ENVELOPE

CIVIL INFRASTRUCTURE REPORT

Mt Welcome

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1.0 EXECUTIVE SUMMARY

INTRODUCTION

This Infrastructure Report is intended to support a Fast-Track Approvals Act 2024 application for the Mt Welcome development within the Porirua Northern Growth Area (NGA). It outlines the key infrastructure requirements, opportunities, and constraints to enable the construction of 949 new homes and a 1.3-hectare commercial centre. While Envelope has led the civil and servicing design, the report draws on specialist inputs from ENGEO (geotechnical), BlueGreen Ecology (ecology), Pattle Delamore Partners – PDP (hydrology, contamination, water quality), Heritage & Archaeology Services Ltd (archaeology), BLAC (landscape and urban design), and Stantec (transport), and is intended to be read alongside their respective reports to demonstrate compliance with Porirua City Council, Greater Wellington Regional Council, and Wellington Water requirements.

EARTHWORKS

The development requires significant earthworks to form stable, buildable platforms across moderately steep and undulating terrain. The design approach achieves a cut-fill balance, minimises off-site disposal, and avoids ecologically sensitive areas. Erosion and sediment control will follow Greater Wellington Regional Council (GWRC) guidelines, with measures such as sediment ponds and staged construction utilised to manage runoff. A draft Earthworks and Construction Management Plan (ECMP) is appended to this report and outlines the proposed earthworks methodology and environmental controls.

ROADING

The proposed primary road network generally follows the Northern Growth Area (NGA) Structure Plan and has been designed to suit the site's varied topography. It establishes a connected, safe, and efficient local network that provides access throughout the development and integrates with State Highway 59 via a new roundabout at the main entry to the development. The internal roads include collector routes, local streets, and shared access lanes designed to support low-speed residential traffic and provide for walking and cycling. Pedestrian paths, on-road cycle lanes, and recreational trails connect homes, open spaces, and the commercial centre, ensuring a well-linked and accessible neighbourhood.

STORMWATER

Stormwater management focuses on protecting sensitive downstream environments, including Taupō Swamp and Te Awarua-o-Porirua Harbour. The strategy uses a combination of underground networks, raingardens, four large retention wetlands, and smaller basin to manage post development discharge and water quality. These systems will ensure post-development discharges match pre-development levels, achieving hydraulic neutrality and meeting the requirements of Wellington Water (WWL) and GWRC.

WASTEWATER

A primarily gravity-based wastewater system will service the development, with several small pump stations and low-pressure systems in areas where gravity is not feasible. The network has been designed to integrate with the neighbouring Muri Road development and connect to the existing SH59 trunk main. Some upgrades to the downstream wastewater network are required to improve capacity to cater for this development. These consist of three discrete sections of pipe upgrades which are proposed to remedy the downstream constraints. Ongoing coordination with Wellington Water to confirm the timing of these upgrades and the operation of the new infrastructure will ensure network performance and future resilience.

WATER SUPPLY

The site will be supplied by both the existing Pukerua Bay reservoir and a new 3.7 ML shared reservoir located on the Muri Road block. A new DN225 bulk main and pump station will transfer water from the existing bulk main in SH59 to the new reservoir, which will in turn supply the elevated areas within Mt Welcome. The reservoir is currently being consented under a separate application. The reticulation network has been designed in accordance with Wellington Water RSWS and ensures adequate pressure, fire-fighting capacity, and network redundancy.

UTILITIES

Telecommunications providers (Tuatahi First Fibre and Chorus) have confirmed that they have infrastructure in the SH59 corridor available to service the proposed development.

Wellington Electricity (WE) have advised that some reinforcement of their existing network will be required to enable power supply to the site. Wellington Electricity are currently preparing an assessment to identify the necessary network upgrades.

No gas network is proposed for the residential or commercial areas.

SUMMARY

The proposed infrastructure provides a coordinated and practical servicing solution for Mt Welcome, enabling staged delivery of 949 homes and a commercial centre. The design meets regional and local standards, integrates with adjoining land, and supports the long-term vision for the Porirua Northern Growth Area.

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2.0 INTRODUCTION

2.1 BACKGROUND

The proposed development is located south of Pukerua Bay, within the Porirua Northern Growth Area. This land was rezoned as part of Council-led Plan Variation 1 to Plan Change 19 (PC19), which was notified in 2022 and is now operative.

This report addresses the civil engineering components of the project to support a Fast-track application under the Fast-track Approvals Act 2024.

2.2 LOCATION

The site is located at 422, 422A and 422B State Highway 59, Pukerua Bay, and encompasses a total area of 205.60 hectares. It formally comprises the following land parcels:

- Part Lot 1 DP 89102 (4.38 ha)
- Lot 2 DP 891020 (5.64 ha)
- Lot 1 DP 534864 (55.33 ha)
- Lot 2 DP 534864 (140.25 ha)
- Lot 1 DP 608433, Lot 1000 DP 608433 (34 Muri Road)
- Road Reserve (SH59 Corridor)

References to "the site" within this report refer collectively to all seven allotments, unless stated otherwise.

The site is situated in a rural area south of Pukerua Bay and north of Plimmerton, within the Porirua City boundaries in the Wellington region. It is bounded by State Highway 59 to the west and three adjoining land blocks to the north, east, and south.

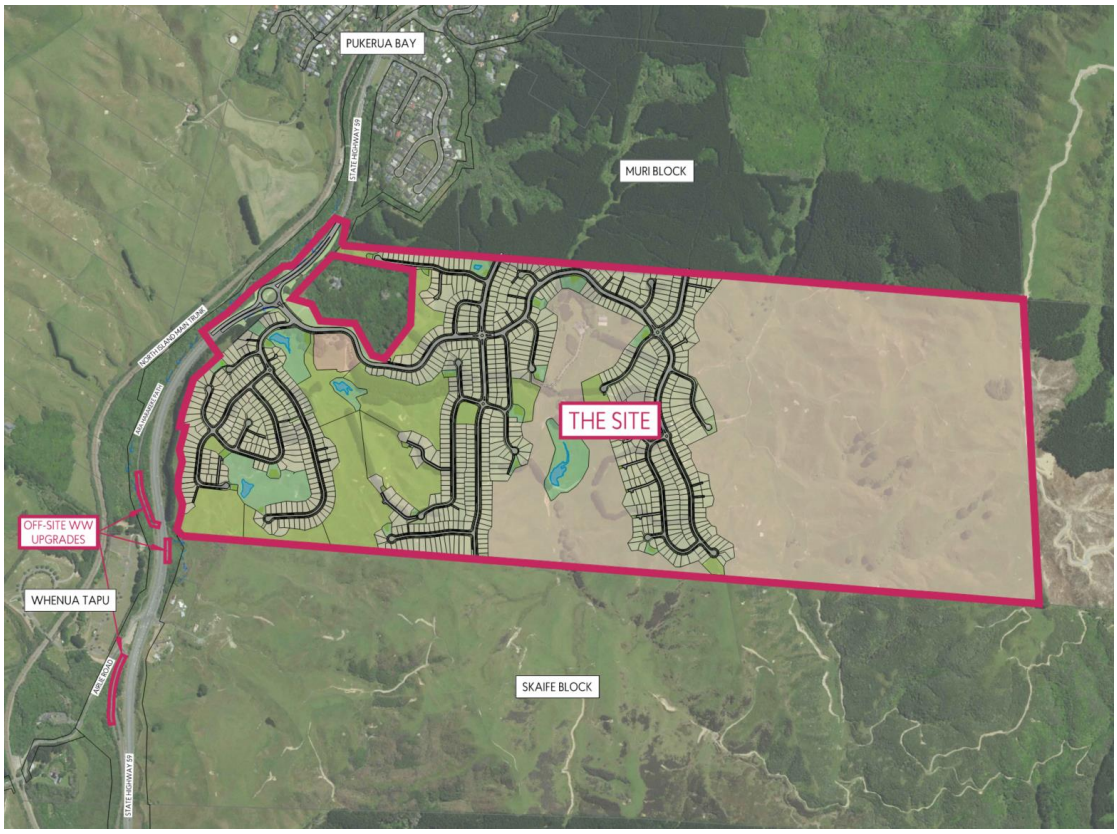

Figure 1. Site Extents Plan – Entire Site.

2.3 SCOPE

The scope of works includes:

- Earthworks and Erosion & Sediment Control – Bulk earthworks design including cut/fill balance, retaining structures, and management of unsuitable material. Incorporates erosion and sediment control measures consistent with the GWRC Erosion and Sediment Control Guide.
- Roading –Design of the internal road network, intersections, and connections to the external transport network. The design includes geometric and cross-sectional design, provision for walking, cycling, and public transport, and integration of a new intersection with State Highway 59 (SH59).
- Stormwater – Design of the primary and secondary stormwater systems, including piped reticulation and centralised treatment, retention, and detention devices. The system is designed to achieve hydraulic neutrality, provide effective water-quality treatment, and ensure protection of downstream environments.
- Wastewater – Gravity and pumped wastewater reticulation including upgrades to the SH59 bulk main. Design scope includes capacity assessments, modelling and coordination with the adjacent Muri Road development for shared infrastructure.
- Water Supply – Design of the potable water network, including reticulation, service connections, and to meet requirements for flow, pressure, and fire-fighting capacity.
- Utilities Servicing – Provision for underground power, telecommunications, and fibre services. project objectives

2.4 PROJECT OBJECTIVES

The Mt Welcome development seeks to deliver safe, efficient, and sustainable infrastructure to support 949 homes and a commercial area. The project will carry out earthworks to provide a stable landform, provide a connected roading network, manage stormwater through wetlands and raingardens, and deliver resilient wastewater and water supply systems. All works will meet council and regional standards, be staged to support growth, and protect the natural environment.

3.0 PLANNING CONTEXT

3.1 COUNCIL-LED PLAN CHANGE

Porirua City Council (PCC) initiated Variation 1 to the District Plan to rezone land within the Northern Growth Area for residential development. This variation has now been made operative. As part of the plan change process, a series of technical reports were prepared to support the rezoning. From a civil infrastructure perspective, these reports assessed the bulk servicing requirements needed to service future development.

3.2 STRUCTURE PLAN

The Northern Growth Area (NGA) Structure Plan establishes the framework for coordinated development across the Mt Welcome and Muri Road block, ensuring integrated land use, transport, and infrastructure outcomes. The Structure Plan defines the layout of key roading corridors, pedestrian and cycle connections, open space networks, and the sequencing of bulk infrastructure required to support urban development.

The Structure Plan encompasses both the Mt Welcome and Muri Road developments, ensuring a coordinated and consistent approach to urban form, transport, and servicing across the wider catchment. The Muri Road block, located immediately north of Mt Welcome and under separate ownership, is integrated within the overall framework. Both developments will share key infrastructure, including transport connections, pedestrian links, wastewater storage and a water reservoir site. Collaborative discussions between the landowners are ongoing to coordinate the design and delivery of infrastructure across the shared boundary.

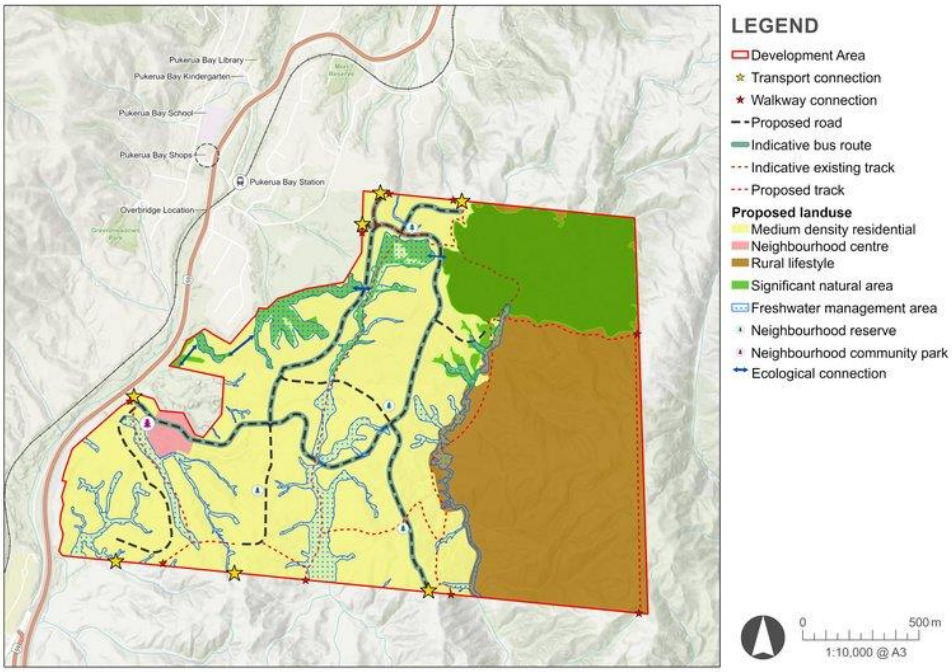

Figure 2. Northern Growth Area Structure Plan

4.0 THE SITE

4.1.1 EXISTING LAND USE & TOPOGRAPHY

The site is currently used as a deer farm, comprising predominantly pastoral grassland with several existing homesteads, farm sheds, and associated agricultural infrastructure. Historical aerial imagery dating back to 1942 shows the land as open pasture, and it has remained pasture since that time, with no significant changes in land use or built development.

The topography is varied and includes some land that is moderately steep and undulating, with elevations ranging from approximately RL 50 m near the western boundary (adjacent to SH59) to RL 300 m at the eastern extent of the site. The landform includes three prominent high points separated by two gullies. The western portion of the site comprises of rolling hills and shallow gullies, while the central and eastern areas are steeper, with slopes typically between 26° and 45°, and locally exceeding 45° in areas.

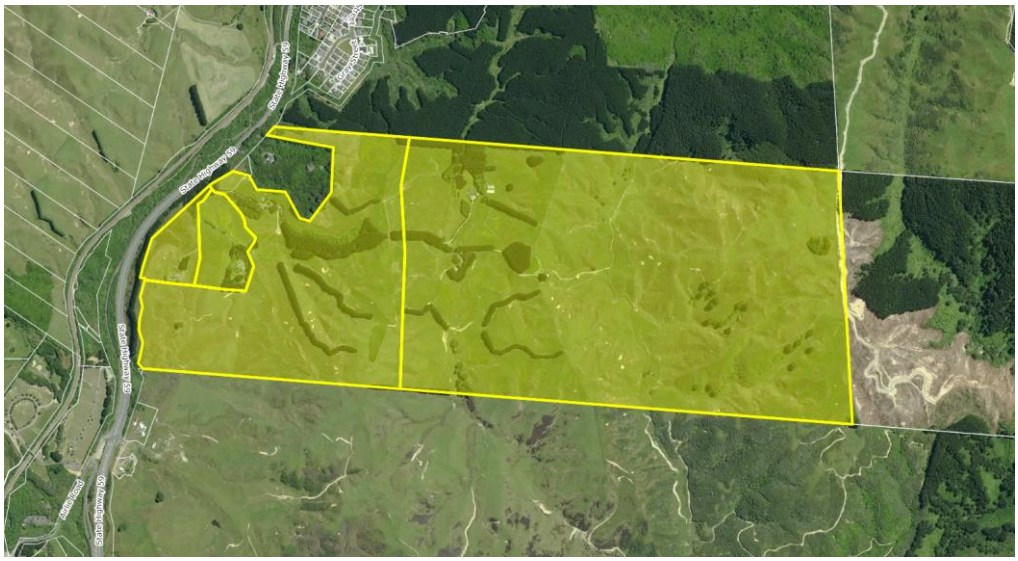

Figure 3. Existing Site Plan

4.2 PROPOSED DEVELOPMENT

The proposed development comprises 949 residential allotments ranging in size from 316m² to 2,386m², enabling the construction of 949 future dwellings with an average lot size of around 523m². The development also includes a commercial centre to serve the new local community, together with associated three-waters infrastructure (wastewater, including storage facilities; stormwater management systems; and water reticulation), roading, and a connected network of pedestrian and cycling trails.

Earthworks will be undertaken to establish suitable finished surface levels for building platforms, roads, parks, and drainage systems. The proposal will also incorporate extensive landscaping and public open spaces, including recreation and drainage reserves for stormwater attenuation and conveyance. A new intersection with State Highway 59 will provide primary access to the site and integrate the development with the wider transport network.

4.3 COMMERCIAL AREA

A 1.3-hectare commercial centre is proposed on the main entry road to the development, nearby the new SH59 intersection. It is located within the neighbourhood centre zone identified in the Structure Plan. It is currently intended as mixed-use centre with a small supermarket, early childcare centre, and retail and hospitality spaces. This proposed land-use has been incorporated into all relevant infrastructure design calculations presented in this report, including impervious surface allowances for stormwater management, commercial wastewater flows, and water-demand assessments.

At the detailed design stage, once the commercial area layouts are confirmed, secondary earthworks and civil works will be undertaken to finalise site levels, drainage, and service connections in accordance with the development design.

4.4 RESERVES AND OPEN SPACE

The development incorporates a network of reserves and open spaces that provide both ecological and recreational functions. The layout follows the *Mt Welcome Landscape and Urban Design Strategy* (BLAC, 2025), which establishes green corridors linking residential areas, reserves, wetlands, and the neighbourhood centre.

This network includes existing landform, gullies, and wetlands, with improvements designed to enhance biodiversity and visual amenity. Stormwater management has been considered, and a variety of stormwater design measures have been integrated into this open space network. Steeper slopes are retained as natural open space, with walking tracks, parks, and playgrounds positioned along ridges and valleys to connect key areas. The reserve system also strengthens links from the site to Pukerua Bay and the Muri Road block.

4.5 DEVELOPMENT STAGING

Staging of the development will be undertaken to enable a progressive delivery of housing. Indicative staging is shown on the scheme plans in Appendix 1 and summarised in Table 1 below. A total of 24 stages are proposed. It is recommended that conditions provide for flexible staging to occur, provided that appropriate infrastructure is in place for each stage.

Table 1. Development Staging

Stage	Lots	Stage	Lots
Stage 1	54	9	55
Stage 2	57	10	42
Stage 2b	19	11	48
Stage 3a	37	12	56
Stage 3b	22	13	43
Stage 4a	32	14	47

Stage	Lots	Stage	Lots
Stage 4b	32	15	21
Stage 5a	Commercial	16a	43
Stage 5b	62	16b	23
Stage 6	48	17	48
Stage 7	37	18	39
Stage 8	44	19	40

Prior to the subdivision of the final individual lots, four super lots will be created to facilitate staging of the development. These super lots will subsequently be further subdivided into the individual residential lots as each stage progresses. This approach enables more efficient delivery of infrastructure, supports commercial flexibility, and allows for continued interim agricultural use of undeveloped areas.

5.0 MANA WHENUA VALUES

5.1.1 GENERAL

This Infrastructure Report has been prepared to manage freshwater values in a manner consistent with Te Mana o te Wai and the principles of the National Policy Statement for Freshwater Management.

Mana whenua values, as expressed by Ngāti Toa Rangatirathe iwi with mana whenua status over the Porirua catchment—have been recognised across all infrastructure components, including earthworks, stormwater, wastewater, water supply, transport, and open space planning.

5.1.2 CONSULTATION

Engagement with Ngāti Toa Rangatira has been ongoing throughout the design and development process, ensuring iwi values and cultural considerations are incorporated into the design and implementation of the project. A summary of engagement is outlined below:

- 10 June 2025 – Initial meeting: Project overview, timeframes, process, and discussion of key issues to work through.
- 19 June 2025 – Site visit: Initial site orientation and walkover of the Lower Terrace to familiarise iwi representatives with the project area.
- 25 September 2025 – Hui: Progress update in response to further information sought on Structure Plan compliance, stormwater management, ecology, and works in waterways.
- 13 October 2025 – Site visit: Follow-up visit to discuss key areas of interest including the design of the roundabout, approach to ecology and archaeology, attended by the applicant's planning, ecology, archaeology, and engineering experts.
- 05 November 2025 – CVA: A Cultural Values Assessment was received and reviewed by the project team, which provided several comments on the development proposal and highlighted a number of matters. A follow-up meeting was subsequently scheduled, and these matters will be addressed through the AEE.

6.0 SAFETY IN DESIGN

6.1.1 GENERAL

A Safety in Design (SiD) process has been initiated for the Mt Welcome infrastructure works in accordance with the Health and Safety at Work Act 2015 and standard industry practice. The purpose is to identify and address potential health and safety risks throughout the design, construction, and operational stages of the development.

6.2 RISK IDENTIFICATION

Preliminary risk identification has been undertaken during the design phase to consider hazards associated with key civil and servicing activities. These include excavation and trenching for drainage systems, installation of underground utilities, construction around raingardens and other stormwater treatment devices, roading alignment and sightlines, and interactions between construction plant and the public. No specific items have yet been recorded in the SiD register; however, the register will be developed and populated as the detailed design advances toward construction.

6.3 MITIGATION MEASURES

The design seeks to eliminate or reduce risks through the design process in consultation with the wider team. Measures include minimising excavation depths where practicable, maintaining clear sightlines for vehicles and pedestrians, providing adequate edge protection around open structures and stormwater devices, and ensuring utilities and crossings are located to avoid conflicts with traffic and pedestrians. Residual risks identified during later design stages will be documented in the SiD register and communicated to the contractor for inclusion in construction safety planning.

7.0 EARTHWORKS

7.1 OVERVIEW AND DESIGN OBJECTIVES

The earthworks design aims to achieve a balanced, and environmentally conscious outcome that supports the overall development. Key objectives include:

- Comply with Greater Wellington Regional Council (GWRC)'s Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region.
- Ensure geotechnical compliance in accordance with geotechnical engineer (ENGEO) recommendations.
- Incorporate ecological requirements in line with ecologist (Blue Green Ecology) and hydrological (PDP) advice.
- Achieving a practical cut–fill balance and minimising material disposal off-site.
- Eliminate the need for future secondary earthworks.
- Incorporate ecological and environmental constraints into the design.
- Stage works to enable progressive development and minimise exposed areas.
- Apply Safety in Design principles and identify project specific risks

7.1.1 DESIGN STANDARDS & COMPLIANCE

The following documents and standards have been adopted for the design and assessment of earthworks:

- GWRC Erosion and Sediment Control Guide for Land-Disturbing Activities in the Wellington Region (2021)
- ENGEO Geotechnical Report
- Blue Green Ecology Report
- PDP Hydrological Advice
- PDP Preliminary Site Investigation Report
- Heritage & Archaeology Services Ltd Archaeological Report

7.2 GEOTECHNICAL CONSIDERATIONS

ENGEO have completed a geotechnical report for the Mt Welcome development, which should be read in conjunction with this report. The key points relevant to the proposed civil works are summarised below:

- The site is located approximately 500 m from the mapped trace of the Pukerua Fault, within a seismically active area that also includes the Ohariu and Wellington Faults. While the site is not

directly traversed by a known fault, ground rupture and regional subsidence could occur during a major seismic event on nearby or unmapped faults.

- Liquefaction risk is considered low within the developable areas but may occur locally in low-lying gullies and valley floors.
- Groundwater was recorded between approximately 0.4 m and 3.8 m below ground level, varying seasonally and by location. Continued groundwater monitoring is recommended to inform the detailed design of earthworks, retention wetlands, and slope stability assessments.
- Slopes steeper than 25 degrees require specific engineering assessment and mitigation where development is proposed above or below them. Specifically Engineered Design (SED) zones should be applied in these areas.
- Most surficial soils and Greywacke rock are suitable for reuse as engineered fill, subject to verification and field compaction testing.
- Detailed design of the proposed stormwater retention wetlands and adjacent embankments is required by a chartered professional engineer.
- Installation of piezometers for ongoing groundwater monitoring for a minimum of four months prior to major earthworks is recommended to support final design and construction staging.

7.3 CONTAMINATION ASSESSMENT & REMEDIATION

Pattle Delamore Partners (PDP) have been engaged to carry out a Preliminary Site Investigation (PSI) to assess the risk of any previous land activities on the health of future residents. The investigation identified potential contamination sources from historical sheep dip/spray race operations and from older buildings that may have contributed asbestos and lead residues to surrounding soils.

PDP recommend that areas associated with these potential HAIL activities are subject to a Detailed Site Investigation (DSI) to confirm the extent of contamination and whether the National Environmental Standard for Assessing and Managing Contaminants in Soil (NESCS) will be triggered. An asbestos survey will also be required prior to demolition of existing buildings, with shallow soil testing undertaken around building footprints.

A Soil Management Plan (SMP) will be required for the duration of the earthworks to manage the potential discovery of contaminated soils and to set out safe handling and disposal requirements. Any soils to be removed from site will require testing against landfill acceptance criteria before disposal to an approved facility.

Following remediation and development works, a Site Validation Report (SVR) will be required to confirm that all remediation has been undertaken in accordance with the SMP and NESCS requirements.

7.4 ECOLOGY AND ENVIRONMENTAL

BlueGreen Ecology have prepared the ecological assessment for the site. Their investigations identified that the existing streams, wetlands, and terrestrial habitats are of low ecological value, being largely exotic and modified by historic farming activities.

Ecological enhancement measures have been integrated into the earthworks design, including riparian planting and sediment treatment feature

7.5 ARCHAEOLOGICAL ASSESSMENT

The Archaeological Assessment found no recorded sites within the project area but noted a possibility of uncovering unrecorded remains during earthworks. An Archaeological Authority is recommended, along with archaeological monitoring, recording, and information recovery if discoveries occur. Any demolition or modification of pre-1900 buildings will also require assessment and recording by a built heritage specialist.

7.5.1 BULK EARTHWORKS

This section summarises the extent and purpose of proposed bulk earthworks and the design approach adopted to achieve a balanced and stable landform.

Bulk earthworks will need to facilitate a balanced approach between cut and fill, ensuring there is no excess material requiring removal from site or additional material import, achieve compliant road gradients, and produce flat buildable house sites. This will also minimise the need for secondary earthworks, retaining requirements and encourage batter slopes to be designed at grades to minimise the time required for rehabilitation and revegetation post earthworks. The methodology for the earthworks is outlined within the ECMP. Autodesk Civil 3D 2025 was used for overall 3D model design and plan production. A complete set of plans can be found in Appendix 1. The earthworks proposed on the site consist of:

- Total earthworks area: 81.46 ha.
- Topsoil stripping is estimated at 128,000m³, assuming an average depth of 300 mm.
- Subgrade preparation is assumed to extend 200mm below finished ground level (FGL).
- Maximum cut height is approximately 21m, and maximum fill depth is approximately 24m.
- Total earthworks area: 81.46 ha.
- Total cut volume: 1,905,000m³.
- Total fill volume: 1,806,000m³.
- Approximately 135,000m³ of unsuitable material allowance

These volumes are solid volumes and make no allowances for bulking as advised by the geotechnical engineer based on field experience in similar ground conditions.

A cut/fill balance has generally been achieved meaning no earthworks are intended to be removed from the site, subject to detailed geotechnical testing and civil design. Ground material that is unsuitable has been accounted for and will generally be disposed of on site in the designated unsuitable fill area, as detailed below.

To achieve a cut/fill balance, certain gullies and low-lying areas will be utilized for placement of fill material. Through close collaboration with the ecology team, we have identified areas of lower ecological value that can accommodate earthworks, alongside areas that have higher ecological sensitivity and should be protected or enhanced. Is it expected these gullies will contain material unsuitable for fill, and fill be disposed of within the fill site as detailed below.

Excess topsoil material will be managed in accordance with the ECMP and placed within the designated unsuitable material stockpile. Topsoil identified for reuse will be stockpiled around the perimeter of the earthworks area for later reinstatement within lots and berms upon completion of civil works. All topsoil stockpile locations and management measures will be shown on the certified Erosion and Sediment Control Plans.

7.5.2 EARTHWORKS STAGING

The earthworks will be carried out in a staged approach. These stages have been designed to enable the civil works to be carried out as outlines in the development staging and to balance earthworks. They have also been designed to be carried out in an earthworks season. Prior to the commencement of each stage of earthworks a detailed ECMP will be submitted for certification prior to commencement.

Table 2. Earthwork Staging

Stage	Area (ha)	Cut (m³)	Fill (m³)	Unsuitable (m³)	Enables Civil
Stage 1	10.2ha	195,000	167,500	27,500	Stage 1, 5A
Stage 2A	8.2	230,000	75,000	10,000	Stage 2A, 2B, 3A, 3B
Stage 2B	4.7	50,000	187,500	2,500	Stage 4A, 4B
Stage 2C	15.9	7,500	10,000	2,500	SH59
Stage 3	11.6	250,000	220,000	30,000	Stage 5B
Stage 4	12.4	320,000	31,0000	10,000	Stage 6, 7, 8, 9

Stage	Area (ha)	Cut (m³)	Fill (m³)	Unsuitable (m³)	Enables Civil
Stage 5	2.8	32,500	30,000	2,500	Stage 10
Stage 6A	11.7	257,500	182,500	15,000	Stage 11, 13, 14
Stage 6B	2.2	15,000	95,000	7,500	Stage 12
Stage 7	10.5	380,000	360,000	20,000	Stage 15, 16A, 16B, 17
Stage 8	6.0	177,500	170,00	7,500	Stage 18, 19
Total	**81.46**	**1,905,000**	**1,806,000**	**130,000**	

Detailed earthworks plans, including existing and proposed contours, cut–fill layouts, and staging plans, are provided in the 2000-series Civil Design Drawings in Appendix 1.

7.5.3 FILL SITE

A dedicated fill area has been incorporated into the development to minimise the need for off-site disposal of unsuitable material. The 2ha area has capacity for approximately 135,000 m³ of surplus material and will be contained by a structural bund, with finished grades designed at flatter slopes to ensure stability. Primarily clean, uncontaminated material will be placed within this area; however, if material with minor or localised contamination is encountered, it may be blended or encapsulated in accordance with a site-specific management plan.

7.5.4 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures have been developed in accordance with the Greater Wellington Regional Council (GWRC) Erosion and Sediment Control Guide for Land-Disturbing Activities in the Wellington Region (2021).

A preliminary Erosion and Sediment Control Plan (ESCP) has been prepared to demonstrate the feasibility of the proposed controls and forms part of this application. The plan includes catchment layouts, sediment retention pond (SRP) and decanting earth bund (DEB) sizing, and outlines the proposed methodology for gully filling and early-stage earthworks. Given the requirement for early fill placement, a temporary DEB will be utilised prior to SRP construction.

Ongoing monitoring will be undertaken in accordance with the Erosion and Construction Management Plan (ECMP), developed in collaboration with PDP, to address water quality testing and outflow monitoring requirements. The preliminary ESCP is provided on sheets 2300, with the detailed Stage 1 ESCP provided on sheets 2400, which also sets the standard for subsequent stages.

- SRP and DEB detailed sizing
- Construction methodology and staging
- Stabilized construction entrance will be utilised at the existing site entrance
- Silt fence installed along the site boundary
- Stormwater culvert sizing

7.6 EARTHWORKS AND CONSTRUCTION MANAGEMENT

Envelope have prepared a draft Earthworks and Construction Management Plan (ECMP) for works at the site, which should be read in conjunction with this report.

This plan is intended to provide the information required to establish a framework for the safe and environmentally conscious completion of earthworks and civil construction proposed to be undertaken for the project.

The intention of this document is to set out the key parameters and likely site conditions that are required to be considered to assist the contractor in preparing their site-specific ECMP, for which they will be contractually responsible.

It is not intended to be prescriptive, and the contractor will be free to propose alternative measures if they meet the minimum performance standards as outlined in this document and in accordance with the GWRC document "Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region – Issued Feb 2021" and if compliance is still achieved with the relevant conditions of consent.

It is our view that the erosion and sediment control design can be adequately addressed to ensure that potential adverse effects are managed and mitigated to an acceptable level. We consider that subject to employing the measures outlined above, there will be no significant adverse effects relating to the proposed earthworks. We propose finalising the ECMP as a condition of consent prior to the commencement of earthworks for each relevant stage.

7.7 FLOCCULATION MANAGMENET PLAN (FMP)

It is likely that control of sediment on this site will require the use of a flocculant and the use of this would be controlled a Flocculation Management Plan (FMP). We propose developing this as a condition of consent, to be certified by GWRC prior to commencing earthworks for each relevant stage.

7.8 WATER QUALITY

As large-scale earthworks progress, careful management of erosion and sediment generation will be essential, reinforcing the need for robust erosion and sediment control measures to maintain water-quality standards during and after construction.

Baseline water-quality monitoring is currently underway to establish existing conditions across the site. This provides a reliable pre-development benchmark against which future changes can be measured. While this dataset is still being finalised, baseline water-quality conditions will be confirmed prior to construction commencing for each stage. Testing locations are described in the PDP Hydrological Assessment.

8.0 ROADING AND ACCESS

8.1 OVERVIEW AND DESIGN OBJECTIVES

- Deliver a clear and connected road hierarchy suited to the site's topography.
- Achieve compliant road geometry, grades, and sight distances.
- Integrate pedestrian, cycle, and recreational paths to support multimodal travel.
- Design for future public transport within collector roads.
- Apply Safety in Design principles to reduce risks and promote safe operation.
- Provide resilient and attractive streetscapes with capacity for long-term growth.

8.2 DESIGN STANDARDS & COMPLIANCE

- Porirua City Council District Plan
- Porirua City Council: Code of Land Development and Subdivision Engineering, (2010)
- Porirua City Council: Track Standards Manual Version 1.2 – May 2014
- Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling
- Austroads Guide to Road Design Part 3: Geometric Design
- Austroads – Guide to Road Design, Part 4A

8.3 EXISTING ROADING

The Mt Welcome site has sole frontage and legal access to State Highway 59 (formerly State Highway 1), immediately south of Pukerua Bay. The existing driveway currently provides access to lifestyle blocks within the property.

SH59 in this location is a regional route, operating as a two-lane highway with a posted speed limit of 100 km/h, reducing to 50 km/h at the northern edge of Pukerua Bay. Daily traffic volumes adjacent to the site are around 9,000–10,000 vehicles per day.

There are currently no footpaths or cycle facilities within the SH59 corridor, however the Ara Harakeke shared path runs parallel on the western side of the highway, providing an off-road walking and cycling link between Plimmerton and Pukerua Bay, and connecting to nearby rail stations. Public transport in the area is served by the Kapiti Line rail service at Pukerua Bay Station to the north and local Metlink bus services from Pukerua Bay.

This significant reduction in highway traffic volumes at the site, associated with the opening of the Transmission Gully motorway (SH1), has created capacity within the SH59 corridor, enabling new growth and subdivision development without requiring major roading upgrades.

8.4 PROPOSED ROAD NETWORK

The roading layout and geometric design have been informed by earthworks and traffic modelling, with an emphasis on connectivity and compliant road grades. The primary network follows the Northern Growth Area (NGA) Structure Plan, linking to both SH59 and the Muri Road block. Two southern connections have not been included due to engineering and ecological constraints, as detailed in this report and within the AEE.

The roading design plans are provided in the 3000-series Civil Design Drawings in Appendix 1.

8.4.1 PARKING

On-street parking will be provided throughout the development via designated parking bays. Provision of parking bays will be alternate with grassed berms or landscape areas. The total number of spaces proposed has been determined in consultation with the traffic engineer. Given the high frequency of driveway crossings, some parking bays overlap with driveways. These bays have been designed with increased crossfall to minimise kerb lips and ensure smooth vehicle access, reducing the likelihood of future rework or non-compliant alterations by property owners. No-parking restrictions will be applied across driveways, and bays have been sized to ensure adequate parking without encroaching into private accessways.

The development layout has been designed to provide an appropriate balance of on-street and off-street parking, sufficient to meet the anticipated parking demands associated with the scale and nature of the proposed activities. Off-street parking spaces will comply with the *Porirua District Plan* requirements, providing a minimum width of 2.1m and a length of 5.0–6.6m, depending on adjacent obstructions.

8.4.2 PEDESTRIAN, CYCLING AND MULTI MODAL TRANSPORT

Pedestrian footpaths have been designed at varying widths across the development. Along collector roads, footpaths will generally be 2.5m wide on one side and 2.0m on the other, providing shared space for pedestrians and non-commuter cyclists. On local roads, 1.8 m footpaths will typically be provided on both sides, with single-sided footpaths applied to smaller road classifications in accordance with the PCC Code of Practice.

8.4.3 CYCLE AND COMMUTER PATHS

Commuter cycle lanes are incorporated within the collector roads across the development, each 1.8 m wide and located within the carriageway, consistent with the Northern Growth Area (NGA) Structure Plan provisions. These routes will connect to the northern block, providing future access to the Pukerua Bay train station while avoiding direct reliance on SH59.

8.4.4 RECREATIONAL TRACKS & TRAILS

Recreational tracks have been designed in collaboration with the landscape architect to create walking routes through otherwise inaccessible terrain. These routes will strategically link key features of the development, including recreational reserves, commercial areas, and connections to both the Muri Road block to the north and to the southern boundary of the site.

8.4.5 STREETSCAPE

Drainage services have been designed within the carriageways to allow for tree planting within berms and the integration of other landscape elements, while avoiding conflicts with drainage infrastructure. The Landscape and Urban Design has been prepared by Blac as part of the Landscape and Urban Design Strategy.

8.5 ROAD CLASSIFICATIONS

The proposed roading network comprises six primary road typologies across three road classifications. A map illustrating these is provided in Figure 4 below. Each classification is discussed in further detail below in this report, with the detailed proposed roading plans included in the 3000-series Civil Design Drawings within Appendix 1.

Figure 4.: Road Classification

8.5.1 COLLECTOR ROADS (21.7M–18.6M)

Collector roads have been designed to accommodate public transport, shared paths, and dedicated cycle lanes, forming the primary connection to the proposed SH59 roundabout. Vertical grades and turning radii have been developed to support future bus operations, with bus stop locations to be confirmed in consultation with GWRC. 5 primary cross-section types are proposed:

- **Type A & B:** Standard Collector Road, 7m carriageway, 1.8m on-road cycle lanes, 2.5m kerbside parking or berms on both sides, a 2.5m shared path on one side, and a 2m footpath on the other. This road type will continue into the Muri block to the north
- **Type C**: Collector Road adjacent to steep topography (entry to site), 7m carriageway, 1.8m on-road cycle lanes on both sides, 2.5m kerbside parking or berm on one side, a 2.5m shared path, and a 3.5m berm on the opposing side.
- **Type D & E**: Collector Road specifically for Road 2, 7m carriageway, 2.5m kerbside parking or berms on both sides, a 2.5m shared path on one side, and a 2m footpath on the other. This road type provides access to the Skaiffe block to the south.

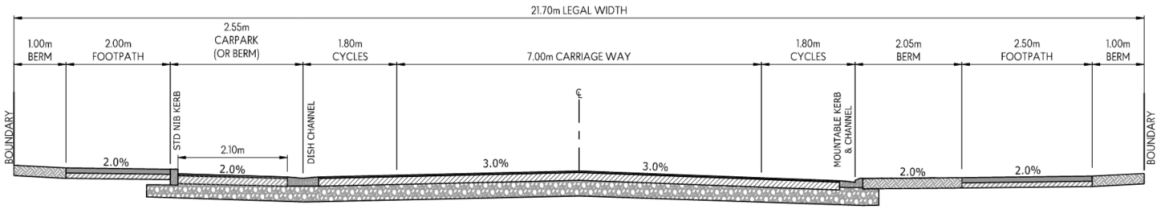

Figure 5.: Typical Cross-Section **(A)** Collector – 21.7m With Cycleway and Carpark

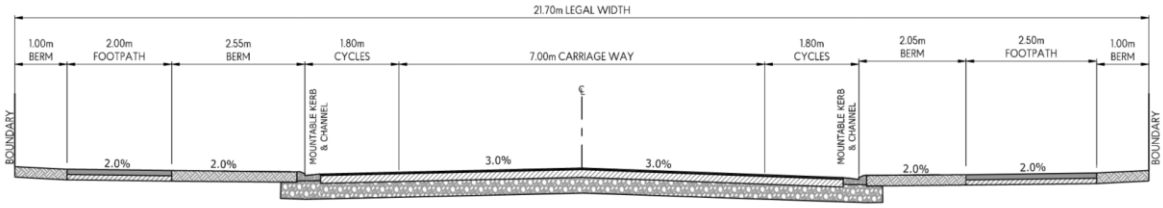

Figure 6. Typical Cross-Section **(B)** Collector - 21.7mwith Cycleway and Berm

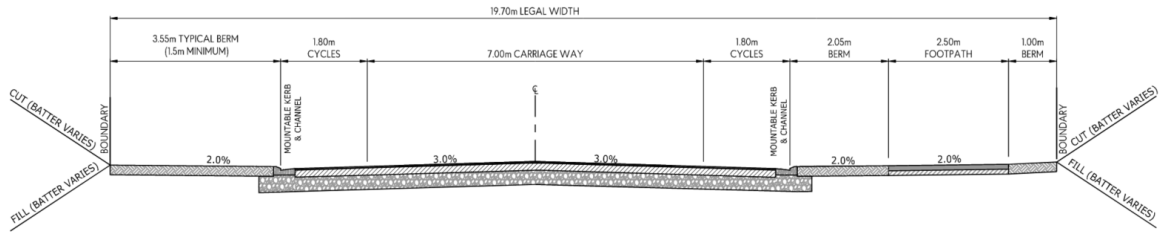

Figure 7.: Typical Cross-Section **(C)** Collector – 19.7m with Cycleway

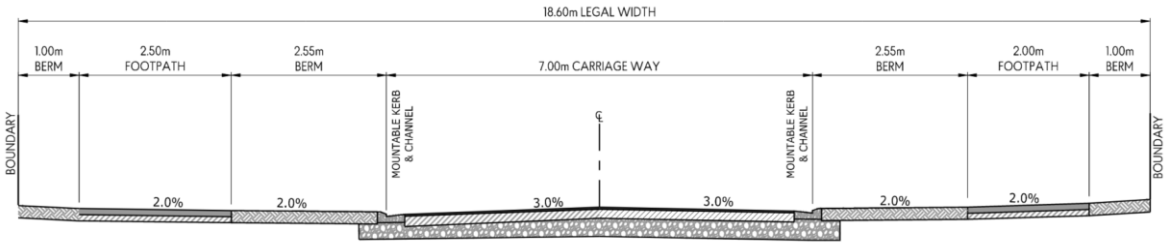

Figure 8.: Typical Cross-Section **(D)** Collector – 18.6m with Berm

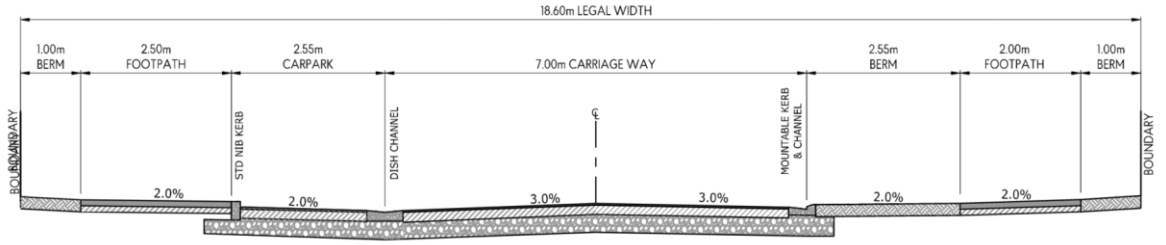

Figure 9.: Typical Cross-Section **(E)** Collector – 18.6m with Berm & Carpark

8.5.2 LOCAL / ACCESS ROADS (16.7M–14.5 M)

Access roads are designed as residential streets featuring indented parking bays and 1.8m footpaths, providing direct property access while maintaining safe and efficient traffic movement. In constrained locations where lots front only one side of the road, a reduced total width of 14.5m is adopted, with a single footpath provided.

- **Type F:** Standard Access Road, 6m carriageway with indented 2.5m kerbside parking lanes or berms on both sides, 1.8m footpaths on both sides, and rear berms.
- **Type G & H:** Access Road adjoining steep topography or single-sided development, 6m carriageway with a 2.5m indented kerbside parking lane or berm on one side, a 1.8m footpath on one side, and a 3m berm on the opposite side.

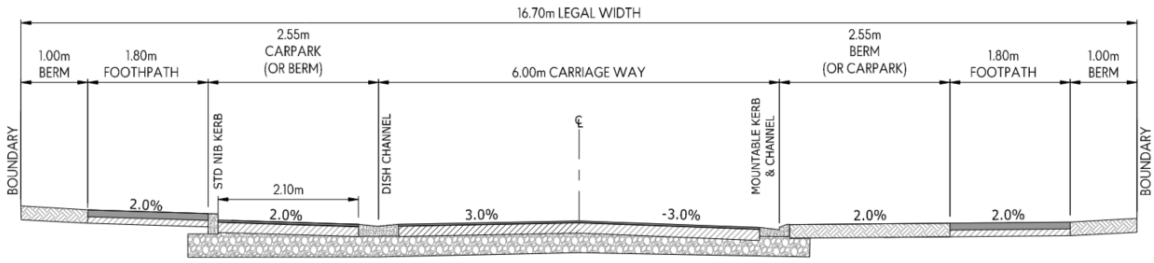

Figure 10.: Typical Cross-Section **(F)** Local Road - 16.7m with Carpark and Berm

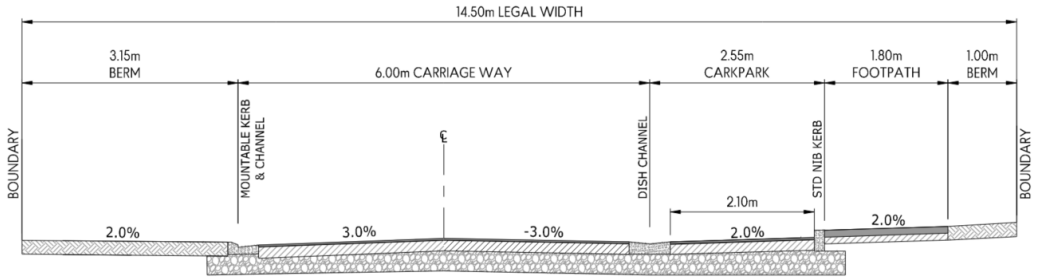

Figure 11.: Typical Cross-Section **(G)** Local Road - 14.5m With Carpark

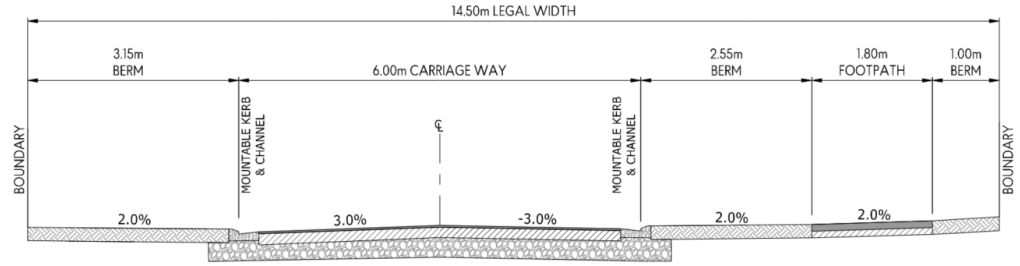

Figure 12.: Typical Cross-Section **(H)** Local Road - 14.5m With Berm

8.5.3 PRIVATE JOALS (5.5M–9M)

Short, low-speed access lanes are proposed to serve small clusters of dwellings (typically ten or fewer). These lanes are designed as shared spaces for both vehicles and pedestrians, featuring narrow carriageways (3.5m–5.5m) with berms on either side. Each Jointly Owned Access Lot (JOAL) has been designed to suit its specific use and layout, resulting in more variable widths than standard public roads. The three primary JOAL types are illustrated below, showing the minimum legal widths

and typical configurations that reflect their intended functions.

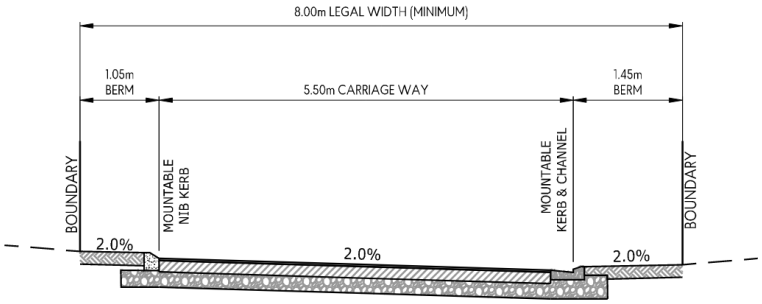

Figure 13.: Typical JOAL Cross-Section **(1)** - 8.0m Minimum with Berms

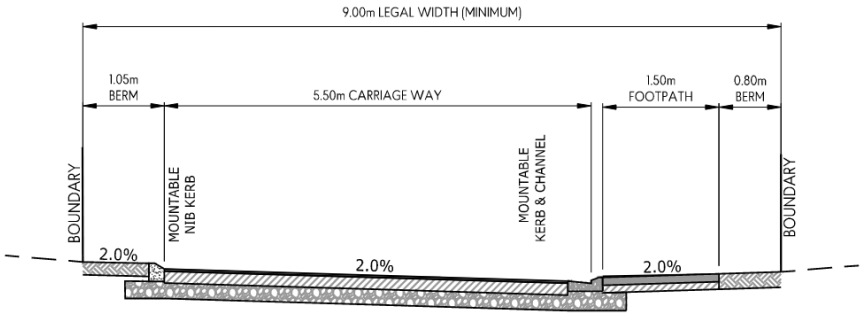

Figure 14.: Typical JOAL Cross-Section **(1)** - 9.0m Minimum with Footpath

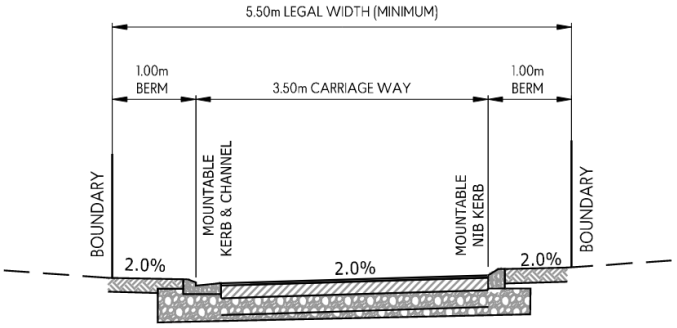

Figure 15.: Typical JOAL Cross-Section **(3)** – 5.5m Minimum

8.6 PAVEMENT DESIGN

Pavement design will be undertaken during the detailed design stage and will be informed by the fully developed traffic volumes and ground conditions.

8.7 SH59 INTERSECTION

A new roundabout is proposed on SH59 to provide the main site access. The design is being coordinated between Stantec and Envelope. The roundabout has been conceptually designed to accommodate full traffic demands from both the Mt Welcome and the adjacent Muri Road block. Two-lane approaches and circulating lanes have been included to provide sufficient capacity and to future-proof the intersection for expected traffic growth. The roundabout can operate at the current 100km/h speed limit but also has been designed with the potential to operate at a reduced 60km/h

speed environment. The roundabout will also reduce operating speeds along this section of SH59, improving safety outcomes compared to the existing highway environment. The design is further detailed in Stantec's ITA and integrated into the 8000-series Civil Design Plans in Appendix 1.

A number of intersection options were assessed for this intersection, including alternative layouts and locations; however, NZTA design and safety requirements limit flexibility in the design. The options summarised below were explored during the design process but were not progressed, as they were not supported by NZTA and are therefore not considered suitable. Table 3 below provides a brief summary of the options assessment.

Table 3: SH59 Options Assessment

Option	Assessment	Suitability
Change Location	The proposed location aligns with the Northern Growth Area Structure Plan. Relocating east would move SH59 through-lanes outside the legal NZTA corridor. Due to the existing topography, this shift would require additional earthworks and result in greater stream impacts on the eastern side of the highway It would also create issues with horizontal and vertical geometry relative to the existing highway alignment. The current location represents the easternmost alignment within NZTA design tolerances.	No
Change Size	The roundabout diameter and approach geometry are governed by NZTA geometric design standards for a 100km/h highway. Reducing the size would compromise safety and operational performance and is non-negotiable with NZTA	No
Change Intersection Type	A signalised intersection was considered; however, NZTA has confirmed that only a dual-lane roundabout is acceptable at this location given the speed environment and traffic volumes.	No

8.8 TEMPORARY TURN LANE

Prior to construction of the roundabout, an interim access arrangement will be implemented at the existing site driveway. This will involve upgrading the current priority T-intersection to include a dedicated right-turn bay for northbound SH59 traffic, shifting the existing northbound merge taper further south, and realigning the site access to a 90-degree approach to improve sightlines and vehicle tracking. The temporary right-turn lane is proposed to operate until 110 dwellings are occupied.

8.9 INTEGRATED TRANSPORT ASSESSMENT

Stantec have prepared an Integrated Transport Assessment (ITA) for the Mt Welcome development, which should be read in conjunction with this report. The ITA confirms that the proposed subdivision, with its planned access via SH59 and internal road hierarchy, can be accommodated within the surrounding transport network without compromising safety, function, or capacity. The assessment demonstrates that the development provides suitable provision for vehicles, pedestrians, and cyclists, integrates with the Northern Growth Area structure plan, and achieves appropriate outcomes for all transport modes and users.

8.10 STRUCTURE PLAN TRANSPORT CONNECTIONS.

The Northern Growth Area (NGA) Structure Plan identifies key transport connections extending both north and south of the Mt Welcome site. To the south, three potential connection points were originally identified to the adjoining Skaife Block. Preliminary investigations into these options have been undertaken; however, opportunities to establish practical and meaningful connections are limited due to topographical and environmental constraints. The potential southern connections are discussed in more detail below.

8.10.1 ASSESSMENT

The primary road network within Mt Welcome generally aligns with the NGA Structure Plan, providing strategic connections to State Highway 59 and the Muri Road block. However, the three suggested southern connections have been found to offer limited feasibility or practical connectivity. Our desktop engineering assessment indicates that only the central southern alignment is technically viable, primarily due to steep topography and ecological constraints within the Skaife Block. Accordingly, only the central route has been retained as the provisional southern link toward the Skaife Block.

It is also important to note that the Skaife Block remains zoned rural, with no current development plans. We understand that no ecological or geotechnical field investigations have been undertaken, and any assessment to date have been at a desktop level only. If development of the Skaife Block proceeds in the future, the site already benefits from direct access to SH59. Together with the provisional upper-terrace connection through Mt Welcome, this would provide sufficient transport connectivity. The feasibility of extending this provisional central connection further south within the NGA remains uncertain, as such works would likely involve significant earthworks that may not be practical or feasible.

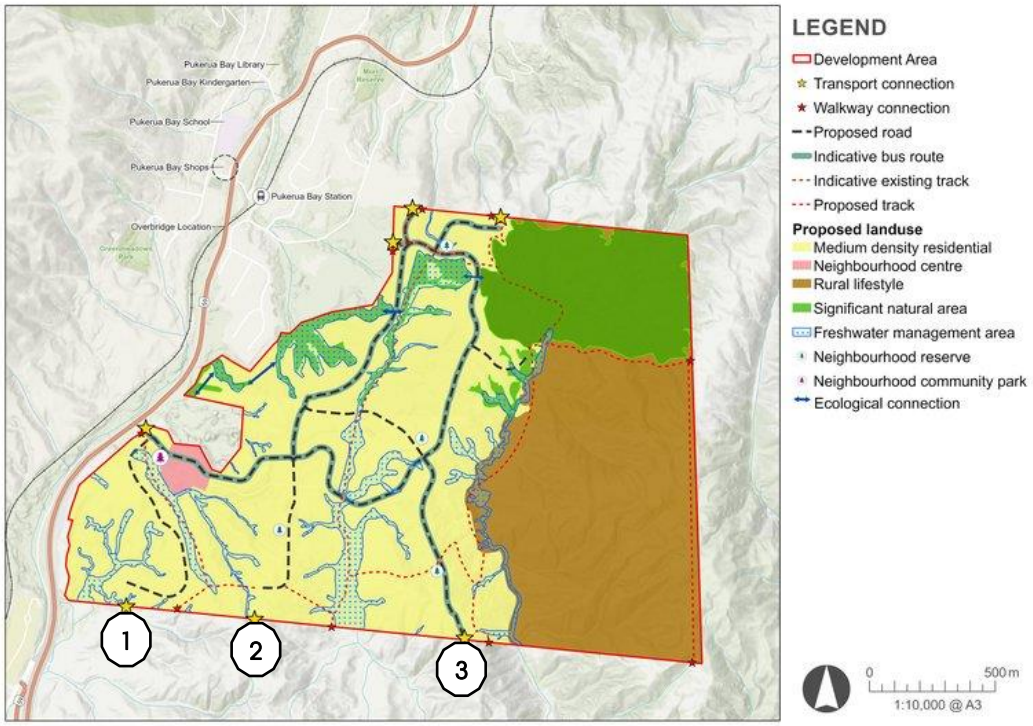

Figure 16. Northern Growth Area Structure Plan

The following section summarises the outcomes of the engineering assessment for the three key transport connections identified within the Structure Plan. These connections numbered 1–3, correspond to the annotations presented in Figure 16 of the Structure Plan above.

1. **Lower Route:**
   The proposed transport connection traverses the lower terrace of the development. As identified within the technical assessments, this part of the site is constrained by streams, wetlands, and freshwater management areas. The wetland and gully system identified within Mt Welcome appears to extend along the site boundary. Even if the ecological constraints could be mitigated, the topography would soon force any potential road alignment westward toward SH59. Given that the Skaiffe Block already has a direct intersection with SH59, this connection would effectively create a short loop between the existing Skaiffe Block intersection and the new Mt Welcome roundabout, providing access only to a single local road within the lower terrace of Mt Welcome.

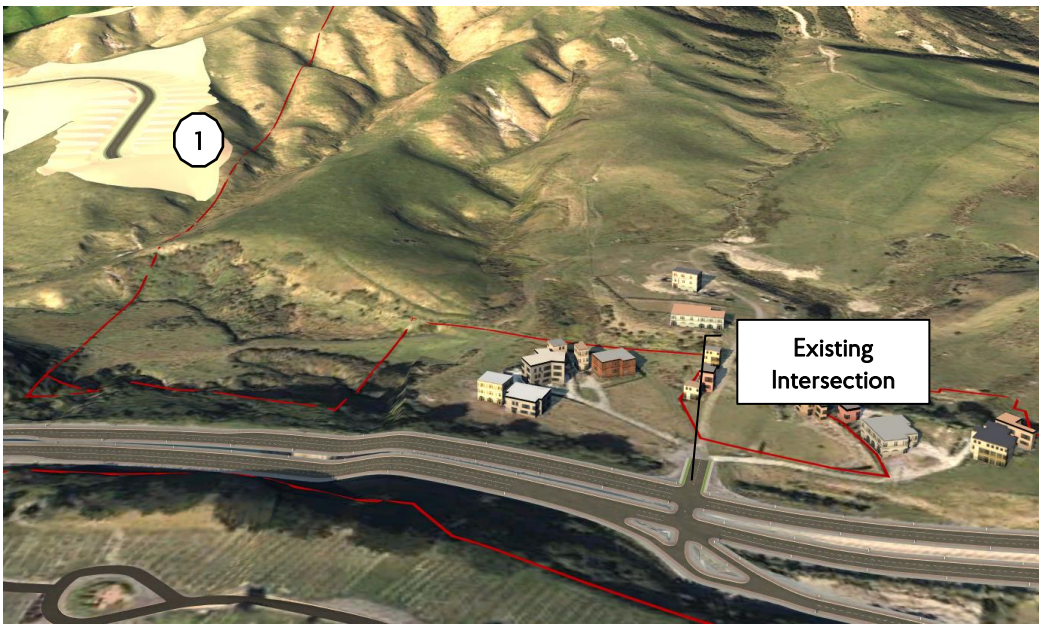

Figure 17. Lower Route

In summary, this potential connection is significantly constrained both ecologically and topographically and would offer limited additional connectivity or value to the wider transport network within the Northern Growth Area. For this purpose, no transport link has been provided within our civil design.

2. **Central Route:**
This option provides the most viable connection, linking directly to the upper terrace of Mt Welcome, which is suitable for development. However, any continuation further south is limited by steep terrain and would require substantial earthworks. While it could potentially support future development within the Skaife Block, its feasibility remains dependent on future land-use decisions. A further extension south into Plimmerton Farms is considered unlikely to be feasible. Provision has nevertheless been made for a possible connection should development of the Skaife Block proceed in the future.

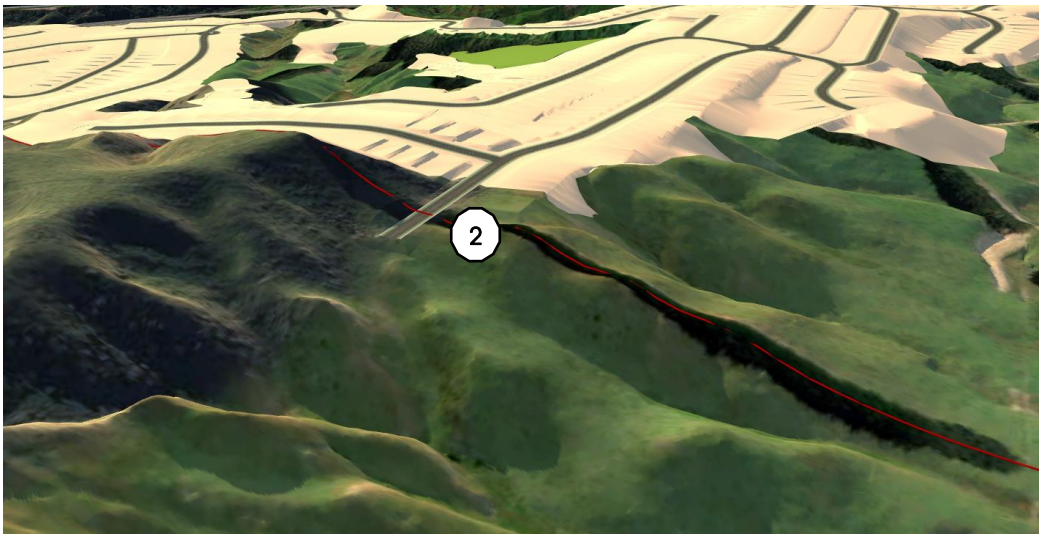

Figure 18. Central Route

3. **Upper Route:**
Follows a steep ridgeline and terminates soon after the development boundary. Refer to figure 19 below with the portion of this road that would be inside the Skaife block. The alignment is flanked by steep embankments and stream corridors, limiting any practical extension south. No

meaningful connectivity or development opportunity would result from this option. For this reason, no transport link has been provided within our civil design.

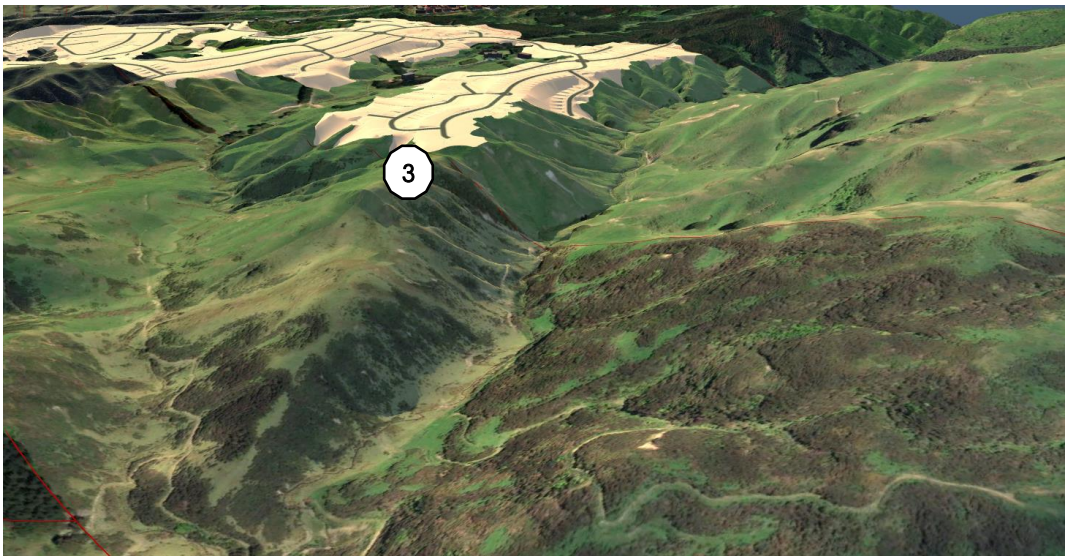

Figure 19: Upper Route

9.0 STORMWATER

9.1 PRINCIPLES OF STORMWATER MANAGEMENT

The stormwater management approach for the Mt Welcome development has been guided by the principles of integrated catchment management, water-sensitive urban design, and hydraulic neutrality, consistent with the Wellington Water RSWS v3.0 and GWRC Plan Change 1. These principles ensure that stormwater is managed in a way that protects downstream environments, enhances ecological and cultural values, and supports long-term asset resilience and maintainability.

Key principles applied to this development include:

- Stormwater treatment and attenuation are centralised, minimising the use of on-lot devices and reducing operation and maintenance costs.
- Post-development catchments are aligned with pre-development catchments to maintain existing discharges and downstream receiving environments
- Apply Safety in Design principles and identify project specific risks
- Support of development staging to ensure the network can be constructed and commission progressively
- Recognise and protect the natural environment with low impact and water sensitive design
- Incorporate cultural values through engagement with mana whenua

9.2 STORMWATER MANAGEMENT PLAN

Envelope Engineering has prepared a Stormwater Management Plan, which should be read in conjunction with this report. The Stormwater Management Plan makes a range of recommendations on items including water sensitive urban design and hydraulic neutrality. This also contains details to meet stormwater impact assessment and requirements under PC1.

9.3 STORMWATER IMPACT ASSESSMENT

A Stormwater Impact Assessment has been prepared and is submitted as part of the application, in accordance with Schedule 29 of the NRP-PC1. This will include detailed assessment of stormwater and hydrological controls, prepared with input from the specialist team, including hydrology (PDP) and ecology (Blue Green Ecology).

9.4 EXISTING STORMWATER INFRASTRUCTURE

There is no existing public stormwater infrastructure within site. However, there are a number of existing culverts as well as areas identified as freshwater management areas within the structure plan.

9.5 PROPOSED STORMWATER NETWORK

The proposed stormwater management system has been designed to collect, convey, treat, and attenuate runoff from all developed areas in accordance with Wellington Water RSWS v3.0, GWRC Plan Change 1, and the Porirua District Plan.

Detailed modelling is provided within the Stormwater Management Plan (SMP).

9.5.1 PRIMARY NETWORK

Stormwater from lots and road surfaces during the 10 % AEP event is collected via downpipes, catchpits, and a piped network discharging to centralised treatment and attenuation devices. The primary network has been designed for the 10 % AEP storm (with climate-change allowance) and includes sufficient capacity for larger events given the site's steep topography.

Catchpits are positioned at low points and along road corridors to efficiently capture runoff, with all residential lots connected via laterals. Network layouts are shown on the 4000-series Civil Design Drawings.

Flows from the piped network discharge to centralised raingardens which provide water-quality treatment. Each raingarden is sized to treat at least 85% of the Mean Annual Runoff Volume from its contributing impervious area. High-flow bypasses convey larger events directly to downstream attenuation devices to maintain treatment efficiency.

9.5.2 SECONDARY NETWORK

For the 1 % AEP event, overland flow will be safely conveyed via the road corridors toward the retention wetlands. The road profiles have been designed to form defined secondary flow paths, ensuring surface water is directed away from dwellings and toward designated outlet locations These larger rain events will bypass the rain gardens. No low-lying or flood-prone areas have been identified, and no additional freeboard controls are required.

Where overland flow descends steep embankments, energy-dissipation measures such as rock armouring and vegetation will be provided to protect slope stability and receiving environments.

9.5.3 ATTENUATION AND RETENTION

Four primary retention wetlands (A, B, C and E) and one smaller attenuation basin (D) are proposed within the site's gullies to provide both peak-flow control and hydrological retention. These wetlands temporarily detain and release stormwater to match pre-development discharge rates, achieving hydraulic neutrality across all design storms up to the 1 % AEP event.

Each wetland includes a permanent water level for extended detention storage for frequent rainfall events, and multi-stage outlets to control peak flows.

Together, these devices provide flow control across the site, ensuring the protection of downstream waterways.

9.5.4 STORMWATER TREATMENT

Water-quality treatment is provided through a network of centralised raingardens. These systems are designed in accordance with the Wellington Water Design for Stormwater: Treatment Device Design Guide and GWRC PC1.

Treated flows from the raingardens are conveyed to the downstream retention wetlands, which provide retention functionality before discharging to existing natural watercourses.

These combined systems achieve both hydrological control and water-quality treatment targets required under the RSWS and GWRC Plan Change 1.

Detailed modelling is provided within the Stormwater Management Plan (SMP).

9.6 ASSET OWNERSHIP, OPERATION & MAINTENANCE

All public stormwater infrastructure—including pipes, manholes, raingardens, wetlands, and attenuation basins—will be vested in Porirua City Council and managed under Wellington Water's asset-management framework, with private laterals remaining the responsibility of lot owners. Shared access lots will include vested underground networks protected by easements, while catchpits within private driveways will be privately maintained. Dedicated maintenance and inspection access will be provided to all stormwater infrastructure.

10.0 WASTEWATER

10.1 OVERVIEW AND DESIGN OBJECTIVES

- Utilise a gravity system wherever practicable.
- Centralise and minimise the number of pump stations.
- Adopt low-pressure systems only where no other option is practicable.
- Support of development staging to ensure the network can be constructed and commissioned progressively.
- Apply Safety in Design principles and identify project specific risks.
- Recognise and protect the natural environment with low impact design.
- Incorporate cultural values and engagement with mana whenua.

10.2 DESIGN STANDARDS & COMPLIANCE

The following guidance documents were used in the design of the proposed reticulated gravity and low-pressure wastewater networks:

- Regional Standard for Water Services, RSWS, Version 3.0
- Wellington Water Pressure Sewer Design Guide and Water Services Association of Australia WSA 0716.

Additional references and models were used to inform network modelling and storage assessments:

- Regional Wastewater Model Specification: Modelling Specifications – Draft 2020
- InfoWorks ICM Model - System Performance 2024 Porirua D (SP.2024.POR.D)
- InfoWorks ICM Model - System Performance 2024 Porirua S (SP.2024.POR.S (interim))

All wastewater modelling and analysis were based on the SP.2016.POR.D model provided by Wellington Water Ltd (WWL) in May 2024. existing network

A Wastewater Hydraulic Modelling Report has been prepared by Envelope and is included in Appendix 2. This report provides detailed modelling inputs, outputs, and the range of options assessed to inform the final design.

10.3 EXISTING NETWORK

There is currently no reticulated wastewater network within the Mt Welcome site, with existing rural dwellings relying on on-site septic disposal systems.

The nearest Council-owned network comprises a DN250 gravity trunk main that conveys flows from Pukerua Bay southwards along State Highway 59 to Plimmerton. Wastewater is then pumped via Pump Station 13 (PS13) to the Porirua Wastewater Treatment Plant (WWTP), where it is treated and ultimately discharged to the sea west of Titahi Bay.

Much of the downstream network is already operating near or beyond its design capacity, with overflows observed during storm events with return periods of less than 1 year ARI.

Hydraulic modelling of the existing network confirms the following:

- The existing wastewater trunk main along the Pukerua Bay section has been assessed for flow capacity within the three identified upgrade sections. The current capacities are summarised below:

    - **Upgrade 1:** Existing DN250 main at 0.4% gradient with a flow capacity of approximately 39 L/s. There is no residual capacity under current conditions.
    - **Upgrade 2:** Existing DN250 main at 0.4% gradient with a flow capacity of approximately 39 L/s. There is no residual capacity under current conditions.
    - **Upgrade 3:** Existing DN250 main at 1.0% gradient with a flow capacity of approximately 60 L/s, providing a residual capacity of 20 L/s under current conditions.
- Pump Station 13 (PS13) currently operates with a pump rate of approximately 68 L/s, controlling discharge to the downstream system.
- Downstream sections near Plimmerton are not expected to experience immediate issues under current conditions, as any surcharging would occur further upstream before flows reach these lower parts of the network.
- Overall, the existing network performs adequately under current (2018 baseline) conditions but has limited available capacity to accommodate additional flows from the fully developed NGA without bulk upgrades and storage.

The PCC GIS data contains some inconsistencies when compared with the WWL InfoWorks ICM model, with the GIS indicating some flows heading north toward Pukerua Bay. These discrepancies have been reviewed, and the GIS data has been disregarded for the purposes of this assessment. All analysis has been based on the WWL-supplied calibrated InfoWorks ICM model, which WWL has confirmed as being the most accurate and up-to-date representation of the existing bulk wastewater network and the preferred source for all network data and analysis.

10.4 INTEGRATION WITH MURI ROAD DEVELOPMENT

The wastewater design for Mt Welcome incorporates allowance for flows from the adjoining Muri Road Development, which is designed to discharge to the SH59 bulk main via the proposed Mt Welcome wastewater network. The Muri Road site is constrained by existing downstream infrastructure and has limited direct access to the SH59 network and has therefore been designed integrally with Mt Welcome.

For modelling and planning purposes, the Muri Road development has been designed for 500 lots, with the catchment being split into East and West sub-catchments, each representing approximately 250 lots. A cost-sharing agreement between both developers is currently being established to formalise shared infrastructure responsibilities and funding contributions. While we expect the number of lots to be approximately 500, there is the design flexibility for storage design and network capacity to be adjusted as the development design process progresses.

The same hydraulic modelling and design parameters have been applied to Muri Road as to Mt Welcome to ensure network consistency and performance alignment. Final flow rates and storage volumes will be confirmed through detailed design. Further coordination between both development teams is required to refine upgrade triggers, staging, and programme alignment.

10.5 PROPOSED NETWORK DESIGN

A predominantly gravity-based network has been designed across the site. Given the topography minimum grade requirements are not generally a constraint, and local network standards can be achieved. However, the undulating terrain and constraints within gullies, means that 6 pump stations will be required along with localised low-pressure systems. The pump station and low-pressure systems designs are detailed further in this report. The below tables outlines design flows for each pump station catchment. Below summarises the parameters used for the internal reticulation network.

- ADWF (per person): 200 L/person/day
- Dry Weather Peaking Factor (PF): PF = 7.23 × Area^0.2 (Area in ha)
- PDWF: ADWF × PF
- Self-cleansing velocity: ≥ 0.75 m/s at PDWF
- Maximum velocity: ≤ 3.0 m/s at PWWF
- Minimum grades:
    - DN 150 → 1.11 %

- DN 225 → 0.69 %
- DN 300 → 0.44 %

Table 4 below summarises the calculated flows for each catchment based on the design flow parameters outlined above. These results differ from the InfoWorks ICM model outputs, which simulate wastewater flows under historical rainfall conditions; however, the calculated flows have been used as a reference for assessing smaller catchments and confirming pipe gradients. These design flows have also been used as a check and for guidance against the ICM model. WWF outputs from the ICM model can be found in attached Hydraulic Modelling Report in Appendix 2.

Table 4: Design Flows

Asset ID	Catchment	Population	ADWF (L/s)	PDWF (L/s)	PWWF (L/s)
WWPS - 1	374 lots 1.3ha Commercial	1309	3.01	10.52	12.57
WWPS – 2	136 lots	476	1.09	5.11	5.87
WWPS – 3	27 lots	94.5	0.22	1.41	1.53
WWPS – 4	42 lots	147	0.34	1.80	2.07
WWPS – 5	171 lots	598.5	1.38	5.28	6.17
WWPS – 6	203 lots	710.5	1.63	6.99	8.10
Muri West	250 lots	875	2.01	8.44	15.88
Muri East	250 lots	875	2.01	8.38	16.09

The piped network is also designed to incorporate flows from the Muri Road development and convey them through this site to the SH59 bulk main.

The proposed wastewater network layout is illustrated on the 4000-series Civil Design Drawings in Appendix 1.

10.5.1 PUMP STATION DESIGN AND STORAGE

Six wastewater pump stations are proposed across the site. Pump Station 1 (PS1) will serve as the primary peak wet-weather storage facility, providing the main attenuation function for the development prior to discharging to the existing bulk main. The PS1 discharge rate will be controlled and rate-limited to align with the capacity of the downstream trunk network and the proposed bulk-main upgrades.

The remaining five pump stations are designed solely to convey wastewater from local low points where gravity discharge is not achievable. It is understood that Wellington Water's current telemetry and control systems do not support operation of multiple linked pump stations in a daisy-chain configuration, meaning that each station cannot dynamically manage storage based on downstream water levels. As a result, 8 hours of maintenance storage has been incorporated into each internal pump station, with PS1 providing the final attenuation and flow control prior to discharge to the public network. Each pump station is intended to be vested to Council.

Figure 20 below illustrates the general locations of the proposed pump stations. All internal pump stations discharge via gravity mains to PS1 for flow attenuation. Table 5 summarises the proposed internal storage capacities and pump rates, with PS1 discussed in further detail later in this report.

Table 5: Pump Station Summary

Asset ID	Catchment	Storage (Hours)	No Pumps (l/s)	Pump Rates (l/s)	Max Storage (m^3)
WWPS - 1	Full Development	-	-	-	-
WWPS – 2	136 lots	8	1	6	32.6

Asset ID	Catchment	Storage (Hours)	No Pumps (l/s)	Pump Rates (l/s)	Max Storage (m³)
WWPS – 3	27 lots	8	1	2	6.8
WWPS – 4	42 lots	8	1	2	10.3
WWPS – 5	171 lots	8	2	11 and 25	91.7
WWPS – 6	203 lots	8	1	7	49.2
Muri West*	250 lots	8	1	8.5	70.4
Muri East*	250 lots	8	1	8.5	69.0

*The Muri Road catchments have been included more hydraulic modelling purposes only. Gravity discharge has been assumed into the respective east–west catchment pump stations, with those requiring pumping directed to WWPS-5. Pump rates and maximum storage volumes have been provisionally assumed using the same methodology applied to Mt Welcome but remain subject to refinement. The final Muri Road pump station configuration and wastewater servicing methodology will be confirmed during their detailed design of the development.

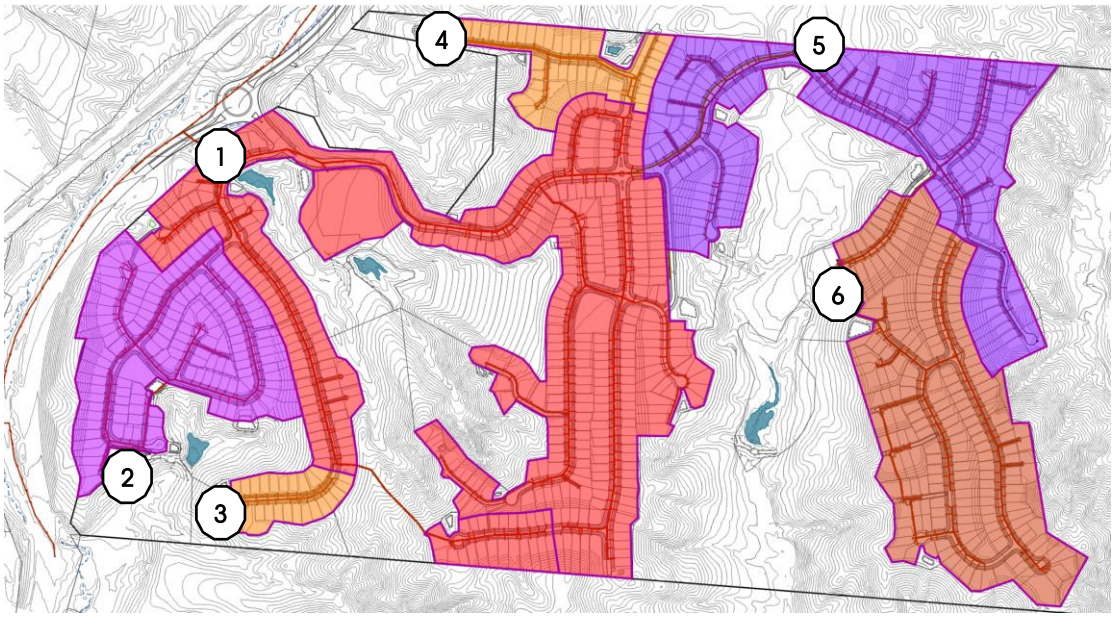

Figure 20: Pump Station Locations

Storage requirements for each pump station have been modelled using InfoWorks ICM, accounting for the hydraulic interaction between stations operating in series. Several design scenarios were tested within the model to evaluate alternative storage configurations and discharge control strategies. Detailed ICM outputs are located within Appendix 2 along with the detailed hydraulic modelling report.

10.6 LOW PRESSURE WASTEWATER SYSTEMS (LPS)

Topographical constraints within the site necessitate the use of low-pressure wastewater systems in 7 localised catchments. These catchments are small and do not warrant construction of an additional public pump station. A low-pressure unit will be installed on each lot at the time of development, with the unit remaining a private asset of the lot owner.

The system will provide up to 24 hours of storage and allow controlled discharge from each property. Discharge management, including restriction of flows during significant wet weather events, will be achieved through a smart pressure sewer system enabling centralised monitoring and control of individual units. The proposed approach is consistent with Wellington Water's Pressure Sewer Design Guide and Water Services Association of Australia WSA 0716.

At the property boundary, a boundary box containing backflow prevention, an isolation valve and a flushing tee will mark the point of transfer to public ownership. The low-pressure sewer network downstream of the boundary is proposed to be vested in Council.

Figure 21. Low Pressure System Diagram

Wellington Water has advised that, while its policy on pressure sewers is currently under review, these systems have been accepted in areas where direct wastewater flow mitigation is not required. For this development, mitigation will be provided further downstream of the low-pressure outlets rather than at the immediate connection to the gravity network.

10.6.1 LOW PRESSURE DESIGN

For the performance assessment and hydraulic calculations of the LPS system the following assumptions have been adopted:

- Residential loading: 420 L/lot/day (140 L/person/day × 3 people) = ~0.0049 L/s per lot
- No allowance for inflow and Infiltration:
- Smart system operation
- Network sized to carry ≥1.5 × ADWF at ultimate build-out
- Performance checks:
    - Minimum velocity 0.6 m/s (target 0.9 m/s) for daily solids removal.
    - Retention < 8 hrs

Table 6 below summarises flow and catchment sizes from each LPS catchment.

Table 6: LPS Catchments

LPS ID	Lots	ADWF (L/s)	1.5 x ADWF (L/s)
LPS A	7	0.049	0.073
LPS B	7	0.049	0.073
LPS C	12	0.084	0.126
LPS D	26	0.182	0.273
LPS E	4	0.028	0.042

LPS ID	Lots	ADWF (L/s)	1.5 x ADWF (L/s)
LPS F	19	0.133	0.200
LPS G	13	0.091	0.137

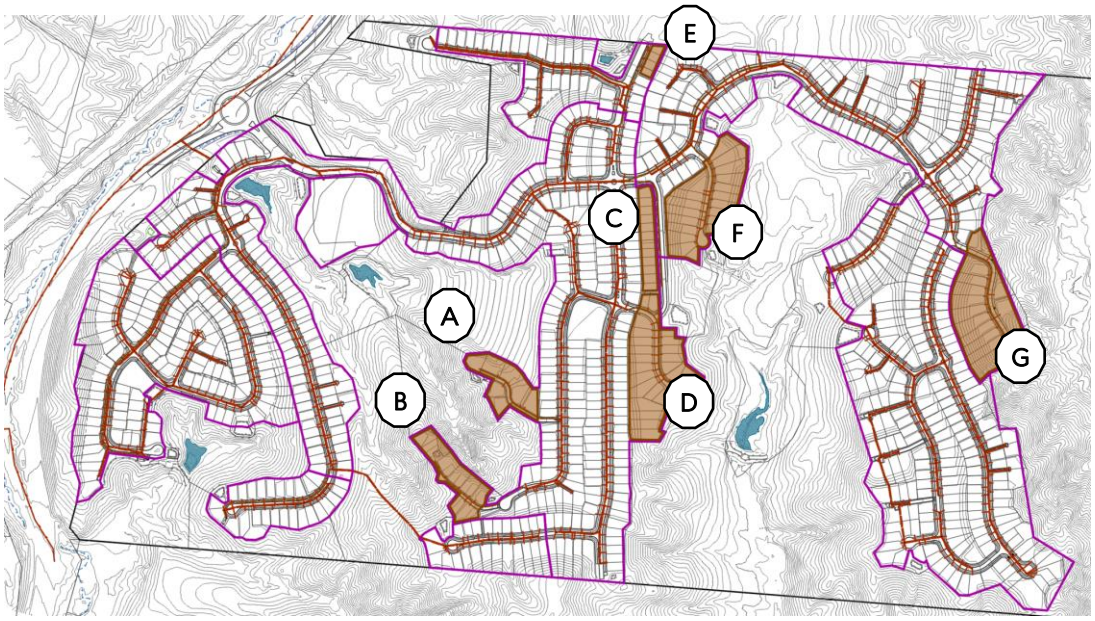

Figure 22. Low Pressure System Catchments

10.6.2 LPS SUMMARY

Within specific catchments, a low-pressure wastewater system is considered more suitable than a public or centralised pump station due to local topographical constraints and catchments sizes. The system will be designed in accordance with Wellington Water's standards and the WSAA 07-16 Pressure Sewer Design Manual.

A dispensation application will be lodged with Wellington Water to obtain early approval for the proposed systems.

10.7 WASTEWATER MODELLING

An assessment of wastewater network capacity, proposed network performance, and pump station storage has been undertaken to identify system constraints and confirm the upgrades required to service the development.

The report outlines modelling undertaken under various development and upgrade scenarios to determine the most effective servicing approach for the site. Discussion and technical guidance were provided throughout by the Wellington Water Limited (WWL) modelling team. Hydraulic modelling was completed using InfoWorks ICM 2024.5, based on the current 2018 Porirua base model and proposed design layouts prepared in Autodesk Civil 3D 2025. Below table outlines key parameters used to model the networks:

- Model: Simplified Northern Growth Area Model (v2024.5)
- Scenario: 2018 ICM model baseline
- Baseflow: 0.1 L/s per ha
- Domestic flow: 200 L/person/day
- PS13 – Plimmerton Pump Station: P1 – Duty 68.0 L/s
- Pump station storage: PS2 to PS6 – 8 hours; PS1 – PWWF
- Pump capacity: ≥ 120 % of design PWWF (duty/assist or standby)

A detailed Hydraulic Modelling Report is provided in Appendix 9.

10.8 WASTEWATER PUMPSTAION 1 (PS1)

Pump Station 1 (PS1) will provide peak wet-weather attenuation for the Mt Welcome development prior to discharge into the existing SH59 bulk main. Several scenarios were assessed, covering internal storage, pump rates, and downstream capacity to identify a balanced approach between storage requirements, network upgrades, and development staging.

The key scenarios, storage requirements, discharge rates, and network overflows are summarised below with further detail provided in the Hydraulic Modelling Report within Appendix 2.

Table 7: PS1 Storage Scenarios

Scenario	Discharge leaving site (L/s)	Storage on site (m^3)	Overflow in the bulk network
1. Mt Welcome fully developed (949 lots + commercial)	31 (gravity)	–	–
2. NGA fully developed (incl. Muri Road)	27	1,590	None
3. NGA fully developed (incl. Muri Road)	42	380	S133404 (79m^3), S130207 (42m^3), S130204 (33m^3)
4. NGA fully developed (incl. Muri Road), No trunk upgrades	20	1940	None

Scenario 1

Hydraulic modelling indicates that Mt Welcome can discharge via gravity without on-site attenuation at PS1 or bulk network upgrades if developed solely. This provides a peak discharge of approximately 31.26 L/s, servicing 949 residential lots and a commercial area. This scenario assumes no concurrent NGA development and demonstrates the feasibility of gravity servicing while deferring the need for large-scale storage infrastructure. Upgrade staging is detailed in Section 10.9.4 of this report.

Scenario 2

Flow rates leaving the site are reduced under the fully developed 1,500-lot NGA scenario, as discharge volumes are increased due to the tank and pump requirement. This scenario results in significant on-site storage requirements to prevent overflow within the lower reaches of the bulk network. This scenario assumes that the three key downstream upgrades have been implemented, these are discussed further in Section 10.9.

Scenario 3

At higher discharge rates (42 L/s), the system is generally capable of conveying flows; however, minor overtopping is observed at critical manholes near Plimmerton. These effects can be addressed through future downstream upgrades.

Scenario 4

This scenario tests network performance under a constrained discharge condition of 20 L/s, assuming no bulk main upgrades are implemented.

When the Muri Road development is included, both on-site storage and bulk network upgrades become essential to accommodate additional flows. Under this combined, fully developed NGA scenario, substantial storage capacity is required to manage peak wet-weather discharges.

The final storage requirements for PS1 will depend on development timing across the wider Northern Growth Area (NGA). It is recommended that consent conditions require confirmation of storage sizing when future civil stages trigger the need for PS1 construction.

Real-time control (RTC) systems could be developed and implemented to coordinate storage and discharge across the Northern Growth Area (NGA). Such a system would allow flows to PS13 to be timed and optimised, improving the overall efficiency and utilisation of available storage throughout the network. This concept should be further explored with Wellington Water (WWL) during the detailed design stage of the project.

10.9 PROPOSED BULK NETWORK UPGRADES

Targeted capacity upgrades are proposed along key sections of the SH59 bulk main to address existing network constraints identified through hydraulic modelling. Several pipe upgrade options and on-site attenuation measures were evaluated; however, while additional storage can assist in managing peak wet-weather flows, it does not resolve the underlying downstream pipe capacity limitations. A storage only approach can often concentrate higher pumped discharges, worsening downstream pipe capacity constraints.

The proposed upgrade locations were identified in areas where existing capacity is limited and surcharging occurs by low pipe gradients or where overflows are first expected to occur under increased discharge conditions.

In this context, surcharge refers to water levels rising above the pipe crown but remaining contained within the underground network, such as within pipes and manholes. Overtopping, however, occurs when surcharge levels exceed the ground surface or manhole rim, causing uncontrolled overflow.

It should be noted that the development will add flow to pipes that are already operating close to capacity (Upgrades 1 and 2). Although these sections are expected to surcharge under future development conditions, modelling confirms that water levels will remain contained within the system and will not overtop. This controlled surcharge also assists in attenuating peak flows entering the more constrained downstream network within the Plimmerton catchment and network. These upgrades may be brought forward if required. The proposed upgrades are summarised in table below.

Table 8. Bulk Network Upgrade Summary

Upgrade	Existing	Existing Capacity	Proposed	Proposed Capacity
1	DN250 0.4%	39 L/s	DN375 at 0.4%	112 L/s
2	DN250 0.4%	39 L/s	DN375 at 0.4%	112 L/s
3	DN250 1.0%	60 L/s	DN375 at 1.0%	219 L/s

As the existing pipe grades cannot be increased, the solution involves upsizing specific pipe sections to improve capacity. It is acknowledged that this will temporarily result in larger upstream pipes discharging into smaller downstream sections, which does not fully comply with the WWL RSWS. However, this staged upgrade approach is considered fit for purpose as an interim measure until the remaining downstream sections are upgraded as identified in PCC's Long-Term Plan and Development Contribution Policy.

10.9.1 BULK WASTEWATER UPGRADE 1

Figure 23 Upgrade 1

The first stage of works involves upgrading approximately 189 m of the existing DN250 wastewater main to DN375. This section follows the Ara Harakeke Pathway alignment, avoiding the trafficable off-ramp from SH59 to Airlie Road. The existing DN250 main, laid at a 0.4% gradient, currently conveys approximately 39 L/s. Upgrading to DN375 will increase the capacity to around 112 L/s, providing sufficient allowance for the proposed additional discharge. The works can be undertaken without disrupting vehicle traffic; however, temporary pedestrian management along the Ara Harakeke Pathway will be required during construction.

10.9.2 BULK WASTEWATER UPGRADE 2

Figure 24. Upgrade 2

The second upgrade involves replacing approximately 22m of the existing DN250 wastewater main with a DN375 pipe. Two approaches are being considered: either replacing the existing main along its current alignment or installing a new section within the SH59 berm. Locating the new main within the berm, outside the trafficable carriageway, would enable the works to be undertaken with minimal traffic disruption, reduce vegetation removal, and allow the pipe to be installed offline.

The existing DN250 main, is at a 0.4% gradient, with a capacity of 39L/s; upgrading to DN375 will increase capacity to around 112L/s

10.9.3 BULK WASTEWATER UPGRADE 3

Figure 25. Upgrade 3 (163m)

The third upgrade requires 163 m of the existing DN250 wastewater main to DN375. This may be achieved either by replacing the existing pipe or by constructing a new bypass. Installing a bypass along the Ara Harakeke Pathway alignment would avoid vegetation removal, provide a more accessible construction corridor, and improve access for future maintenance activities.

The existing DN250 main, is at 1.0% gradient and a current capacity of 60L/s. Upgrading to a DN375 main at the same gradient will increase capacity to approximately 219L/s.

10.9.4 UPGRADE STAGING

We have proposed a staged approach to wastewater upgrades that aligns with the progression of development. The staging has been based on Mt Welcome as the primary development, noting that other known developments discharging to the same bulk main include Plimmerton Farms and Muri Road.

For the purposes of this staging assessment, we have adopted the 2018 base scenario, excluding the delivery of surrounding developments. This will be further refined during detailed design. It is anticipated that the number of lots supported under each stage may reduce once the Muri Road development is incorporated into the programme. Until development sequencing is confirmed, Muri Road has not been included in the current staging.

Given the long-term development programme, it is recommended that storage capacity and network upgrade requirements be periodically reviewed as the development progresses. The next review should occur at Stage 10, when the Muri Road connection is established. This stage will enable servicing of approximately 541 residential lots and the commercial area, for which the existing infrastructure has sufficient capacity. At that time, the hydraulic design and modelling should be reassessed to confirm and refine storage requirements prior to commissioning the Muri Road connection.

Table 9: Wastewater Enabling Upgrades

No of Lots	Proposed Infrastructure	Proposed Upgrades
301	Gravity Network (GN)	
375	GN + PS2	
407	GN + PS2	
501	GN + PS2 + PS3	
542	GN + PS2 + PS3 + PS4	*Review Model & Storage*
590	GN + PS2 + PS3 + PS4 + PS5	
759	GN + PS2 + PS3 + PS4 + PS5 + PS6	
949	GN + PS2 + PS3 + PS4 + PS5 + PS6	*Review Model & Storage*
949 + Muri 1 (1199)	GN + PS1 + PS2 + PS3 + PS4 + PS5 + PS6 + PS7	Bulk Upgrades + PS1 Storage
949 + Muri 2 (1449)	GN + PS1 + PS2 + PS3 + PS4 + PS5 + PS6 + PS7 + PS7	PS1 Storage

Detailed wastewater modelling and calculations can be found in Appendix 2.

10.9.5 BULK UPGRADE OUTCOMES

Three staged wastewater main upgrades are proposed, totalling approximately 395 m of pipe capacity improvements, with diameters increased from DN250 to DN375 to address existing constraints and support future development within the NGA.

- Stage 1 – 210 m of main along the Ara Harakeke Pathway, avoiding the SH59 off-ramp to Airlie Road. Works can proceed without disrupting vehicle traffic, though temporary pedestrian management will be required.
- Stage 2 – 22 m of main within the berm outside the trafficable carriageway, enabling construction with minimal disturbance to road users.
- Stage 3 – 163 m of main, either by replacing the existing pipe or constructing a new bypass within the Ara Harakeke Pathway corridor to minimise vegetation removal and improve long-term maintenance access.

These upgrades will increase trunk main capacity near Mt Welcome from 39 L/s to 112 L/s, improving network performance and enabling staged NGA development. Some surcharging may occur during peak wet-weather events, but no overflows are expected once upgrades and interim storage are in place. On-site storage can be reduced as downstream upgrades near Plimmerton and PS13 are completed.

10.10 SUMMARY

- The full NGA development (1,449 lots + 1.7 ha commercial) produces a peak discharge of approximately 56 L/s at manhole PCC_WW007923, resulting in limited downstream capacity and an estimated 389 m^3 overflow under existing conditions.
- The Mt Welcome development alone (excluding Muri Road Stage 2) can discharge 32 L/s by gravity without causing new overflows downstream.
- Three option sets were tested to mitigate the increased flows of the NGA.
    - Localised bulk main upgrades increase capacity locally but shift hydraulic constraints further downstream toward PS13.

- PS1 attenuation (1,600 m³) reduces peak discharge to around 28 L/s and effectively prevents downstream overflows; however, it does not resolve the underlying capacity limitations in the bulk main, and the required storage volume is not considered feasible. Relying solely on this option would also constrain all further NGA development.
- A combined option (bulk upgrades + PS1 attenuation) enables higher discharge rates (42 L/s) and reduced storage on site. Storage can be reduced with only minor, localised overtopping near Plimmerton, which can be addressed through future downstream upgrades.

- An 8-hour storage duration across the proposed pump stations provides the best performance balance, minimising downstream impacts.

11.0 WATER SUPPLY

11.1 OVERVIEW AND DESIGN OBJECTIVES

- Looped reticulation where practicable for network redundancy
- Integration with the Muri Road bulk main and reservoir
- Support staged delivery so construction and commissioning can proceed progressively.
- Apply Safety in Design
- Incorporate mana whenua values through ongoing engagement.

11.2 DESIGN STANDARDS & COMPLIANCE

The water supply system is designed to provide a reliable primary supply for Mt Welcome and to interface with the Muri Road works, meeting Wellington Water's service levels and firefighting requirements. Capacity and pressure targets are set to support the planned yield while maintaining compliance with RSWS v3.0.

- Wellington Water RSWS v3.0 compliance.
- Minimum operating pressure: 25 m (may be reduced to ~10 m near a reservoir).
- Maximum operating pressure: 90 m.
- Firefighting: SNZ PAS 4509:2008 compliance

11.3 EXISTING INFRASTRUCTURE

The site is not currently connected to a public potable network; the few existing dwellings use roof water. A DN225 transmission main runs adjacent to the site beneath SH59, supplying the Pukerua Bay Reservoir.

11.4 PROPOSED RETICULATION DESIGN

The proposed water network consists of primary water mains located within the road berms on one side of each road, with rider mains extending to service lots on the opposite side of the roads. The network configuration is generally described below:

- Primary watermains in one road berm; rider mains to opposite lots.
- Hydrants at ~135 m spacing (final locations at detailed design).
- Looping where feasible; residual dead-ends provided with flushing points.
- DN150 connection to the existing Pukerua Bay DMA Zone at Gray St
- Pressure reducing valve (PRV) at RL 90
- Pipe sizes/materials to be confirmed through detailed design

The proposed water supply plans are provided in the 5000-series Civil Design Drawings in Appendix 1.

11.5 SUPPLY AND PRESSURE ZONING

The network will operate as two pressure zones, separated by a pressure-reducing valve (PRV) at RL 90 located within the bulk-main pump house that feeds the new reservoir. The PRV will cap pressures in the lower zone to WWL RSWS limits (slightly lower than existing Pukerua Bay reservoir pressure) and enable controlled back-feeding from the new reservoir, increasing effective storage and resilience within the Pukerua Bay zone. The reservoir and zoning are summarised in Table 10. below.

Table 10. Reservoir & Pressure Summary

Zone	Top Water Level (TWL)	RSWS Service Range	Proposed Service Range	Lots
Lower Zone Existing Pukerua Bay Reservoir 2.3ML	RL 125	RL 35-100	RL 53 - 82	263 + Commercial
Upper Zone Proposed 3.7ML Reservoir	RL 186	RL 96-161	RL 90 - 162	686

11.6 LOWER ZONE

The lower zone will be supplied primarily by the existing Pukerua Bay reservoir, with a supplementary interconnection to the new reservoir for redundancy. All lots in this zone comply with RSWS pressure requirements.

The existing Zone Management Plan (ZMP) indicates that the Pukerua Bay reservoir has approximately 0.8 ML of spare capacity, based on information provided by Wellington Water. This equates to capacity for approximately 326 additional residential lots. Of this, 144 lots have already been allocated under Resource Consent RC8763 (34 Muri Road subdivision), although only 46 of those lots are located below RL 100 and consented to be supplied from the existing reservoir, with the remaining lots to be serviced from the future reservoir.

In addition, an allowance of 44 lots for infill development is identified in Table 7-2 of the *Porirua City Model Update and SMP 7 Growth* report. This results in an available capacity for approximately 236 lots from the existing Pukerua Bay reservoir.

Based on this assessment, the proposed 236 lots within the lower terrace are expected to be adequately serviced by the existing reservoir supply with a total of 263 lots and the commercial area within this pressure zone.

Once surplus capacity is used from Pukerua Bay reservoir, the balance of the lots are dependent on a gravity feed with PRV from the Mt Welcome reservoir for supply but will remain in the lower pressure zone.

11.6.1 LOWER ZONE BACK UP FEED

Under WWL RSWS requirements, no more than 50 lots are to be isolated from a single point of supply. Given the staging and layout of the development, a temporary secondary feed from the proposed bulk main is planned to ensure compliance and maintain a backup feed. The proposed configuration is summarised below and shown in Figure 26.

1. **Domestic Main:**
   A new DN150 domestic main will be installed within the SH59 berm, connecting to the existing DN150 main at Gray Street. This will supply the lower zone, as further described in Section 11.5.
2. **Bulk Main:**
   A new DN225 bulk main will be constructed, connecting to the existing trunk main within SH59.

This main will ultimately supply the future reservoir and will initially extend to the proposed pump station and PRV located within Road 1.

3. **Interim Secondary Supply.**
   The bulk main will initially extend to the future pump station and PRV located within Road 1. In the interim, the PRV will supply a DN150 domestic main that extends back down Road 1 to service the lower terrace. This arrangement provides a secondary feed and should be operational prior to, or at the time of, construction of the 50th lot.

   Once the reservoir is commissioned, the bulk main will be connected directly to the reservoir, and the PRV will be reconfigured to supply the domestic network from the reservoir, maintaining a resilient dual-supply arrangement.

This approach has been discussed with Wellington Water and has been agreed to be acceptable in principle.

Figure 26. Backup Feed Diagram

11.7 UPPER ZONE

The upper zone servicing 686 residential lots will be supplied by the proposed reservoir, described in Section 11.8 below. Two minor exceptions are noted: 3x lots at RL 90–96 near the Road 1 pump station will experience >90 m head (slightly above the RSWS upper limit), and 29x lots at the southern end of the Lucas Block will have ~24 m head (marginally below the 25 m minimum). Given the close proximity to the reservoir and short distribution lengths, these are considered an acceptable departure from the standards.

The upper zone will be connected to the lower zone through a pressure reducing valve at RL85 as described above to increase network redundancy.

11.8 PROPOSED RESERVOIR

A new reservoir will provide the primary water supply to the development. The reservoir has been approved under a separate resource consent (RCA24215), granted on 3 February 2026 in conjunction with the northern landowners (Muri Road).

This consent authorises land use consent for the construction of a water supply reservoir with associated earthworks, reticulated water mains, a pumping station, accessway, and subdivision consent to create two infrastructure allotments accommodating the reservoir and pumping station.

The design and coordination of the reservoir works are being undertaken by Envelope Engineering. The reservoir is located on elevated land within the neighbouring Muri Road block to the north and is intended to service both the Mt Welcome and Muri Road developments.

The following key design parameters are being adopted in the reservoir design:

- Primary supply to both Mt Welcome Upper Zone and Muri Road.
- 3.7 ML storage, sized to service up to ~1,500 lots (~900 Mt Welcome, ~600 Muri Road).
- Sizing based on RSWS assumptions: 3.5 occupants/dwelling and 700 L/person/day.
- Constructed at RL 180 with TWL RL 186; compliant service range RL 96–161.
- Final sizing and specifications to be confirmed at detailed design.

The later stages of the development within the upper zone will require the new reservoir to be constructed and commissioned before lots can be serviced, while the lower lots can be supplied from the existing Pukerua Bay reservoir, with commissioning of the new reservoir occurring concurrently with early-stage development.

The proposed location of the reservoir and connecting bulk main are shown in Figure X below. The final reservoir capacity and design parameters will be confirmed during detailed design in consultation with Wellington Water.

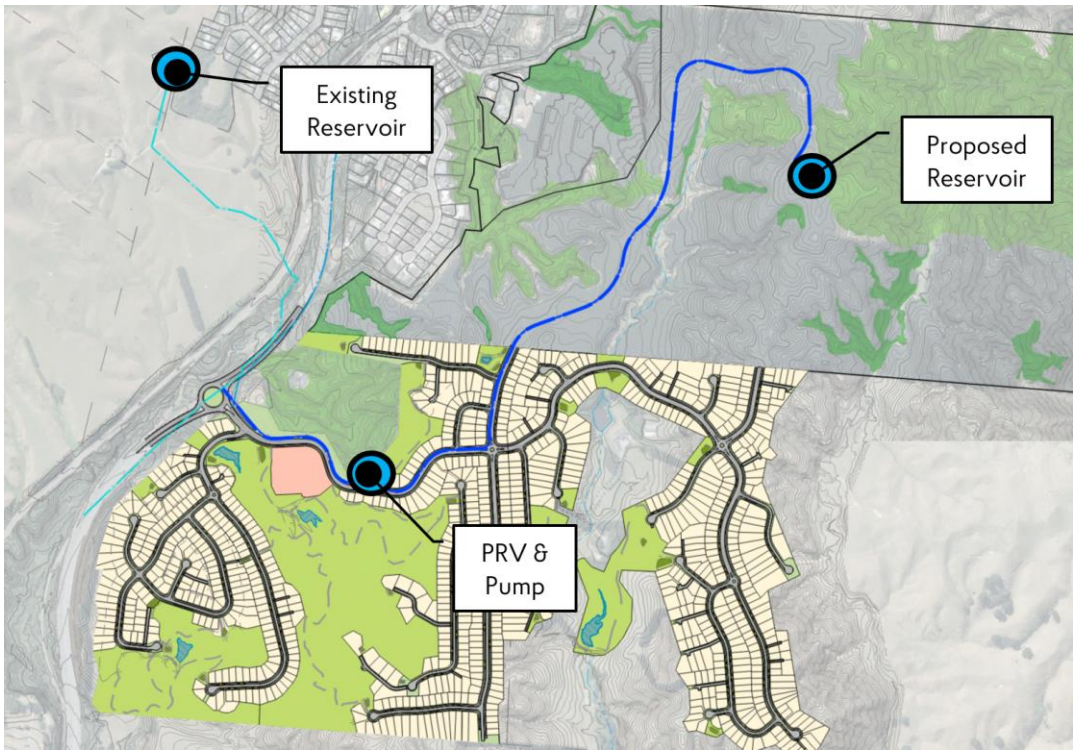

Figure 27. Proposed Bulk Network

The proposed reservoir and bulk main design can be found in Appendix 3.

11.8.1 PROPOSED BULK MAIN

Approximately 2.4 km of new public bulk main is required to connect the proposed reservoir to the existing bulk main along SH59. This proposed bulk main is being designed and consented under the same application as the reservoir. The following points summarize the proposed bulk watermain design.

1. Connect to the existing DN225 bulk main within the SH59 corridor adjacent to the site.
2. Install ~2,400m of DN225 main to provide bulk supply to the reservoir.
3. Construct a pump station at RL 90 to boost pressure in the bulk main to the reservoir operating level.
4. Provide an equipment building of approximately 6m × 4m to house the pumps and PRV.

The bulk main alignment runs within the Mt Welcome road reserve, then continues into the Muri Road site within a same planned road reserve. The road cross-section and location of the bulk main within the road will be consistent across the boundaries. The route is being coordinated with the Muri Road developer and design team.

12.0 UTILITIES

12.1 TELECOMMUNICATIONS

We have initiated discussions with Tuatahi First Fibre and Chorus as two potential network operators. Both have confirmed through their initial high-level assessments that the existing fibre infrastructure along SH59 is sufficient to service the site. Conditional clearance letters have been issued and are included in Appendix 4 of this report.

12.2 EXISTING POWER

An existing overhead power line traverses the site, with underground 11 kV cables connected at various pole locations. These cables are routed underground to service the individual dwellings within the development. Any realignment of existing services will be addressed during the detailed design phase.

12.3 PROPOSED POWER

Envelope have had ongoing discussions with Wellington Electricity Limited (WEL) and Edison Consulting Group regarding options to service the development. It is recognised that power infrastructure is not yet in place, consistent with other services required to accommodate the fully developed site. Network reinforcement will be necessary and will need to be delivered alongside other developments and projects in the area.

To confirm the extent of network upgrades and associated costs, a High-Level Report (HLR) will be commissioned by Pukerua Property Group LP. This will assess the network and provide a concept design for power supply. A supporting letter from WEL has been provided in Appendix 4 of this report.

12.4 GAS

No gas supply is proposed for the new residential or commercial areas.

13.0 CONCLUSION

In summary, this report confirms that the site can be developed and adequately serviced subject to further engineering design, provided that the recommendations of this report are followed.

14.0 ADHERENCE TO THE EXPERT CONDUCT CODE.

While this is not a matter before the Environment Court, the author of this report has read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 ('Code'). The author has complied with the Code in the preparation of this report.

The data, information, facts and assumptions the author has considered as part of this report are set out in this report. The reasons for the conclusions of the report are also set out in this report. Unless stated otherwise, this report is within the author's expertise and the author has not omitted to consider material facts known to him that might alter or detract from the opinions expressed.

15.0 LIMITATIONS

This report has been prepared for the project described to us and its extent is limited to the scope of work agreed between the client and Envelope Engineering Limited. No responsibility is accepted by Envelope Engineering Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

APPENDICES

APPENDIX 1
ENGINEERING PLANS

The full drawing package is provided as a separate attachment.

APPENDIX 2
WASTEWATER HYDRAULIC MODEL REPORT

APPENDIX 3
RESERVOIR DESIGN PLANS (RCA24215)

APPENDIX 4
UTILITY PROVIDER LETTERS

APPENDIX 5
EXISTING UTILITY SERVICES