



Infrastructure Memorandum

P25-198 Milldale North Fast-track Referral

Wainui Road, Upper Orewa
Fulton Hogan Land Development Limited
November 2025

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Originator	Sam Kirk – Associate Engineer
Reviewer(s)	Tim Rickards – General Manager (Land Development) Jamie Whyte – Principal Land Development
Approval	Jamie Whyte – Principal Land Development
Consultant details	Woods (Wood & Partners Consultants Ltd) Level 1, Building B, 8 Nugent St, Grafton, Auckland 1023 PO Box 6752 Victoria St West, Auckland 1142 E: info@woods.co.nz P: 09-308-9229 woods.co.nz
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Statement of Qualifications and Experience

Sam Kirk – Associate Engineer

I, Sam Kirk, am an Associate Engineer at Woods. Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since July 2025, although also previously between January 2019 and September 2022.

I hold the qualifications of a Bachelor of Surveying, which I completed in 2018, and I also hold a Cadastral Surveying License. I am also a Voting Member of S+SNZ.

I have eight years of experience in the Engineering industry. My experience includes the design and construction observation of a range of land development projects, including project management and the procurement of earthworks, roading, services and other infrastructure. I have been involved with the surveying, design and management of previous Milldale projects, dating back to Stage 1A. I have also been involved in managing multiple land development projects in London and Melbourne.

I confirm that, in my capacity as the author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practices Note 2023.

Tim Rickards – General Manager (Land Development)

I, Tim Rickards, am the General Manager of Land Development at Woods. I have been employed at Woods since February 2013.

I hold the qualifications of Bachelor of Engineering (Technology), which I completed in 2008. I am a Chartered Professional Engineer of Engineering New Zealand.

I have 20 years of professional experience in the Engineering industry. My experience includes the design and construction observation of a range of land development projects, including project management and the procurement of earthworks, roading, services and other infrastructure. I have been involved in the design and construction of most of the previous stages of Milldale including the surrounding Milldale Stage 4 development and the development of the secondary superlot developments at Milldale.

I confirm that, in my capacity as reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Jamie Whyte – Principal Land Development

I, Jamie Whyte, am a Principal Engineer at Woods. I have been employed at Woods since January 2004.

I hold the qualifications of a Bachelor of Surveying from the University of Otago (BSurv), which I completed in 2003. I hold a professional qualification as a Register Professional Surveyor (RPSurv). I am a Full (voting) Member of Survey and Spatial New Zealand.

I have 20 years of professional experience in Subdivision Engineering and the Land Development industry. I have extensive knowledge in the design, construction and delivery of large-scale land development projects. My experience includes major roles on some of New Zealand's largest subdivision projects including Stonefields, Long Bay, Millwater and Milldale.

I confirm that, in my capacity as reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

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Executive Summary

This Infrastructure Memorandum has been prepared in support of a Fast-track Referral application by Fulton Hogan Land Developments (FHLd) under the Fast-track Approvals Act (FTAA) 2024, addressing the servicing requirements for the proposed residential development of approximately 1,500 lots in Milldale North – which will be integrated into the existing Milldale development.

The servicing strategy is based on specialist technical assessments and confirms that each component of infrastructure can be delivered efficiently and in alignment with surrounding growth areas. Key servicing elements are summarised below:

- Earthworks – bulk earthworks will establish finished landforms suitable for residential development, coordinated with drainage catchments and integrated stream alignments.
- Transport – the proposed transport network will extend the existing masterplanned Milldale network. This will see an extension of key transport services including roading, public transport corridors, cycleways, pedestrian and recreational paths.
- Stormwater – a comprehensive stormwater management strategy includes at-source stormwater detention via large bioretention devices and constructed wetlands located within open spaces, and reuse tanks within private property. Local stormwater will be managed into these detention devices via the stormwater primary network (gravity based pipe network). Enhanced riparian margins will provide downstream conveyance for stormwater.
- Wastewater – the existing wastewater network within Milldale can be extended to provide wastewater connections. Gravity-networks will be utilised wherever possible, and a new pump station will be required to service low-lying catchments without a gravity connection to the existing Milldale network.

As an alternative, a private treatment plant is also being proposed on FHLd-owned land, in case there is not available capacity at the Army Bay Wastewater Treatment Plant at the present time.

- Water Supply – the existing water supply serving Milldale is able to be extended to service Milldale North. This extension of the Milldale network will be supported with an additional bulk supply point which is planned on the Orewa 3 transmission main on land that FHLd is providing WSL for this purpose.

An alternative water supply via a privately owned and managed bore supply system has also been identified as a viable water supply solution should Watercare not support the extension of their network as proposed at the present time.

- Utilities – power, and telecommunications services will be extended from existing networks within Milldale, using established service corridors and typical servicing approaches.

This report confirms that infrastructure is available to be extended into the site to support the proposed residential development. The infrastructure masterplanning of the Milldale development has planned for further growth into these adjacent future urban zoned areas, allowing the necessary services to be readily available.

1. Introduction

1.1. General Proposal

Fulton Hogan Land Development Limited (FHL) is applying for referral under the Fast-track Approvals Act 2024 (FTAA) to enable the development of land zoned 'Future Urban' under the Auckland Unitary Plan (AUP).

The area subject to this referral is located north of the existing Milldale development, the Milldale North Fast-track Referral Area – hereafter referred to as *Milldale North*.

This area is comprised of two blocks, each of which are natural extensions to the current Milldale development and as such have been included in the infrastructure planning that has occurred for Milldale over the past 8 years.

Milldale North is illustrated in the conceptual masterplan prepared by Barker & Associates – included as **Appendix A** – which shows its location in the context of the wider Milldale development.

A Private Plan Change (PPC) application including the Milldale North site was lodged with Auckland Council in 2024 – however, these areas extended beyond FHL's landholdings. This application relates to only FHL landholdings in Milldale North (being the land it has the ability to deliver development over), as is reflected in the existing zoning overlay plan, included as **Appendix B**.

The areas included in this application are also those areas that can be supported by on-site sewerage and water solutions, should Watercare not support the extensions of their networks to serve the area at the present time.

This memorandum has been prepared to support the FTAA referral application and provide preliminary commentary on the servicing requirements and infrastructure strategy needed to facilitate the proposed residential development.

As no residential development is planned on the portion of the site situated north of the Orewa Awa, this area has not been included in our assessment of the figures that follow.

1.2. Site Description

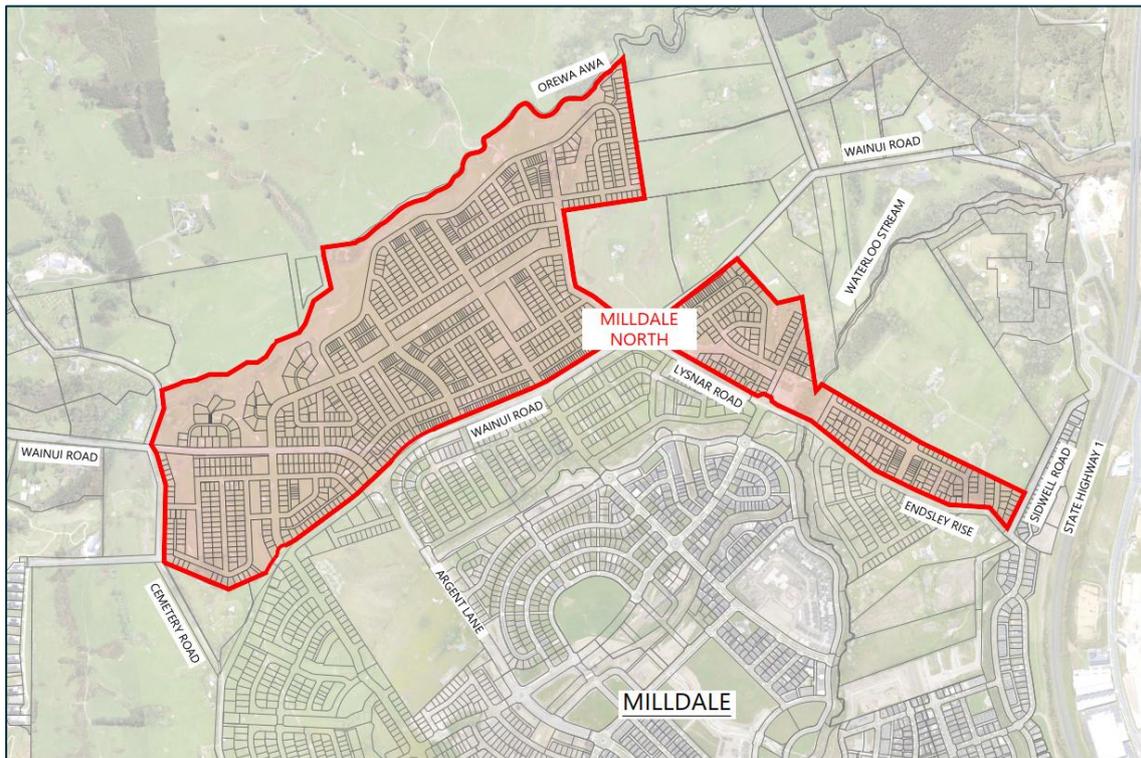


Figure 1: Location of Milldale North

The Milldale North residential development area covers two non-contiguous sites, both adjoining the existing Milldale development, but situated on opposite sides of Wainui Road.

The sites are situated approximately 4 km from Orewa and 13 km from Albany, with State Highway 1 directly to the east of the existing Milldale Development.

Milldale North is located between the Orewa Awa to the north and the existing Milldale development to the south. Historically used for farming, the land retains rural features such as fences, tracks, drains, and farmhouses.

The site consists of two blocks – one to the north-west of Wainui Road and the other to the south-east.

The north-west block features steep riverbanks along the Orewa Awa, flattening slightly before rising again towards Wainui Road situated atop a ridgeline.

The south-eastern block spans either side of the Waterloo Stream, with steeper topography along its eastern boundaries abutting Sidwell Road and Endsley Rise.

These major watercourses, along with their smaller tributaries, define the existing catchments within Milldale North.

The total area of the Milldale North residential development area is approximately 98 hectares.

1.3. Project Description

FHLD are proposing the development of Milldale North to support the subdivision of the land into a medium density residential area – which will be an extension of the existing Milldale community.

The development will include residential lots and superlots, jointly owned access lots (JOALs), roads to vest, esplanade and drainage reserves, open space and recreation reserves, landscaping and supporting infrastructure.

It will also be supported by the establishment of an ecological restoration area on existing (FHLD-owned) pastureland on the northern side of the Orewa Awa. This presenting an opportunity for ecological regeneration and the proposed site for a Wastewater Treatment Plan, should it be required.

Land and stream modifications, including bulk earthworks to establish appropriate finished surface levels, will be required to facilitate the proposed development.

The infrastructure required for servicing the development, as detailed in this report, has been based on the masterplan and superlot yield estimates – as well as considering the adjoining 'Future Urban' land anticipated for further development.

The development of both areas will cater for a total yield of approximately 1,500.

All infrastructure will be designed in accordance with Auckland Council standards and meet the requirements of all relevant network utility operators and service providers.

2. Earthworks

Reference Documents:

- *CMW Geosciences, Milldale North Preliminary Geotechnical Investigation Report (AKL2022-0087AC Rev 1), dated 28 July 2023*
- *Viridis Environmental Consultants, Milldale Plan Changes Ecological Impact Assessment (10015-003-C), dated 9 October 2023*

2.1. Bulk Earthworks

Bulk earthworks are proposed to re-contour the land and prepare the site for residential development. These works will include lot shaping, retaining features, geotechnical improvement works, and streamworks – each of which will be carried out using methodologies consistent with those applied across the existing Milldale development.

Sustainable design principles will guide the surface layout – including the retention of stream corridors wherever possible, minimisation of earthworks volumes, optimisation of drier seasonal periods, and balancing of cut and fill to reduce the need for further rework during civil construction.

Each stage or season will conclude with stabilisation of the earthworked areas, ahead of civil construction.

As has been the case at Milldale since construction works began, up to a maximum of 30 hectares will be open for bulk earthworks during any one season (excluding active civil works areas).

2.2. Erosion & Sediment Control Methodology

A best-practice management strategy will be implemented for the proposed earthworks (and associated works), in accordance with the Auckland Council Guidance Document 2016/005 (GD05), Amendment 3. This approach is consistent with the methodology used on the adjacent, previously developed Milldale sites.

The strategy involves ongoing monitoring of the sediment and erosion control (SEC) network, with adaptive responses triggered in the event of non-conformances, sediment discharges or forecasted rainfall events.

Primary controls will include sediment retention ponds (SRPs), with secondary devices such as decanting earth bunds, silt fences, or super-silt fences used as required.

Emphasis will also be placed on proactive erosion control and dust management – particularly given the sensitivity of neighbouring, recently developed areas.

2.3. Geotechnical Investigations and Considerations

CMW Geosciences have undertaken geotechnical investigations across the site and prepared a Geotechnical Investigation Report (GIR) for the Milldale North site. The GIR outlines the underlying geology, identifies geotechnical hazards, and recommends appropriate mitigation measures.

All earthworks and geotechnical remediation will be carried out in accordance with the GIR, and a Geotechnical Completion Report will be provided at the conclusion of site works.

With implementation of the recommended measures, the site will be suitably prepared for residential development.

2.4. Streamworks Methodology

The planned streamworks – including the reclamation of intermittent streams, diversion of existing streams and the retention/enhancement of key streams – will be limited to that necessary to enable an integrated urban development of the Milldale North site. An Ecological Assessment, prepared by Viridis, has informed this approach by identifying stream values, habitats, and ecological sensitivities across the site.

Streamworks will occur during summer low flows, outside of fish migration periods, and will adopt earthworks and erosion control methodologies in accordance with ecological advice.

These measures will support appropriate drainage outcomes, while ensuring the development proceeds in a manner that protects the site's ecological values and integrates ecology into the urban fabric of the new community.

2.5. Contaminated Soils

A preliminary site investigation of Milldale North has been undertaken by Environmental Management Solutions Ltd (EMS), from which a Preliminary Site Investigation Report

This concluded that the site is overall suitable for development.

It is noted that localised areas (used for historical horticulture, spraying or containing old structures) will require further investigation before development – as these are potential HAIL (Hazardous Activities and Industries List) sites and could contain contaminants such as asbestos.

These further investigations will be carried out as advised and any necessary remedial works will be carried in accordance with the specialist guidance received.

3. Road Network and Design

Reference Documents:

- *Stantec, Milldale North Preliminary Traffic Memorandum (310206516), dated 5 June 2025*

A conceptual masterplan has been developed by Barker & Associates for the site (see **Appendix A**). This includes a well-coordinated cycling, pedestrian and roading network that responds to the site's existing features, constraints and builds on the Milldale network.

The Wainui Precinct Plan has previously guided road alignments within the Milldale development, however, this does not currently extend to the Milldale North site. Even so, the transport design philosophy and principles set out in the Wainui Precinct Plan will logically extend to the Milldale North development to support an integrated and coherent urban development. This is achieved through applying a shared design philosophy of connectivity and linkages with both existing and future roads.

While the masterplan is still being finalised, any road layout changes are not expected to materially affect overall development structures or connectivity to surrounding networks.

3.1. Traffic Analysis and Modelling

Stantec New Zealand have undertaken a detailed traffic assessment to support the proposed development of Milldale North. The assessment builds upon the original Integrated Transport Assessment (ITA) for the Milldale Precinct – previously reviewed and approved by Auckland Transport and Waka Kotahi NZTA – and uses updated macro and micro-simulation modelling to test network performance through to 2035.

The modelling confirms that, with delivery of key upgrades (many of which are already committed or consented), the surrounding network will continue to operate at acceptable levels of service. The assessment also identifies thresholds for future intersection upgrades, based on projected dwelling yields.

The outcomes of this work have directly informed the conceptual masterplan road network – ensuring appropriate connectivity, alignment with existing roading typologies, and integration with the planned infrastructure delivery programme.

3.2. Existing Road Network

The Milldale North sites connects to State Highway 1 (SH1) via the existing Milldale local road network, including Pine Valley Road, Argent Lane, the Milldale to Highgate Bridge over SH1 and Wainui Road – providing access to both Millwater and Silverdale. These connections form part of the wider masterplanned transport framework supporting the development of the Wainui Precinct.

Milldale North fronts Wainui Road, Lysnar Road and Endsley Rise along its southern edge. These roads are consented for upgrade works, which will soon commence for construction as part of the Milldale project. These roads form part of the primary roads within Milldale and provide access to Argent Lane – being the main arterial road in the area, which provides a direct connection to the Silverdale Interchange.

These existing and upgraded connections will ensure continued access to the wider transport network, supporting integration with State Highway 1 and aligning with the planned infrastructure identified in the supporting Traffic Assessment.

3.3. Proposed / Existing Road Upgrades

A range of road upgrades are planned or already consented to support the development and ensure it is well integrated with the wider transport network. These works align with the recommendations of the supporting Traffic Assessment and follow the established road hierarchy adopted throughout Milldale.

The works will upgrade key fronting roads – Lysnar Road, Endsley Rise, and the consented Wainui Road section between Argent Lane and Lysnar Road. This will improve capacity and provide appropriate connections to the wider area.

Intersection upgrades are also planned at several locations to support turning movements and maintain network performance as development progresses.

To enable the delivery of these works, FHLD has entered into Infrastructure Funding Agreements (IFAs) with both Auckland Transport. These agreements cover the key transport upgrades across the Wainui Precinct and ensure works are delivered in alignment with development staging and future network demand.

In parallel, broader network improvements consented through earlier stages – including the extension of Argent Lane and upgrades at Pine Valley Road – will continue to support long-term connectivity and provide additional capacity beyond the immediate development area.

The roading layout has been developed in accordance with Auckland Transport and national design guidelines, with Collector and Local Roads designed to reflect appropriate speed environments and safety expectations.

Typical road cross sections have been applied throughout – consistent with those used across earlier stages of Milldale – and tailored to reflect the functional role of each corridor. These indicative cross-sections are included as **Appendix C** for reference.

3.4. Pedestrian and Cycleway Networks

The pedestrian and cycleway networks have been planned as an extension of the existing Milldale development, ensuring consistency in layout, function and connectivity across the wider area.

Pedestrian connectivity will be provided via 1.80m-wide footpaths on both sides of roads. Mid-block accessways have been planned for to improve pedestrian permeability along longer blocks.

Cycle movement is supported by on-carriageway cycling on local 30 km/h streets, separated lane on collector roads, and 3.00 m shared paths along green spaces and stream corridors. These provide safe routes that connect schools, parks, neighbourhood centres, and the wider Milldale and Orewa areas.

A 4.0 m wide active modes path will be extended from the core of the Milldale development, across Wainui Road and into the central area of the Milldale North site.

All facilities will be designed in accordance with Auckland Transport's Local Path Design Guide, which promotes low-conflict, accessible and connected active mode routes. The indicative road cross-sections in **Appendix C** reflect these intentions and will be further refined during later design phases.

This active mode infrastructure has also been incorporated into the assumptions and network modelling set out in the Stantec Traffic Memorandum.

3.5. Public Transport

The existing public transport network will be extended to service Milldale North, with routes planned to follow the central collector road. This alignment has been identified to maximise accessibility across the development, with the majority of future dwellings located within a 400m walk of a potential bus stop.

The proposed network extension has been informed by input from Auckland Transport and supported by the findings of the Stantec Traffic Assessment. Route planning and road layout have been designed to accommodate frequent bus services and ensure efficient connections to key destinations such as Silverdale, Highgate, and the Hibiscus Coast Station. The layout also allows for potential alternative route alignments and staged implementation as the area develops.

The planned east–west collector and its linkages to Argent Lane and Wainui Road will play a central role in delivering a connected and resilient public transport network that integrates with existing services operating in the wider Milldale area.

These efficient road designs and upgrades to existing infrastructure will ensure that the extended public transport network can service the entirety of the Milldale North area.

4. Stormwater Catchment Analysis & Management

Reference Documents:

- Woods, (Updated) Wainui East Stormwater Management Plan V7 (December 2023)

4.1. Existing Stormwater Infrastructure

There is currently no public stormwater network servicing the Milldale North site. Stormwater runoff is currently conveyed through a series of natural and modified watercourses that drain to surrounding streams and rivers.

Across the western portion of Milldale North, runoff discharges to tributaries of the Orewa Awa, while the eastern block drains into the lower reaches of the Waterloo Creek – these flows eventually converging and discharging to the Orewa Estuary.

In addition to natural waterways, stormwater is conveyed via several farm drains and culverts, including four culverts beneath Wainui Road which carry flows northwards from the block between Wainui and Cemetery Roads toward the Orewa River. These existing structures are generally informal and of varying condition and capacity.

As part of the development, the majority of these natural streams are proposed to be retained and enhanced, with alignments integrated into the urban layout. The existing artificial farm drains and culverts will be removed or reclaimed. This is reflected on the provided masterplans (**Appendix A**), with further details on the existing freshwater features shown below on **Figure 2**.



Figure 2: Freshwater Features within Milldale North (Source: Viridus)

4.2. Stormwater Management Strategy

4.2.1. Wainui East Stormwater Management Plan V7

An updated Stormwater Management Plan, titled Wainui East Stormwater Management Plan (WE-SMP) V7 (July 2025), and corresponding Flood Modelling Report, has been completed by Woods. This is the guiding document for stormwater management across Milldale North – informing the layout, design, and servicing of all stormwater infrastructure.

WE-SMP V7 extends the proven approach used across the existing Milldale development – shown to perform well during recent Auckland rainfall events – and updates WE-SMP V4 (2016) in alignment with the AUP and Schedule 4 of the Auckland Regional Network Discharge Consent (NDC).

As detailed further in the Stormwater Design Memorandum (**Appendix D**), the V7 update was prepared to support the PPC applications – which cover a wider footprint than this FTAA referral – however, the V7 strategies, design criteria and staging approach remain directly applicable to this Fast-track referral.

The overarching strategy, to provide management at source, is applied catchment-wide and targets the following two complementary outcomes across all impervious areas:

- **Hydrology Mitigation** – to manage peak flows and runoff volumes prior to discharge; and
- **Water Quality Treatment** – to protect the receiving environment by reducing contaminants and managing gross pollutants

4.2.2. Stormwater Management Zones

As shown in **Figure 3**, the development spans three of the five defined WE-SMP V7 Zones, being Zones A, B and C.

Each zone provides management in line with the overall strategy.

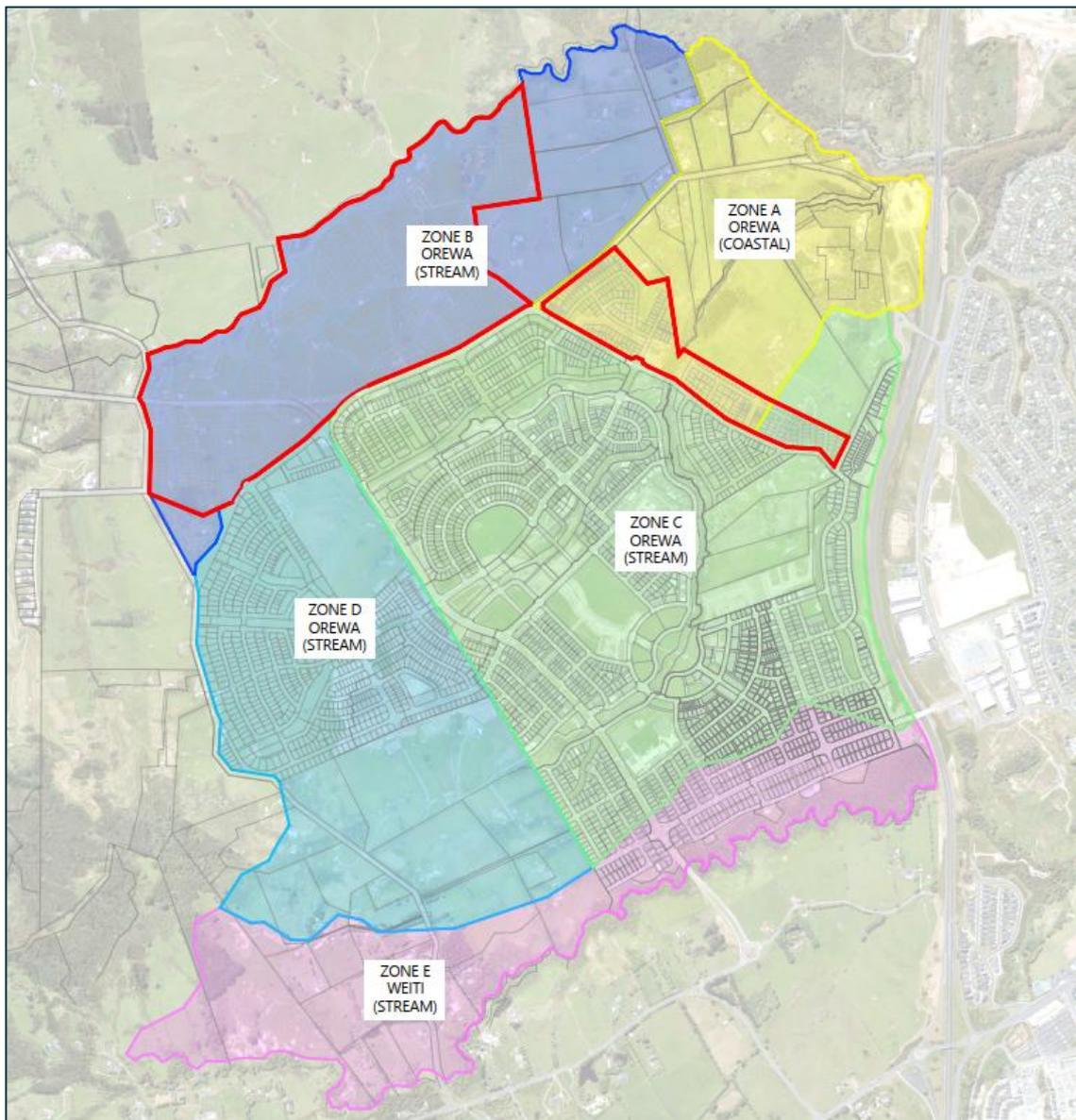


Figure 3: Wainui East Precinct Stormwater Zones

4.2.3. Hydrology Mitigation

Although the site is not included within the SMAF-overlay (as defined by the AUP), the WE-SMP V7 strategy adopts the same hydrology mitigation principles to manage impervious runoff and protect downstream watercourses.

The development will provide detention of the 95th-percentile rainfall event (over 24-hours), supported by retention of at least 5 mm of rainfall depth. Detention will be achieved through large (landscaped) communal bioretention devices and constructed wetlands, while retention will be delivered via private roof rainwater-reuse tanks.

For larger stormwater events, a pass-forward approach applies – allowing unattenuated flows to be conveyed downstream within streams and drainage reserves sized by the flood model. This is further detailed in the accompanying Stormwater Design Memorandum (**Appendix D**), which proves that peak-flows remain contained in these streams and reserves in a 100-year, climate change adjusted event.

Secondary flows will also be managed within road reserves, to safely convey overland flow paths through the development to suitable discharge locations within the stream and drainage reserve network.

Stream recharge will be provided to ensure the retained streams have an adequate contributing catchment and base flow to support ecological function. Stream recharge will be optimised by directing controlled discharges from the primary network and subsoil drainage into the upper reaches of retained or naturalised watercourses – maintaining and enhancing stream baseflows. This provides visual and ecological benefits while promoting naturalised drainage within the developed landscape.

4.2.4. Water Quality Treatment

As per the updated WE-SMP V7, water quality treatment of impervious surfaces is to be designed in accordance with Auckland Council's GD01 and TP10.

When assessing the suitability of treatment devices, the WE-SMP V7 concluded that located roadside raingardens are no longer a preferred solution. This is due to the limitations of individual raingardens in providing water quality treatment, and the high maintenance requirements.

Accordingly, treatment is delivered by large communal bioretention devices and constructed wetlands – located at downstream sub-catchment outlets. This maximises available space and efficiently treats runoff from both public and private impervious areas before discharge to the receiving environment.

4.3. Stormwater Network Layout

The development will primarily be serviced by a conventional stormwater reticulation network, primarily located within road reserves and green corridors.

The piped network will convey runoff from events up to the 10% AEP in accordance with Auckland Council standards. Larger events will be managed via overland flow paths, discharging to waterways without causing adverse flood risk to properties.

Road catchments, as noted, will be treated by large communal bioretention devices and wetlands.

On-site mitigation measures, such as detention tanks, will also be incorporated within JOALs and individual lots.

5. Wastewater Design

Reference Documents:

- Woods, Milldale North and Wainui West Plan Change Wastewater Assessment (September 2023)

5.1. Existing Wastewater Infrastructure

The proposed Milldale North site, along with the wider Milldale development, falls within the Army Bay Wastewater Treatment Plant catchment.

The Milldale development has established (constructed by FHLD) wastewater trunk infrastructure, which is designed with allowances for both the wider 'Future Urban' zone including the subject sites and the conveyance of wet weather flows. This includes provision for the anticipated demand from Milldale North.

The existing infrastructure and major catchments are shown below on **Figure 4**.

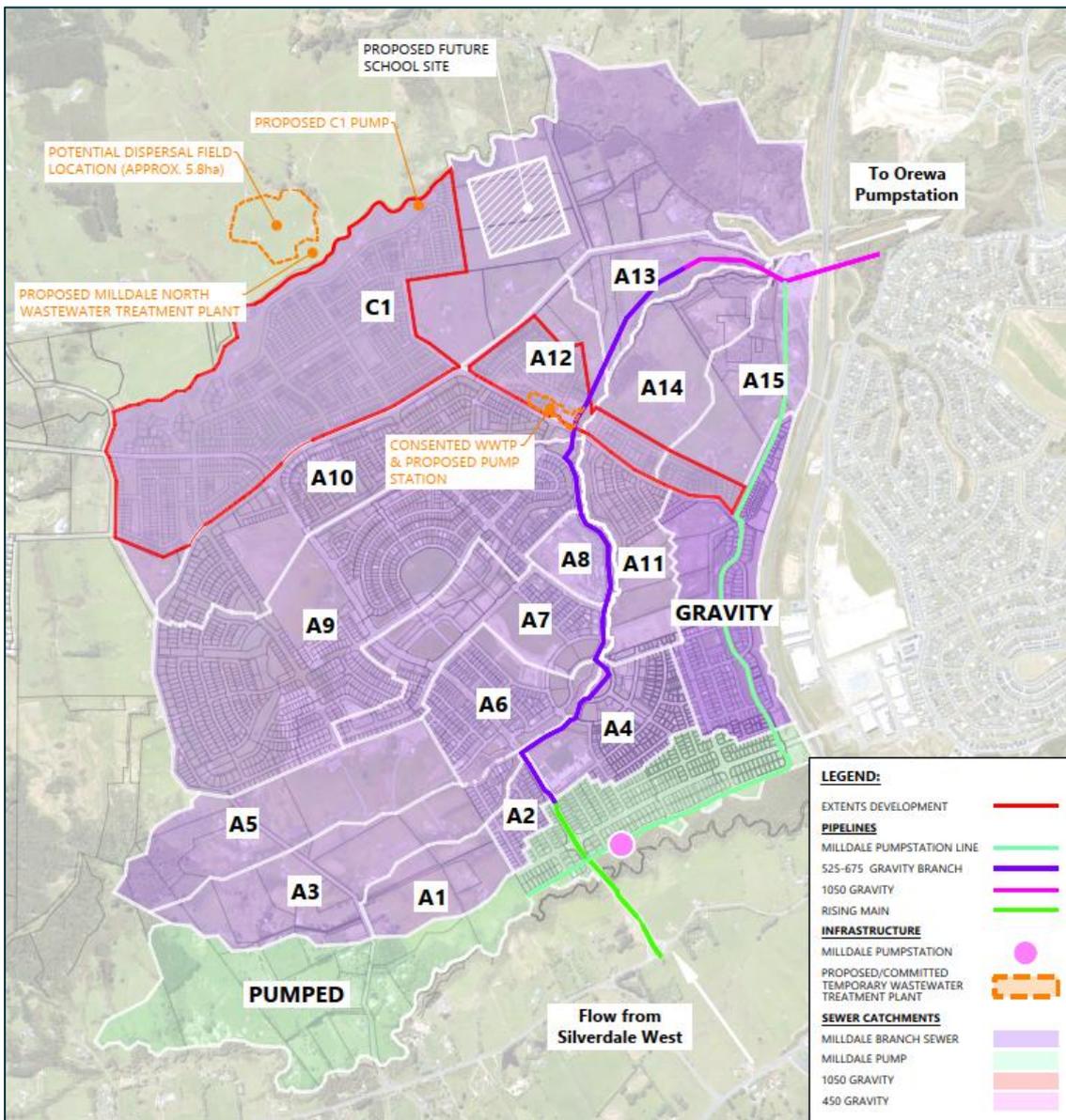


Figure 4: Existing Milldale Wastewater Trunk Infrastructure and Proposed WWTPs

As shown, the three main pipelines servicing Milldale and the proposed Milldale North site are:

- The Milldale Pumpstation Catchment – gravitates to Milldale Branch Sewer
- The Milldale Branch Sewer Catchment – draining to the Branch Sewer along Waterloo Creek
- The 1050 Gravity Catchment – draining towards the 1050 gravity portion of the Branch Sewer

Watercare Major Developments has confirmed that this infrastructure has been designed with capacity allowances for servicing the adjoining 'Future Urban' in an email dated 12 April 2023 (see **Appendix E**).

5.2. Wastewater Servicing Strategy

5.2.1. Plan Change Wastewater Assessment

The wastewater servicing approach for Milldale North is largely guided by the Milldale North and Wainui West Plan Change Wastewater Assessment (dated September 2023) – which defines the contributing catchments and assesses peak flows, infrastructure capacity, and overall serviceability of the PPC areas.

While this assessment remains applicable to the reduced footprint of this memorandum, there are some revised strategies proposed to manage the catchments within the Fast-track Referral area.

5.2.2. Consented Wastewater Treatment Plant:

Watercare has indicated the Army Bay Wastewater Treatment Plant (WWTP) is at risk of reaching capacity before its scheduled 2031 upgrades. As a contingency, FHLD has committed to a temporary, privately operated facility – the "Consented WWTP" – to service interim Milldale demand if required. Although not yet constructed, it would enable controlled diversion from the Milldale Branch Sewer – allowing development to proceed without additional loading on the Army Bay WWTP.

However, the Consented WWTP is only proposed to operate until 2031 — when the upgrades are completed – and is therefore not a viable treatment solution for any Milldale North catchments, which will require isolated servicing for a longer period.

5.2.3. Proposed Milldale North Wastewater Treatment Plant:

Accordingly, a further privately operated WWTP (the "Milldale North WWTP") on the northern side of the Orewa Awa (on FHLD-owned land) is proposed. This would operate on similar fundamentals to the Consented WWTP – treating wastewater to a high standard and deferring loads that would otherwise pose a capacity risk to the Army Bay WWTP.

This would allow for the servicing of the C1 catchment via a predominantly gravitating sewer network, with a localised pump at its lowest point to pump flows to the WWTP over or under the Orewa Awa.

The Milldale North WWTP would also allow for the effective servicing of the remaining Milldale North catchments (A12, A14 and A15), via the implementation of additional pump infrastructure.

It is proposed that the site for the Consented WWTP be utilised for the construction of a new pump-station – which will remain in place beyond the 2031 Army Bay upgrades and planned decommissioning of the Consented WWTP. This will allow for flows from catchments A12 and A14 to be pumped directly up Lysnar Road, from where they will gravitate towards the proposed C1 treatment infrastructure.

A15 will also be serviced via this same pump-station – however, low-lying sub catchments within A15 may require further localised pumping or a low-pressure system.

Both the proposed and consented WWTP infrastructure, including an indicative dispersal field, are shown on **Figure 4**.

5.2.4. Long-Term Servicing Options

The previous servicing options, utilising pumped and WWTP solutions, are alternative measures only – to be implemented if Watercare to no support the extension of their network to service Milldale North at the present time.

As originally shown in the PPC Wastewater Assessment, the following two routes are viable long-term solutions:

- The 'Pumped Route' – Operating southwards and connecting into the branch at Lysnar Road; or
- The 'Conventional Route' – An extended gravity branch sewer line through abutting 'Future Urban' land, that is subject to future land acquisitions.

Each of these are shown indicatively below on **Figure 5**.

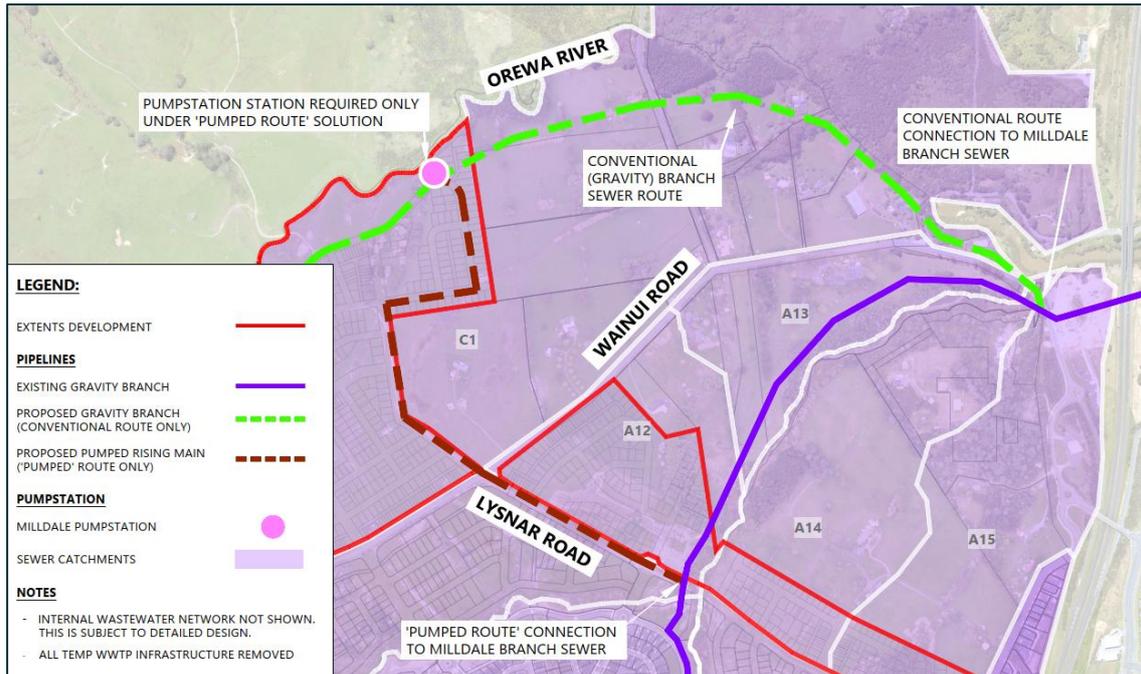


Figure 5: 'Conventional' and 'Pumped' Long-Term Treatment Routes for Catchment C1

6. Water Supply

Reference Documents:

- *Woods, Milldale North and Wainui West Plan Change Potable Water Assessment (February 2024)*
- *Williamson Water and Land Advisory, Milldale North – Groundwater Prospect for Community Water Supply (November 2025)*

6.1. Existing Water Supply Infrastructure

The current Milldale development is supplied from the Wainui Bulk Supply Point (BSP), located near the Millwater Parkway on-ramp. The BSP is supplied by the Orewa 1 Watermain and supplies water to Milldale via a two pipe crossing at the Wainui Road motorway overbridge.

A local network of watermains has been masterplanned and extended throughout the Milldale development, supplying homes and businesses with potable water. This masterplanned network has been future proofed for extension into 'Future Urban' zones (including the Milldale North referral area), with key primary network lines strategically located within Milldale to ensure the local network can deliver water supply into future urban land.

The current servicing strategy, with Milldale being supplied from the sole Wainui BSP, is an interim measure only. Planned upgrades and the staged delivery of new infrastructure will provide a more resilient long-term water-servicing solution for Milldale North and the wider future urban zone.

6.2. Water Supply Servicing Strategy

The overall servicing strategy was originally informed by Woods' Water Supply and Servicing Report (dated September 2023), developed with input from Watercare Services Ltd (WSL), in support of the PPC application. Following the reduced footprint and subsequent correspondence with WSL, the strategy has been refined — with particular consideration of medium-term servicing solutions — as set out in the Water Supply Report (**Appendix F**).

Under this updated strategy, Milldale North is planned to be serviced under Watercare's interim dual-BSP scenario. This includes connecting the Orewa 3 transmission main to the Orewa 1 transmission mains at their Silverdale intersection – which will supply the planned Orewa 3 BSP (for which FHLD are providing land abutting Weiti Stream to WSL).

This second BSP — alongside the existing Wainui BSP — will improve resilience across Milldale and potential future development areas. Modelling confirms that either BSP can supply the combined developments independently should the other be offline.

Hydraulic modelling confirms the proposed network generally complies with the Watercare Code of Practice — with only two brief, localised non-compliances (headloss exceedances in short sections near the Orewa 3 connection during limited peak periods) that are expected in the ultimate scenario.

Watercare has confirmed that a new Cemetery Road reservoir is expected to provide the majority of supply to both the existing and proposed developments in the ultimate scenario, with the Wainui and Orewa 3 BSPs being retained for supplementary support. This multi-source strategy promotes a resilient and robust supply, further safeguarding against single-point failures.

The strategy also ensures compliance with the requirements of SNZ PAS 4509:2008, which sets out firefighting water supply standards for residential developments.

A summary of the (ultimate) proposed and existing infrastructure is shown in **Figure 6**, on page 21.

6.3. Water Reticulation Layout

The internal water supply network will follow the road layout, with watermains located within the road reserve in accordance with previous Milldale stages.

Although minor refinements to the road layout are expected, hydraulic modelling has been completed based on the current masterplan. This includes consideration of adjacent Future Urban land, confirming sufficient capacity to service both the proposed development and anticipated future growth areas.

6.4. Alternative Water Supply (independent network)

Supplying the Milldale North Fast-track Referral Area from local groundwater bores, hydraulically isolated from the wider Milldale network, is a feasible alternative based on preliminary hydrogeological advice.

The proposed reticulation can allow for the network to be disconnected from the overall Milldale development along Cemetery, Wainui and Lysnar Roads.

The Milldale North Fast-track Referral Area average day demand is 10.9 l/s, peak day demand is 16.4 l/s, with a peak hour demand of 41 l/s.

Under this configuration, water would be extracted from bores, treated to drinking-water standards, stored in a local reservoir and supplied via a booster pump station. The reservoir would buffer the peak demands to reduce the load on the treatment plant and bores.

Supply feasibility depends on confirming sustainable bore yields and seasonal variability, bore spacing and number to supply the demands, raw water quality and treatment selection, and sizing of treatment, storage and pumps to meet demand, resilience and Watercare CoP requirements. Consenting, operational responsibilities and the interface with the Milldale network also require confirmation. These will be addressed in subsequent design stages.

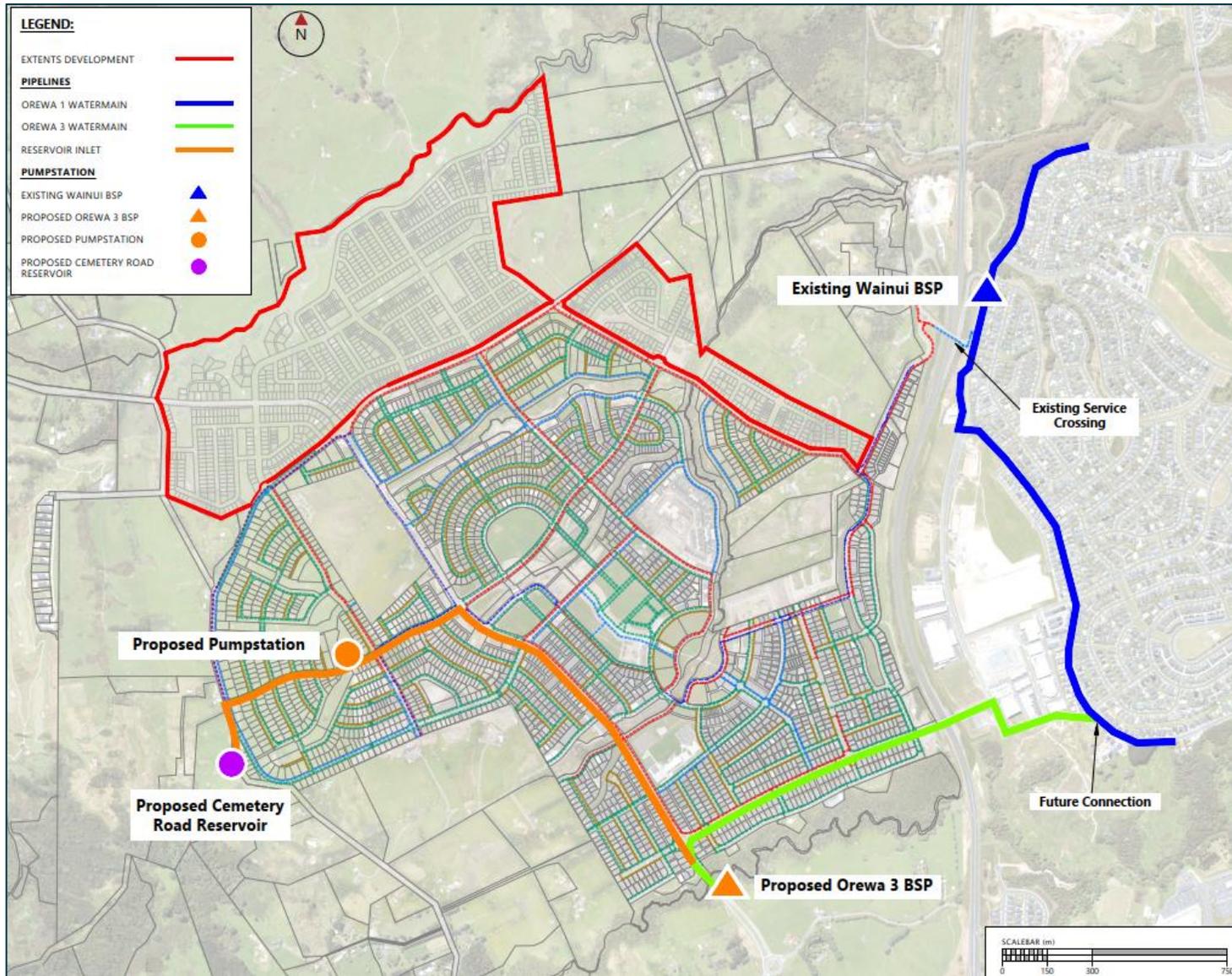


Figure 6: Proposed and Existing Water Supply Trunk Infrastructure

7. Utility Services

7.1. Power Reticulation

The Milldale North site will be serviced by extensions to the existing power reticulation network established within the earlier Milldale stages.

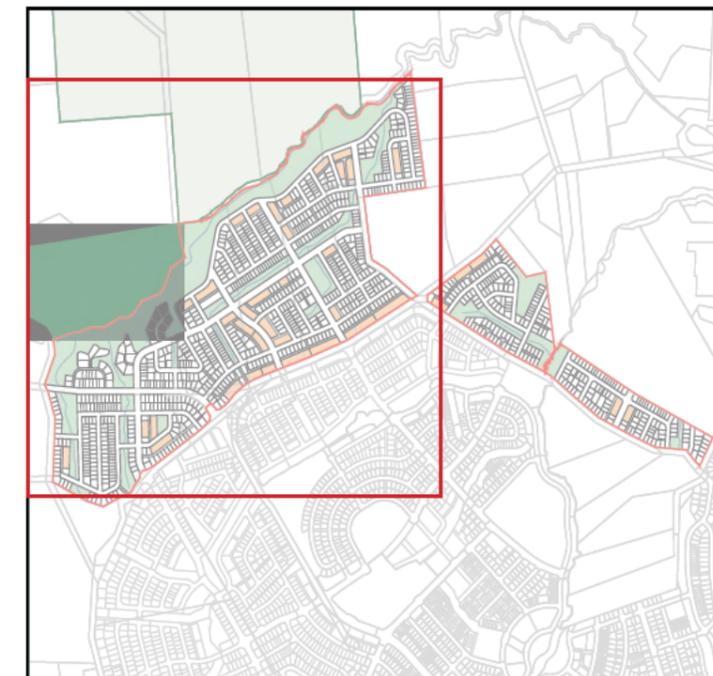
Vector, as the electricity provider, will confirm the final alignment and capacity of the power reticulation network.

7.2. Telecommunications Reticulation

Telecommunications services will also be extended from the existing Milldale network to service Milldale North.

Tuatahi First Fibre will confirm the location and capacity requirements for these services.

Appendix A – Milldale North Conceptual Masterplan



Key Plan (not to scale).

Legend

- Site boundaries
- Indicative water course alignments
- Indicative open space / SW management areas / pedestrian connections
- Indicative commonly owned access lots
- Future revegetation / ecological enhancement
- Indicative terrace superlot boundaries

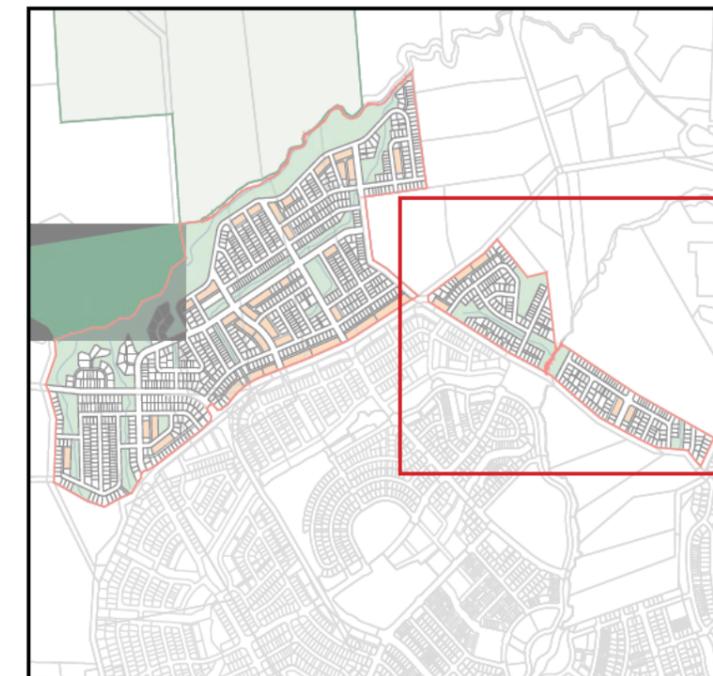
Indicative Yield - 1200 lots

- Below 300sqm - 500
- 300 - 400sqm - 450
- 400 - 500sqm - 150
- Over 500sqm - 100
- Superlots - 63

Figure 5: Northern Masterplan Area.

Scale: 1:5000 at A3.





Key Plan (not to scale).

Legend

- Site boundaries
- Indicative water course alignments
- Indicative open space / SW management areas / pedestrian connections
- Indicative commonly owned access lots
- Indicative terrace superlot boundaries

Indicative Yield - 300 lots

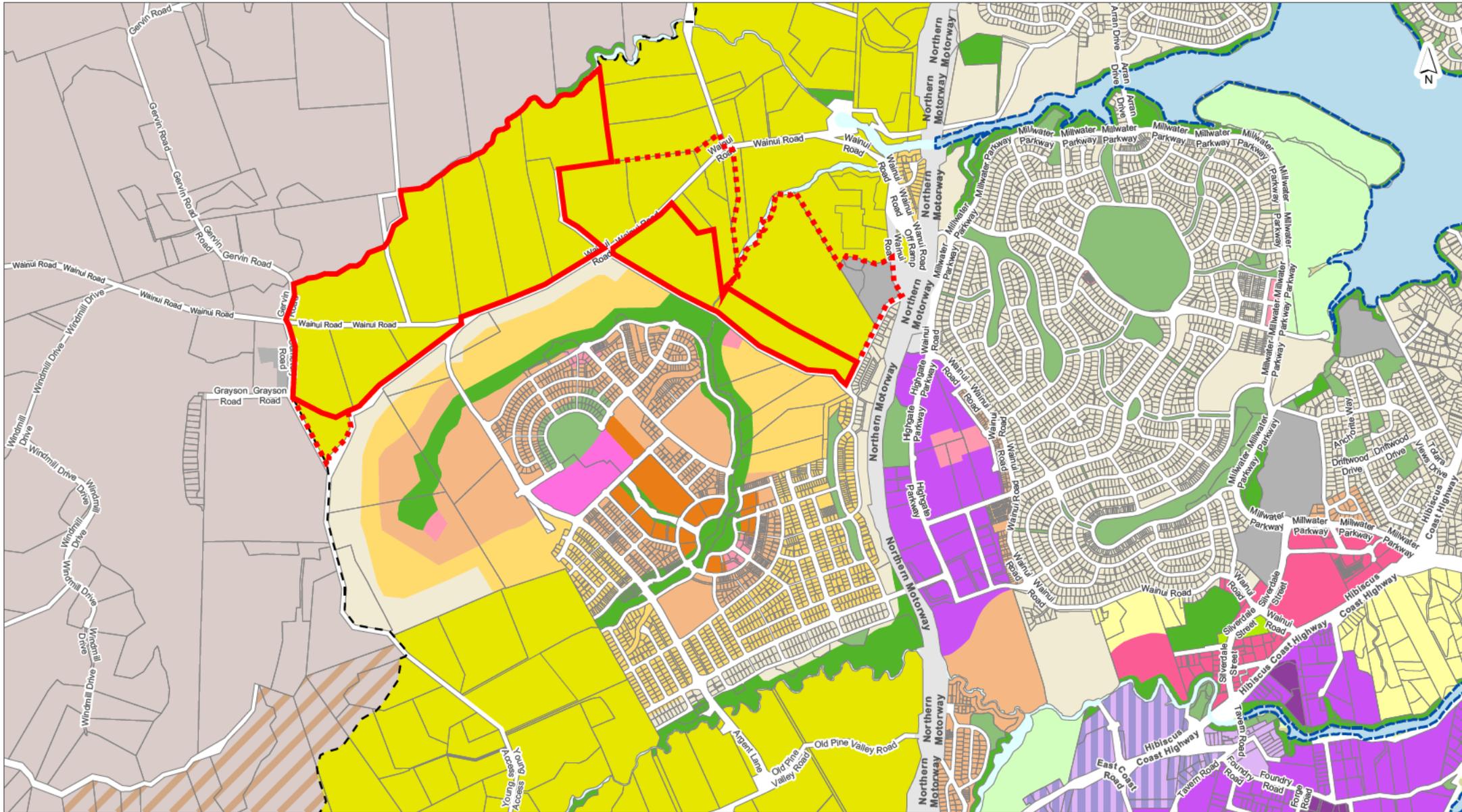
- Below 300sqm - 50
- 300 - 400sqm - 175
- 400 - 500sqm - 50
- Over 500sqm - 25
- Superlots - 6

Figure 6: Eastern Masterplan Area.

Scale: 1:4000 at A3.



Appendix B – Milldale North Zoning Overlay



DISCLAIMER:
 This map/plan is illustrative only and all information should be independently verified on site before taking any action. Copyright Auckland Council. Land Parcel Boundary information from LINZ (Crown Copyright Reserved). Whilst due care has been taken, Auckland Council gives no warranty as to the accuracy and plan completeness of any information on this map/plan and accepts no liability for any error, omission or use of the information. Height datum: NZVD 2016.

Zones and Rural Urban Boundary Milldale North Zoning



Scale @ A3
 = 1:15,000

Date Printed:
 29/07/2025



NOTATIONS

Appeals to the Proposed Plan

 Appeals seeking changes to zones or management layers

Proposed Modifications to Operative in part Plan

 Notice of Requirements

 Proposed Plan Changes

Tagging of Provisions:

[i] = Information only

[rp] = Regional Plan

[rcp] = Regional Coastal Plan

[rps] = Regional Policy Statement

[dp] = District Plan (only noted when dual provisions apply)

ZONING

Residential

-  Residential - Large Lot Zone
-  Residential - Rural and Coastal Settlement Zone
-  Residential - Single House Zone
-  Residential - Mixed Housing Suburban Zone
-  Residential - Mixed Housing Urban Zone
-  Residential - Terrace Housing and Apartment Buildings Zone

Business

-  Business - City Centre Zone
-  Business - Metropolitan Centre Zone
-  Business - Town Centre Zone
-  Business - Local Centre Zone
-  Business - Neighbourhood Centre Zone
-  Business - Mixed Use Zone
-  Business - General Business Zone
-  Business - Business Park Zone
-  Business - Heavy Industry Zone
-  Business - Light Industry Zone

Open space

-  Open Space - Conservation Zone
-  Open Space - Informal Recreation Zone
-  Open Space - Sport and Active Recreation Zone
-  Open Space - Civic Spaces Zone
-  Open Space - Community Zone
-  Water [i]

Rural

-  Rural - Rural Production Zone
-  Rural - Mixed Rural Zone
-  Rural - Rural Coastal Zone
-  Rural - Rural Conservation Zone
-  Rural - Countryside Living Zone
-  Rural - Waitakere Foothills Zone
-  Rural - Waitakere Ranges Zone

Future Urban

-  Future Urban Zone
-  Green Infrastructure Corridor (Operative in some Special Housing Areas)

Infrastructure

-  Special Purpose Zone - Airports & Airfields
Cemetery
Quarry
Healthcare Facility & Hospital
Tertiary Education
Māori Purpose
Major Recreation Facility
School
-  Strategic Transport Corridor Zone

Milldale North Extents

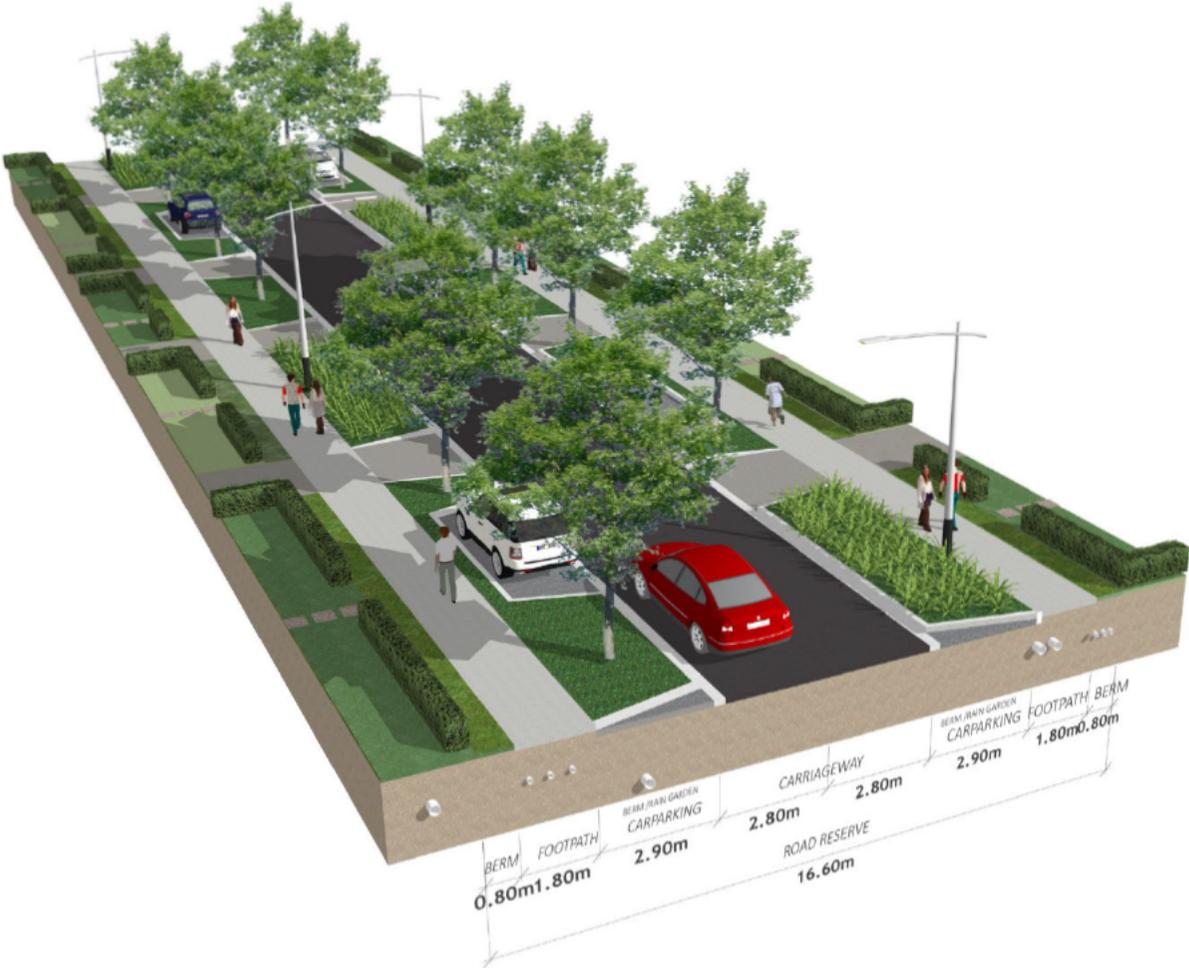
-  Milldale North Stage Boundaries
-  Proposed Plan Change Extents

--- Rural Urban Boundary

Appendix C – Milldale North Indicative Road Cross Sections

Suburban Streets

6.6m Suburban Street Type 1



Collector Roads

4.0m Collector Road Type 1



Stream-Edge Roads

6.60m Orewa River Reserve Edge Road



Jointly Owned Access Lots

7.0m JOAL



Pedestrian Accessway

3.0m Shared Path - Pedestrian Accessway



Appendix D – Milldale North Stormwater Design Memorandum

**To**

Barker and Associates

From

Woods

Sam Kirk – Associate Engineer

Pranil Wadan – Technical Director

W-REF: P25-198

23 October 2025

Reviewer: Pranil Wadan

Stormwater Design Memorandum

Milldale North Fast-Track Referral

Statement of Qualifications and Experience

Sam Kirk – Associate Engineer

I, Sam Kirk, am an Associate Engineer at Woods. Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since July 2025, although also previously between January 2019 and September 2022.

I hold the qualifications of a Bachelor of Surveying, which I completed in 2018, and I also hold a Cadastral Surveying License. I am also a Voting Member of S+SNZ.

I have eight years of experience in the Engineering industry. My experience includes the design and construction observation of a range of land development projects, including project management and the procurement of earthworks, roading, services and other infrastructure. I have been involved with the surveying, design and management of previous Milldale projects, dating back to Stage 1A. I have also been involved in managing multiple land development projects in London and Melbourne.

I confirm that, in my capacity as the author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practices Note 2023.

Pranil Wadan – General Manager Water Infrastructure and Planning, Wood & Partners Consultants Limited

I am a Technical Director and the General Manager of Water Infrastructure & Planning at Wood and Partners Consultants Limited (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since April 2012.

I hold a Bachelor of Engineering degree from the University of Auckland, which I completed in 2007. I am a Chartered Professional Engineer (CPEng) and a member of Engineering New Zealand (CMEngNZ) and Water New Zealand. In addition, I also hold the following qualifications and affiliations: International Professional Engineer (IntPe(NZ)), Certified Independent Hearing Commissioner, Certificate in Company Direction & Governance.

I have over 16 years of experience in stormwater design, hydrodynamic modelling, flood risk assessments, water infrastructure and stormwater management for land development.

I confirm that, in my capacity as approver of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

1. Introduction

This memo has been prepared to support the application by Fulton Hogan Land Development (FHL) for referral under the Fast-Track Approvals Act 2024 (FTAA) to enable the development of land zoned 'Future Urban' under the Auckland Unitary Plan (AUP).

This development is hereby referred to as 'Milldale North'.

The purpose of this memorandum is to confirm the stormwater management approach and provide assurance that:

- The sites are not subject to unacceptable flood risk from natural hazards or the effects of climate change.
- That the performance and resilience of the stormwater infrastructure addresses the effects of climate change; and
- Any stormwater or flooding-related constraints can be appropriately avoided, mitigated, or remedied, and do not present barriers to development under the FTAA.

This memorandum should be read in conjunction with the Wainui East Stormwater Management Plan (WE-SMP V7, 2025), which sets the framework for stormwater design across the wider Wainui East and Milldale catchments.

2. Background

2.1. Wainui East Stormwater Management Plan

Milldale North is covered by the Wainui East Stormwater Management Plan (WE-SMP) V7 (July 2025).

WE-SMP V7 updates the previously adopted WE-SMP V4 (2016), which applies to only the live-zoned Wainui Precinct (excluding Future Urban land). V7 was prepared to support a Private Plan Change (PPC) application to Auckland Council and covers a wider footprint than this FTAA referral.

This referral applies to a section of the PPC footprint, limited to FHL landholdings – with a yield of approximately 1,500 dwellings (compared to 2,500 dwellings estimated with the PPC). However, the V7 stormwater strategy, design criteria and staging approach remain directly applicable.

Accordingly, WE-SMP V7 is the appropriate guiding document for the referral area and forms the basis of this design memorandum.

The different areas subject to the SMPs, PPC and this referral are shown on **Figure 1** on the following page.

2.2. Site Description

This referral relates to Milldale North only – a non-continuous site comprised of two blocks that directly adjoins the existing Milldale development.

Predominantly pastoral and undeveloped, the two blocks are gently undulating—forming sub-catchments along natural gullies and drains. Steeper ground is confined to incised stream margins.

As with the existing Milldale development, stormwater from Milldale North discharges to the Orewa Estuary via the Orewa Awa and Waterloo Creek corridors, with contributions from local tributaries. There is no existing stormwater drainage infrastructure within the site, other than localised farm culverts and one four-way crossing near the intersection of Argent Lane and Wainui Road.

Access is currently provided from a combination of existing Milldale local roads and Wainui Road.

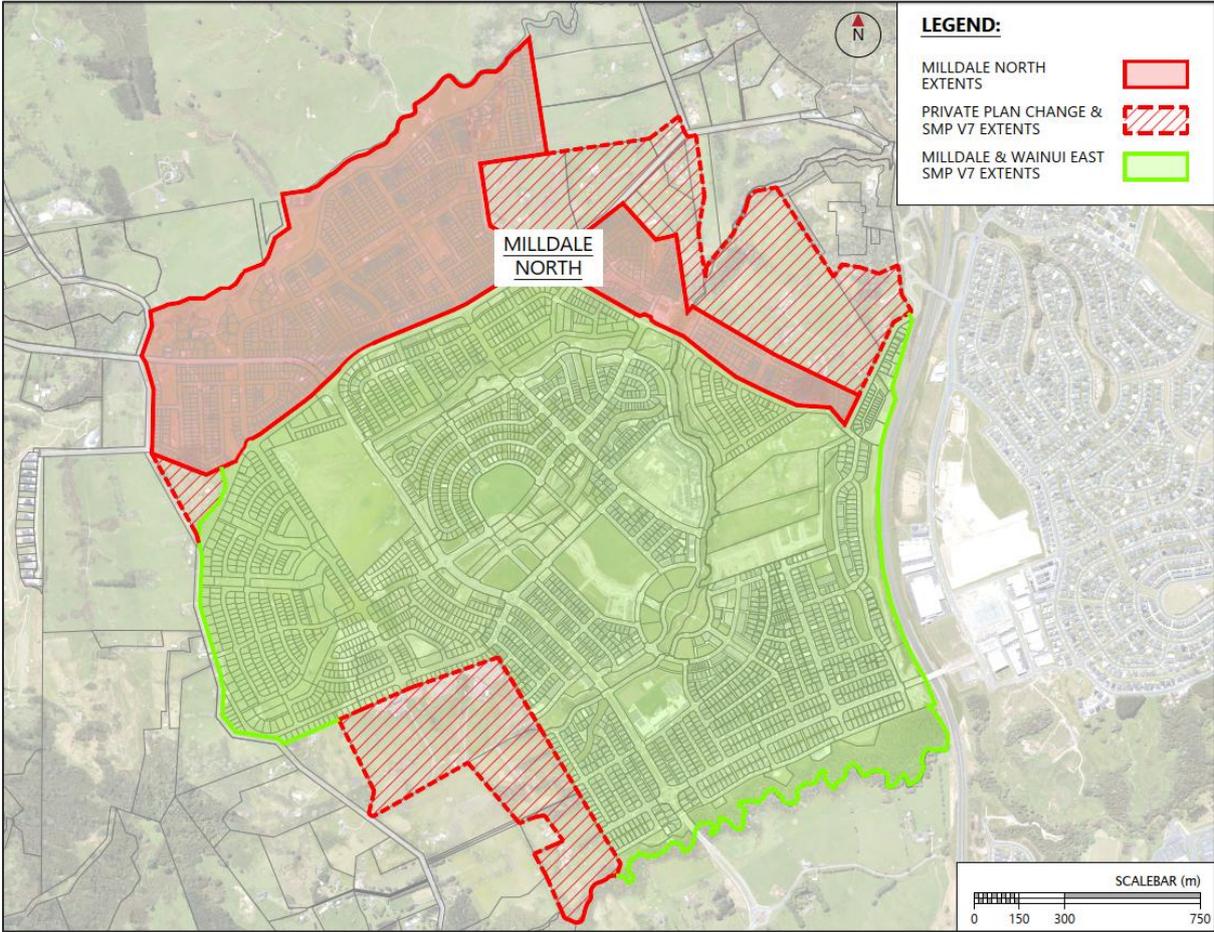


Figure 1: WE-SMP V4 and V7 Precinct Extents

3. Stormwater Management Strategy

The stormwater strategy for Milldale North, consistent with WE-SMP V7, is based on at-source management supported by a pass flow forward approach through natural watercourses.

3.1 Water Quantity Management

- **Retention/Detention:**
 - **Detention** of the 95th-percentile 24-hour rainfall event.
 - **Retention** of a minimum 5 mm rainfall depth
- **Proposed Stormwater Management Options:**
 - Use of communal devices i.e. bioretention / wetlands to provide hydrology mitigation and water quality treatment.
 - On-lot rainwater reuse tanks to deliver retention.

3.2 Water Quality Management

- Treatment for all impervious areas is designed in accordance with Auckland Council's GD01 and TP10.
- Retention from roof area runoff is deemed BPO for treatment from these surfaces.

3.3 Flood Management

- A pass-forward approach is proposed for flood management given the sites locality within the catchment, the approach of passing flood flows forward is consistent with the wider strategy for this area.
- The flood management strategy looks to convey flood flows within the stream reserves/corridors and contained within riparian margins.

3.4 Water Sensitive Design

The strategy integrates stormwater management with urban design:

- Stream corridors are protected and enhanced to provide ecological and recreational benefits.
- Stormwater wetlands and bioretention areas are designed as landscaped features within the urban environment that incorporates a treatment train approach.
- The staged approach aligns with development sequencing to ensure network capacity is maintained as the area urbanises.

4. Flood Modelling

Comprehensive flood modelling has been undertaken to support the proposed development. The key assumptions and inputs put into this flood model are detailed in the WE-SMP V7.

This model build report provides technical details of all parameters and assumptions (hydrological and hydraulic) used for flood modelling undertaken to support the updated Wainui East Stormwater Management Plan.

A summary of the key assumptions and inputs into the model are summarised below:

- **Rainfall Profiles:** TP108 normalised 24-hour rainfall profiles and corresponding depths applied
- **Climate Change Scenarios:** Simulations made for both 2.1 °C and 3.8 °C climate change scenarios, as per the currently operative stormwater code of practice.
- **Pre-Development Assumptions:**
 - Hydraulic Conveyance – consented structures included; remaining extents as per the SMP base model
 - Impervious Coverage – 5% for 'Future Urban' land and 65% for existing Milldale development
- **Plan Change (Post-Development) Assumptions:**
 - Hydraulic Conveyance – consented structures included; pass-forward of major events within the PPC extents
 - Impervious Coverage – 65% for 'Future Urban' land and existing Milldale development
 - Model Build – incorporates the designed landform and proposed stormwater infrastructure known to date (including consented works across remainder of the broader Milldale development)

Modelled scenarios have been completed for the 2, 10 and 100-year storm events.

Although this modelling covers the wider PPC area, as noted, it is directly applicable to the Fast-Track Referral extents of Milldale North and will guide flood management accordingly.

5. Flood Risk Assessment

The following results detailed are based on the modelled 100-year flood event, where a 3.8 °C climate change scenario has been assumed as the 'worst case' scenario and is the focus of both pre-development and post-development flood assessments.

5.1. Pre-Development Flooding (Existing Flood Hazards)

Pre-development modelling confirms the existing Milldale development contains flooding within the existing and planned stream reserve.

Modelling also shows that, while runoff is contained within Milldale's conveyance structures, several older downstream structures along Wainui Road are undersized and at risk of overtopping. As noted in WE-SMP V7, these are identified for future upgrades, which is reflected in the post-development models.

Model plots also highlight a wide floodplain within existing land parcel 147 Argent Lane, which falls outside the extents of this referral application and is to remain undeveloped. This land is not currently owned by FHLD and is characterised low and flat topography abutting watercourses – which easily flood when streambanks are overtopped. Addressing this area does not form a part of this scope.

Within Milldale North, this model confirmed that existing tributaries and farm drains will require modifications and/or enhancements to ensure that any bank overtopping is restricted to planned stream reserves in the worst-case scenario.

Figure 2 below shows the flood extents and depths across the site in this 3.8°C climate change pre-development scenario, with climate change allowances.

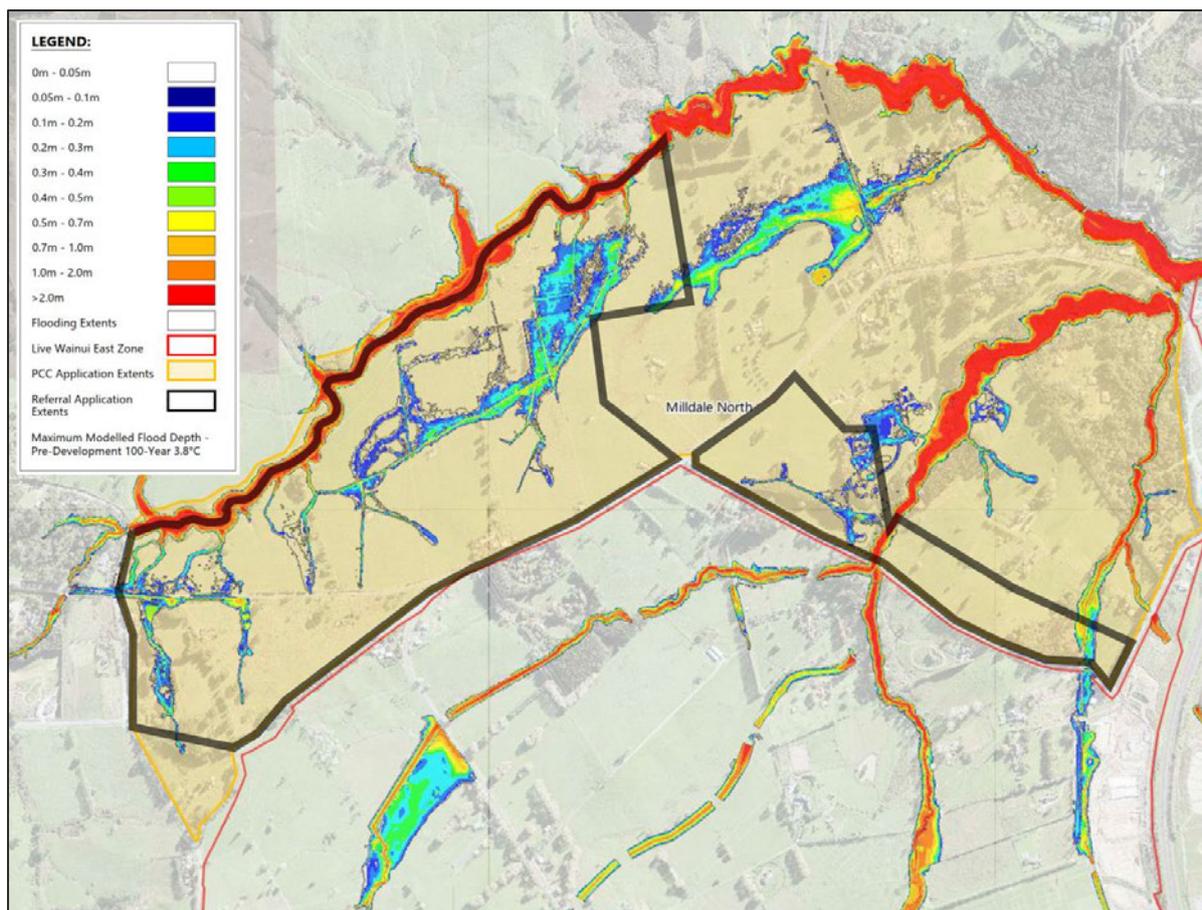


Figure 2: Milldale North Maximum Modelled Flood Paths – Pre-Development (100-Year ARI, 3.8°C)

5.2. Post-Development Flooding

Modelling of the post-development PPC scenario confirms that flooding in the 3.8°C climate change scenario will be contained within the existing and planned stream reserves, across both the existing Milldale development and the proposed Milldale North site.

While water levels and flows increase locally with the planned urbanisation and changes to runoff timings, they remain contained within the riparian margins of the drainage reserves. Therefore, the development does not increase existing flooding risk on the developable or abutting lands.

Overall, WE-SMP V7 and its flood modelling conclude that there are no adverse effects on any third-party land upstream or downstream of the development areas.

Figure 3 shows the flood extents and depths across both sites in this worst-case plan change post-development scenario.

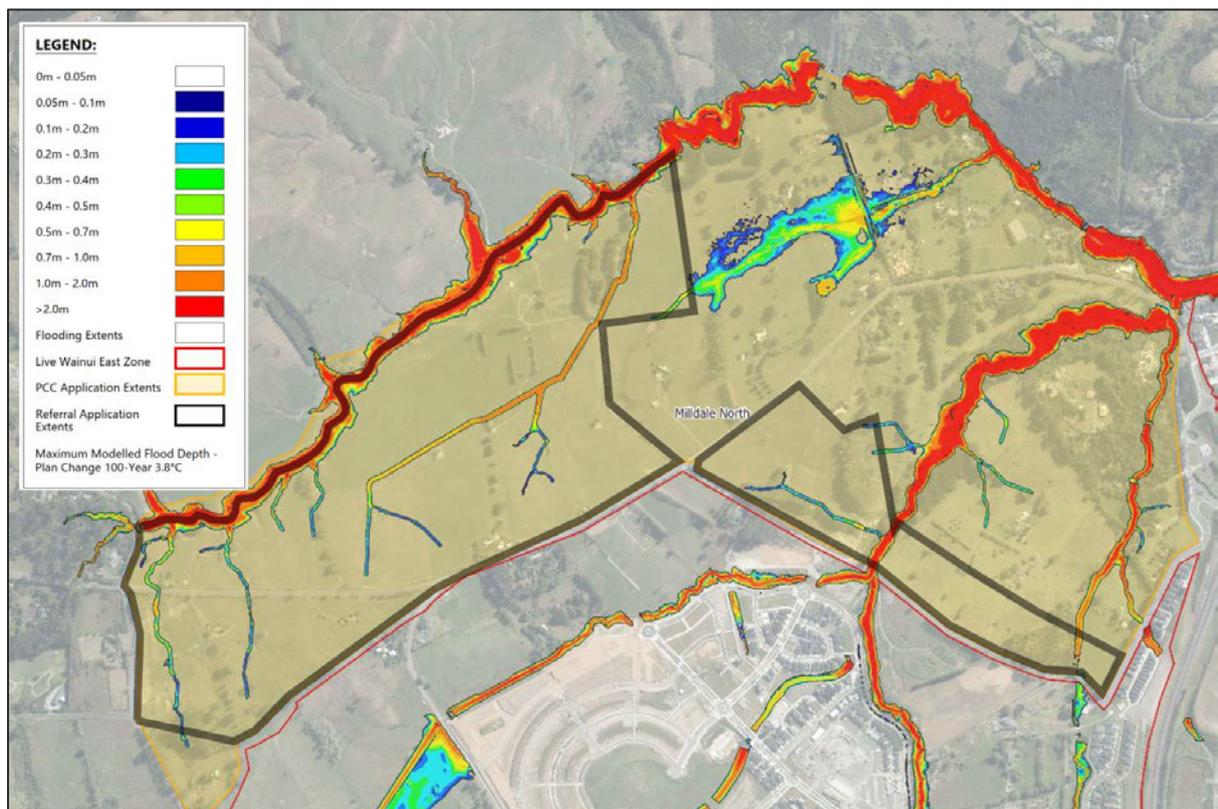


Figure 3: Milldale North Maximum Modelled Flood Paths – Plan Change Post-Development (100-Year ARI, 3.8°C)

6. Conclusion

The 3.8°C climate change scenario modelling confirms that flood levels are contained within existing or planned stream/drainage corridors – across the existing Milldale area and the Milldale North site. No adverse flood effects are expected on third-party land upstream or downstream.

A pass-forward basis applies for major storms, with flows being conveyed via existing watercourses (such as the Orewa River and Waterloo Creek). At-source controls – detention of the 95th-percentile rainfall event (over 24-hours) and at least 5 mm retention – remain the primary tools for managing post-development hydrology and ensuring compliance with GD01 and TP10.

Known constraints outside the referral footprint are acknowledged – including several structures along Wainui Road that require upgrading – which are already being planned as separate works.

Detailed design will finalise device layouts, outlet tie-ins and maintenance access, and will configure low-flow outlets to support stream baseflows. Staging will align with development sequencing and existing network capacity, with figures and schedules updated as designs are confirmed.

Appendix E – Email from Watercare Major Developments on Wastewater Design (Dated 12 April 2023)

From: Lars Fog s 9(2)(a)
Sent: Wednesday, April 12, 2023 10:02 AM
To: FAHEY, Grants 9(2)(a)
Cc: DRooke (David) s 9(2)(a) MBear (Marcel) s 9(2)(a)
Subject: Milldale North - Water and Wastewater Servicing

Hi Grant,

Further to our recent communications regarding the servicing of the future development of the Milldale North area, Watercare are comfortable that the servicing of this area with both water and wastewater is feasible. The mechanism of achieving this will be discussed further as part of the proposed structure planning and plan changes and is likely to be finalised at resource consent and EPA stage.

Kind Regards

Lars Fog | Programme Lead

Major Developments

Watercare Services Limited

Customer service line: +64 9 442 2222

Postal address: Private Bag 92 521, Wellesley Street, Auckland 1142, New Zealand

Physical address: 73 Remuera Road, Remuera, Auckland 1050, New Zealand

Website: www.watercare.co.nz

Appendix F – Milldale North Water Supply Report



**Milldale North Fast-track Referral
Water Supply Report**

Fulton Hogan Land Development Limited

FINAL

Document Control

Project Number	P25-198
Project Name	Milldale North Fast-track Referral – Water Supply Report
Client	Fulton Hogan Land Development Limited
Date	11/11/2025
Version	V1
Issue Status	FINAL
Originator	Cristian Jara – Engineer
Reviewer	Marcel Bear – Principal Engineer
Approval	Pranil Wadan – General Manager – Water Infrastructure and Planning
Consultant details	Woods (Wood & Partners Consultants Ltd) Level 1, Building B, 8 Nugent St, Grafton, Auckland 1023 PO Box 6752 Victoria St West, Auckland 1142 E: info@woods.co.nz P: 09-308-9229 woods.co.nz
Copyright and Limitations	<p>The concepts and information contained in this document are the property of Woods (Wood & Partners Consultants Ltd). Use or copying of this document in whole or in part without the written permission of Woods will constitute an infringement of copyright.</p> <p>This report has been prepared on behalf of and for the exclusive use of Woods client, and is subject to and issued relating to the provisions of the agreement between Woods and its Client. Woods accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this document by any third party.</p>

Statement of Qualifications and Experience

Cristian Jara –Water Engineer, Wood & Partners Consultants Limited

I am a 3 Waters Engineer at Wood and Partners Consultants Limited (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since November 2020.

I hold the degree of Professional Civil Engineer from the Pontifical Catholic University of Chile with a Diploma in Hydraulic Engineering, which I obtained in 2013. I am member of Engineering New Zealand (MEngNZ) and Water New Zealand.

I have 10 years of professional experience in in water supply and wastewater modelling, and pipeline design. My experience includes designing the water supply reticulation for large greenfield (Milldale, Drury East) and brownfield developments (Auckland Housing Programme).

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Marcel Bear – Principal Water Engineer, Wood & Partners Consultants Limited

I am a Principal Water Engineer at Wood and Partners Consultants Limited (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since April 2017.

I hold the qualification of Bachelor of Engineering (Honours) in Civil Engineering from the University of Auckland, which I completed in 1990. I am a Chartered Engineer and member of Water New Zealand.

I have 30 years of professional experience in water supply design and planning, my experience includes water supply design, hydraulic modelling and infrastructure master planning, for greenfield and brownfield developments such as; the Unitec site in Auckland, brownfields developments in Northcote, Wesley and Waikowhai neighbourhoods and the Sleepyhead Development in Ohinewai.

I confirm that, in my capacity as reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Pranil Wadan – General Manager Water Infrastructure and Planning, Wood & Partners Consultants Limited

I am a Technical Director and the General Manager of Water Infrastructure & Planning at Wood and Partners Consultants Limited (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since April 2012.

I hold a Bachelor of Engineering degree from the University of Auckland, which I completed in 2007. I am a Chartered Professional Engineer (CPEng) and a member of Engineering New Zealand (CMEngNZ) and Water New Zealand. In addition, I also hold the following qualifications and affiliations: International Professional Engineer (IntPe(NZ)), Certified Independent Hearing Commissioner, Certificate in Company Direction & Governance.

I have over 16 years of experience in stormwater design, hydrodynamic modelling, flood risk assessments, water infrastructure and stormwater management for land development.

I confirm that, in my capacity as approver of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

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1. Executive Summary

Fulton Hogan Land Development Limited (FHL) is applying for referral under the Fast-track Approvals Act 2024 (FTAA) to enable the development of 1,500 residential dwellings in the Milldale North Fast-track Referral Area, located immediately north of the Milldale Development.

FHL has commissioned Wood and Partners Consultants Ltd (Woods) to develop the water supply servicing to support this FTAA referral application, reported herein.

The proposed water sources for the Milldale North Fast-track Referral Area and the Milldale Development are in accordance with Watercare's current supply strategy, as shown in Appendix A. This strategy consists of:

- The interim scenario, which includes water supply from the existing Wainui BSP and the proposed Orewa 3 BSP, both being supplied from the Orewa 1 Transmission Main;
- The long term scenario, which includes a local reservoir supplied by the proposed Orewa 3 Transmission Main.

Additionally, an independent supply contingency has been developed – The Milldale North Fast-track Referral Area can be isolated and supplied from local bores, which would include a separate private system of treatment, storage and booster infrastructure. Feasibility of this has been confirmed in principle, but is subject to further groundwater investigations.

The proposed reticulation for the Milldale North Fast-track Referral Area, using the water supply sources of Watercare's interim scenario are shown in Figure 1.

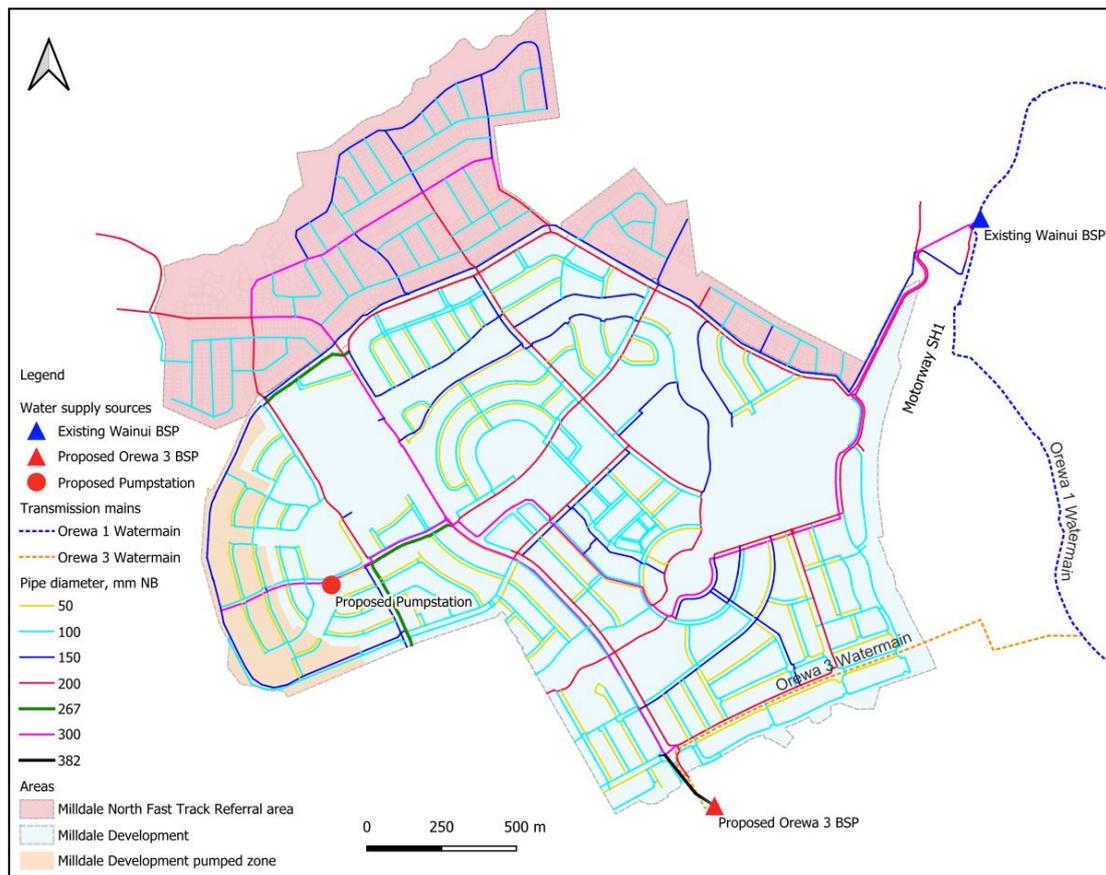


Figure 1: Proposed Water Supply Reticulation Network

Based on modelling of the network in Watercare's interim supply scenario and Watercare Code of Practice (CoP) criteria, this assessment has found the following:

- Levels of Service – Pressure, velocities and firefighting flows meet CoP standards across the Referral Area.
- Localised Headloss Departures – In the interim scenario, short section near the proposed Orewa 3 BSP exceed CoP headloss limits for limited peak-day periods, until the Cemetery Road Reservoir is commissioned.
- Resilience – The proposed servicing strategy ensures the network sustains Watercare standards if either of the two BSPs are offline.
- Demands (Referral Area Only) – Average Day ≈ 11.5 L/s; Peak Day ≈ 17.2 L/s; Peak Hour ≈ 43 L/s.

The reticulation performance when supplied by the independent supply (bores) will comply with the CoP.

On this basis, the proposed network configuration – under Watercare’s interim scenario or bore supply – will provide a robust and serviceable solution for the Referral Area, which integrates with the long-term vision planned for the wider Milldale development and its water supply infrastructure.

2. Introduction

Fulton Hogan Land Development Ltd (FHLDT) has commissioned Wood and Partners Consultants Ltd (Woods) to develop the water supply servicing to support a Fast-track Referral application under the Fast-track Approvals Act 2024. This Milldale North Fast-track Referral Area, shown in Figure 2, will comprise of approximately 1,500 residential dwellings.

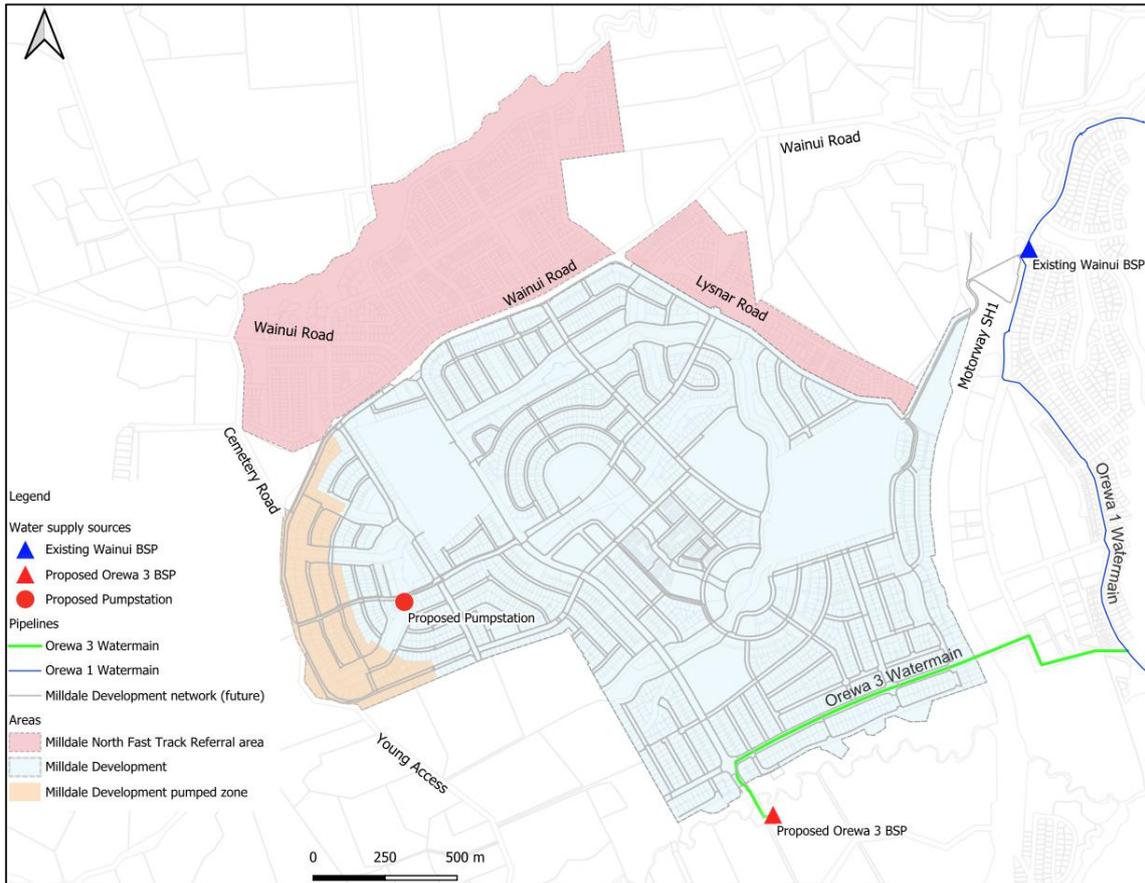


Figure 2: Water Supply Overview

Watercare have a supply strategy for Milldale, which includes transmission upgrading that will provide the source for the growth anticipated in the area, shown in Appendix A. The strategy provides an interim and long term supply. It is assumed the Milldale North Fast-track Referral Area would potentially be serviced as per Watercare's interim transmission supply strategy shown in Figure 2. Under this supply scenario, the Wainui BSP and the Orewa 3 BSP would both provide supply from the Orewa 1 transmission main into the Milldale and Milldale North Fast-track Referral Areas.

If this interim supply is unavailable or delayed, a bore-supplied local reservoir and booster system is also a feasible alternative based on hydrogeological advice, subject to further pre-commissioning investigations and approvals. The reticulation has been designed to operate with either the Watercare interim or alternative bore supply.

A hydraulic model of the reticulation has been developed to demonstrate compliance with CoP limits for pressure, headloss, velocity and fireflow. The results of the modelling are presented in Section 6.

3. Design Standards

Water demands and network design criteria are based on the Watercare CoP and the NZFS Firefighting Water Supplies Code of Practice (SNZ PAS 4509: 2008), as summarised in Appendix B.

4. Yields and Demands

Table 1 summarises the total yields for the Milldale Development and the Milldale North Fast-track Referral Area shown in Figure 2. Detailed yield and demand information is included in Appendix C.

Table 1: Yields for Milldale and Milldale Fast-Track Referral Area

	Milldale Development	Milldale North Fast-track Referral Area	Total
Dwellings, DUE	4,526	1,500	6,026
Population, people	14,743	4,500	19,243
Average Day Demand, l/s	38.2	11.5	49.7
Peak Day Demand, l/s	58.1	17.2	75.3

5. Model Build

5.1. Network

The water supply network model for this analysis was developed in Innovzye InfoWorks WS Pro version 2024.5. The model was updated to show the latest as-built water network. The proposed network layout for the Milldale North Fast-track Referral Area is indicative. This indicative layout provides a sufficient level of detail for the purposes of analysing the network performance. The modelled network shown in Figure 1 includes the following existing and proposed elements:

- Wainui Bulk Supply Point (BSP) in service - existing
- Orewa 3 BSP in service (supplied from the Orewa 1 Transmission Main) - proposed
- A pumped zone to service elevated areas of the Milldale Development - proposed

The area supplied includes:

- Milldale Development (both as built and proposed, assumed to be fully developed)
- Milldale North Fast-track Referral Area

The indicative layout and pipe sizes acknowledge potential future neighbouring developments and can be expanded to service them.

Pumped Zone:

The proposed Milldale Development pumped zone would not be expanded by the addition of the Milldale North Fast-track Referral Area as seen in Figure 2 and detailed in the results presented in Section 6.

5.2. Boundary Conditions

The sources for the development will be:

- Wainui BSP, downstream of the PRV at 85m Hydraulic Grade Line (HGL)
- Orewa 3 BSP, downstream of the PRV at 85m HGL

Both these BSPs are supplied from the Orewa 1 Transmission Main as per the Watercare interim supply scenario shown in Appendix A and in Figure 2.

Refer to Section 7 for details of the alternative bore supply.

6. Model Results

The full buildout model is shown in Figure 3 with results shown in Appendix D.

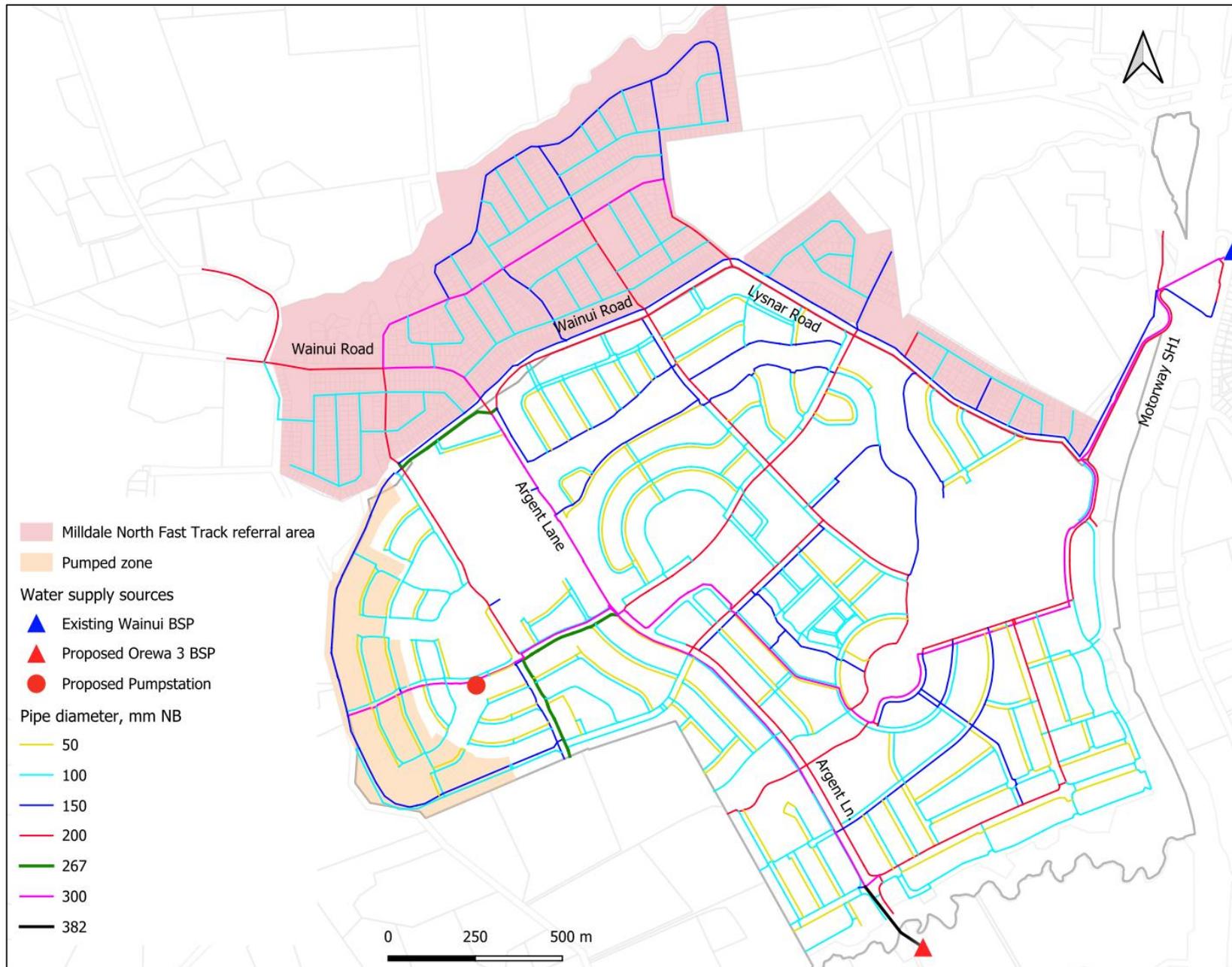


Figure 3: Proposed Water Supply Reticulation Network

6.1. Network performance

Table 2 summarises the network performance within all the development areas. The full network results are included in Appendix D.

Table 2: Summary of results – Full buildout (Milldale and Milldale North Fast-track Referral Area)

Parameter	Results	Code of Practice (CoP) compliance
Minimum pressure, m Over 25m required	25 to 72m	Yes
Maximum pressure, m Under 80m required	28 to 75m	Yes
Maximum headloss, m/km Required: Less than 5 m/km, pipes ≤ 150NB Less than 3 m/km, pipes > 150NB	Generally below 3 m/km Except for: - 38m of existing 100NB at 5.4m/km - 14m of existing 200NB at 3.2 m/km (both near Orewa 3 BSP)	Partial Compliance Compliant except for the 2 pipes over 3m/km
Maximum velocity, m/s Less than 2 m/s required	Less than 1.1 m/s	Yes
Available fireflow, l/s Required within 135m distance: -FW2 (25 l/s) residential -FW3 (50 l/s) local centre	Over 20l/s overall. Over 84l/s in local centre area	Yes All locations are within 135m of hydrants that achieve FW2 (25 l/s)

The network performance within the Milldale North Fast-track Referral Area complies with the Watercare CoP limits.

Within the wider Milldale network, performance is generally compliant. However, an exceedance occurs under the interim supply scenario for approximately 2 hours on the annual peak demand day: Headloss exceeds CoP limits in a 38 m section of existing 100 NB pipe (5.5 m/km vs 5 m/km) and a 14 m section of 200 NB pipe (3.2 m/km vs 3 m/km), both near the Orewa 3 BSP. This issue is limited to the period before the Cemetery Road Reservoir is constructed, while the 300/382 NB watermain from Orewa 3 BSP is directly connected to the Milldale reticulation.

6.2. Resilience performance

The following 2 resilience scenarios were analysed for the network:

1. Supply only from Wainui BSP
2. Supply only from Orewa 3 BSP

The network would be maintained in both resilience scenarios to Watercare requirements, with a minimum pressure over 10m (17m and 24m for resilience scenarios 1 and 2 respectively) and a maximum velocity less than 3m/s (2.5m and 1.5m for resilience scenarios 1 and 2 respectively). Results are included in Appendix D.

7. Alternative Water Supply (independent network)

Supplying the Milldale North Fast-track Referral Area from local groundwater bores, hydraulically isolated from the wider Milldale network, is a feasible alternative based on preliminary hydrogeological advice¹.

The proposed reticulation can allow for the network to be disconnected from the overall Milldale development along Cemetery, Wainui and Lysnar Roads, as shown in Figure 3.

The Milldale North Fast-track Referral Area average day demand is 11.5 l/s, peak day demand is 17.2 l/s, with a peak hour demand of 43 l/s.

Under this configuration, water would be extracted from bores, treated to drinking-water standards, stored in a local reservoir and supplied via a booster pump station. The reservoir would buffer the peak demands to reduce the load on the treatment plant and bores.

Supply feasibility depends on confirming sustainable bore yields and seasonal variability, bore spacing and number to supply the demands, raw water quality and treatment selection, and sizing of treatment, storage and pumps to meet demand, resilience and Watercare CoP requirements. Consenting, operational responsibilities and the interface with the Milldale network also require confirmation. These will be addressed in subsequent design stages.

¹ Milldale North – Groundwater Prospect for Community Water Supply, WWLA1603. Memorandum prepared for Fulton Hogan Land Development Limited by Williamson Water and Land Advisory, 6 November 2025.

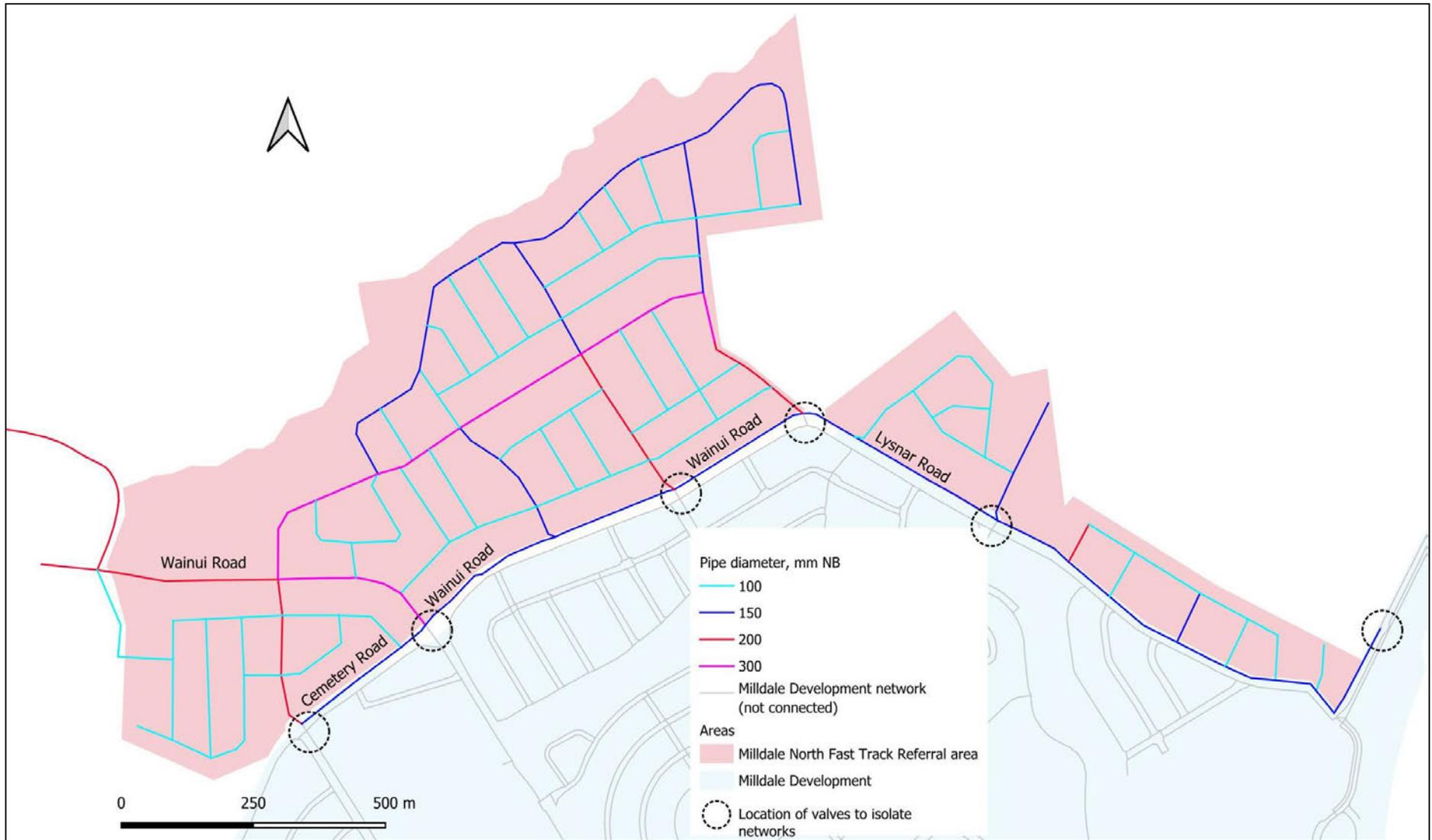


Figure 4: Milldale North Fast-track Referral Area Network isolated from Milldale Development

8. Summary and Conclusions

This report presents analysis of the potable water supply for the proposed Milldale North Fast-track Referral Area, which will draw from – and form part of – the Milldale Development network. Watercare has been consulted about the supply plans for the area and has provided information on the future supply strategy, including a new bulk-supply arrangement of the interim scenario. These components have been included in the network analysis.

A hydraulic model was developed based on the existing Milldale reticulation and expanded to include future areas of supply (the ultimate Milldale Development and Milldale North Fast-track Referral Area) and sources. The model results confirm that the proposed network and supply points would generally comply with the Watercare Code of Practice requirements for the development including the Milldale North Fast-Track Referral Area.,

Under the interim configuration, brief, localised headloss exceedances are predicted near the proposed Orewa 3 BSP during limited peak-day periods; however, these are expected to resolve in the ultimate scenario when the Cemetery Road reservoir is commissioned, and the interim connection is augmented.

The Milldale North Fast Track referral area can be supplied by the Wainui and Orewa 3 BSPs, without requiring a booster pump. The resilience of the supply was checked by shutting off one supply and feeding the area by the remaining source. Supply would be maintained with only one source, albeit at a reduced, but acceptable, level of service.

The network layout for the Fast-track Referral Area can be isolated from the Milldale Development network, if required, and instead be served by local groundwater supply bores – with necessary treatment, storage and pumping subject to confirmation after further hydrogeological investigations and design.

Overall, the assessment confirms a viable medium-term servicing solution for the Referral Area under Watercare's interim scenario or alternative bore supply, with resilience and compliance maintained. This configuration will continue to support and integrate with Watercare's long-term supply strategy for Milldale as the ultimate infrastructure, with the Orewa 3 transmission main and the Cemetery Road reservoir, is delivered.

Appendix A Watercare Supply Intentions

From: DRooke (David) s 9(2)(a)
Sent: Thursday, October 20, 2022 11:55 AM
To: Marcel Bear s 9(2)(a)
Cc: FAHEY, Grant s 9(2)(a)
Subject: RE: Milldale North servicing meeting with Watercare

Hi Marcel

Sorry I thought I had sent this through.

Many Thanks

David Rooke | Principal Water Network Planner

Watercare Services Limited

Mobile: s 9(2)(a)

Customer service line: +64 9 442 2222

Postal address: Private Bag 92 521, Victoria Street West, Auckland 1142, New Zealand

Physical address: 73 Remuera Road, Remuera, Auckland 1050, New Zealand

Website: www.watercare.co.nz

From: Marcel Bear s 9(2)(a)
Sent: Thursday, 20 October 2022 11:27 am
To: DRooke (David) s 9(2)(a)
Cc: FAHEY, Grant s 9(2)(a)
Subject: FW: Milldale North servicing meeting with Watercare

CAUTION: External Email!

Hi David

Re the discussion of the supply for the Milldale North area, please send through the sketch of the supply configuration from the Cemetery Rd Reservoir, as noted below.

Thanks

Marcel

Marcel Bear

Water Engineer

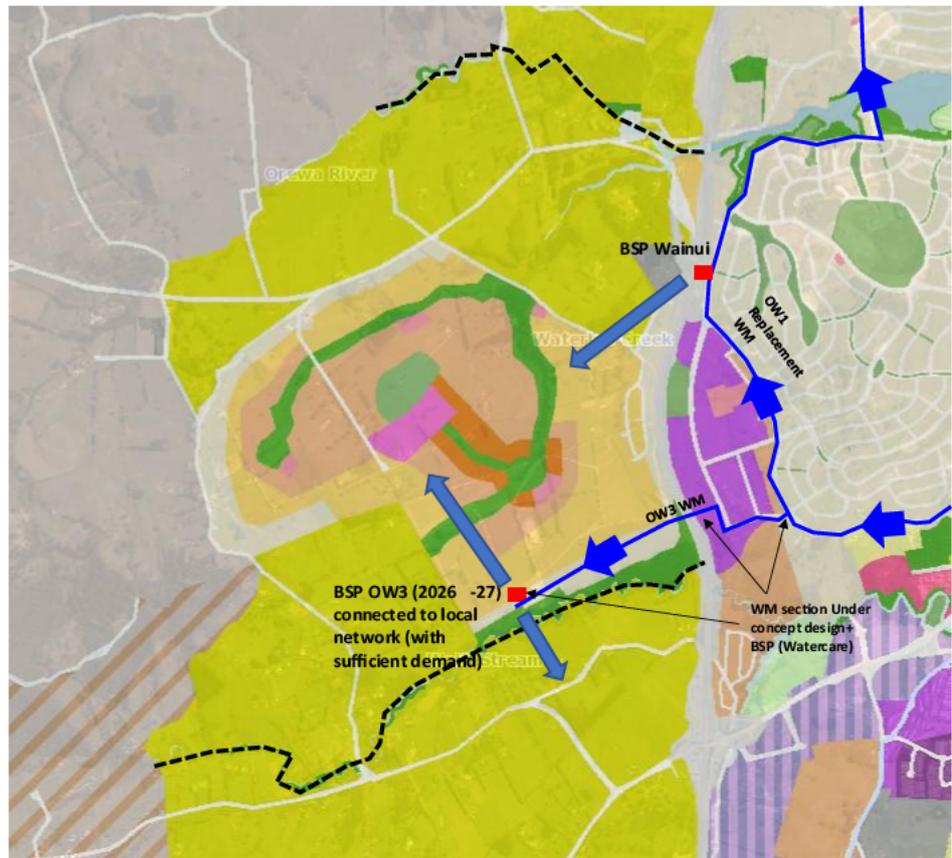
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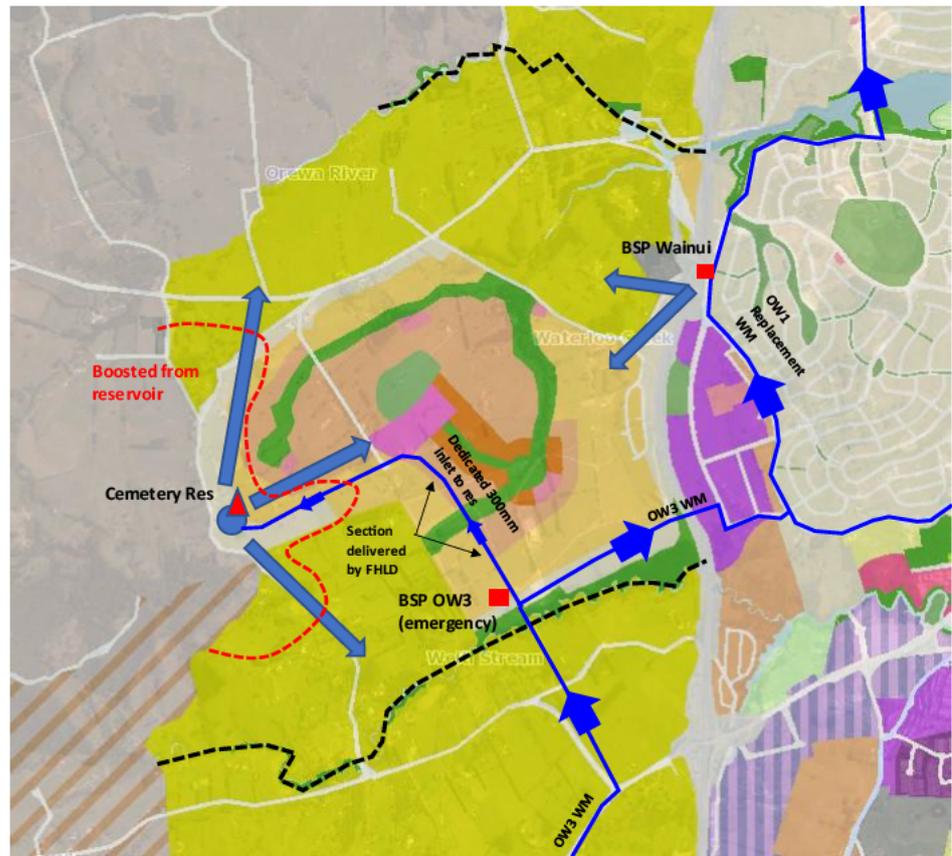
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woods.co.nz

Interim



Long Term



Appendix B Design Standards

Design

The design standards used in the assessment are based on the Water and Wastewater Code of Practice (CoP) for Land Development and Subdivision v2.4, dated June 2021, and are as follows:

- Pressure : 25 – 80 m
- Maximum Headloss:
 - For pipe diameter \leq 150mm : \leq 5m/km
 - For pipe diameter $>$ 150mm : \leq 3m/km
- Velocity : 0.5 – 2.0 m/s
- Fireflow : FW2, 25l/s

Water Demand

The water demand design flows are:

- Design Flow
 - Residential/Retirement Home : 220 litres per person per day
 - Commercial : 65 litres per person per day
 - School : Primary School: 20 litres per student per day
: Secondary School 25 litres per student per day
: 50 litres per staff member per day
- Occupancy Rate
 - Residential : 3 people per dwelling
 - Commercial : 1 person per 15 m² assuming Dry Retail where toilet facilities are provided to customers
- Peak Day Demand (PDD) Peak Factor : 1.5 (for populations over 10,000)
- Peak Hour Demand (PHD) Peak Factor
 - Residential : 2.5
 - Commercial : 2.25

A PDD Peak Factor of 1.5 was used because the development would form part of a network that supplies over 10,000 people as per the CoP.

Fireflow Demands

Based on SNZ PAS 4509:2008, A Fireflow of FW2 was considered for the Residential part of the development. This would mean that the minimum flow requirement is 25 litres/second (l/s); 12.5 l/s within 135m of the development and an additional 12.5l/s within 270m of the development.

Sprinkler protection is assumed for the commercial and school area and thus has the same hydrant demand (25 l/s) as residential areas.

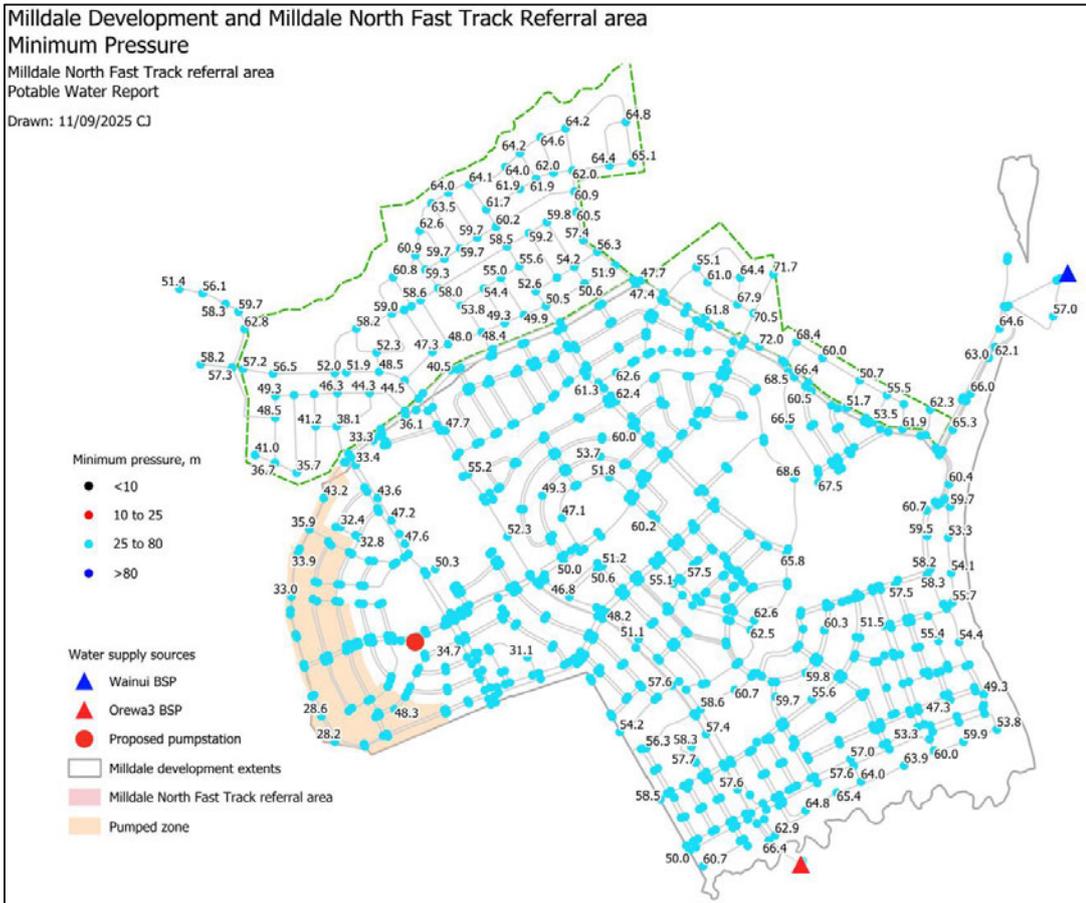
Appendix C Water Demand Calculations

Based on Watercare Code of Practice design parameters (Appendix B)

Demand component	Milldale	Milldale North Fast Track referral	Total
Dwellings DUE			
-Standalone Lot	2,774	1,500	4,274
-Superlot	853	-	853
-THAB Superlot	649	-	649
-Retirement village	250	-	250
Dwellings TOTAL DUE	4,526	1,500	6,026
Population people			
-Standalone lots, superlots, THAB	12,828	4,500	17,328
-Retirement village	600	-	600
-School/childcare	1,315	-	1,315
Population TOTAL people	14,743	4,500	19,243
Average Day Demand, TOTAL l/s	38.2	11.5	49.7
Peak Day Demand, TOTAL l/s	58.1	17.2	75.3
Peak Hour Demand, TOTAL l/s	143.7	43.0	186.7

Appendix D Model Run Results

Peak day demand scenario

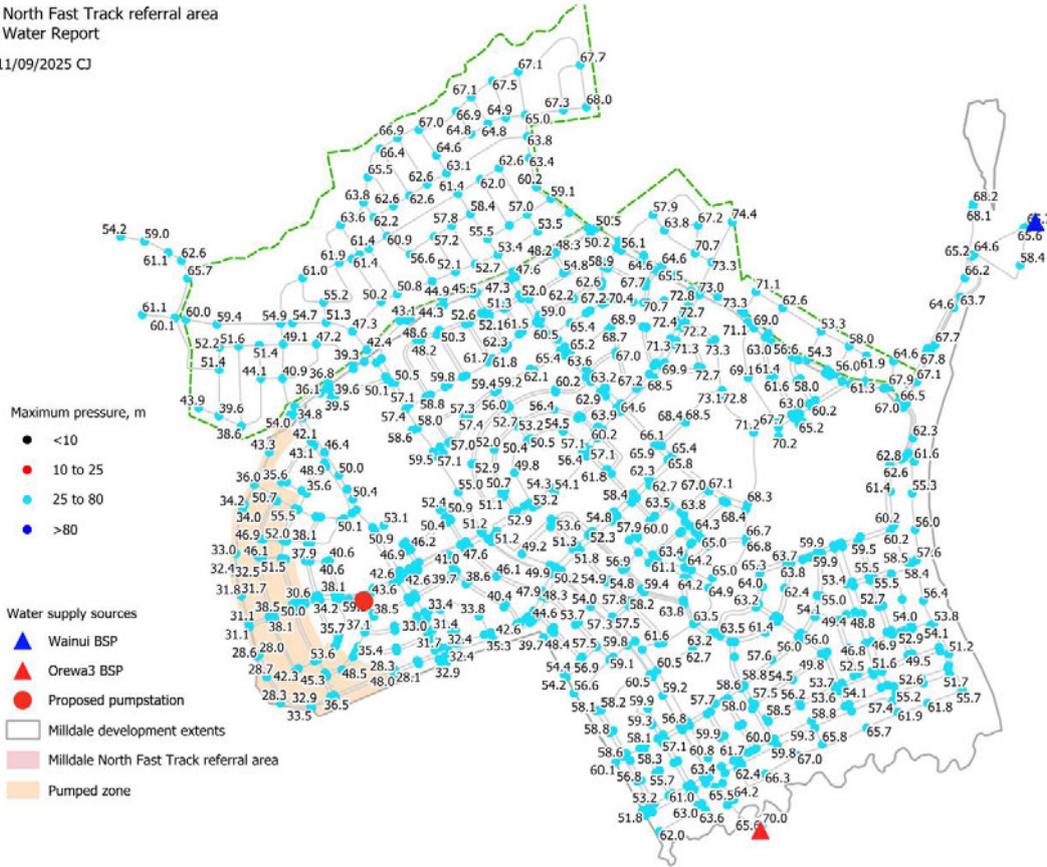


Milldale Development and Milldale North Fast Track Referral area

Maximum Pressure

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ

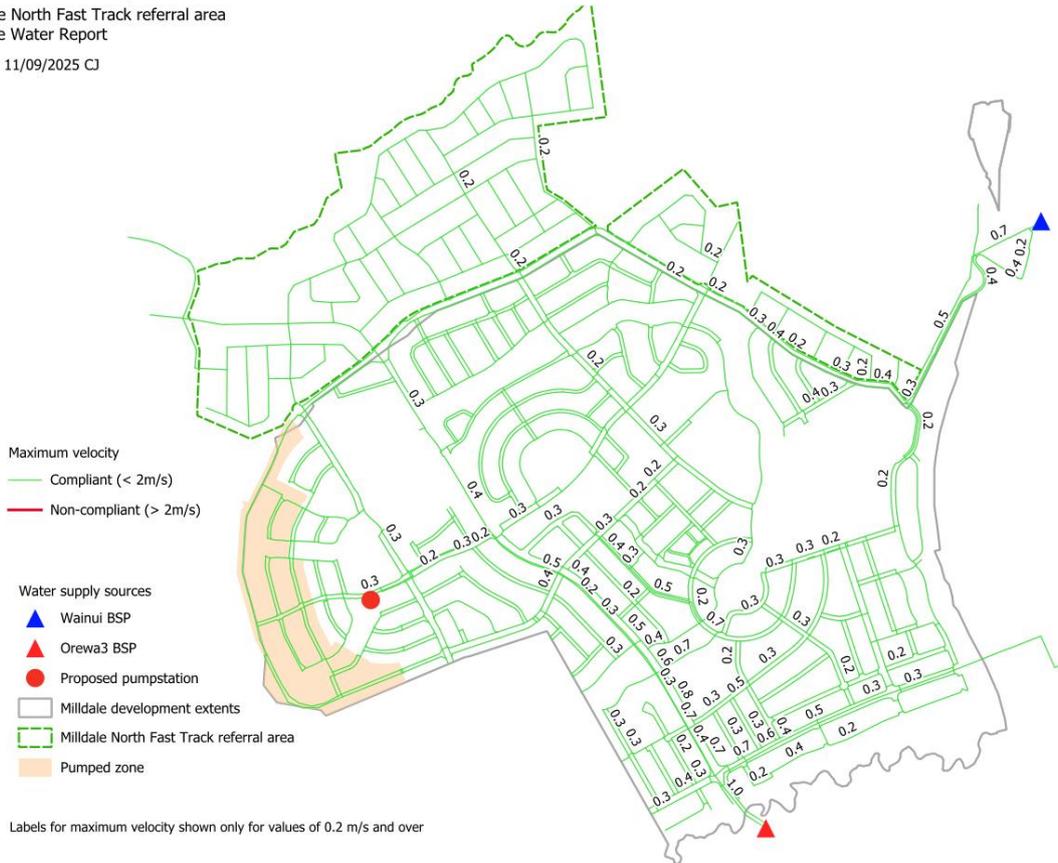


Milldale Development and Milldale North Fast Track Referral area

Maximum Velocity

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ



Milldale Development and Milldale North Fast Track Referral area

Maximum Headloss

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ

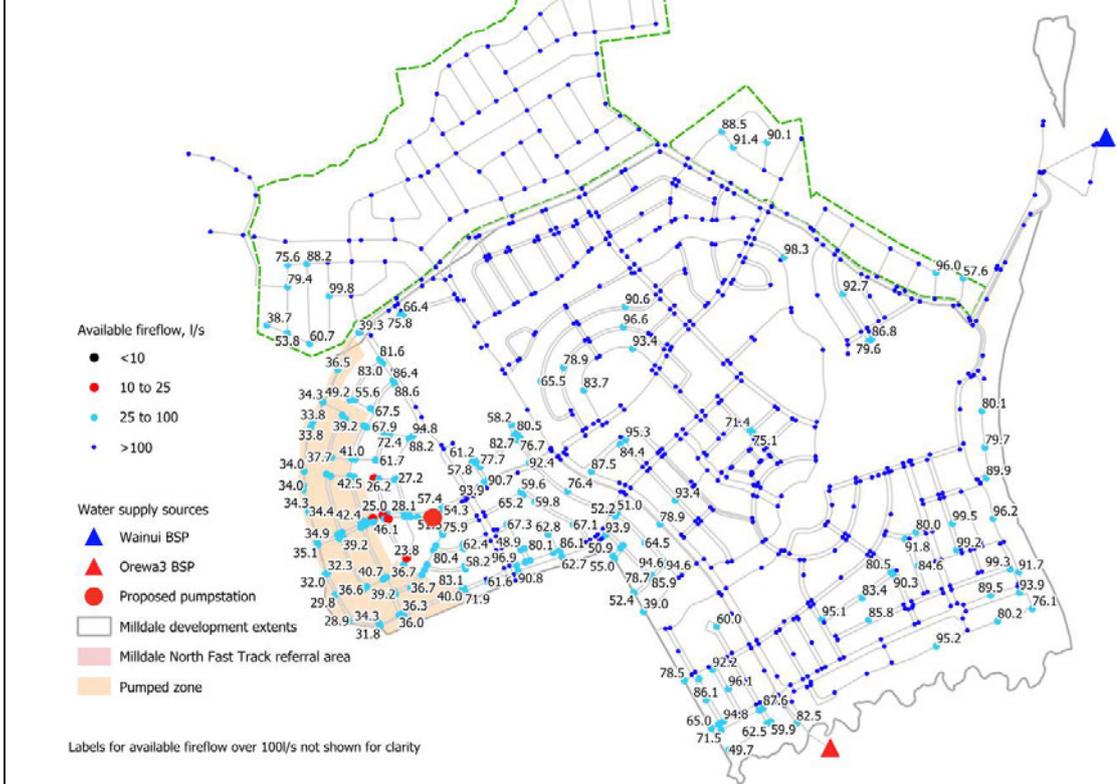


Milldale Development and Milldale North Fast Track Referral area

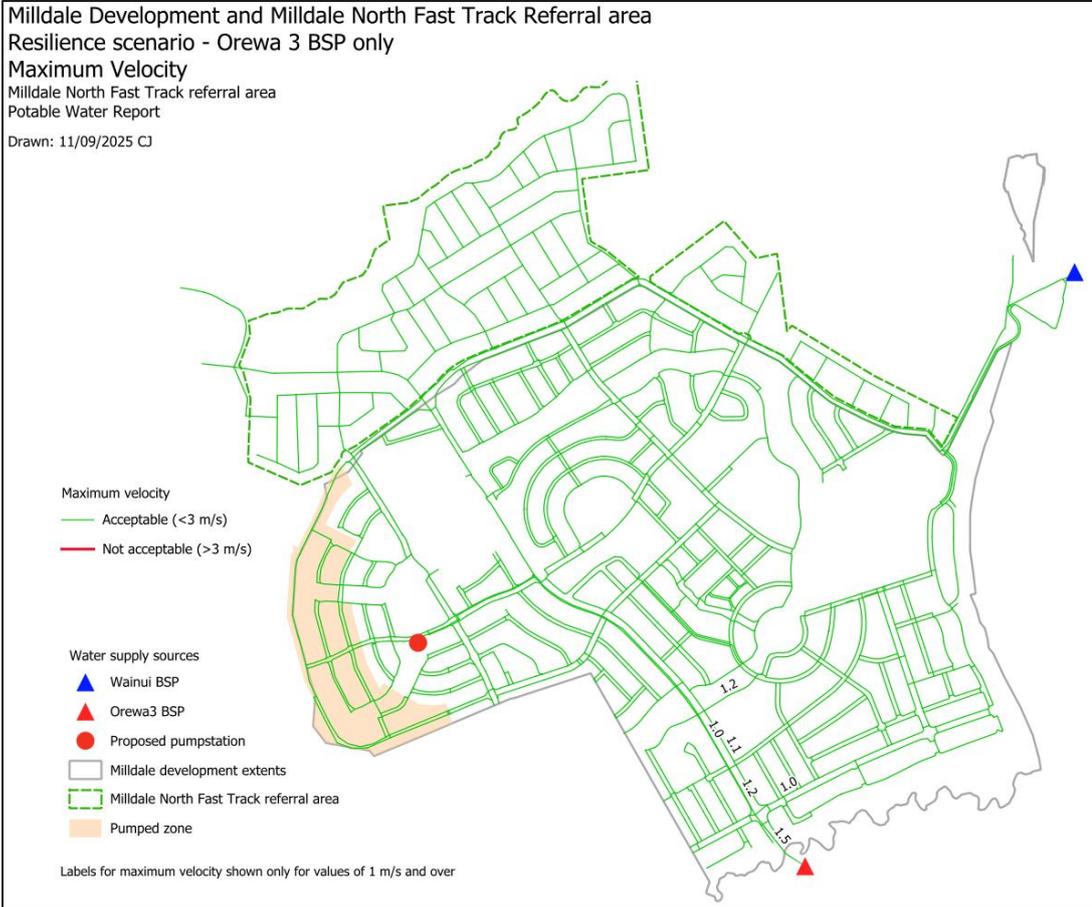
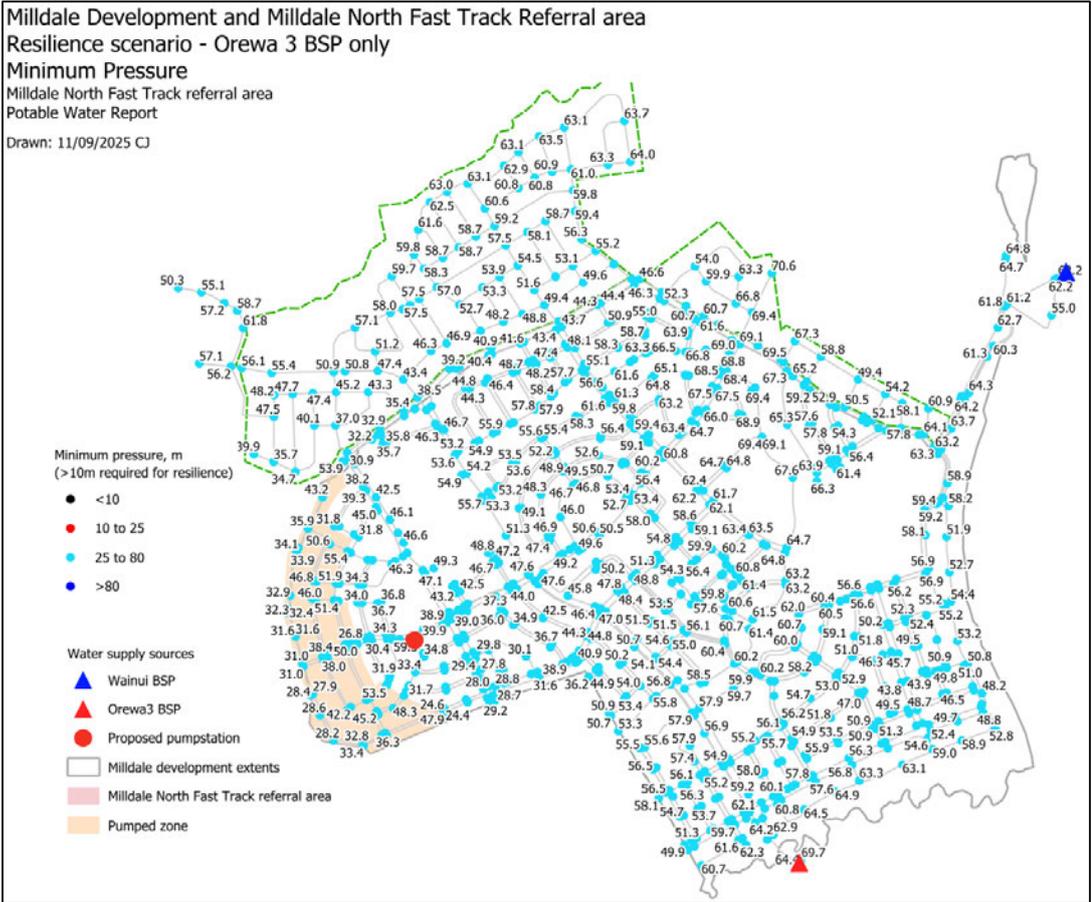
Available Fireflow

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ



Resilience scenarios



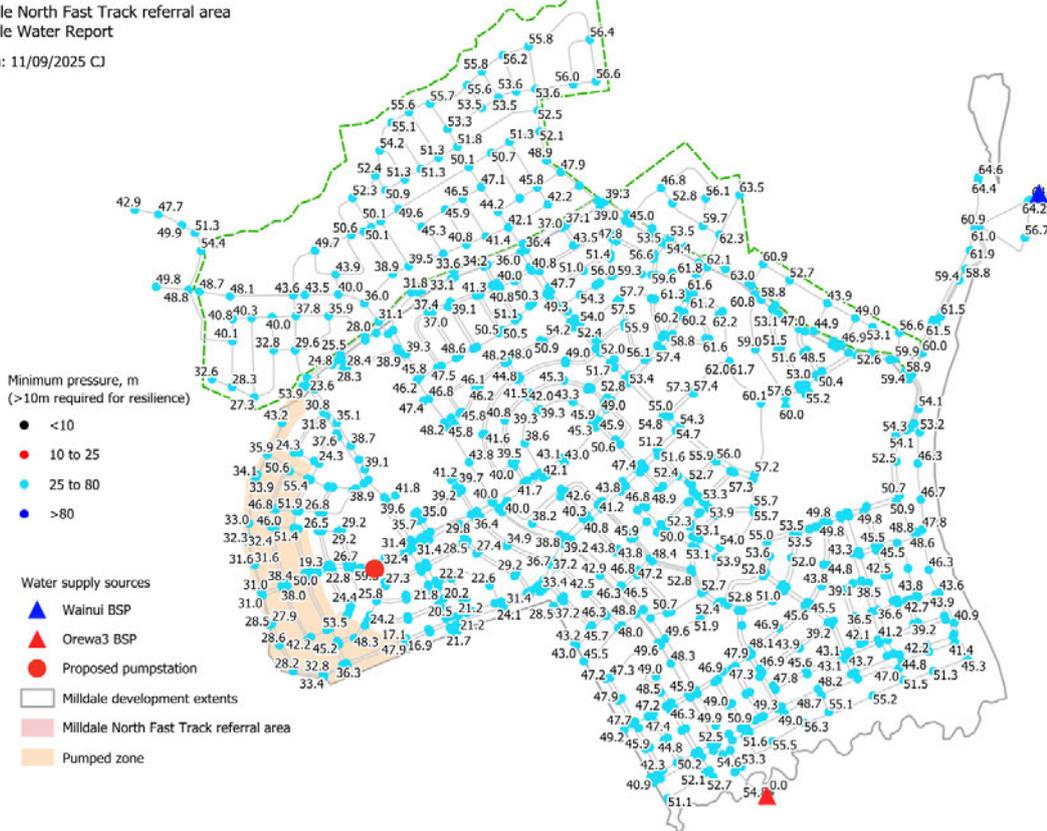
Milldale Development and Milldale North Fast Track Referral area

Resilience scenario - Wainui BSP only

Minimum Pressure

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ



Milldale Development and Milldale North Fast Track Referral area

Resilience scenario - Wainui BSP only

Maximum Velocity

Milldale North Fast Track referral area
Potable Water Report

Drawn: 11/09/2025 CJ

