff from rainfall events.

Geotechnical Considerations

A geotechnical assessment has been undertaken by KGA Geotechnical Group Ltd (KGA) in support of this consent application. The assessment identifies the site geology and subsurface conditions and confirms that, subject to recommended measures, the landholding is suitable for urban development. Further details are provided in the Geotechnical Assessment Report prepared by KGA.

Design Development and Further Investigations

Further site investigation and/or detailed design analyses will be undertaken at subsequent stages of the project, including as part of the EPA process, commensurate with the approved earthworks design.

Construction Monitoring and Certification

Earthworks will be supervised by a suitably qualified geotechnical engineer to verify that the works are undertaken in accordance with the approved design and are geotechnically suitable for the proposed development.

A Geotechnical Completion Report (GCR) will be prepared at the completion of each stage of earthworks. The GCR will document the construction methodology, record monitoring undertaken, and confirm the suitability of the Site for its intended future land use. Statements will also be provided confirming the standard of fill placed, along with any relevant constraints or considerations for future foundation design.

5.0 STORMWATER

5.1 EXISTING STORMWATER CATCHMENT & CONDITIONS

The Site is located within the upper reaches of the Rangitōpuni River catchment, as illustrated in Figure 2 below. The Site contains multiple internal subcatchments associated with its natural topography, which collectively drain via a network of on-site streams. These internal subcatchments also receive runoff from upstream rural catchment areas beyond the Site boundary.

Stormwater runoff from both the Site and upstream contributing areas is conveyed through this network before discharging to the Rangitōpuni River, and ultimately to the Upper Waitematā Harbour. At this location, the Rangitōpuni River forms part of a high-order stream system within a low-gradient valley, approximately 4.5 km upstream of the coastal marine area. The upstream contributing catchment is rural in character.

The Upper Waitematā Harbour is an estuarine system comprising seven primary tidal creeks and sub-estuaries that converge into a central channel, discharging to the Central Waitematā Harbour through a constricted outlet.

The Site comprises approximately 77.9 hectares of land zoned Mixed Rural Zone (MRZ) under the Auckland Unitary Plan (Operative in Part). Existing land use is predominantly rural, consisting of large pastoral landholdings with established stream corridors located within natural low-lying areas. Built form is limited to farm-related structures and a small number of dispersed rural dwellings. Land adjoining the eastern boundary of the Site is zoned for business and light industrial activities.

Topographically, the Site comprises varied terrain ranging from gently sloping to steep areas, characterised by a series of ridgelines and incised gullies draining toward a central stream corridor that traverses the Site. This configuration defines several discrete subcatchments, each contributing flows to the receiving stream network.

There is no reticulated stormwater network servicing the Site. Stormwater runoff is currently conveyed via the existing natural stream system, which accommodates both on-site runoff and inflows from upstream rural catchments.

The Site is subject to existing flood hazards associated with the natural drainage and stream network, including defined overland flow paths, floodplain extents, and localised inundation during high rainfall events, as illustrated in Figures 3 and 4 of this report.

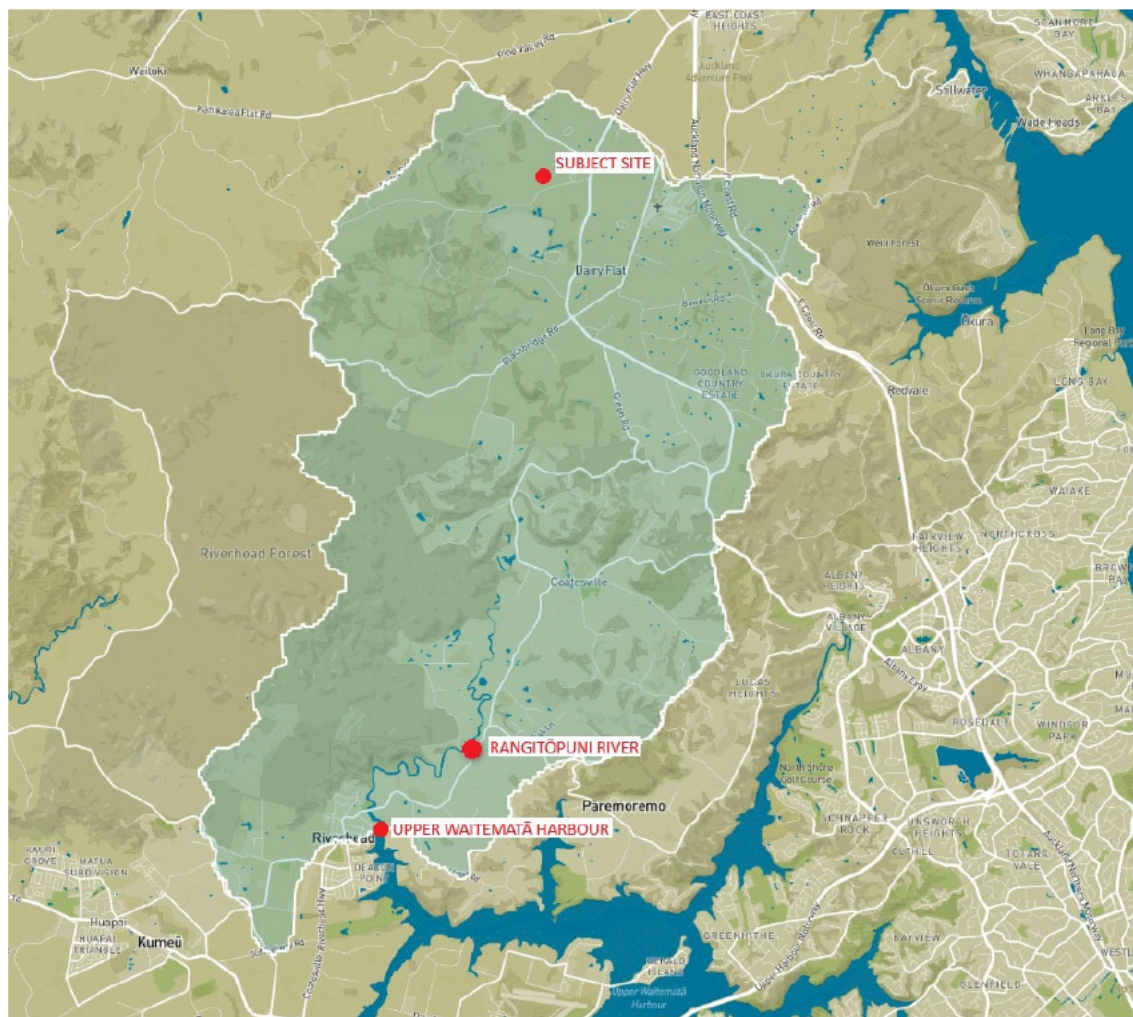


Figure 2: Stormwater Catchment Plan (Existing)

5.2 STORMWATER REGULATORY AND DESIGN REQUIREMENTS

Stormwater management requirements for the Site are set out Table 2 below.

Table 1: Regulatory requirements and design guidelines relevant to the application

Requirement	Relevant Regulatory / Design to Follow
Natural resources and catchment management	AUP Chapter B7
Significant ecological areas	AUP Chapter D9
Integrated management of land and water	AUP Chapter E1
Stormwater discharge standards	AUP Chapter E7
Discharge and diversion of stormwater	AUP Chapter E8
High contaminant generating areas	AUP Chapter E9

Hydrological mitigation	AUP Chapter E10
Land disturbance and erosion and sediment control	AUP Chapter E12
Natural hazards, flooding and overland flow paths	AUP Chapter E36
Stormwater management device design	Auckland Council GD01
Water sensitive design principles	Auckland Council GD04
Erosion and sediment control design	Auckland Council GD05
Streams, riparian margins and watercourses	AUP Chapter E15
Auckland Council Regionwide Network Discharge Consent (NDC)	NDC (including Schedule 4)
National freshwater policy	National Policy Statement for Freshwater Management 2020
Urban development policy	National Policy Statement on Urban Development
National natural hazards policy	National Policy Statement for Natural Hazards 2025

5.3 PROPOSED STORMWATER MANAGEMENT

The stormwater strategy for the proposed development has been developed to manage stormwater quantity and quality effects, respond to existing flood hazards and natural drainage patterns, and protect downstream receiving environments. It is intended to support early stakeholder engagement and will be refined through detailed investigations and the preparation of a Stormwater Management Plan as part of the subsequent design and consenting phases.

As the Site is currently zoned Rural – Mixed Rural, stormwater discharges cannot be authorised under the NDC. Accordingly, a project-specific private diversion and discharge consent will be sought.

The stormwater approach has been developed in accordance with the following:

- Auckland Council's policies and plans.,
- Best practice stormwater management techniques to meet AUP(OP) regulatory policies and provisions.
- Auckland Council's stormwater-specific guidelines and relevant best practice approaches for greenfield development.
- Engagement with Mana Whenua.

SUMMARY OF PROPOSED STORMWATER MANAGEMENT PLAN

The proposed stormwater management strategy for the development is summarised as follows:

- Stormwater runoff from the development will discharge initially to the on-site stream network, with the ultimate receiving environment being the Upper Waitematā Harbour.
- Stormwater quality treatment will be provided prior to discharge using devices designed in accordance with Auckland Council Guideline Document GD01 – Stormwater Management Devices.
- Hydrological mitigation is proposed to achieve, as a minimum, equivalence with SMAF 1 outcomes, consistent with established Auckland Council practice for greenfield development.
- Stormwater attenuation is proposed for design storm events up to and including the 100-year ARI event, including climate change allowances, such that post-development peak flows are designed to match pre-development levels.
- Stormwater management will incorporate both retention and detention measures to manage runoff volume and flow characteristics.
- Primary and secondary stormwater conveyance systems will be designed to safely manage stormwater flows up to and including the 100-year ARI event, including climate change allowances.
- Existing and proposed overland flow paths will be maintained or formalised as required to ensure safe conveyance of secondary flows through the Site and continuity of upstream and downstream flow paths.
- The development will be designed to avoid increases in flood risk within the Site and to upstream and downstream properties as a result of the proposed works.
- Habitable buildings will be located and designed to avoid identified flood hazard areas where practicable, with finished floor levels set above the relevant design flood levels, including appropriate freeboard, in accordance with Auckland Council and Building Code requirements.

5.3.1 CONVEYANCE PRIMARY STORMWATER FLOWS

Primary stormwater flows (up to the 10-year ARI event) will be conveyed via a public piped stormwater reticulation network to the downstream receiving environment. The system will be designed to accommodate the 10-year ARI storm event for the MPD, including an allowance for climate change, and in accordance with Chapter 4 of the Auckland Council Stormwater Code of Practice (SWCoP).

The reticulation will be designed to outfall to the proposed wetland system. This wetland will provide treatment, attenuation, and controlled release of stormwater to downstream stream environments. The piped network will be designed to integrate with the wetland's inlet structures.

5.3.2 STORMWATER MANAGEMENT AND HYDROLOGICAL EFFECTS ASSESSMENT

The proposed stormwater management system has been designed to mitigate hydrological effects associated with the proposed residential development. The engineered stormwater ponds will attenuate post-development runoff to pre-development peak flow rates for up to the 1% AEP (100-year) storm event, inclusive of climate change allowances, in accordance with SWCoP requirements.

The attenuation ponds will temporarily store runoff generated by increased impervious surfaces and provide controlled discharge such that post-development peak flows are limited to, or are designed to match, pre-development levels. This approach is intended to manage downstream hydraulic effects and maintain appropriate performance of the receiving environment.

While peak flow attenuation addresses changes in flow rates, it is acknowledged that this alone may not address changes in runoff volume associated with development. Accordingly, the stormwater management approach incorporates both retention and detention measures to manage runoff characteristics and achieve hydrological outcomes equivalent to pre-development conditions. This approach is intended to ensure that stormwater effects on receiving environments are appropriately managed.

The stormwater ponds will be engineered to attenuate the following events:

- 95th percentile stream protection flow (Stormwater Management Area – Flow (SMAF 1))
- 2-year ARI storm event (including climate change allowances)
- 10-year ARI storm event (including climate change allowances)
- 100-year ARI storm event (including climate change allowances)

The proposed stormwater management approach does not rely on the use of the floodplain alone to achieve attenuation. Stormwater management will be located outside of the floodplain where practicable, with floodplain areas retained primarily for conveyance and natural function. Any use of floodplain areas for stormwater management will be supported by appropriate design and assessment to ensure that flood risk is appropriately managed and does not increase, and that hydrological mitigation outcomes are achieved.

5.3.3 HYDROLOGICAL MITIGATION

The Site is a greenfield development and is not subject to the AUP(OP) Stormwater Management Area – Flow (SMAF) overlay. Notwithstanding this, hydrological mitigation is proposed to achieve equivalence with pre-development (grassed) conditions in terms of runoff volume, peak flows, and, where practicable, infiltration. This approach is consistent with established Auckland Council practice for greenfield development and reflects a level of mitigation equivalent to SMAF 1 outcomes.

In practice, this will be achieved through a combination of retention (volume reduction) and detention (temporary storage) measures for impervious areas, applied across the site as part of an integrated stormwater management system. This approach is intended to avoid increases in downstream erosion potential and adverse hydraulic effects on receiving environments.

SMAF 1 is recognised as an appropriate benchmark for managing the effects of urbanisation on natural stream systems by reducing changes to natural runoff patterns. Impervious surfaces increase runoff volumes and rates, resulting in more frequent and higher energy flows that can contribute to stream erosion, sediment mobilisation, and degradation of aquatic habitat. Hydrological mitigation through retention and detention addresses these effects by reducing runoff volume and attenuating peak flows, thereby maintaining more natural hydrological conditions and supporting downstream environmental outcomes.

The SMAF 1 hydrological mitigation requirements in the Table E10.6.3.1.1 of AUP(OP) are:

- **Retention** (volume reduction) of at least 5mm runoff depth for the impervious area for which hydrology mitigation is required; and

- **Detention** (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24-hour rainfall event minus the achieved retention volume, over the impervious area for which hydrology mitigation is required.

Proposal to Achieve SMAF Retention and Detention Requirement:

The retention and detention required are proposed to be provided within the stormwater wetland ponds within each catchment, where practicable and subject to detailed design. It is noted that the detention volume required to achieve SMAF 1 involves subtracting the retention. Therefore, where retention is able to be achieved within the wetland system, this will proportionally reduce the detention storage volume required within the ponds.

Retention is proposed to be achieved within the constructed wetland system where practicable; however, where this is not achievable, alternative retention measures will be implemented through distributed source control measures and/or supplementary stormwater management devices to ensure that the required hydrological mitigation outcomes are met. The final approach to retention and detention will be confirmed through the Stormwater Management Plan.

5.3.4 WATER QUALITY

The Site ultimately discharges to the Upper Waitematā Harbour, identified as a degraded coastal receiving environment (Level 1) in the AUP policy framework. Auckland Council's integrated stormwater management approach requires the maintenance and improvement of water quality where it is degraded. Consequently, stormwater treatment is required prior to discharge to the public network.

Stormwater quality requirements will be provided via stormwater management devices consistent with the requirements of Auckland Council guidance document GD01 - Stormwater Management Devices.

Stormwater quality treatment will be delivered primarily through constructed stormwater wetlands designed in accordance with GD01, with supplementary treatment devices utilised for sub-catchments that do not discharge to the wetland system, in accordance with the Stormwater Management Plan and Best Practicable Option approach.

5.3.5 FLOOD MANAGEMENT

5.3.5.1 EXISTING OVERLAND FLOOD PATHS AND FLOOD PLAIN

Auckland Council's GeoMaps identify several overland flow paths (OLFPs) and their associated floodplains across the Site. These OLFPs originate both within the Site and from upstream contributing catchments. The principal OLFPs generally align with the existing stream corridor, conveying flows predominantly in a west-east direction through the natural gully system. In addition to these primary flow paths, a number of secondary OLFPs originate along the Site's side slopes, directing runoff either north-south or south-north before converging with the principal OLFPs within the stream corridor.

Auckland Council's Healthy Water's have provided their latest flood modelling based on 100-year MPD with 3.8 degrees climate change. This is shown on Figure 3 below.

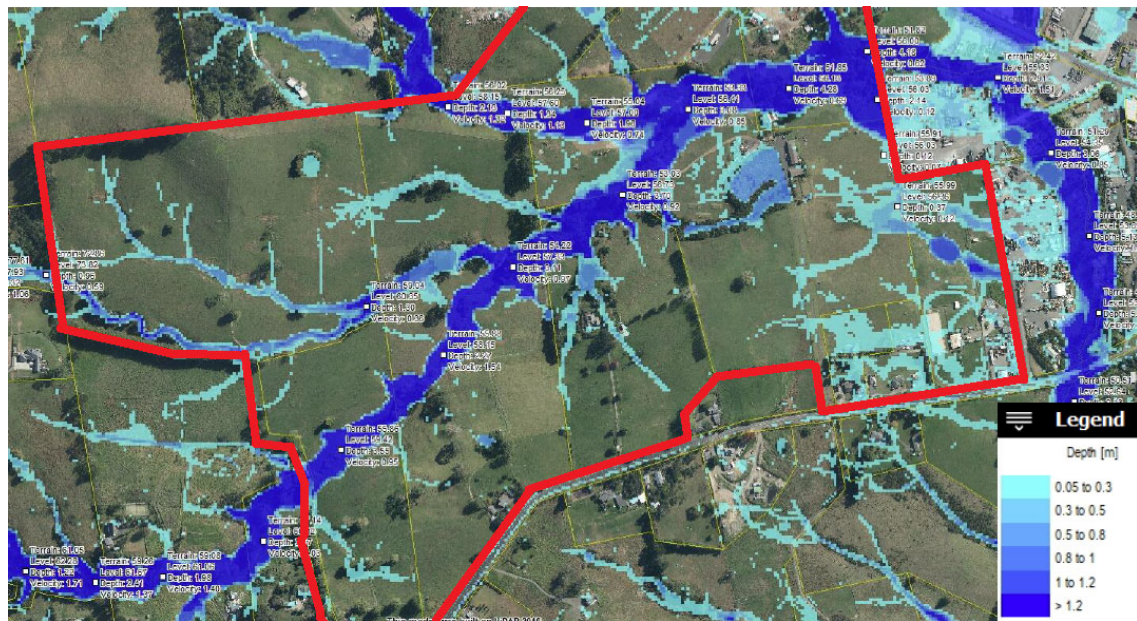


Figure 3: 100-Year Flood Model Provided by Healthy Waters

5.3.5.2 EXISTING FLOOD PRONE AREAS

As identified within Auckland Council GeoMaps, the Site also contains localised flood prone areas scattered throughout. These are present due to localised depressions within the Site.

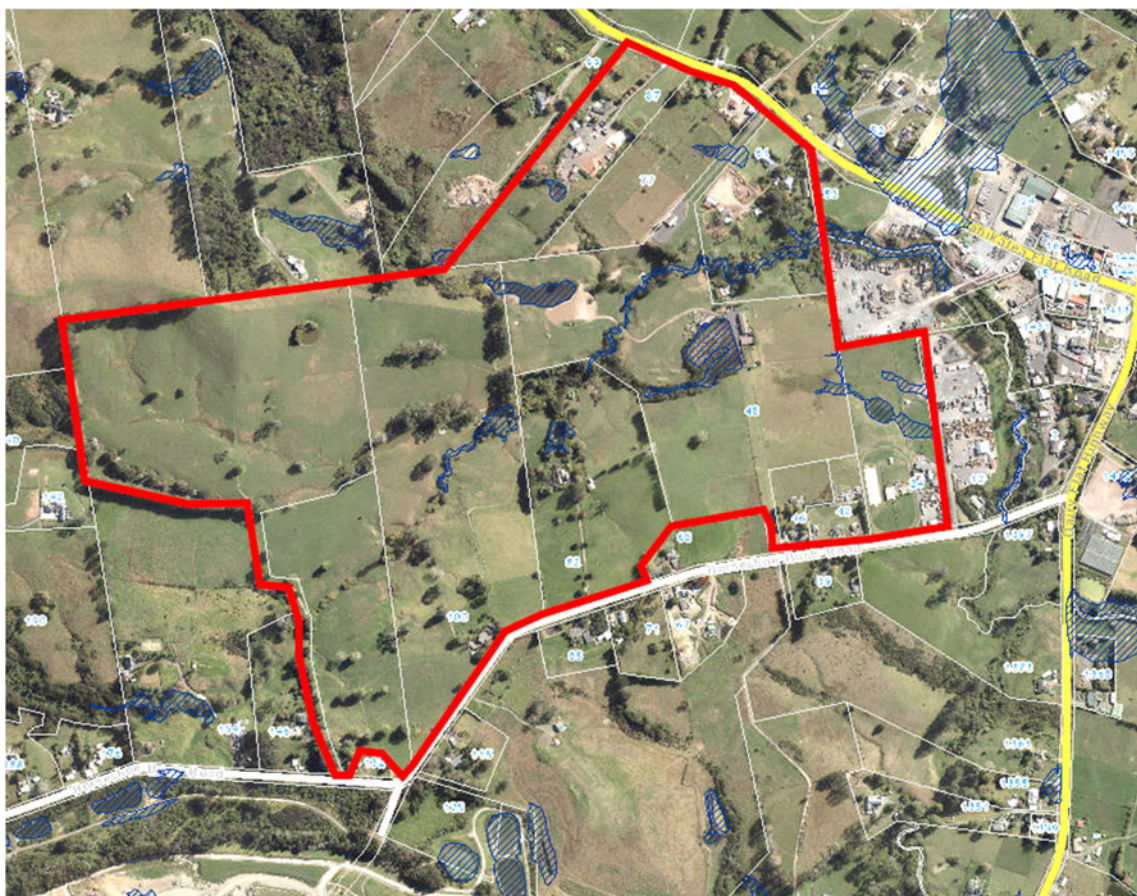


Figure 4: Flood Prone Areas. Source: Auckland Council GeoMaps

5.3.5.3 PC120 FLOOD HAZARD AREAS

Auckland Council GeoMaps identifies the spatial extent of Flood Hazard Areas (FHA) and their classification in accordance with Plan Change 120 (PC120). These are illustrated in Figure 5 below. Based on this mapping, the Site is subject to flood hazards ranging from low to high, as defined under PC120.

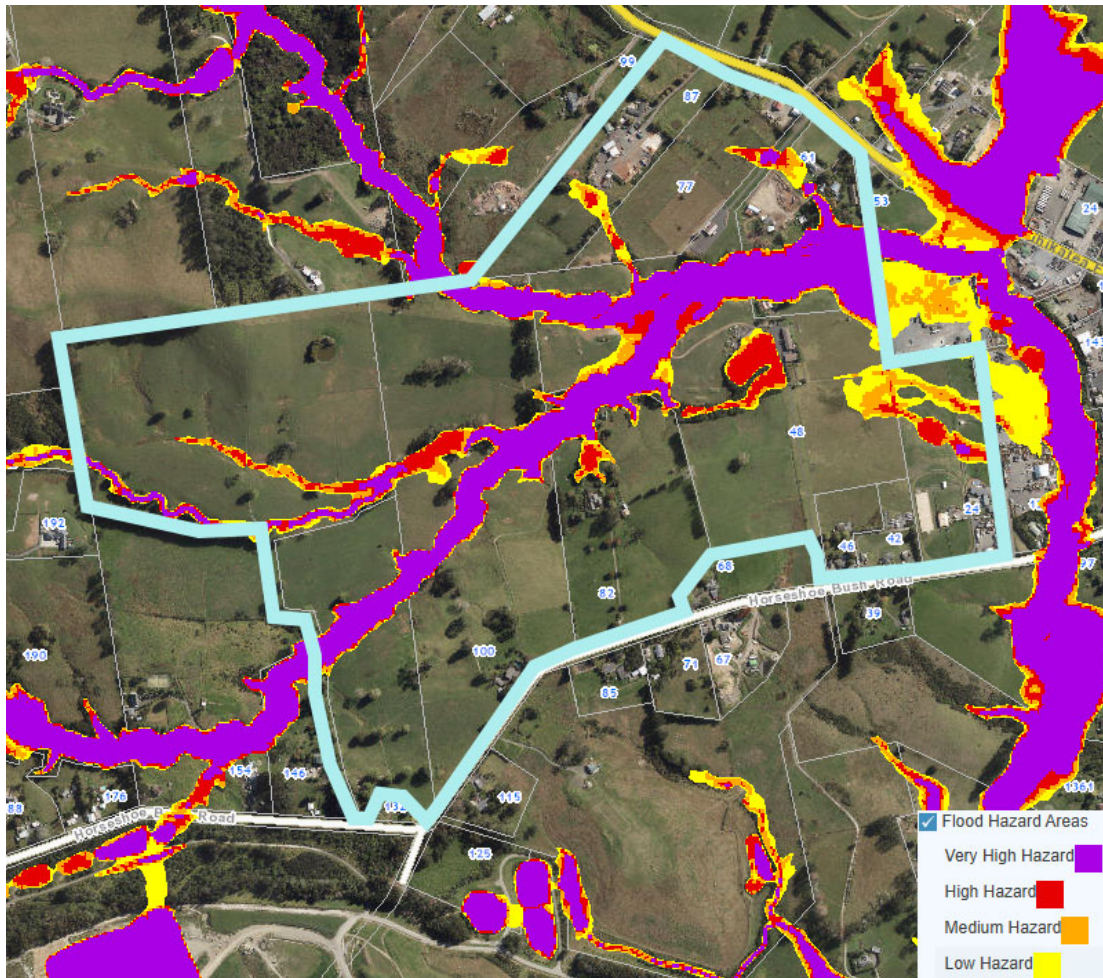


Figure 5: PC120 Flood Hazard Classification. Source: Auckland Council GeoMaps.

5.3.5.4 PROPOSED FLOOD MANAGEMENT

Flood management for the proposed development will be designed to ensure that flood risk is appropriately managed and does not increase within the Site or to upstream and downstream environments as a result of development. The approach is based on maintaining pre-development hydrological conditions for the 1% AEP (100-year) storm event, including allowance for climate change in accordance with the SWCoP.

Post-development peak discharge rates will be limited to pre-development levels through engineered stormwater attenuation. Overland flow paths will be maintained and protected to ensure the safe conveyance of secondary flows through the Site for up to the 1% AEP event, without obstruction or adverse alteration of flow behaviour. The majority of identified floodplain areas will be retained, with only localised filling required to accommodate the proposed development platform.

Where floodplain storage is displaced by filling, hydraulic compensation will be provided through the stormwater attenuation system to ensure no increase in downstream peak flows. Finished floor levels will be set above design flood levels with appropriate freeboard in accordance with Auckland Council and New Zealand Building Code requirements, ensuring habitable areas are protected from inundation.

Overall, the flood management approach is intended to maintain hydraulic performance at or better than existing conditions, without increasing flood risk to surrounding environments.

5.3.5.5 FLOOD QUANTITY MANAGEMENT AND PEAK FLOW ATTENUATION

As outlined in Section 5.1.2, the proposed stormwater management system has been designed to mitigate the hydrological effects associated with the proposed residential development. The engineered stormwater ponds will attenuate post-development runoff to pre-development peak flow rates for the 1% AEP (100-year) storm event, inclusive of climate change allowances, in accordance with SWCoP requirements. The controlled discharge regime will limit post-development peak flows to pre-development levels, thereby avoiding an increase in peak flow-related downstream effects.

5.3.5.6 CONVEYANCE OF SECONDARY STORMWATER FLOWS

For events greater than a 10% AEP (10-year) and up to a 1% AEP (100-year) storm event, secondary stormwater flows (i.e. flows exceeding the capacity of the primary stormwater network) will be conveyed via overland flow paths within the development.

Secondary stormwater flows will be safely conveyed through:

- Road reserves
- Public open space
- Formalised overland flow paths and easements where required

Design Capacity: Overland flow paths will be designed to accommodate the 1% AEP (100-year) storm event for Maximum Probable Development (MPD), including climate change allowances, in accordance with the SWCoP. Overland flow paths will provide hydraulically effective and safe conveyance of stormwater, ensuring that flow depths and velocities remain within acceptable limits.

Overland Flow Route: Overland flow paths will be located within road reserves and public open space areas wherever practicable. Routing of overland flows across private property will only occur where unavoidable and will be formalised via registered easements or otherwise approved by Auckland Council.

Upstream and Downstream Flow Paths: Existing upstream and downstream overland flow paths will be retained and protected, with no reduction in conveyance capacity or alteration of flow behaviour.

Overland Flow Path (OLFP) Entry and Exit Points: Existing OLFP entry and exit points within the Site will be retained and protected to ensure continuity of flow conveyance. Overland flow paths will remain hydraulically effective such that upstream and downstream flood levels, depths, and velocities are not adversely affected by the proposed development, ensuring safe conveyance in accordance with Auckland Council stormwater management requirements.

5.3.5.7 FILLING OF LOCALISED FLOODPLAIN AND FLOOD-PRONE AREAS:

The Site contains areas of identified floodplain and flood-prone land, as shown on Auckland Council GeoMaps and in Figures 3 & 4. The majority of these areas will be retained in their existing form, with only localised areas subject to filling to accommodate the proposed development platform. The stormwater design will ensure that post-development peak discharge rates from the Site will be maintained at or below pre-development levels for the 1% AEP (100-year) storm event, including climate change allowances, in accordance with the SWCoP. Stormwater attenuation will be provided to ensure that any increase in runoff resulting from impervious surfaces and any reduction in natural floodplain storage due to filling does not result in an increase in downstream peak flows. The overall design will ensure that adverse flood effects on upstream, downstream, and on-site environments are avoided or appropriately mitigated.

5.3.5.8 FREEBOARD

Adequate freeboard to finished floor levels will be provided above the design flood levels in accordance with the SWCoP and the relevant performance requirements of the New Zealand Building Code. Finished floor levels will be set above the 1% AEP (100-year) flood level, including climate change allowances, together with an appropriate freeboard allowance to account for modelling uncertainty, blockage, and extreme rainfall variability. This will ensure habitable floor levels are protected from inundation during design storm events and will reduce the risk of flood damage to buildings.

5.3.6 ASSET OWNERSHIP & MAINTENANCE

Overland flow paths will be conveyed within public open space, road reserves, and formalised overland flow paths protected by easements where required. Primary stormwater conveyance will be provided via a piped reticulation network proposed to be vested as part of the public stormwater network.

Stormwater attenuation and treatment will be provided via engineered stormwater wetlands and ponds within each catchment. These assets, together with the piped reticulation network and overland flow paths, are proposed to be vested as public stormwater assets as they collectively form an integrated system providing primary and secondary conveyance, flood risk management, and water quality treatment.

Public ownership is considered appropriate as the system delivers essential stormwater functions and broader public infrastructure and environmental benefits, and enables coordinated operation, maintenance, and long-term performance.

It is acknowledged that the Site is currently zoned Rural – Mixed Rural and is not covered by the Auckland Council Network Discharge Consent. Accordingly, the proposed vesting approach is not reliant on NDC authorisation and will be progressed through the resource consenting process and confirmed at detailed design stage.

Further detail regarding the extent, location, and function of assets proposed for vesting will be provided as part of the substantive application.

6.0 WASTEWATER

This section outlines the preliminary wastewater servicing strategy for the proposed Horseshoe Bush Road development. The approach has been developed in response to the absence of an existing public wastewater network in the area. The strategy presented is indicative only and will be refined through further technical investigations, detailed design, and the required consenting processes.

The estimated average daily wastewater demand for the development is approximately 682 m³/day.

6.1 CURRENT WASTEWATER CONTEXT

The Site is not currently connected to a public wastewater network and is serviced by on-site systems (e.g., septic tanks and disposal fields).

6.2 PROPOSED WASTEWATER STRATEGY

The wastewater generated by the proposed development will be collected via a private on-site reticulation system and conveyed to a centralised on-site wastewater treatment plant. The reticulation network is anticipated to comprise a low-pressure sewer (LPS) system as the preferred solution, although conventional gravity or hybrid arrangements may be adopted where appropriate.

The use of an LPS system offers a number of advantages, including reduced infiltration and inflow, limited reliance on deep gravity infrastructure, and flexibility in network layout. It also enables controlled operation of the system and supports staged implementation aligned with the development programme.

This indicative wastewater servicing approach provides a practical and efficient solution suited to the Site's location and development scale, in the absence of public wastewater infrastructure.

Treated effluent from the on-site treatment plant would be discharged to the most appropriate receiving environment, which may include discharge to land and/or to the central stream, subject to detailed design, regulatory approvals, and discharge consent conditions.

The key elements of the wastewater approach include:

- A private wastewater reticulation network, with LPS as the preferred servicing approach, supplemented by gravity or hybrid systems where required.
- A centralised, modular wastewater treatment plant designed to achieve a high standard of treatment appropriate to the receiving environment.
- Treated effluent will be discharged to land and/or the receiving stream, as appropriate, subject to detailed design and consenting, with effects on water quality and downstream environments appropriately managed.
- Staged implementation of infrastructure to align with development delivery and demand.
- Ongoing operation, maintenance, and monitoring of the private wastewater system by a suitably qualified operator in accordance with consent conditions and regulatory requirements.

Further technical detail of the wastewater proposal is provided in the report prepared by GWE accompanying this application.

7.0 WATER SUPPLY

This section outlines the high-level water supply strategy for the proposed development. The strategy has been developed to provide a reliable and resilient potable, non-potable, and firefighting water supply that responds to the absence of an existing public water supply network in the area. A range of private, public, and hybrid servicing options are identified to support staged development delivery and future integration with Watercare infrastructure, subject to further technical investigations, consultation, and confirmation of capacity. The preferred water supply solution will be confirmed through subsequent design development and consenting processes.

The estimated average daily water demand for the development is approximately 720 m³/day.

7.1 CURRENT WATERSUPPLY CONTEXT

The Site is currently not serviced by any public water supply network, and the existing dwellings rely on individual tank systems for their water needs.

7.2 FIREFIGHTING REQUIREMENTS

Where a reticulated water supply is available, the Watercare Code of Practice for Land Development and Subdivision sets out the design principles for water supply, including requirements for firefighting water supply to be assessed in accordance with SNZ PAS 4509:2008 – New Zealand Fire Service Fire-Fighting Water Supplies Code of Practice, or any subsequent approved replacement standard (noting that this code is currently under review by Fire and Emergency New Zealand).

Regardless of the servicing approach adopted for the Site, future development will be required to demonstrate that an appropriate firefighting water supply can be provided in accordance with SNZ PAS 4509:2008, or any superseding standard.

For residential development, the minimum firefighting water supply classification is FW2, which requires the following performance criteria to be achieved:

- A primary water flow of 12.5 L/s within a laid distance of 135m.
- An additional secondary flow of 12.5 L/s within a radial distance of 270m.
- The required flow must be achieved from a maximum of one or two hydrants operating simultaneously; and
- A minimum running pressure of 100kPa.

For any non-residential development, a site-specific assessment will be required to determine the appropriate firefighting water supply classification, having regard to the nature and scale of the proposed activities and associated fire risk, in accordance with SNZ PAS 4509:2008 (or any subsequent approved replacement standard).

7.3 WATER SUPPLY SERVICING OPTIONS

Option 1 – Private Water Supply via Bore, Private Reticulation, and Communal Reservoir

Under this option, water supply would be provided via a privately owned and operated, self-supplied system, as connection to the public Watercare reticulated network is not available to service the Site.

The Site is located within the Rangitopuni–Waitemata Aquifer, which provides a viable groundwater source for the development, subject to confirmation through site-specific investigation and testing. Council has confirmed that approximately 1,403,000 m³/year of groundwater remains available for allocation within the Rangitopuni–Waitemata Aquifer, indicating that sufficient capacity exists to support this supply option. As part of implementation, one or more on-site production bores would be drilled and tested to confirm available yield and inform detailed design, subject to the granting of the relevant consents.

The proposed water supply system would comprise:

- One or more on-site production bores abstracting groundwater.
- A centralised water treatment system to achieve potable water quality standards prior to distribution.
- A private reticulated water network servicing individual lots.
- Raw and treated water storage infrastructure to provide operational storage and manage demand variability.

Based on the current concept design, the development is estimated to generate an average daily water demand of approximately 720 m³/day. Rainwater harvesting is proposed as a supplementary source for non-potable uses, including toilet flushing, irrigation, and outdoor use, thereby reducing reliance on groundwater abstraction. The remaining demand is anticipated to be met from groundwater, subject to confirmation through further investigation and testing.

The servicing approach adopts a centralised system, whereby groundwater is abstracted, treated, stored, and distributed through an internal network. This enables coordinated management of water quality and system performance. Storage will be sized to provide operational resilience and accommodate fluctuations in supply and demand, with final storage volumes and configuration to be confirmed at the detailed design stage.

Firefighting requirements will be addressed as part of the detailed design and consenting phase.

The proposed system is expected to be classified as a networked drinking water supply and will be required to comply with the Water Services Act 2021 and the Drinking Water Quality Assurance Rules administered by Taumata Arowai. This will include registration of the supply and implementation of appropriate management and monitoring frameworks.

This option enables the development to proceed independently of public water supply infrastructure and provides a self-sufficient servicing solution appropriate to the Site's scale and location. Ownership and management arrangements will be confirmed at the substantive application stage.

Further technical detail on this option is provided in the drinking water servicing report prepared by GWE, which accompanies this application.

Option 2 – Public Water Supply via Extension from the Orewa 2 Trunk Main

This option contemplates servicing the Site via a connection to Watercare’s public water supply network through an extension from the existing Orewa 2 trunk water main, with the closest connection point located at the intersection of Wilks Road and East Road. From this location, new reticulation, anticipated to be in the order of approximately 4 km in length, would be extended along Wilks Road and Dairy Flat Highway, before connecting to the subject site via either Horseshoe Bush Road or Kahikatea Flat Road. Implementation of this option would be subject to consultation with Watercare and confirmation of available network capacity.

Key components of this option include:

- Extension of public water reticulation from the Orewa 2 trunk main to the Site boundary.
- An on-site reticulated network designed and constructed to Watercare standards.
- Provision of firefighting supply in accordance with Fire and Emergency New Zealand and Watercare requirements, potentially supplemented by on-site storage if necessary.

This option would provide a fully public, compliant long-term servicing solution and minimise reliance on private water infrastructure. However, implementation is dependent on the timing, capacity, and availability of the Orewa 2 trunk main and associated Watercare approvals, which may affect development staging.

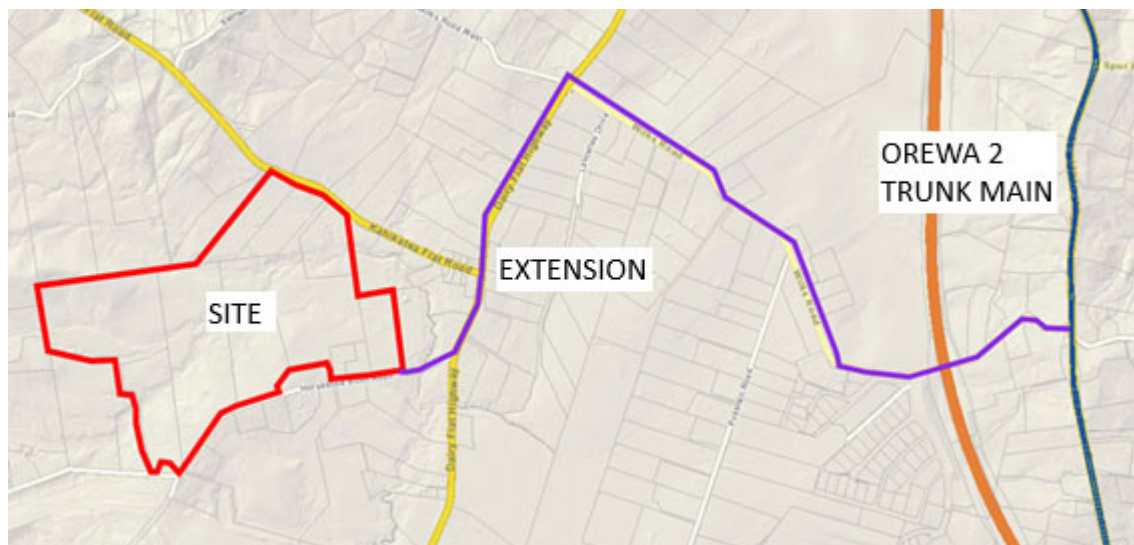


Figure 6: Overview of Water Supply Extension Alignment – Source:Auckland Council GeoMaps.

Option 3 – Hybrid Water Supply (Private Bore Supply with Public Top-Up from Orewa 2 Trunk Main)

The hybrid option combines elements of Options 1 and 2 to deliver a flexible and resilient servicing outcome. Under this approach:

- Primary water supply would be provided via on-site bores, private reticulation, and a private communal reservoir, as described in Option 1.

- A secondary connection to the public water supply network would be established via an extension from the Orewa 2 trunk water main, subject to consultation with Watercare and confirmation of available network capacity.
- The public connection would provide a low, continuous top-up supply to the communal reservoir, rather than directly meeting full development demand.

This option reduces reliance on groundwater abstraction while enabling early development ahead of the full availability of public water supply infrastructure. It provides enhanced resilience, operational redundancy, and adaptability to future Watercare requirements, while allowing the system to transition over time should increased reliance on public supply become feasible.

Interim and Staging Considerations

Regardless of the preferred option, water supply infrastructure would be staged to align with development delivery, ensuring that adequate capacity, water quality, pressure, and firefighting supply are provided at each stage. Detailed assessments of water demand, fire flows, storage volumes, treatment requirements, and network layout will be undertaken as part of the next design phase.

6.0 UTILITIES

6.1 TELECOMMUNICATIONS

Chorus have confirmed that there is existing telecommunications infrastructure in the surrounding area of the Site and that they are able to extend their existing network to provide connection to the proposed development.

6.2 POWER

Vector have been engaged for the proposed development of the Site. Vector have confirmed they will continue to work with the applicant to understand the electrical load requirements and timing of delivery of the proposed development.

6.3 UTILITIES SUMMARY

Detailed design of utility services for the proposed development of the Site will be completed as part of the Engineering Plan Approval applications in liaison with the respective service providers.

Services will be connected to the development as per respective service agreements that will be entered into between applicant and the service providers.

7.0 CONCLUSIONS

As set out in this Infrastructure Report prepared by Maven, the proposed infrastructure servicing can, from an engineering perspective, be delivered in a manner consistent with the applicable regulatory requirements and relevant engineering standards.

Subject to detailed design and the necessary approvals from the relevant authorities, we consider that there are no infrastructure constraints that would preclude development of the Site for the proposed land use. There are viable alternative wastewater and water supply servicing options available if a connection to the public network cannot be provided.

Based on our preliminary review of the site, we are of the view that natural hazards can be appropriately addressed as part of the detailed design to ensure safety to building occupants, egress to and from the sites and in terms of both the upstream and downstream stormwater catchment.

We recommend that the final infrastructure solutions be developed in consultation with relevant third-party stakeholders.