ENVELOPE

CIVIL INFRASTRUCTURE REPORT

77 AND 109 KAPITI ROAD AND 1 BRETT AMBLER WAY, PARAPARAUMU

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1.0 INTRODUCTION

New Central Park Limited (NCPL) is proposing the comprehensive development of land at 77 and 109 Kapiti Road and 1 Brett Ambler Way, Paraparaumu, together with associated works on adjoining land. The Project is a comprehensive, master planned mixed-use development providing for the expansion of the Paraparaumu Metropolitan Centre.

The Project comprises:

- Approximately 600 residential dwellings, including apartments, townhouses, duplexes, courtyard housing and standalone dwellings;
- Approximately 20,000 m² GFA of Large Format Retail (LFR);
- Approximately 3,800 m² of other retail and commercial activities, including specialty retail and drive-through activities;
- Subdivision to create residential, commercial, LFR and other development allotments, together with roads, reserves and infrastructure;
- A new internal transport network, including the Town Centre Link Road, local roads and JOALs, together with pedestrian and cycling connections and provision for public transport;
- Three waters infrastructure required to service the development;
- An extensive network of open space, landscaping and blue-green infrastructure; and
- Wetland reclamation and creation and ecological restoration and enhancement, including a constructed indigenous wetland primarily providing ecological offsetting and compensation, together with complementary flood-storage functions.

The development has been comprehensively master planned to integrate the residential, commercial, transport, infrastructure, ecological, landscape and open space components of the Project. It is intended to proceed progressively in stages as an integrated extension to the existing Paraparaumu town centre.

The Project has been referred for consideration under the Fast-track Approvals Act 2024. This report forms part of the technical documentation supporting the substantive application for the Project and covers the following:

- Earthworks and Erosion and Sediment Controls
- Access and Roading
- Three Waters Infrastructure
- Utilities Servicing

This report should be read alongside other project documentation and reports submitted with the substantive application.

2.0 FAST TRACK INFRASTRUCTURE INFORMATION REQUIREMENTS

The Minister for Infrastructure's Section 28 Notice of Decision, dated 18 September 2026, accepted the New Central Park project for referral to the fast-track approvals process. The Notice specifies additional information to accompany the substantive application pursuant to section 27(3)(b)(ii) of the Fast-track Approvals Act 2024.

In relation to infrastructure, paragraph 3(a) of the Notice requires:

An assessment of the relevant transport and three waters infrastructure, including but not limited to:

- The existing condition and capacity of that infrastructure;
- Any upgrades, improvements or new infrastructure required in connection with the project;
- Any funding required to carry out those upgrades, improvements or new infrastructure, including who will provide that funding; and
- Information on any discussions held, and any agreements made, between the applicant and relevant infrastructure providers in relation to those matters.

This Civil Infrastructure Report has been prepared to address the three waters and civil infrastructure components of the information requirements specified in the Notice of Decision. The report should be read alongside the Integrated Transport Assessment, Stormwater Management Plan, Flood Risk Assessment and supporting engineering plans.

The requirements are addressed as follows:

- **Existing infrastructure condition and capacity:** Sections 8 and 9 identify the existing wastewater and potable water infrastructure surrounding and traversing the Site, including available connection points and the findings of network capacity modelling undertaken by HAL Consulting and Stantec. The wastewater assessment considers the capacity of the existing network, including the Rata Road pump station, while the potable water assessment considers network pressures, capacity, resilience and firefighting supply. The Stormwater Management Plan and Flood Risk Assessment provide the corresponding assessment of existing stormwater infrastructure, drainage conditions and flood management requirements.
- **Required upgrades, improvements and new infrastructure:** Sections 5 – 9 describe the proposed roading and three waters infrastructure required to service the development. This includes the new internal road network, stormwater collection and treatment infrastructure, wastewater pump stations, and associated reticulation, diversion of the existing wastewater rising main, and a new interconnected potable water supply network. The report identifies the proposed connection arrangements and matters requiring confirmation through detailed design and engineering approval.
- **Infrastructure funding and delivery:** The infrastructure assessments confirm that the Proposal can be serviced by the existing surrounding infrastructure networks, together with the new infrastructure and connections proposed as part of the development. No off-site three waters network upgrades are proposed to enable the development. The Project is therefore considered to be infrastructure ready, with the necessary servicing infrastructure able to be delivered as part of the development itself.

  The required on-site infrastructure, including the internal roading network, three waters reticulation, stormwater management facilities and associated connections, will be delivered by the Applicant as part of the staged development. These works will be funded through the development and undertaken in accordance with the approved engineering plans, relevant infrastructure provider requirements and conditions of consent. Upgrades to the electricity network needed to serve the full development (Section 10.2) will be co-ordinated with Electra, with funding to be confirmed through the network connection agreement with Electra.
- **Engagement with infrastructure providers:** The infrastructure design has been informed by engagement with KCDC and relevant network utility operators, including previous technical reviews and requests for information associated with the 2024 resource consent applications. Sections 3 and 8–10 describe how this engagement has informed the current servicing approach, including wastewater and water supply modelling, connection arrangements and discussions with Chorus, Electra/Scanpower and Firstgas. Further engagement will occur as required to finalise detailed design, infrastructure connections and any necessary network approvals.

The transport-specific requirements in paragraph 3(b) of the Notice of Decision are addressed separately in the Integrated Transport Assessment prepared by Stantec.

Accordingly, this report, together with the supporting technical assessments and wider substantive application, provides the civil infrastructure and three waters information required by paragraph 3(a) of the Minister's Notice of Decision.

3.0 PROJECT BACKGROUND

A previous masterplan was prepared for the site and formed the basis of resource consent applications lodged with Kapiti Coast District Council (KCDC) and Greater Wellington Regional Council (GWRC) in 2024 for subdivision, bulk earthworks and associated infrastructure works. The previous proposal was subject to technical review and requests for further information from both Councils, including in relation to earthworks, stormwater management, wastewater and water supply servicing.

The development has subsequently been redesigned, and the current proposal differs from the earlier masterplan in a number of respects, including the development layout, earthworks, stormwater and flood management approach, and infrastructure requirements. The current engineering design has been developed having regard to the technical investigations, modelling and feedback obtained through the previous consent process, where these remain relevant to the revised proposal. A key difference between this application and the previous application is that this is a substantive application, considering land use in addition to subdivision as opposed to the previous "superlot" approach.

Where appropriate, previous technical work has been updated to reflect the current masterplan and development yield.

The previous application received Section 92 requests for information, which have been addressed through the design process. These are outlined in Table 1.

Table 1. Summary of KCDC S92 requests and where these are addressed.

RFI issue / information requested	Where addressed in current application
Clarify whether wastewater servicing will use a centralised pump station and/or individual/multiple pump stations where gravity servicing is not feasible and provide plans showing the proposed approach.	Civil Infrastructure Report – Section 8. Wastewater pump stations are proposed as gravity reticulation to Rata Road is not feasible.
Confirm the proposed wastewater connection strategy having regard to the HAL wastewater modelling, including the relationship with the Rata Road pump station and any network upgrades required to service the development.	Civil Infrastructure Report – Section 8. Wastewater will be fed back to Rata Road pump station. The HAL modelling (Appendix 3), and the basis on which the current proposal is considered not to need network upgrades, are discussed in Section 8.2.
Demonstrate that proposed wastewater mains achieve the minimum grades required by NZS 4404:2010 Table 5.4 or otherwise explain the proposed design response.	Civil Infrastructure Report – Section 8 and Appendix 1.
Demonstrate why gravity servicing is not practicable for the relevant parts of the development and provide the technical basis for the proposed pumped wastewater solution, including consideration of lifecycle and maintenance implications.	Civil Infrastructure Report – Section 8. Wastewater pump stations are proposed as gravity reticulation to Rata Road is not feasible.
Assess whether the development can be serviced entirely by gravity to the Rata Road pump station and explain the constraints where gravity servicing is not	Civil Infrastructure Report – Section 8. Wastewater pump stations are proposed as gravity reticulation to Rata Road is not feasible.

RFI issue / information requested	Where addressed in current application
practicable, including stream/channel crossings and pipe depths.	
Assess available water supply and storage capacity to service the development, including the implications of projected growth and any future network/reservoir upgrades.	Civil Infrastructure Report – Section 9. The development is not constrained by water supply or storage capacity.
Confirm the proposed connection to the existing KCDC water network and demonstrate consistency with the recommendations of the water supply modelling, including provision for network resilience.	Civil Infrastructure Report – Section 9 and Appendix 1.
Confirm the proposed depth and design of the 300 mm water main crossing beneath the channel/watercourse.	Civil Infrastructure Report – Section 9 and Appendix 1.
Confirm how peat and unsuitable soils beneath proposed three-waters infrastructure will be managed, including removal/replacement with engineered fill where required.	Geotechnical Report, Earthworks Plans. Shallow peat will be removed below three waters infrastructure.
Identify the key characteristics and sensitivities of the receiving environment and the stormwater-management outcomes required to protect those values.	Stormwater Management Plan – Receiving Environment and Stormwater Management Objectives.
Explain how WSUD principles have informed the development and how the proposed stormwater system mitigates the effects of urban development.	Stormwater Management Plan – Receiving Environment and Stormwater Management Objectives.
Bring together the freshwater, terrestrial ecology, geotechnical, landscape, cultural and flood constraints relevant to stormwater design.	Stormwater Management Plan – Site Constraints / Environmental Framework, Masterplan and supporting technical assessments
Demonstrate the relationship between the development layout and environmental constraints, including roads, ecological corridors, flood extents, overland flow paths and centralised stormwater devices.	Stormwater Management Plan – Proposed Stormwater Management System, Flood Modelling Report, Stormwater / Drainage Plans
Explain how required stormwater outcomes will continue to be achieved as superlots and individual development areas are subsequently developed, including management of impervious area and any additional attenuation requirements.	No longer relevant as full land use consent is now being sought.
Confirm the proposed ownership, vesting and long-term maintenance arrangements for stormwater treatment and attenuation devices.	Civil Infrastructure Report, proposed consent conditions and vesting plans.
Assess the ecological effects of changes in stormwater runoff and hydrology, including imperviousness, baseflows, peak flows, sediment and contaminants, and whether the proposed WSUD measures adequately mitigate those effects.	EcIA – Stormwater and Hydrological Effects; Stormwater Management Plan
Provide details of proposed road swales, including capacity, lining/planting and maintenance requirements.	Civil Infrastructure Report – Road Drainage / Stormwater; Drainage and Landscape Plans



4.0 SITE DESCRIPTION

4.1 SITE DESCRIPTION

The site comprises seven lots – Section 3 and 4 SO 501569, Section 2 SO 570550, Lot 2 and 4 DP 470759, Lot 13 DP 361734 and Lot 7 DP 342714 which have an approximate area of 37.45 ha. The proposed development works will also be undertaken on portions of land owned by and in conjunction with external parties (e.g. Kapiti Coast District Council). The site development extents are shown in our drawings (Appendix 1) and in **Figure 1**.



Figure 1. Site Extents

The site is at an elevation of approximately RL 3 – 20 m and is comprised of two distinctive landforms:

- Sand dunes with steep sides in the centre of the site.
- Lowland areas to the north and south of the dunes.

There are several watercourses which run through the site including the Wharemauku Stream on the southern boundary, and various drainage channels which run through the site including a channel which conveys stormwater from the reticulated Council stormwater network discharging adjacent to Kapiti Road. Bioresearches have conducted a watercourse assessment of the site which provides further detail on the various drains and streams and assigns ecological values and classifications to these.

4.2 PROPOSED DEVELOPMENT

The proposed development will deliver approximately 600 residential units in a varied range of typologies, together with approximately 20,000 m² of large format retail and 3,800 m² of other commercial and retail activities. It also includes significant infrastructure works, including a new east–west link road ('the spine road') and Iver Trask extension, three waters servicing, and an integrated network of open space, wetland and flood management areas.

The Fast-track application seeks the land use and subdivision consents required to enable the comprehensive development of the site, including the residential, large format retail, commercial and retail development shown on the architectural plans. The application also seeks approval for the associated earthworks, roads, three waters infrastructure, stormwater and flood management works and other supporting infrastructure required to service the development.

The civil infrastructure described in this report has been designed to service the full development proposed as part of the Fast-track application, with infrastructure sizing and servicing requirements based on the anticipated residential and commercial development yield. Proposed engineering plans for the site are included in Appendix 1 and the Site Survey is included in Appendix 2.

4.3 PROPOSED DEVELOPMENT YIELD

The civil infrastructure design has been developed having regard to the proposed development yield and land uses across the site. The anticipated residential and commercial development summarised in Table 2 has been used to inform infrastructure sizing and demand estimates for the development. While detailed design and staging may result in minor changes to individual infrastructure requirements, the servicing assessment has been undertaken on the basis of the overall development proposed through the Fast-track application.

Table 2. Proposed Development Yield.

Usage type	Commercial GFA (m²)	Residential units	Comments
Apartments	–	219	Assessed at 2.5 persons/dwelling
Courtyard	–	21	Assessed at 2.5 persons/dwelling
Duplex	–	32	Assessed at 2.5 persons/dwelling
House	–	135	Assessed at 2.5 persons/dwelling
Townhouse	–	186	Assessed at 2.5 persons/dwelling
Residential total	–	**593**	
Commercial – Large Format Retail	20,000	–	Assessed as light water use
Commercial – other retail and commercial activities	3,800	–	Assessed as medium water use
Commercial total	**23,800**	–	

5.0 EARTHWORKS

5.1 EARTHWORKS AND CONSTRUCTION MANAGEMENT

Envelope Engineering have prepared an Earthworks and Construction Management Plan (ECMP) for the proposed works at the site. 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 as well as providing an indicative methodology for works at the site.

5.2 WORKS DESCRIPTION

Earthworks are required across the site to facilitate this development, and these are shown on our engineering plans (Appendix 1). The earthworks are required to create flat building platforms and flood storage areas to enable the development. The methodology for the earthworks is outlined within the ECMP.

The earthworks at the site consist of:

- Comparing existing surface levels and proposed surface levels, the volume change is 363,000 m^3 of cut and 272,000 m^3 of fill. When allowing for compaction of the fill material and import of gravels to build the road this approximately balanced. However, to achieve this, additional earthworks are required to remove unsuitable organic soils from under the proposed roads and building areas and replace these soils with sand.
- Top surface strip and unsuitable undercut from lower levels, total volume of 426,000 m^3 and sand volume of 162,000 m^3 to for re-use. A further 162,000 m^3 will be sorted and conditioned to allow re-use as fill (a total of 324,000m^3), leaving a net 257,000 m^3 of peat.
- Sand cut volume of 307,500 m^3 and fill volume of 674,000 m^3 (including sorted undercut material) to finished levels.
- Topsoil and peat respread volume of 87,000 m^3.
- A maximum cut height of 13.5 m which is located within the existing sand dune. The typical cut depth is substantially less than this.
- A maximum fill depth of 10.5 m which is located in the proposed dune location. The typical fill height is substantially less than this.
- An earthworks area of 33.0 ha.

The undercut material will be sorted once excavated. Clean sand can be re-used as fill. Sand with minor topsoil/organic content may be able to be re-used subject to geotechnical advice and monitoring. We understand that some cement stabilisation can be incorporated to improve the re-useability of this excavated material.

There is approximately 170,000 m3 of potentially unsuitable material that requires further geotechnical review prior to either placement on-site or removal from site. Quantities to be removed will be minimised wherever possible either by treatment or undercut and placement within the site.

These volumes are solid volumes and make no allowances for bulking. The earthworks have been designed to minimise the material that needs to be removed from the site. Any excess suitable sand will be used to locally raise proposed Lots where practicable, while excess unsuitable material will require removal off-site.

5.3 GEOTECHNICAL REPORT

Torlesse Ltd have completed a geotechnical report for the development at the site which should be read in conjunction with this report. The key points from the Torlesse report as they relate to civil works are summarised below:

- The site is underlain by unsuitable materials (topsoil and peat), overlying more competent sands below.

- Groundwater depth varies across the site and also varies seasonally with an indicative range of RL 2 to 3.5 m. However, it is typically located below the peat level, which means that large-scale dewatering is not anticipated.
- The site is expected to be at risk of liquefaction in a ULS earthquake event, but these effects can be adequately managed at the surface.

The civil design adopts the key recommendations of the geotechnical report. Fibrous peat will be removed from beneath building platforms and roads and replaced with engineered fill formed from site-won dune sand, with a portion of the organic sand blended into it. Roads and three-waters networks will be founded on this engineered fill, while peat and topsoil will be reused only as landscape fill.

6.0 ROADING AND ACCESS

6.1 PROPOSED ROADING

The proposed roading layout has been decided in conjunction with the project traffic engineer (Stantec) and wider project team including architects and urban designers. The roading consists of a link road between Kapiti Road and Ihakara Street (Road One), with a secondary connection from this link road to Brett Ambler Way (Road Two). Provision has also been made for possible future connections, being an extension to Iver Trask Place (allowed for in the consent but to be constructed by KCDC) and an Airport Link Road extending from Ihakara Street.

Connections from Road One provide a movement function for the various commercial and residential uses with smaller (generally private) roads off these providing more of an access function.

The Integrated Transport Assessment (Stantec) provides further detail on the classification and suitability of the road alignments and intersection design as informed by traffic modelling.

Pedestrian and active user connectivity is provided throughout the development. Footpaths are provided on both sides of each road, with a shared path provided on the south side of the link road.

Signalised pedestrian crossing points are proposed at the Kapiti Road intersection and internal intersection. In addition to this, a crossing point with median refuge islands will be provided at several locations along the new link road including at the old Wharemauku Stream alignment, to allow users of the existing path to safely cross the link road. The formation of these access points will be confirmed at the detailed design stage.

The proposed roading network is shown on our plans (Appendix 1).

7.0 STORMWATER

7.1 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 stormwater treatment, flooding and hydraulic neutrality.

7.2 PROPOSED STORMWATER INFRASTRUCTURE

Proposed Stormwater for the site is shown on our drawings (Appendix 1) and consists of gravity connections provided for each lot, and for the road areas which will convey stormwater to the treatment devices and proposed channels across the site. Stormwater pipe sizes will be confirmed at the detailed design stage based on final impervious areas.

8.0 RAINWATER REUSE

8.1 DISTRICT PLAN

KCDC District Plan permitted standards require new buildings to be connected to a 10,000 L water re-use tank, or a 4,500 L water re-use tank if installed in conjunction with a greywater system. The water re-use tanks are to be connected to outdoor hoses and toilets. The District Plan also has a restricted discretionary standard which demonstrates that water demand is reduced by 30% from "household 2007 summer average water use" (1,560 L/Household/Day).

In all cases, the rules state that outdoor taps should not be connected to the reticulated potable water supply system. Tanks in Kapiti are fitted with an automatic top-up valve that triggers at a level. This is recommended to be at 1,000 L for a 10,000 L tank.

An analysis of rainfall in Paraparaumu was conducted for rainfall between 1984 and 2014. Assuming 10,000 L tanks, with top-up at 1,000 L and nominal water usage of 200 L/day, the tank would draw on the potable water supply system 14.7% of the time i.e. when the volume is less than 1,000 L (Figure 2). With top-up when the tank is empty, the tank draws on the potable water supply system 24.9% of the time. As such, it is impossible to comply with the District Plan requirement to not draw on the reticulated potable water supply system as even a system installed in accordance with KCDC recommendations will not comply.

The Building Code (clause B2) requires that outdoor building elements must be washed to ensure durability. If outdoor taps are not provided, an alternative means of compliance would be to engage an external contractor to wash building elements. Beyond the cost and other impacts (e.g. additional carbon from driving), this option would again use water from the public reticulated water supply.

As all options for outdoor taps cannot meet the District Plan requirements, it is considered that the effect of any non-compliance is negligible.

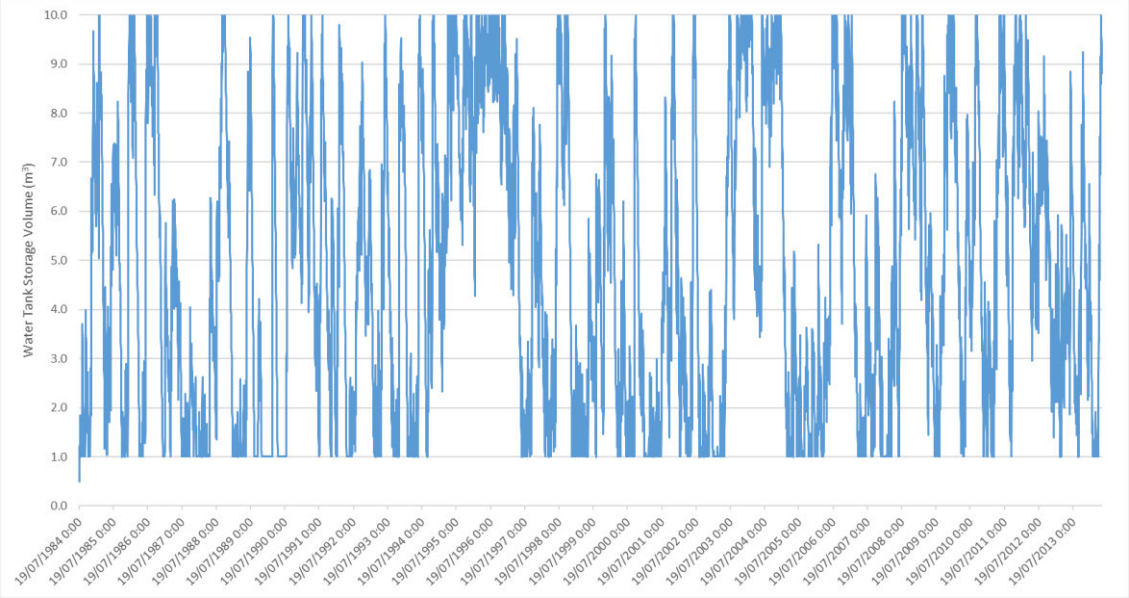


Figure 2. Rainwater Tank Simulation, 1,000 L top-up level.

8.2 WATER REDUCTION

KCDC installed water meters in 2012/2013, which resulted in a 26% decrease in the demand compared to before meters were installed[1].

In addition, water reducing fixtures have become common place in new builds. The potential that these fixtures would be removed is not considered probable.

[1] https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=345

The type of development (medium density) means that some demands such as water for outdoor use, will be significantly reduced from a lower density development, further reducing the water demand.

These factors combined represent the required 30% reduction from the household 2007 summer average water use.

8.3 WATER RE-USE STRATEGY

When considering these factors, water metering and the use of water reduction fixtures can easily meet the water reduction targets of the District Plan. Tanks can also be used as a compliant solution.

As all options for outdoor taps cannot meet the District Plan requirements, it is considered that the effect of any non-compliance is negligible.

It is recommended that each dwelling / building is subject to one of the following:

- Rainwater Re-use System
    - Terraced Houses – 2,000L tank connected to the outdoor hose to supply water for washing and gardening, this will be topped up at 500 L by the town water supply.
    - Standalone Houses – 4,000L tank connected to the outdoor hose to supply water for washing and gardening, this will be topped up at 500 L by the town water supply.
- Water Reduction Fixture. Minimum of 3-star rating for all internal water fittings as per the Water Efficiency Labelling Scheme

9.0 WASTEWATER

9.1 EXISTING INFRASTRUCTURE

There is an existing 450 mm asbestos cement rising main running through the centre of the site. We understand from our discussions with KCDC that this is very shallow at portions of the existing alignment. This rising main runs from the Rata Road pump station, southwest of the site and conveys flows to the Paraparaumu Wastewater Treatment Plant. The downstream 1,034 m section of this rising main (from Arawhata Road to the treatment plant) is shared with the Coleman pump station.

There are several gravity wastewater pipes adjacent to parts of the site including 150 mm pipes on Kapiti Road, Brett Ambler Way, Rimu Road, Ihakara Street and Rata Road.

9.2 WASTEWATER MODELLING

HAL Consulting Limited (HAL) conducted an analysis for KCDC on behalf of Envelope Engineering in 2024 (final report dated 16 February 2024, Appendix 3) to understand existing capacity constraints in the wastewater network and the impact that the previously proposed development would have on the wastewater network. This modelling was undertaken as part of the previous resource consent process and has been reviewed to determine its applicability to the current development proposal.

The HAL report (based on the previous development plans, comprising approximately 708 dwellings, a 300-unit aged care facility, a hospital and approximately 6.5 ha of commercial land) has assumed a Peak Wet Weather Flow (PWWF) of 48.9 L/s.

The current proposal has a lower overall wastewater design demand than the development assessed by HAL in 2024. Based on the proposed land-use there is a reduced number of dwellings, and a reduced area of commercial buildings. We have calculated a PWWF of 27.18 L/s (Table 3) based on the peaking factors within NZS 4404:2010 and loading parameters within the KCDC LDMR, significantly less than the previous design.

Table 3. Wastewater loading calculations.

Catchment	Basis	ADWF (L/s)	PDWF (L/s)	PWWF (L/s)
Residential (593 dwellings)	625 L/dwelling (KCDC LDMR)	4.28	10.72	21.45
Light Commercial (2.0 ha GFA)	0.4 L/s/ha (KCDC LDMR)	0.80	2.00	4.00
Medium Commercial (0.38 ha GFA)	0.7 L/s/ha (KCDC LDMR)	0.27	0.67	1.33
Total		**5.44**	**13.59**	**27.18**

The HAL modelling assessed three discharge options, of which the following two are relevant to the current proposal:

1. Option 1 involves the discharging of wastewater from a pump station within the development to the existing/re-aligned rising main, together with a new dedicated rising main from the Coleman pump station to the treatment plant.

2. Option 2 involves the discharging of wastewater from a pump station within the development to the Rata Road pump station.

The HAL report identified that Option 2 would result in minor upstream surcharging during heavy rain events with the proposed development added to the existing network under the existing (2018) population scenario. But they note that there is sufficient storage to prevent any unacceptable risk of uncontrolled overflows during the modelled 5-year ARI design storm.

HAL recommended Option 1 as the preferred solution, as it avoids double pumping of flows from the development. However, it is acknowledged in the report that this would require a new dedicated rising main from the Coleman pump station to the treatment plant (a significant off-site upgrade).

Option 2 is an acceptable solution, given that there is sufficient in-line storage despite the identified surcharging to prevent an un-acceptable risk of overflow. This is an acceptable and compliant solution.

Under a future 2043 scenario (modelled with assumed other future developments as well as the earlier 48.9 L/s development) HAL noted that while there were no overflows predicted, the level of surcharge is considered to pose an unacceptable risk. However, this future scenario accounts for future expected growth (district wide) and increased in-flow and infiltration with no upgrades to the network beyond committed projects. HAL's modelling also shows that the 2043 inflow to Rata pump station (approximately 187 L/s) exceeds the existing pump capacity (approximately 170 L/s) before any flows from the development are added, i.e. the 2043 constraint is a wider network matter rather than one created by the development. This is a significantly conservative scenario given that upgrades will be enabled by development contributions from this development (and others in the catchment) and routine maintenance and replacement of pipes will reduce in-flow and infiltration.

Based on this we conclude that the proposed development can be accommodated by the existing network in a configuration based on Option 2. The HAL modelling inputs are conservative in this context, given that the current calculated PWWF of 27.18 L/s is substantially lower than the 48.9 L/s assessed in that modelling.

9.3 PROPOSED INFRASTRUCTURE

The proposed wastewater servicing approach has been developed having regard to the wastewater servicing matters raised through KCDC's review of the previous resource consent applications,

including consideration of network capacity, gravity servicing and the use of pumped solutions where gravity servicing is not practicable.

The proposed wastewater infrastructure for the development consists of the following aspects:

- Gravity network, falling to four centralised vested pump stations.
- The pump stations will pipe wastewater using a rising main to a gravity network which will discharge to the Rata Road pump station.
- Lots at the south end of the link road will connect directly into this gravity network.

A gravity connection has been considered for the site but is not considered practicable, as it would require wastewater pipelines to pass beneath the channels at significant depth for any development to the west of Road One. This would result in deep infrastructure within an area of high groundwater and associated construction, groundwater management and maintenance constraints. The proposed pumped solution avoids the need for these deep channel crossings while allowing the remainder of the development to be serviced through the gravity network.

The number of pump stations has been selected to minimise the amount of wastewater lines that will be near or below the groundwater table. While not entirely avoidable, the length of these lines has been minimised to ensure that construction and maintenance is feasible and reduce infiltration possibilities over the lifetime of the pipes.

9.4 RISING MAIN DIVERSION

The Contractor will be required to submit a rising main diversion methodology to KCDC for acceptance, prior to the diversion and reconnection of this being undertaken. This will require input from the KCDC wastewater operations team, to ensure that shutdown times are minimised and so that these can be planned around. Works on the existing asbestos cement main, including removal or abandonment of redundant sections, will be undertaken in accordance with the Health and Safety at Work (Asbestos) Regulations 2016.

10.0 POTABLE WATER SUPPLY

10.1 EXISTING INFRASTRUCTURE

There are existing water mains at various locations around the site, which provide a range of connection points which can be utilised to provide redundancy for the proposed development as shown on our plans (Appendix 1). These include 350 mm ID water mains on Rimu Road and Kapiti Road, 150 mm ID water mains on Ihakara Street and Iver Trask Place and a 100 mm water main on Brett Ambler Way.

10.2 PROPOSED INFRASTRUCTURE

The proposed potable water servicing approach has been developed having regard to the water supply matters raised through KCDC's review of the previous resource consent applications, including network capacity, resilience, fire-fighting supply and the proposed connection strategy.

The proposed water network is shown on our plans (Appendix 1) and consists of the following:

- A 300 mm ID water main connecting to the existing 350 mm ID water mains on Kapiti Road and Rimu Road.
- 150 mm ID water main connections from the proposed 300 mm ID water main to existing water mains on Ihakara Street and Iver Trask Place.
- 100 mm ID water main connection from the existing 350 mm ID water main on Kapiti Road, if this is required by future modelling.

- Dual water mains of varying sizes (typically 100 – 150 mm) will be run on opposite sides of the roads to the main reticulation network to provide water supply on both sides of the proposed roads.

Final pipe sizes, alignments and connection details will be confirmed at detailed design, consistent with the network modelling and KCDC engineering requirements.

10.3 POTABLE WATER MODELLING

Stantec conducted an analysis for KCDC on behalf of Envelope Engineering in 2023 to understand existing capacity constraints in the potable water network and the impact that the proposed development would have on the potable water network. The Stantec assessment was based on the previous masterplan (approximately 680 residential units, a 300-unit retirement village and five commercial lots over 17.85 ha), which has a higher water demand than the current proposal. The report (Appendix 4) makes the following conclusions and recommendations:

- The impact of the proposed development is expected to be minor for the current peak day and future scenarios.
- The network provides sufficient resilience against outages or shutdowns including for fire supply.
- The modelling identified potential resilience constraints for fire flow if only an initial portion of the proposed network is constructed in isolation. However, it is anticipated that the bulk of the proposed network will be constructed together, providing the network connectivity required to address this potential constraint.
- The modelled configuration meets water supply requirements (potable and fire), with sufficient pressures and flows for the proposed development and anticipated land uses.

The Stantec assessment predicted that, with the previously proposed development added to projected growth, additional reservoir storage could be required from around 2025, rather than around 2035 without the development. However, we have confirmed the capacity of the Riwai / Otaihanga reservoir system with KCDC. The 2025 Zone Management Plan (Stantec) shows that there is approximately 7,000 m^3 of available capacity. The additional daily demand is in the order of 800 m^3 of additional water demand, which can be catered for by the existing reservoirs.

KCDC have previously indicated that additional network modelling will not be required at the detailed design stage. However, further modelling may be undertaken to optimise final pipe sizing and configuration.

11.0 UTILITIES

11.1 TELECOMMUNICATIONS

Envelope has previously engaged with the Network Utility Operator (Chorus) who have confirmed that they have network adjacent to the site and that this can be extended to serve the proposed development. Indicative utilities servicing locations are shown on our plans (Appendix 1) which will be confirmed during detailed design once utilities plans are received.

11.2 POWER

Envelope has previously engaged with the Network Utility Operator (Scanpower on behalf of Electra) who have confirmed that they have network adjacent to the site and that this can be extended to serve the proposed development.

Scanpower have confirmed that there is some capacity in the network. However, the full development will require network upgrades. These can be progressed concurrently with the initial

stages of development. The locations of infrastructure and any upgrades will be confirmed during detailed design once utilities plans are received.

11.3 GAS

Envelope has previously engaged with the Network Utility Operator (Firstgas) who have confirmed that they have network adjacent to the site and that this can be extended to serve the proposed development. The network can support a supply of up to 16,000 MJ/hr without significant upgrades being required.

12.0 CONCLUSION

This report provides comment on the civil infrastructure required to service the proposed development and support the substantive application. The assessment confirms that the site can be adequately serviced for water supply, wastewater and stormwater, including the full residential and commercial development proposed as part of the application.

The proposed development can be serviced by the existing surrounding three waters networks, together with the new infrastructure proposed within the site. No off-site three waters network upgrades are proposed to enable the development, and the assessments undertaken have not identified any network capacity constraints that would prevent the proposed development from being adequately serviced. The proposed water supply network will provide sufficient potable and firefighting supply, while the proposed wastewater system can accommodate the anticipated development flows without resulting in unacceptable effects on the wider network.

On this basis, there are no identified civil infrastructure or three waters servicing constraints that would prevent the development proceeding, and the development can be serviced without unacceptable adverse effects on the capacity, operation or performance of the surrounding infrastructure networks.

The infrastructure design will be further developed through detailed design and engineering approval. The remaining detailed design matters are conventional engineering matters that can be appropriately managed through the Council's standard engineering requirements and the proposed conditions of consent included with the substantive application.

13.0 LIMITATIONS

This report is for the use of New Central Park Limited only and should not be used or relied upon by any other person or entity or for any other project.

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

(Refer plans with substantive application)

APPENDIX 2 TOPOGRAPHICAL SURVEY



LEGEND

- WATER — G S WATER MA N
- SS — G S SEWER MA N
- SW — SW — G S STORMWATER MA N
- EDGE OF SEAL
- GUTTER FLOW
- FENCE
- TOP OF KERB
- EDGE OF CONCRETE
- WALL BOTTOM
- EDGE OF VEGETAT ON
- BU LD NG OUTL NE
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- TOPO BREAKL NE
- TOPO BOTTOM OF BANK
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- GATE
- E — O/H POWER L NE
- POST
- D — BU LD NG DOWN P PE
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- T — COMMS PL NTH
- POWER POLE
- WATER VALVE
- W — WATER TOBY
- H — HYDRANT
- TREE
- MH — MANHOLE
- UNKNOWN L D
- S TE BENCHMARK
- GULLY TRAP
- STORMWATER OUTLET
- G — GAS VALVE
- STREET L GHT
- BU LD NG FLOOR LEVEL

NOTES

1. LEVELS ARE N TERMS OF NZ VERT CAL DATUM 2016
   OR G N OF LEVELS
   SP 4 SO 400686 (CUKD)
   RL 9.01m

2. COORD NATES ARE N TERMS NZ GEODET C DATUM 2000 WANGANU C RCU T
   OR G N OF COORD NATES
   SP 4 SO 400686 (CUKD)
   725013.25 mN 359142.38 mE

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A	FOR NFORMAT ON	SGR	16.05.23

PROJECT
THE WELLINGTON COMPANY ASSET MANAGEMENT LIMITED
KAPITI ROAD, PARAPARAUMU

T TLE
SITE SURVEY

ENVELOPE SURVEYING
W W W E N V E L O P E - E N G C O N Z

SURVEYED	KMP (17.04.23)	DRAWN	SGR
CHECKED	ELC	DATE	17-May-2023
SCALE A1	1:1500		A3 Scale 1:3000
STATUS	CLIENT ISSUE		

PROJECT No	DRAW NG No	REV S ON
1942-01-SV	050	A

- Wed May 17 12 31 50 2023



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- Wed May 17 12 32 01 2023

APPENDIX 3 WASTEWATER MODEL REPORT



KAPITI COAST DISTRICT COUNCIL

77 KAPITI RD DEVELOPMENT ASSESSMENT

FEBRUARY 2024

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1	04/11/2022	Draft for client comment	SS	BDR	BDR	BDR
2	19/01/2024	Revised Draft	SS	BDR	BDR	BDR
3	16/02/2024	Final incorporating client comments	SS	BDR	BDR	BDR

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1 Introduction

1.1 Objective

The objective of this study is to utilise the existing hydraulic model (Paraparaumu Wastewater Model, with updates undertaken in 2017 (Watershed) and 2021 (HAL)) of the Paraparaumu wastewater network to assess the impact of the proposed 77 Kapiti Road development. An existing (2018) population and an updated future (2043) population scenarios have been considered.

1.2 Background

Paraparaumu is the largest township in the Kapiti region with a population of 28,300 (2018 census), including the settlements of Paraparaumu Beach, Raumati, Raumati Beach and Otaihanga. The Paraparaumu wastewater catchment which covers these settlements is predominantly located on coastal dunes, with relatively flat topography, with the exception of the area to the east of SH1 which lies on the lower foothills of the Tararuas.

The bulk of the wastewater network servicing the Paraparaumu catchment was laid in 1980, and incorporates 98 sewage pumping stations, many of which serve only a handful of properties. All wastewater flows are conveyed to the Paraparaumu Wastewater Treatment Plant (WWTP), located to the northeast of the town, via one of four major pumping stations located at the downstream end of the catchment.

Moderate development and growth is expected in Paraparaumu over the next 30 years, with KCDC's latest 'medium-growth scenario' estimates showing a projected population of the Paraparaumu catchment of 32,300 in 2043.

This proposed large scale development at 77 Kapiti Road comprises a mixture of residential units, a hospital, an aged care facility and a commercial hub. Wastewater flows from the proposed development would naturally drain to KCDC's Coleman Pump Station (PSP00091), from where flows are conveyed via a shared rising main to the Paraparaumu Wastewater Treatment Plant (WWTP). However, as part of this modelling assessment, the pass forward capacity of Rata Pump Station and the associated rising main is also analysed, with the option of flows generated by the development pumped either to Rata Pump Station, or into the shared rising main.

2 Scope

The following tasks were undertaken as part of this assessment:

- Calculation of design flows for the proposed development
- Model update to represent theoretical wastewater flows from the proposed development for both existing and future Scenarios.
- Determine appropriate hydrological parameters for the proposed development area to reflect expected Code of Practice flows for the future scenario to allow a dynamic assessment of flows from the proposed development.
- Assess system performance for a 5 year ARI design storm for the 'existing network' scenarios detailed below:
    1. An existing development scenario, including the flows from the proposed development at 77 Kapiti Road, assumed to be pumped into the existing Rata PS rising main.
    2. A future development scenario including additional flows from this proposed development, assumed to be pumped into the existing Rata PS rising main, with the existing wastewater network (including any committed projects).
- Identification of potential mitigation options (high level only) to mitigate any adverse effects of development, which is limited to the three options detailed below:
    1. Flows from development pumped into Rata PS rising main, but with new dedicated rising main to take flows from Coleman PS.
    2. Flows from the development discharged to Rata PS, with additional upgrades as required.
    3. Flows from the development discharged to the local gravity network flowing to Coleman PS, with an upgraded PS and a new dedicated rising main to the WWTP.
- Brief report summarising the findings and potential solutions.

3 Post Development Design Flows

3.1 Overview

The proposed Kapiti Road development is in an 18 Ha greenfield site, on the eastern side of the Kapiti Expressway, south-east of the Paraparaumu catchment and is approximately 500m from Coleman Pumpstation and 300m from Rata Pumpstation. The site is currently zoned for a mixture of commercial and residential development.



Figure 3-1 Proposed 77 Kapiti Rd Development location

There are three separate discharge options analysed for the wastewater generated by the proposed development site all of which will eventually result in an increase in flow into the Paraparaumu Wastewater Treatment Plant, located north-east of the Paraparaumu catchment.

A detailed plan view of the development location and the Rata and Coleman Pumpstation are shown in Figure 3-2 below.

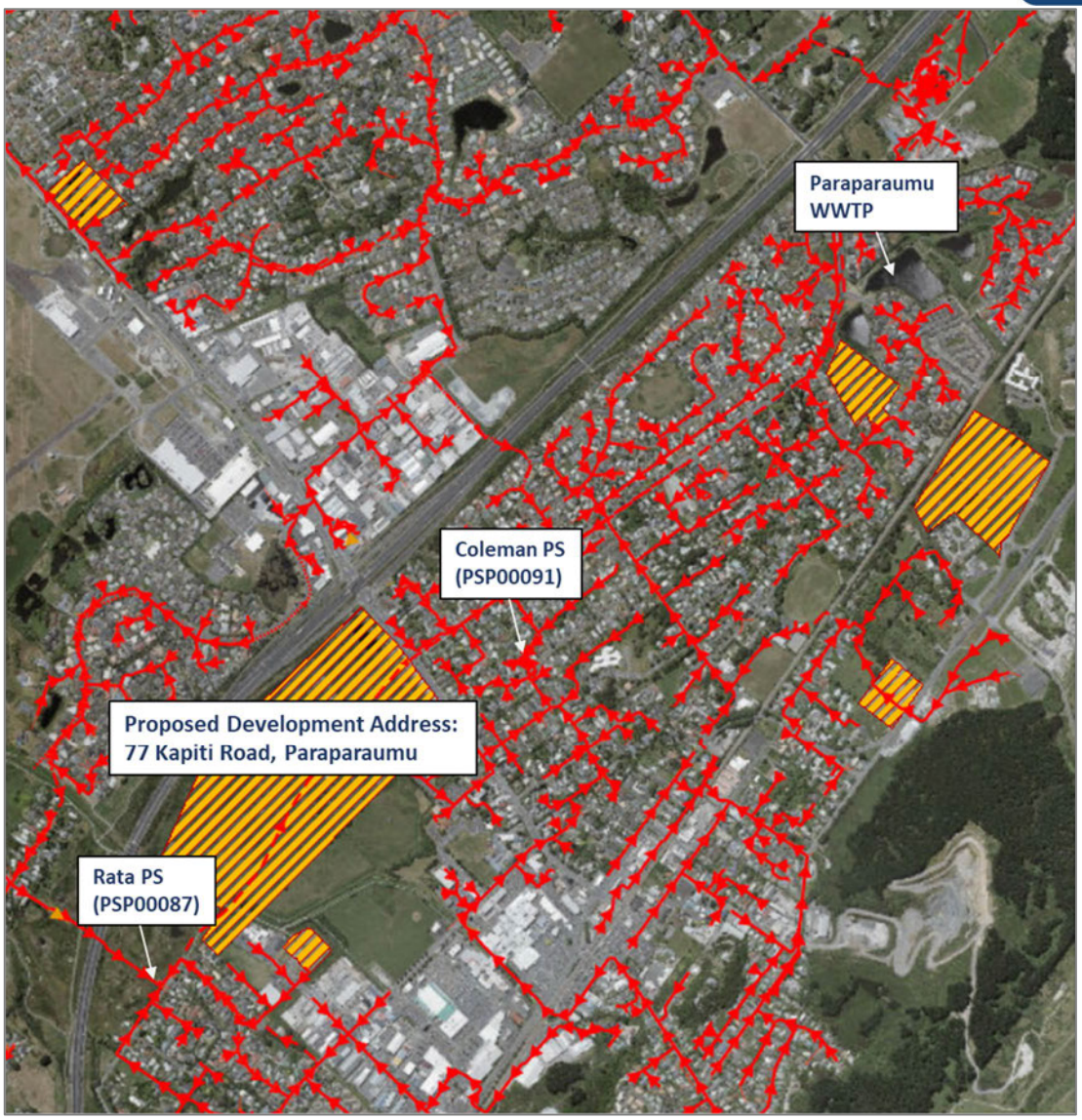


Figure 3-2 Plan view of the Proposed 77 Kapiti Road Development and the downstream Network

The feasibility and sizing of the internal site connections and the sizing of the wastewater pipeline from the development to the discharge point, has not been assessed as part of this study, nor has an assessment of the impact of additional flows on the WWTP which is beyond the scope of this study.

3.2 Development Design Flows

The theoretical wastewater flows from the development site has been calculated based on the developer's proposed plans and planned number of residential dwellings provided by KCDC.

Following the KCDC 'Subdivision and Development – Principles and Requirements' code the design flow formulas as shown below in Table 3-1 can be used to calculate a proposed residential Peak Wet Weather Flow (PWWF) of 30.0 l/s and a commercial Peak Wet Weather flow of 18.9 l/s.

Table 3-1: 77 Kapiti Road Development Design Flows

No of units	Type of units	Occupancy	Population	ADWF (l/p/day)	ADWF (l/s)	DWF Peaking Factor	PDWF (l/s)	WWF Peaking Factor	PWWF (l/s)
400	Residential entry site 400 units - 1,2 and 3 bed units	@ 2.5 EP/dwelling	1000	250	2.9	2.5	7.2	5	14.5
250	Residential Dunes. Approx 250 units 2,3,4 beds	@ 2.5 EP/dwelling	625	251	1.8	2.5	4.5	5	9.1
58	Residential Ihakara. 58 townhouses	@ 2.5 EP/dwelling	145	252	0.4	2.5	1.1	5	2.1
300	Aged care - 300 units	@ 1.0 EP/dwelling	300	252	0.9	2.5	2.2	5	4.4
	Total Residential Flow		**2070**						**30.0**

Area (Ha)	Industry Type	Design Flow (l/s/Ha)	ADWF (l/s)	DWF Peaking Factor	PDWF (l/s)	PWWF (l/p/day)	PWWF (l/s)	Comment
4.5	Light, up to 2 stories (<250 m3/year)	0.4	1.8	2.5	4.5	5	9.0	Commercial
1.02	Medium, 2 - 5 stories (350-600 m3/year)	0.7	0.7	2.5	1.8	5	3.6	Mixed Commercial (fast food, supermarket)
0.98	Heavy, > 5 stories (>600 m3/year)	1.3	1.3	2.5	3.2	5	6.4	Hospital Care
	Total Commercial/Industrial Flow						**18.9**	

4 77 Kapiti Road Development Impact Assessment

4.1 Option 1 – Discharge to Rata PS Rising Main

For this option flows from the development are assumed to be pumped directly into Rata pump station rising main. In this case the main constraint would be the shared section of the rising main, which is a 1034m length of 450mm AC pipe. A detailed desktop analysis of the capacity of this shared section was undertaken to estimate the maximum flow that could be pumped through the rising main by the existing pumps at both Rata and Coleman, during both pre-development and post-development scenarios (in conjunction with expected design flows to be pumped from the development).

The maximum pump flow, which is during a large wet weather event, has been analysed for the following scenario:

1. The pumps at both Rata and Colman pump stations performing at a scaled-down capacity from theoretical pump curves based on measured flows from the 2018 Magflow data provided by KCDC from at the outlet of the shared rising main.

Based on the analysis, an inclusion of 50 l/s into the Rata pump station rising main would result in increased total dynamic head through the shared rising main, impacting Coleman and Rata pumps' ability to continue operating at pre-development pump rates. The pumps at Coleman and Rata would be operating at a reduced capacity due to the increased flows through the shared rising main.

The table below details the existing pump capacities based on 2018 SCADA and post development capacities with the additional 50 l/s from 77 Kapiti Road.

Table 4-1: Pump Capacities during Pre and Post Development Scenarios

		Maximum Flow from Rata during Storm Event (l/s)	Maximum Flow from Coleman during Storm Event (l/s)	Additional Flow from Development (l/s)	Total Flow through Shared RM (450mm)	Comment
Rata & Coleman Pump Performance (Existing pump capacity)	Pre-Development Scenario	171	105	-	276	.
	Post-Development Scenario with additional 50 l/s **pumped into Rata RM**	158	96	50	304	Separate RM required for Coleman PS as currently at capacity

During a large wet weather event, when the network is operating under a stressed state, the reduced performance at Coleman pump station in particular (which has been identified by previous studies as a network constraint) would result in backup within the upstream gravity network with the potential for

wet weather surcharging/overflow incidents. Hence, for this option it is recommended that to mitigate the adverse impact of additional flows from the development, a separate rising main is constructed to convey flows from Coleman pump station to the wastewater treatment plant. This would enable Coleman pump station to continue to operate at or above the pre-development capacity (with the potential to provide additional capacity for growth) and ensure that the additional flows from the proposed development don't have an adverse impact on the performance of the Paraparaumu Wastewater network.

4.2 Option 2 – Discharge to Rata PS

The second option is for the flows from the development to be discharged to Rata pump station, with additional upgrades as required. This is similar to Option 1 but the flow from the proposed site is discharged to the Rata pump station, thus the capacity of the pumps to convey the additional flows have been assessed as well.

4.2.1 Existing Development Scenario

The Paraparaumu wastewater model was run under the existing (2018) scenario, to assess the performance of the local network and inflow into Rata Pumpstation under pre-development scenario. The model was run for a 24-hour, 5-year ARI nested design storm.

As shown in Figure 4-1 below, the inflow into Rata pump station during the pre-development scenario is approximately 170 l/s, and with two pumps operating, there appears to be sufficient pass forward capacity for the existing flows.

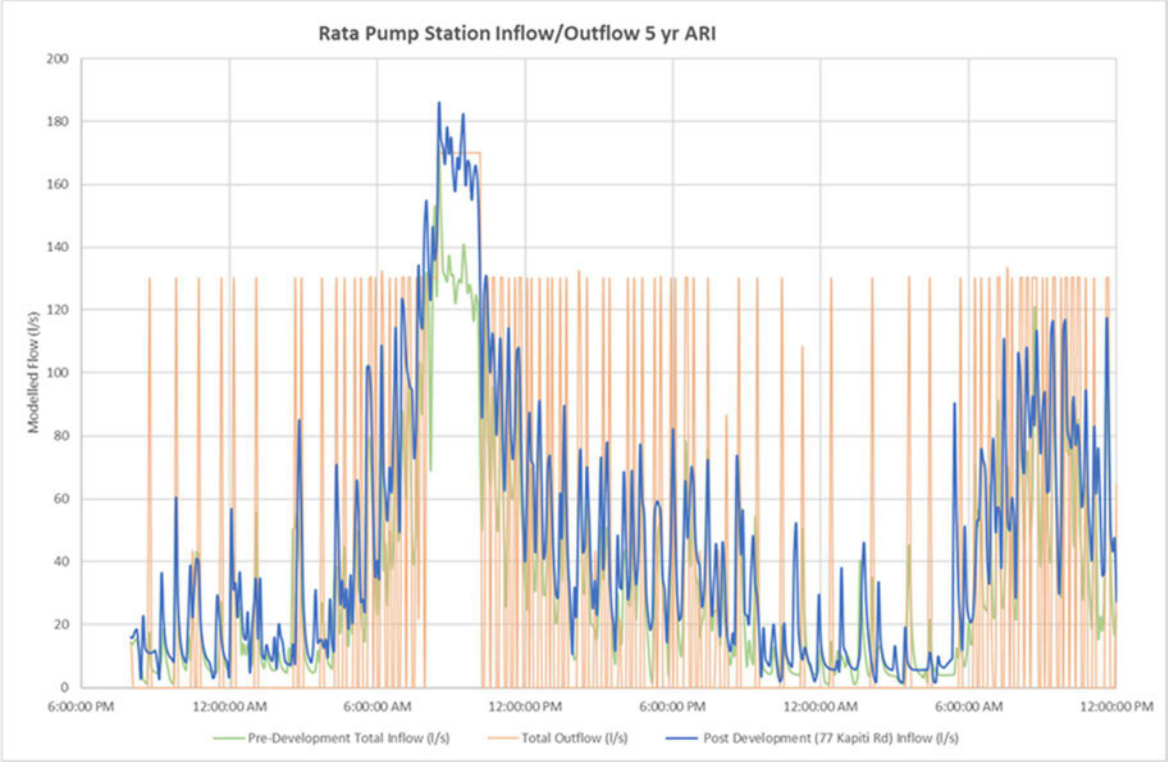


Figure 4-1 Post-Development Flows to Rata PS – 5-year ARI design storm

4.2.2 Post- Development Scenario

As shown in Figure 4-1 above, the inflow into Rata pump station during the post-development scenario increases to 185 l/s, resulting in minor backup within the upstream gravity network due to insufficient pass forward capacity at Rata pump station. However, there appears to be sufficient in-line storage within the 525mm pipeline and ground cover in the upstream gravity network to prevent any unacceptable risk of uncontrolled overflows during a 5-year design storm.

4.2.3 Future Population Scenario (2043)

In order to access the effect of the development in conjunction with projected future population growth on the performance of the downstream network, an ultimate 2043 future growth scenario model that was previously developed by HAL was used.

The Paraparaumu wastewater model was run under the future (2043) scenario, to assess the performance of the local network and inflow into Rata Pumpstation under both pre and post development scenarios. The model was run for a 24-hour, 5-year ARI nested design storm.

As shown in Figure 4-2 below, the inflow into Rata pump station during the pre-development scenario is approximately 187 l/s, and with two pumps operating, the combined capacity of the pumps is only 170 l/s. This would result in minor back up within the upstream gravity network.

During the post development scenario, the inflow into Rata pump station increases to approximately 190 l/s (noting the peak flow is constrained by the pump station capacity), which would exacerbate the surcharge issues identified during the pre-development scenario.

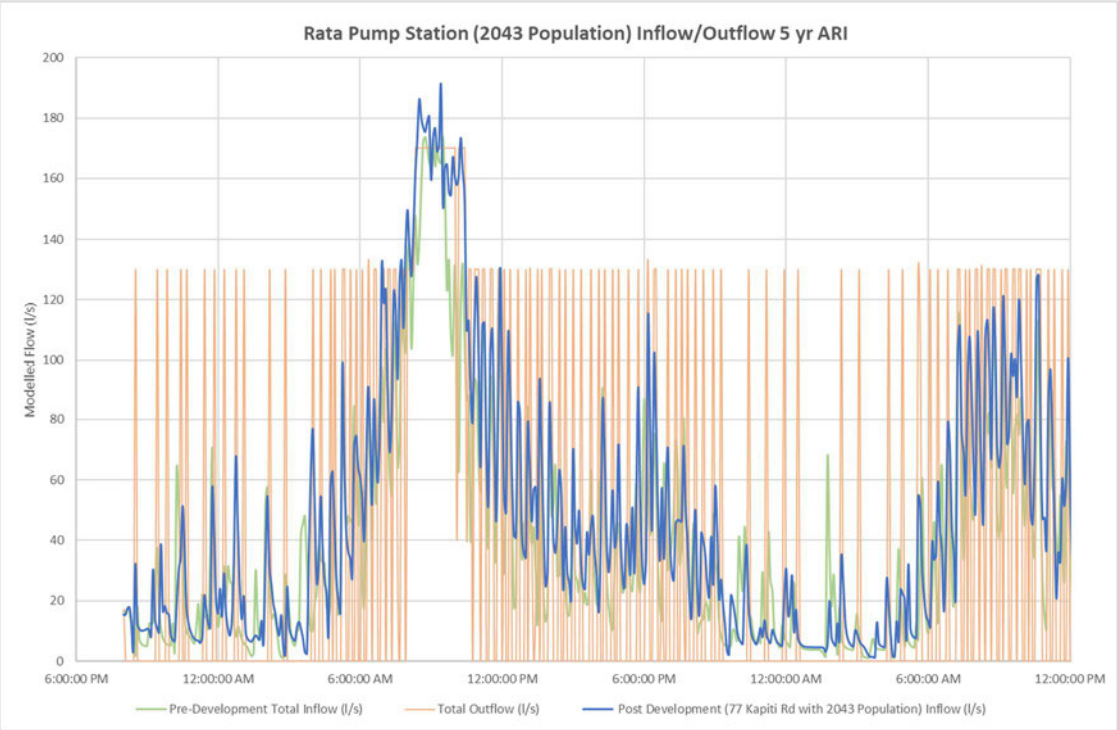


Figure 4-2 Post-Development Flows to Rata PS – 5-year ARI design storm (2043 scenario)

The performance of the local gravity network immediately upstream of Rata Pump Station has been assessed for the future (2043 population) scenario. As shown in the long-section below, during a 5-year

design storm, the downstream gravity network is predicted to have minor surcharge issues immediately upstream of the pump station.

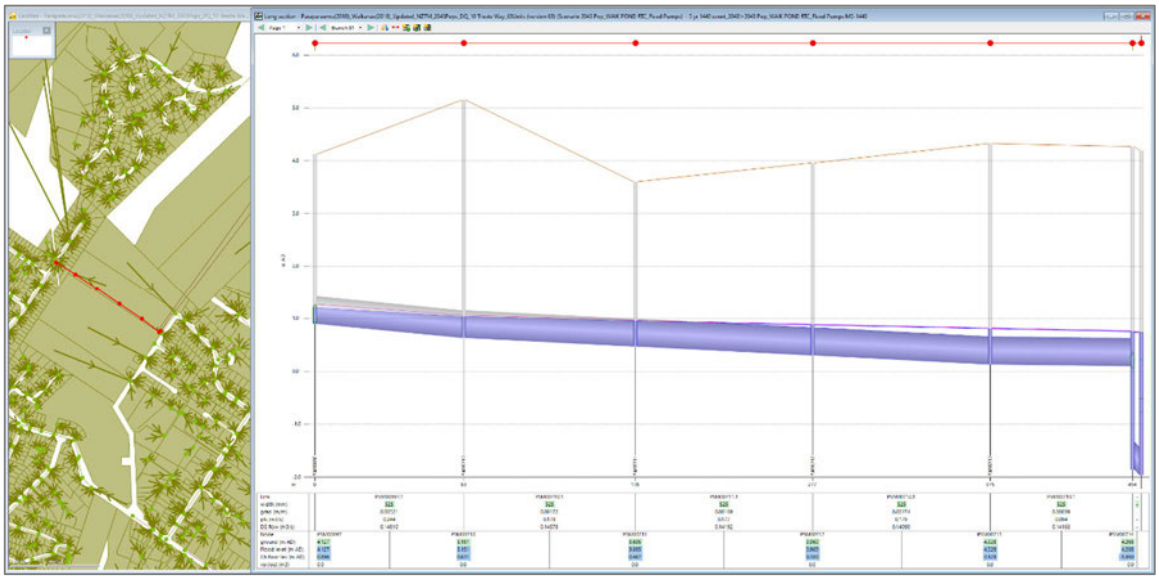


Figure 4-3 Pre-Development Flows to Rata PS – 5-year ARI design storm

In the post-development scenario, with the inclusion of the additional 50 l/s, the surcharge within the 525mm is further exacerbated, but there are no predicted uncontrolled manhole overflows due to the inline storage available in the upstream 525mm gravity pipe being utilised, but the level of surcharge is considered to pose an unacceptable risk of overflows.

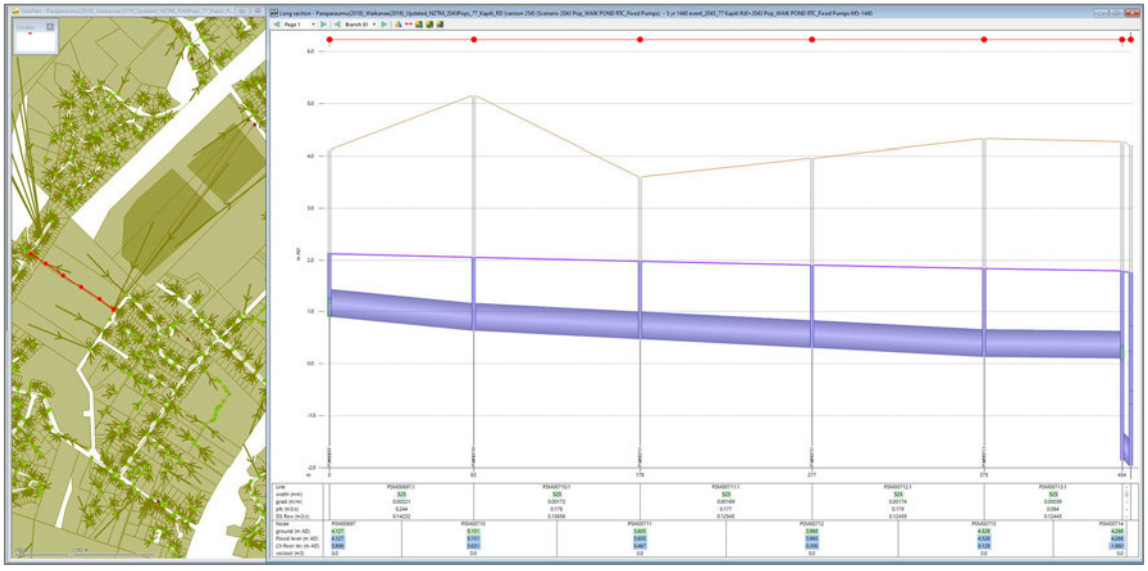


Figure 4-4 Post-Development Flows to Rata PS – 5-year ARI design storm

Based on the above analysis, it is concluded that during the future scenario (2043 population), the Rata pump capacity is insufficient for the additional flows from the development and as a result, there is significant backup within the upstream 525mm gravity network posing an unacceptable risk of network overflows.

It's also worth noting that pump stations the size of Rata pump station would require emergency storage tanks to provide storage equivalent of up to 8 hours of dry weather flow. This is to be used in the event of equipment breakdown or during critical maintenance work. Rata pump station does not have an

emergency storage, hence, the in-line storage would need to be utilised in the event of emergency. Therefore, the pumps at Rata would need to be upgraded to accommodate the additional flows from the development, as the in-line storage needs to be reserved for use during an emergency.

Based on the above analysis it is concluded that for Option 2, the pumps at Rata pumpstation will need to be upgraded by approximately 50 l/s to accommodate the additional flows from the proposed development. Also, when the flow from Rata pump station increases, the second pinch point would be the pass forward capacity of the shared rising main. Hence, a separate rising main is recommended to convey flows from Coleman pump station to the treatment plant, allowing the existing rising main to convey flows from just Rata pump station.

4.3 Option 3 – Discharge to Gravity Network Flowing to Coleman PS

The last option is for the flows from the development to be discharged to the 150mm local gravity network, which is flowing to Coleman PS. The Paraparaumu wastewater model was used to access this option.

4.3.1 Existing Development Scenario

The Paraparaumu wastewater model was run under the existing (2018) scenario, to assess the performance of the local network under pre-development scenario. The model was run for a 24-hour, 5-year ARI nested design storm to assess the performance of the downstream gravity network and Coleman Pumpstation.

As shown in the long section in Figure 4-5 below, the existing 150mm and 300mm gravity network flowing from the development site to the Coleman Pump Station shows evidence of pipe surcharge in the section of network immediately upstream of the pumpstation, as a result of backup from the pump station. However, the gravity network has sufficient capacity for expected flows, and the model does not predict any uncontrolled manhole overflows, nor surcharge to within 500mm of any manhole lid levels.

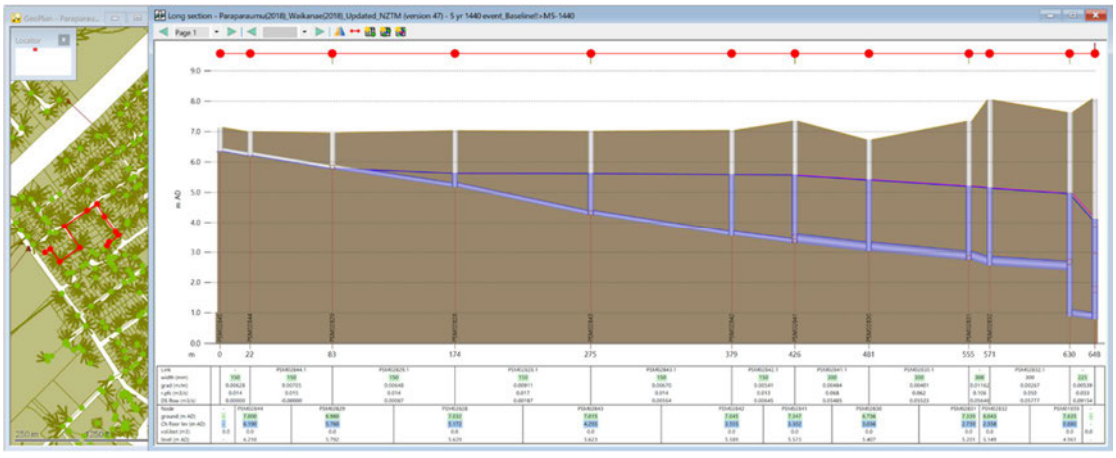


Figure 4-5 Pre-Development Flows to Coleman PS – 5-year ARI design storm

4.3.2 Post-Development Scenario

The Paraparaumu wastewater model was run under the existing (2018) scenario, to assess the performance of the local network with the proposed No. 77 Kapiti Road development flows discharged to MH ID PSM02845, which would eventually flow to Coleman PS. The model was run for a 24-hour, 5-

year ARI nested design storm to assess the performance of the downstream gravity network and Coleman Pumpstation.

As shown in the long section in Figure 4-6 below, the existing 150 and 300mm gravity network flowing from the development site to the Coleman Pump Station shows significant surcharge in the section of gravity network from the discharge point to the pumpstation. This is due to insufficient capacity within the downstream network, including both the gravity network and the capacity of the pumps. The model predicts uncontrolled manhole overflows at MH ID PSM02845 and PSM02844.



Figure 4-6 Post-Development flows to Coleman PS – 5-year ARI design storm

Note: The hydrological parameters of the proposed development area (for both residential and commercial flows) were amended to approximately reflect the expected Code of Practice wet weather flows in a 5-year design storm for the 'rezoning of land' for both existing and future development scenarios in-order to allow a dynamic assessment of flows from the areas under consideration.

4.4 Future Population Scenario (2043) with Committed Projects

In order to access the effect of the projected future population growth on the performance of the downstream network, including the Coleman PS, an ultimate 2043 future growth scenario model that was previously developed by HAL was used.

4.4.1 Post-Development Scenarios

The Paraparaumu wastewater model was run with the future (2043) population, to assess the performance of the local network during the post-development scenario. The model was initially run for a 24-hour, 5-year ARI nested design storm to assess the performance of the downstream gravity network and Coleman Pumpstation.

The long-section in Figure 4-7 below show the capacity of the local 150mm and 300mm network downstream of the discharge location. The model predicts extensive surcharging in the gravity network immediately downstream from the discharge point, as a result of insufficient capacity within the gravity network and backup from the pump station. Hence, it is considered that the downstream gravity network and Coleman pump station does not have adequate capacity for the additional flows from the proposed development and an upgrade is required.

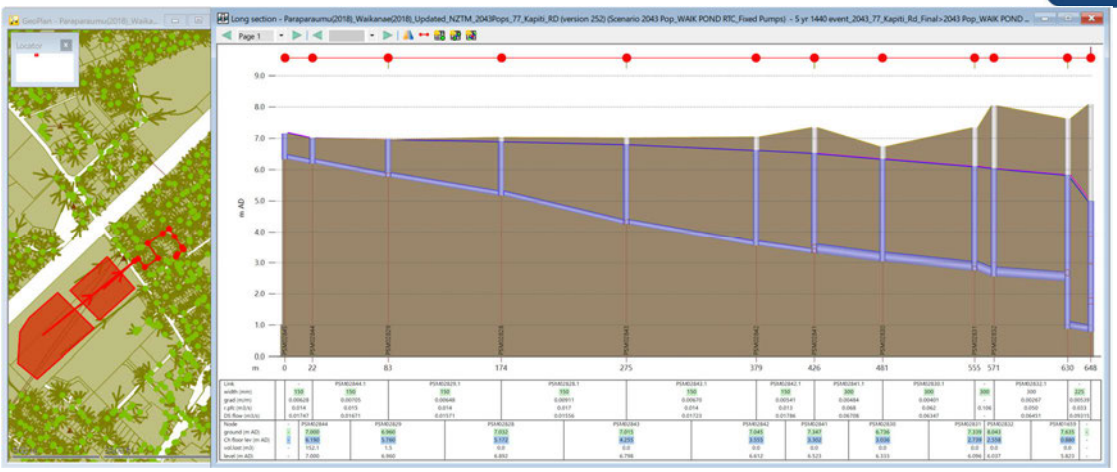


Figure 4-7 Scenario 3: Post-Development Flows to Coleman PS (2043 population) – 5-year ARI design storm

Based on the above analysis, it is concluded that during a large wet weather event, when the network is operating under a stressed state, the increased flows to Coleman pump station would result in backup within the upstream gravity network and result in wet weather overflows. Therefore, the following network upgrades are recommended prior to inclusion of additional flows from the development:

- As the existing 150mm local network is under capacity for the post development flows, the developer is required to construct a separate pipeline from the site to Coleman pump station (which could either be a gravity pipeline, or an extension of the rising main from the proposed pump station),
- An upgrade of the pump capacity at Coleman is required, as the existing pump capacity is insufficient for the additional flows from the development,
- A separate rising main is constructed to convey flows from Coleman pump station to the treatment plant, and the existing shared rising main is dedicated to Rata pump station flow to maintain current capacity for Rata pump station.

5 Model Assumptions and Limitations

The following assumptions should be read in conjunction with the following reports:

- Aurecon's report 'Paraparaumu Wastewater System – Model Build and Calibration' Report, June 2009
- Watershed's Model Update Report (2016)
- Watershed's Model Recalibration and System Performance Report (2017)
- Morphum's report 'Setting a containment standard based on a cost benefit analyses and confirming the 10 year works programme' Report, February 2021

The following limitations apply to the modelling undertaken as part of these studies:

- The model has been verified (and recalibrated) against flows developed from KCDC pump station SCADA data, and as such has an inherent limitation to the degree of accuracy able to be achieved.
- The distribution of the modelled population is an approximation based on the population increase between the 2006 and 2018 census. No allowance has been made for additional growth since 2018 which is considered to be minor.
- Future growth has been distributed within the currently modelled extent, based on KCDC's projections at an area unit level. It is unlikely to accurately represent specific locations of large future developments, which will need to be considered on a case by case basis.
- Flows from new development have been applied to result in approximately Code of Practice wet weather flows in a 5 year ARI design storm
- An allowance has been made in the future growth model (2043) for increased inflow/infiltration in existing areas due to deterioration of existing sewers.
- Pump station model parameters are based on information provided by KCDC operations, and its accuracy has not been validated as part of these studies.
- The identified upgrades are indicative only, and should be investigated in more detail as part of a catchment wide assessment taking into account the cost/benefit of various combinations of pump station capacity upgrades and storage utilisation, and the impact of increased flows at the Paraparaumu WWTP (including future hydraulic capacity), which are likely to have to be buffered in the storm basin to avoid overloading the WWTP.

6 Conclusion

6.1 Overview

The objective of this study is to assess the impact of the flows of approximately 50 l/s from the proposed development site at No. 77 Kapiti Road on the downstream wastewater network, in particular the impact on Rata and Coleman pump stations and the associated shared rising main. Three separate discharge options were analysed, and the impact on the network identified and potential mitigation options recommended.

6.2 Options Analysis

Option 1 is for the flows from the development to be pumped into Rata pump station rising main. In this case an analysis of the capacity of this shared section was undertaken to quantify the maximum flow that could be pumped by the existing pumps at both Rata and Coleman, during both pre-development and post-development scenarios.

The main constraint identified during the analysis of Option 1 was the limited pass forward capacity within the shared section of rising main, which is about 1034m in length (from 108 Arawhata Road to the wastewater treatment plant) with the additional flows from the development resulting in a reduction in pump capacity at both Rata and Coleman pump station from the existing. Given both pump stations are currently shown to be operating at the required capacity, and reduction in pump station capacities will have an adverse impact on the performance of the Paraparaumu wastewater network, and result in an unacceptable risk of wastewater overflows. As such, it is recommended that a separate rising main is constructed to convey flows from Coleman pump station to the treatment plant to free up capacity in the Rata rising main for additional flows form the development. This would enable Coleman pump station to continue to operate at or above pre-development capacity.

Option 2 is for the flows from the development to be discharged to Rata pump station.

Based on the modelling analysis it is concluded that for Option 2, the additional flows from the development will exceed the capacity of the existing pumps at Rata pumpstation resulting in an increase in predicted surcharge of the inline 525mm dia gravity pipe, and an unacceptable risk of overflows. In addition, the in-line storage needs to be reserved for use during an emergency such as pump failure or power outages.

As a result, if this option was adopted, Rata pump station would need to be upgraded to accommodate the additional flows from the proposed development, which would have an adverse impact on the capacity of the Coleman pump station due to the section of shared rising main. As such, for this Option to be feasible, a separate rising main would be required for Coleman pump station to convey flows to the treatment plant as for option 1, however Option 1 is considered preferable.

Option 3 is for the flows from the development to be discharged to the 150mm local gravity network, which is flowing to Colman PS. Based on the modelling assessment, it is concluded that during a large wet weather event, when the network is operating under a stressed state, the increased flows to Coleman pump station would result in backup within the upstream gravity network and result in wet weather overflows. Therefore, the following network upgrades are recommended prior to inclusion of additional flows from the development:

- As the existing 150mm local network is under capacity for the post development flows, the developer is required to construct a separate pipeline from the site to Coleman pump station (which could be either a gravity pipe or an extension of the rising main from the development),
- Construction of a separate rising main from Coleman pump station to the treatment plant including pump station upgrade as required to provide sufficient capacity, and the existing shared rising main be dedicated to Rata pump station flow.

6.3 Recommendations

It is recommended that Option 1 is adopted as the preferred solution to take forward to feasibility assessment, involving the flows from the development being pumped into the Rata pump station rising main, with a separate rising main being constructed for Coleman Pump Station to maintain/improve pump station capacity at Coleman pump station. This option is considered preferable than the other options considered by KCDC operations staff, as it avoids double pumping of the flows from the development.

APPENDIX 4 POTABLE WATER MODEL REPORT

Stantec

KAPITI ROAD DEVELOPMENT

23 August 2023

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Project Number:
310101208

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
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1	Revised for client comments	K Waterland	16/08/23	B Davies	23/8/23	A Babar	23/8/23

The conclusions in the Report titled KAPITI ROAD DEVELOPMENT are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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1 Introduction

1.1 Background

KCDC has engaged Stantec to report on the water supply available at the proposed development at Kapiti Road, Paraparaumu. The location of the development is shown in Figure 1-1 below.



Figure 1-1: Location of proposed development

1.2 Model Setup

For our own reference, the study model used for this work is **KCDC WS MPL06 C13.**

The model is an all-mains model in WS Pro and was rebuilt and calibrated in 2016-2017. Growth scenarios were included at the time of calibration, but these are now out of date – growth has been rebuilt for the current study using the growth projections recently adopted by KCDC.

2 Study area

2.1 Paraparaumu Water Network

Waikanae, Paraparaumu and Raumati are all supplied by the Waikanae Water Treatment Plant (WTP), but the Paraparaumu network is hydraulically separated from Waikanae and is supplied through the Otaihanga DMA which in turn gravity feeds the Otaihanga Reservoir (TWL 80.80m), pumped to the Waikanae Downs DMA and Tanks and the Nikau Valley DMA and Tanks.

Water can then gravitate through the Otaihanga DMA to the Riwai Reservoir (TWL 68.4m), which supplies the rest of the network through a series of 350mmID mains on Amohia Street and Kapiti Road. Some water is pumped to the Riwai High Level Reservoir (TWL 113.3m) via the Panorama Drive DMA.

Figure 2-1 shows the Paraparaumu network schematic, while Figure 2-2 shows the same network with key features highlighted.

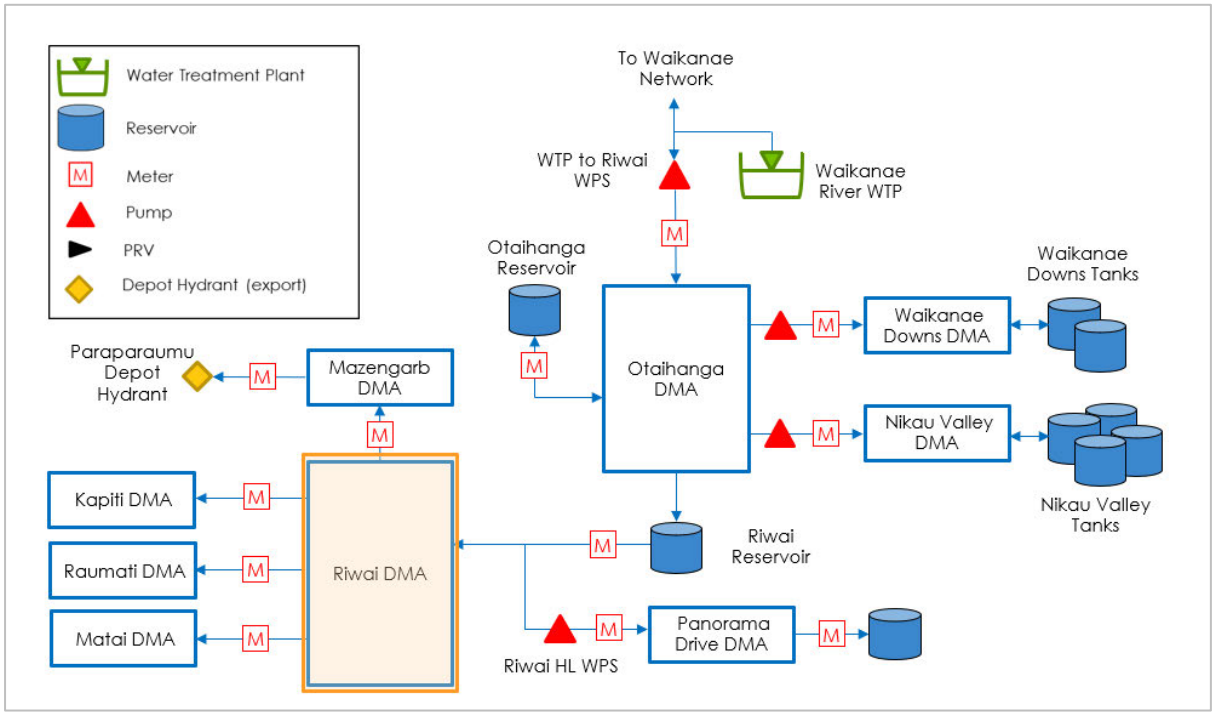


Figure 2-1: Paraparaumu Network Schematic

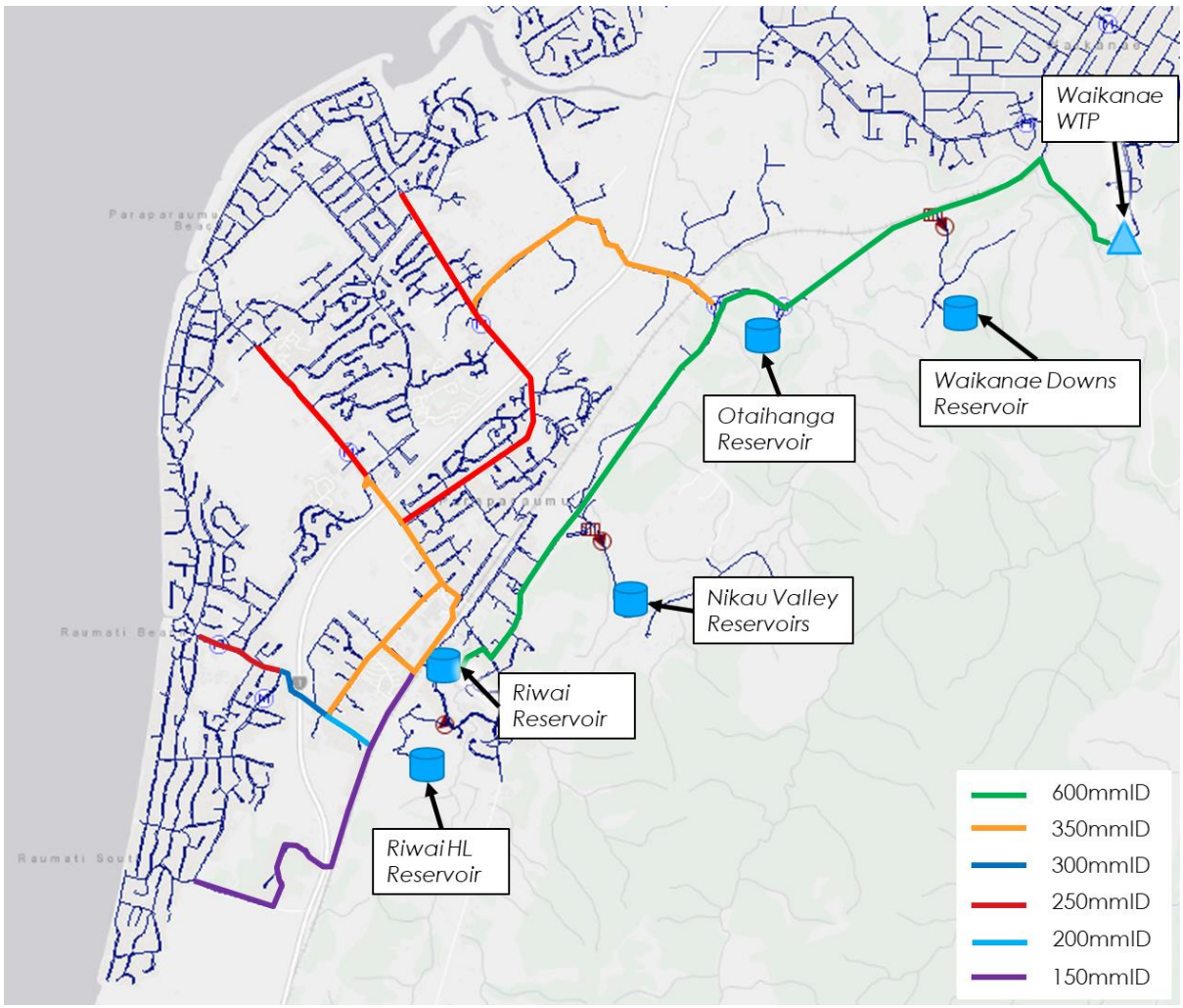


Figure 2-2: Paraparaumu network layout

3 Kapiti Road Development

3.1 Layout

The proposed development consists of residential lots, a retirement village, and several commercial lots.

The total development area comprises ten lots, which sit on a combined total of 17.85ha. The proposed site layout (received from the developer) can be seen in Figure 3-1.

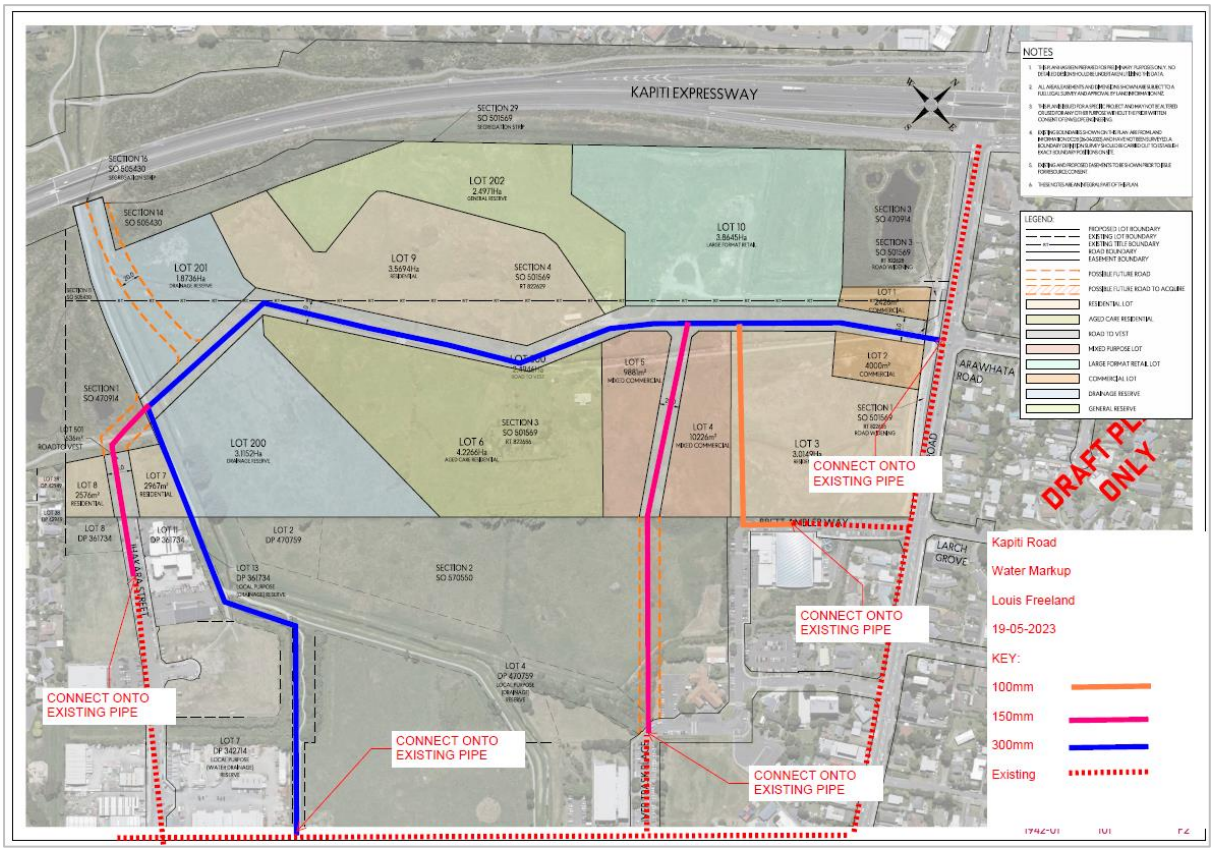


Figure 3-1: Proposed development layout (received from the developer)

3.2 Staging

Three stages of the development were assessed. The assumed stages can be seen in Figure 3-2.

This staging ensures that there is a loop main for supply to the development at all stages, so that no single pipe failure will result in loss of supply to customers within the development.



Figure 3-2: Assumed staging configuration

3.3 Development Demand

Demand was assigned to each customer based on NZS 4404. Each lot has been given one customer demand point, and where a lot represents a number of dwellings or properties, the single customer demand point has been assigned demand representing the total demand of the dwellings or properties.

Demand has been allocated to nine customer points consisting of 300 retirement units, 680 residential units, and 5 commercial units in the development. Details are provided below.

3.3.1 RESIDENTIAL DEMAND

Residential demand has been developed from NZS 4404 using the following:

- 250l/person/day (average day demand)
- Average occupancy of 2.5 people per property

- A peak summer day demand of twice the average day demand

From this, a specific consumption of 1250l/property/day for peak summery demand has been added to each residential point.

For the 680 residential units in total, this results in 850 m^3/day peak summer demand.

NZS 4404 requires a peaking factor of 5 for instantaneous peak residential demand. This relates to the average day demand, so the instantaneous residential peaking factor applied to the peak summer day demands outlined above is 2.5. This was also applied to the retirement village.

3.3.2 RETIREMENT VILLAGE DEMAND

Demand for the retirement village has been developed based on the following assumptions:

- 250l/person/day (average day demand)
- Average occupancy of 2 people per unit
- A peak summer day demand of twice the average day demand

From this, a specific consumption of 1000l/property/day for peak summer day for each property has been added to the retirement village customer point.

For 300 units, this results in 300 m^3/day total peak summer day demand.

3.3.3 COMMERICAL DEMAND

Demand for each commercial point has been calculated using the NZS 4404 standard shown in Figure 3-3, where the design flow is based on the hectarage of the lot and the water usage.

Industry type (Water usage)	**Design flow** (Litre/second/hectare)
Light	0.4
Medium	0.7
Heavy	1.3

Figure 3-3: Commercial flows based on NZS 4404

The assumptions used for the water usage are shown in Figure 3-3

Table 3-1: Water use assumptions and average demand assigned in model

Lot	Area (ha)	Water usage	Peak demand (l/s)	Water use pattern	Average demand (m3/day)
Lot 1	0.24	Medium	0.018	Commercial 16 hour	1.3
Lot 2	0.40	Light	0.028	Commercial 10 hour	1.9
Lot 4	1.02	Medium	0.716	Commercial 10 hour	49.5
Lot 5	0.99	Medium	0.692	Commercial 10 hour	26.6

Lot	Area (ha)	Water usage	Peak demand (l/s)	Water use pattern	Average demand (m3/day)
Lot 10	3.86	Light	2.705	Commercial 16 hour	103.9

3.3.4 DEMAND SUMMARY

The tables below summarise the demand as assigned in the model. This shows the residential demand is by far the most significant portion of demand.

Table 3-2 : Commercial Demand

Lot	type / pattern	Section area (ha)	Max demand (l/s/ha)	Max demand (l/s)	Pattern max	Ave demand (l/s)
Lot 1	medium - 16 hour	0.24	0.7	0.17	1.25	0.14
Lot 2	light - 10 hour	0.40	0.4	0.16	2.25	0.07
Lot 4	medium - 10 hour	1.02	0.7	0.72	1.25	0.57
Lot 5	medium - 10 hour	0.99	0.7	0.69	1.25	0.55
Lot 10	light - 16 hour	3.86	0.4	1.55	2.25	0.69
Total				**3.28**		**2.02**

Table 3-3 : Residential Demand (Peak Summer)

Lot	Type	Res units	l/unit/day	Ave demand (l/s)	Pattern max	Max demand (l/s)
Lot 3	Residential	400	1250	5.79	2.50	14.47
Lot 6	Retirement Village	300	1000	3.47	2.50	8.68
Lot 7-8	Residential	30	1250	0.43	2.50	1.09
Lot 9	Residential	250	1250	3.62	2.50	9.04
Total				**13.31**		**33.28**

4 Performance Criteria

Pressure, fire flow and pipe head loss and resilience were reviewed in this assessment, with the criteria set out below.

- **Pressure –** a minimum pressure of 25m must be maintained under peak summer demand. In scenarios reflecting temporary pipe failures, lower pressure may be acceptable but must always remain positive. An absolute lower limit of 10m pressure was used to allow for model uncertainties.

  A maximum pressure criteria of 90m was also set for properties in the new development and for properties affected by proposed changes in the existing network

- **Fire flow –** it was assumed that the new development will be classified as FW3+ (the Fire Code SNZ PAS 4509:2008 sets FW3+ as a requirement for most commercial properties). This requires at least 50l/s total fire flow on top of 60% of peak instantaneous demand.

  This development includes a fire station and a shopping complex, therefore, fire flow will be assessed assuming FW4.

- **Pipe head loss –** new pipes should be designed to have less than 5m/km. Any other high head losses which directly results in failure of minimum pressure requirements were also identified.

- **Resilience –** failure of a single pipe should not result in the risk of loss of supply (modelled pressure of loss than 10m) to any properties. Fire flow should also remain above 100l/s.

- **Storage –** storage is considered sufficient if there is enough stored water to support both of:

  - 24 hours of demand on a peak summer day
  - An allowance for fire flow in line with Table 2 of the Fire Code (SNZ PAS 4509:2008). For Paraparaumu, FW4 fire class is assumed, requiring an allowance of 540m^3 storage.

5 Methodology

Modelling was undertaken with the full development in place, and with the pipe diameters proposed by the developer. The pressures, head losses and available fire flows were assessed both in the existing network and under 2051 demand. At this stage, pipe diameters may be revised to ensure the new infrastructure can support demand out to 2051.

When the pipe sizes have been confirmed, the staging of the network is investigated in the current day demand scenario, to ensure the network meets requirements throughout the interim stages of development.

6 Growth – Sense Partners

KCDC has adopted growth projections developed by Sense Partners in 2021. To ensure pipes are sized effectively, Sense Partners growth figures were used to estimate future demand in the existing Paraparaumu network.

For this study, it was assumed that new households will use the same amount of water as existing households, so for future scenario the existing demand was simply scaled up relative to the expected growth in population. No adjustment has been made to account for the distribution of this growth into potential new development areas.

Commercial and water loss demand have been assumed to remain the same into the future, with no increase.

A summary of the population growth in existing areas affecting the Paraparaumu network is shown in Table 6-1.

Table 6-1: Sense Partners Growth in Paraparaumu / Raumati by SA2

Statistics NZ SA2 area	Population 2016 (in model)	Population 2051 (sense partners)	Population Change (2016-2051)
Otaihanga	793	1,500	707
Paraparaumu North	3,352	4,937	1,585
Paraparaumu Beach North	3,712	4,601	889
Paraparaumu Beach East	2,422	3,191	769
Paraparaumu Beach West	2,183	3,056	873
Paraparaumu Central	3,845	6,525	2,680
Paraparaumu East	2,453	6,253	3,800
Raumati Beach East	2,233	3,426	1,193
Raumati Beach West	2,661	3,718	1,057
Raumati South	3,596	5,751	2,155
Total	**27,249**	**42,958**	**15,709**

A summary of the demand increase (in m^3/day) can be seen in Table 6-2. There is a 46% increase in residential demand, and the increase in overall demand is 34% increase in demand from 2016 to the 2051 scenario with the Sense Partners growth.

Table 6-2: Summary of demand change from 2016 (existing model) to 2051 (Sense Partners)

SA2	Res Demand 2016 (m3/day)	Total Demand 2016 (m3/day)	Res Demand 2051 (m3/day)	Total Demand 2051 (m3/day)
Otaihanga	233	283	441	490
Paraparaumu North	995	1,460	1,476	1,941
Paraparaumu Beach North	1,173	1,433	1,455	1,715
Paraparaumu Beach East	713	939	939	1,166
Paraparaumu Beach West	886	1,113	1,240	1,466

SA2	Res Demand 2016 (m3/day)	Total Demand 2016 (m3/day)	Res Demand 2051 (m3/day)	Total Demand 2051 (m3/day)
Paraparaumu Central	1,060	1,916	1,797	2,653
Paraparaumu East	540	723	1,376	1,559
Raumati Beach East	643	847	979	1,183
Raumati Beach West	868	1,212	1,213	1,558
Raumati South	1,178	1,244	1,178	1,244
Total	**8,289**	**11,170**	**12,095**	**14,976**

The increase in demand from growth causes an increase in head loss across the network. In some places, the increase in head loss causes a drop in the minimum pressure of up to 15m. Figure 6-1 shows the comparison between existing minimum pressures and minimum pressures with demand growth included.

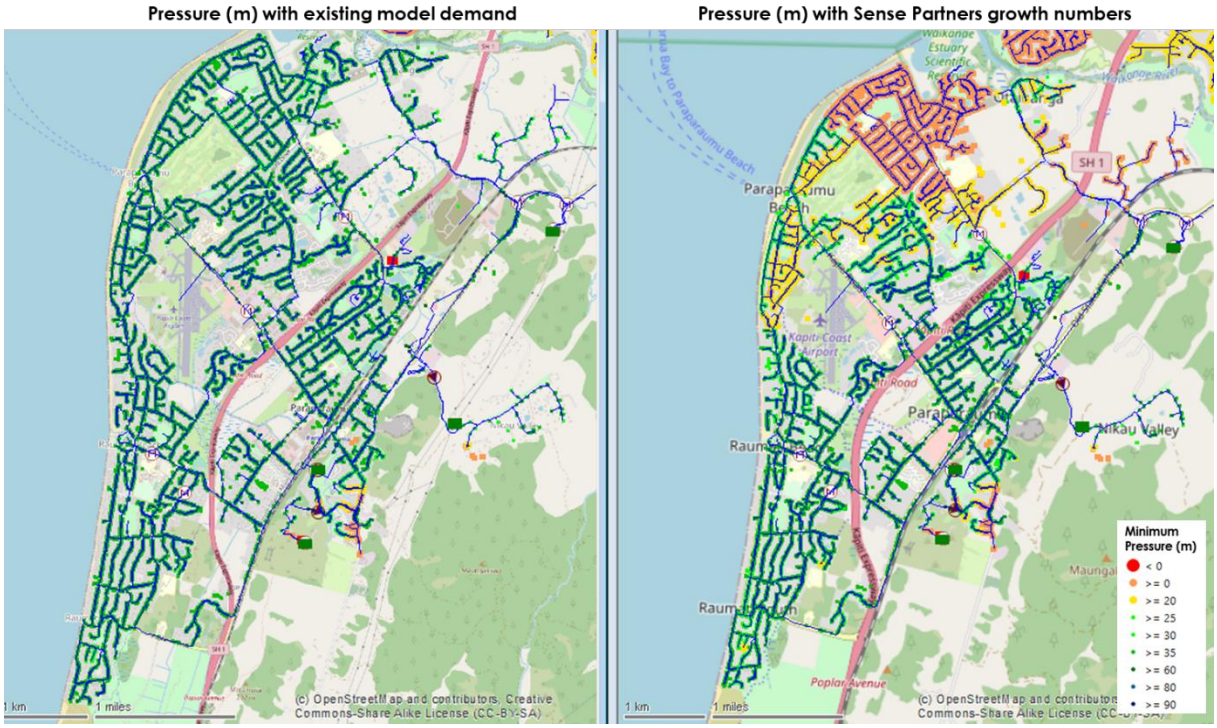


Figure 6-1: Pressure Comparison - Existing modelled demand vs Sense Partners growth

As the growth numbers have only been adopted only recently, upgrades have not yet been identified to address the wider network deficiencies. Through discussions with KCDC it has been agreed that this study will look only at comparative network performance – we will not seek to address network-wide issues which are unrelated to the Kapiti Road development.

7 Findings – Current Peak Day

Initial assessment was undertaken on the existing network with current demand.

Shown in Figure 7-1 below is the proposed network configuration, with pipe sizes based on the site layout sent by the developer. The final development is connected to the existing network in 5 different places.

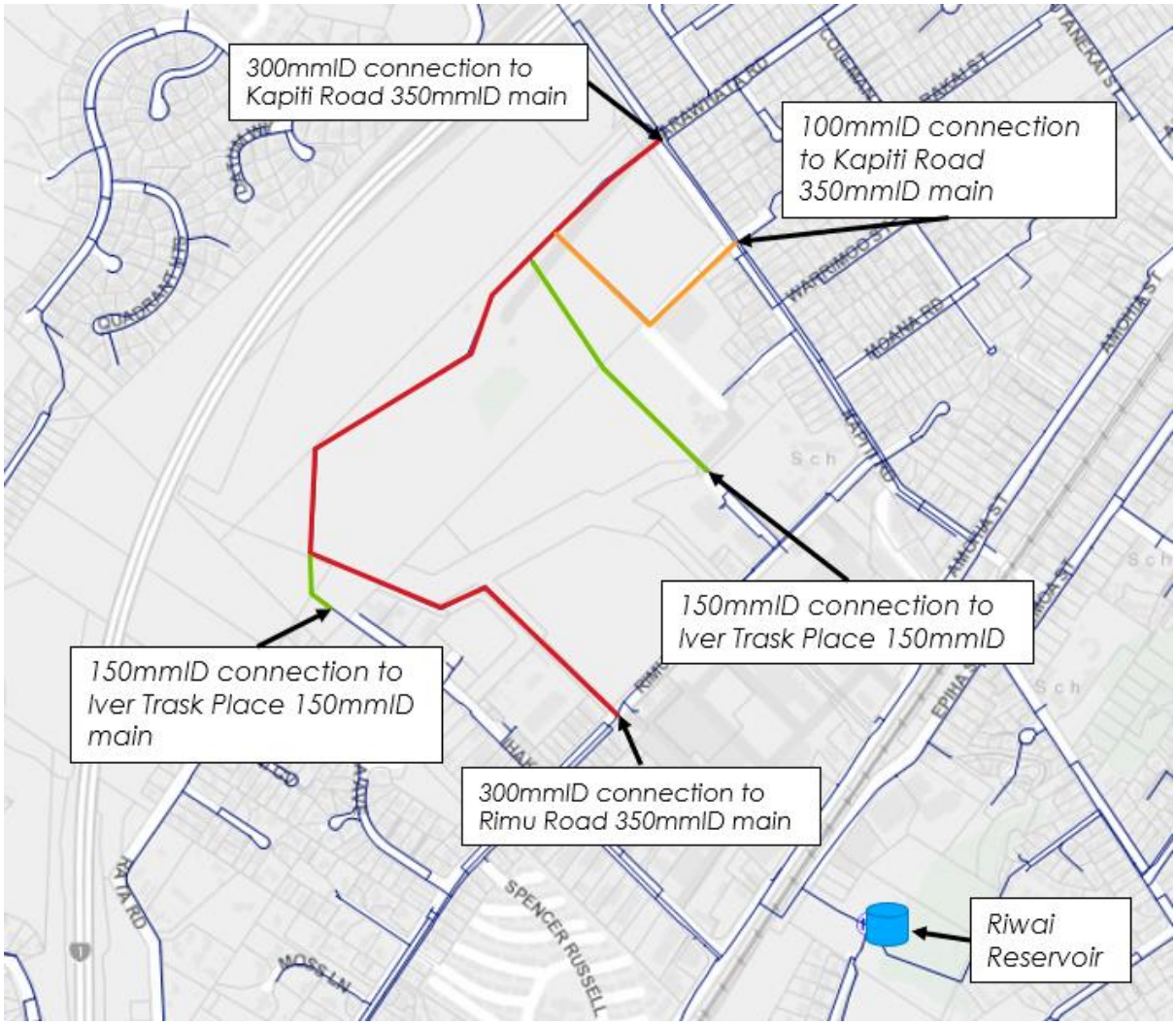


Figure 7-1: Proposed development and connections to the existing network

7.1 Stage 1

The hydraulic assessment has shown that the first section of the 300mmID main connected to the Kapiti Road 350mmID will be the only main required for stage 1. However, for resilience of supply in Stage 1 we have also included the 100mm connection to Brett Ambler Way as part of Stage 1. The 100mm in Brett Amber Way should connect to the 150mm on Kapiti Road.

Pressure is above the minimum 25m requirement, and although fire flow requirements for the development are currently unknown, the fire flow available from the network is upwards of 350l/s (keeping in mind multiple hydrants would be required to deliver the required fire flow).

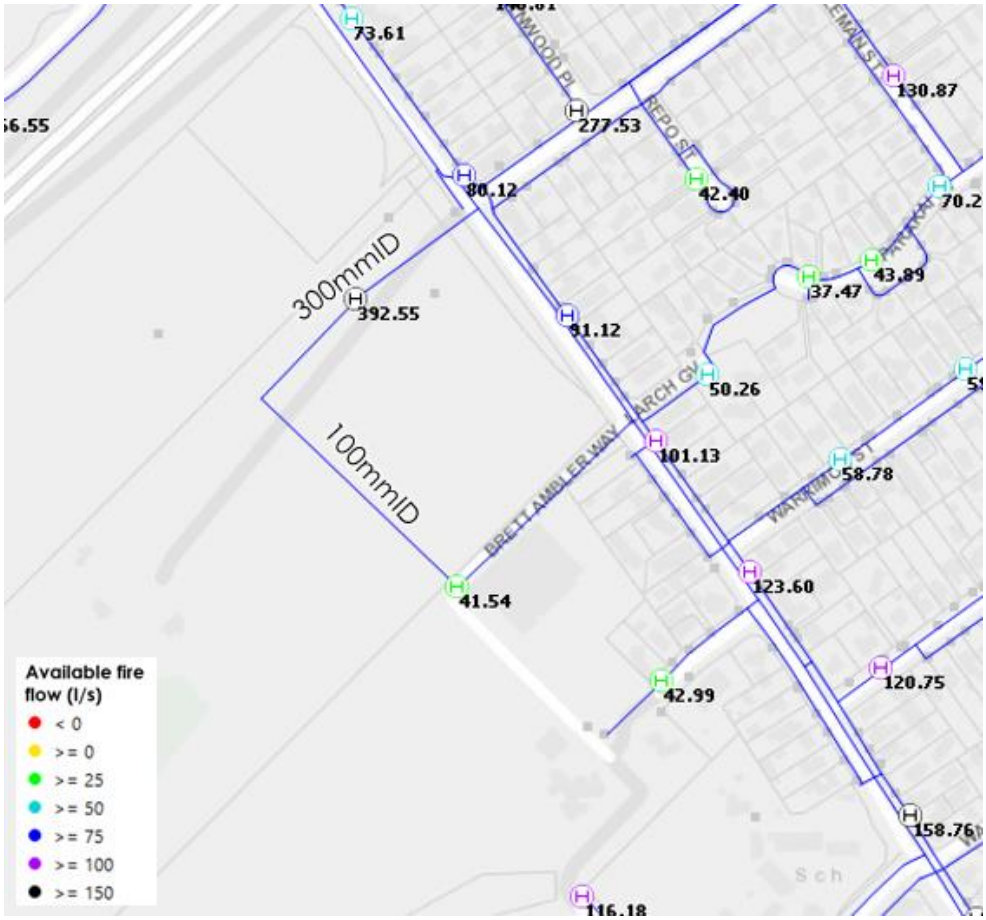


Figure 7-2: Fire Flow (l/s) within the proposed development (stage 1)

7.2 Stage 2

As shown in Figure 3-2, for Stage 2 we have assumed the 300mm is extended further into the development and ties into the proposed 150mm connecting to Iver Trask Place. This ensures both fire flow and resilience for the development.

Fire flow available from the network reaches approximately 450l/s. All customer points are above the minimum 25m requirement for pressure.

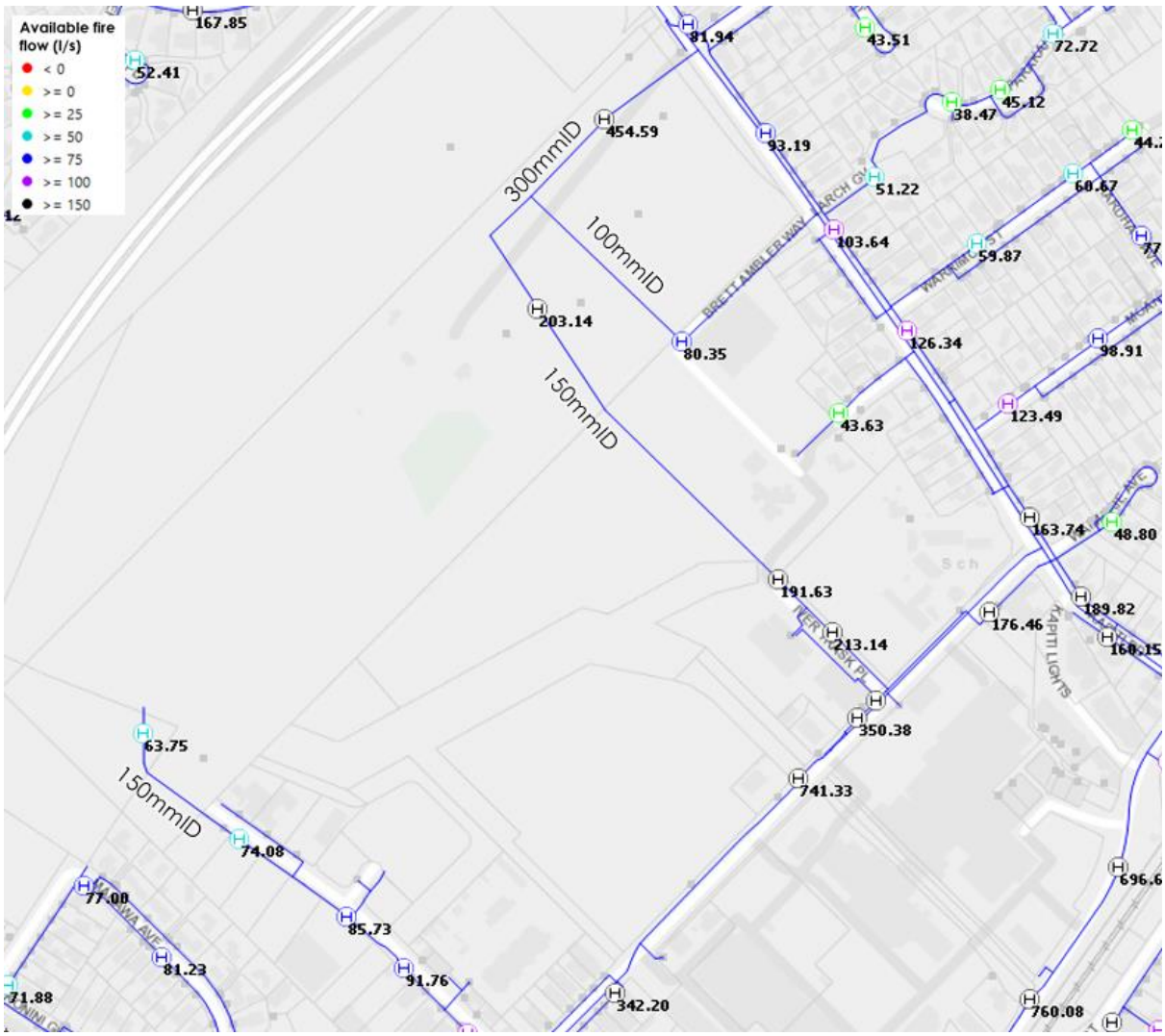


Figure 7-3: Fire flow (l/s) within the proposed development (stage 2)

7.3 Stage 3

In Stage 3 all pipes are constructed, with the 300mm connecting through to Ihakara Street 150mm and Rimu Road 375mm mains.

Pressure at an existing node close to the development is approximately 51m at Stage 3 (Figure 7-4), and pressure within the development is approximately 54m (Figure 7-5). Fire flow available from the network is well in excess of the maximum that could be required (Figure 7-6).

Checks on the existing network show pressures and fire flow in the existing network is unaffected by the addition of the proposed development.

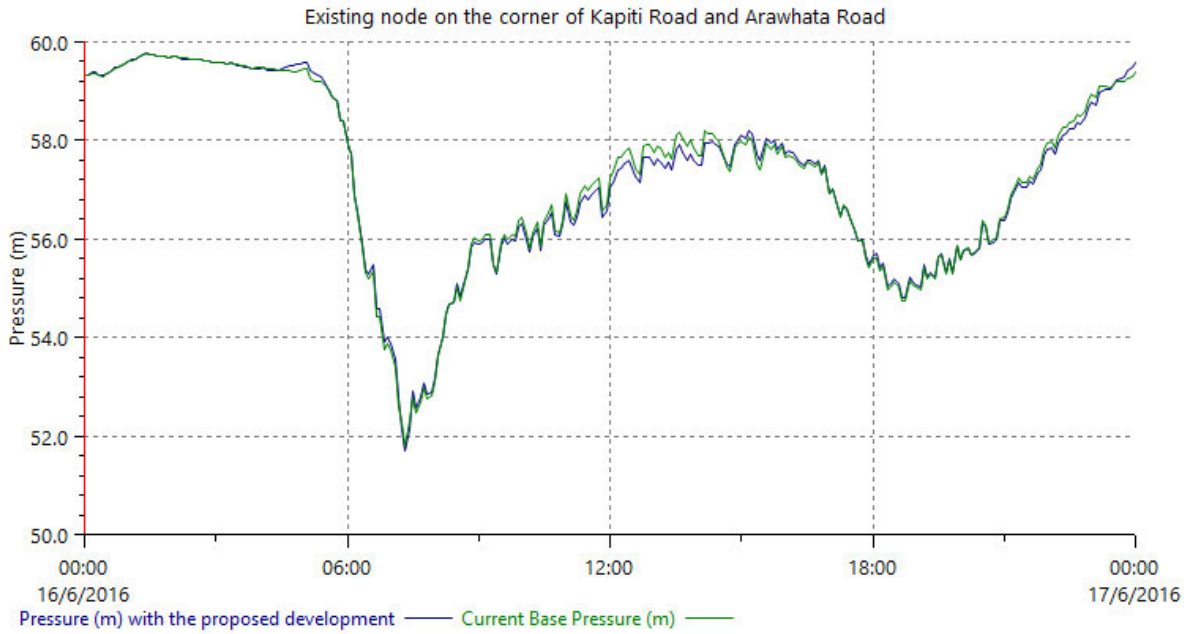


Figure 7-4: Pressure with the proposed development

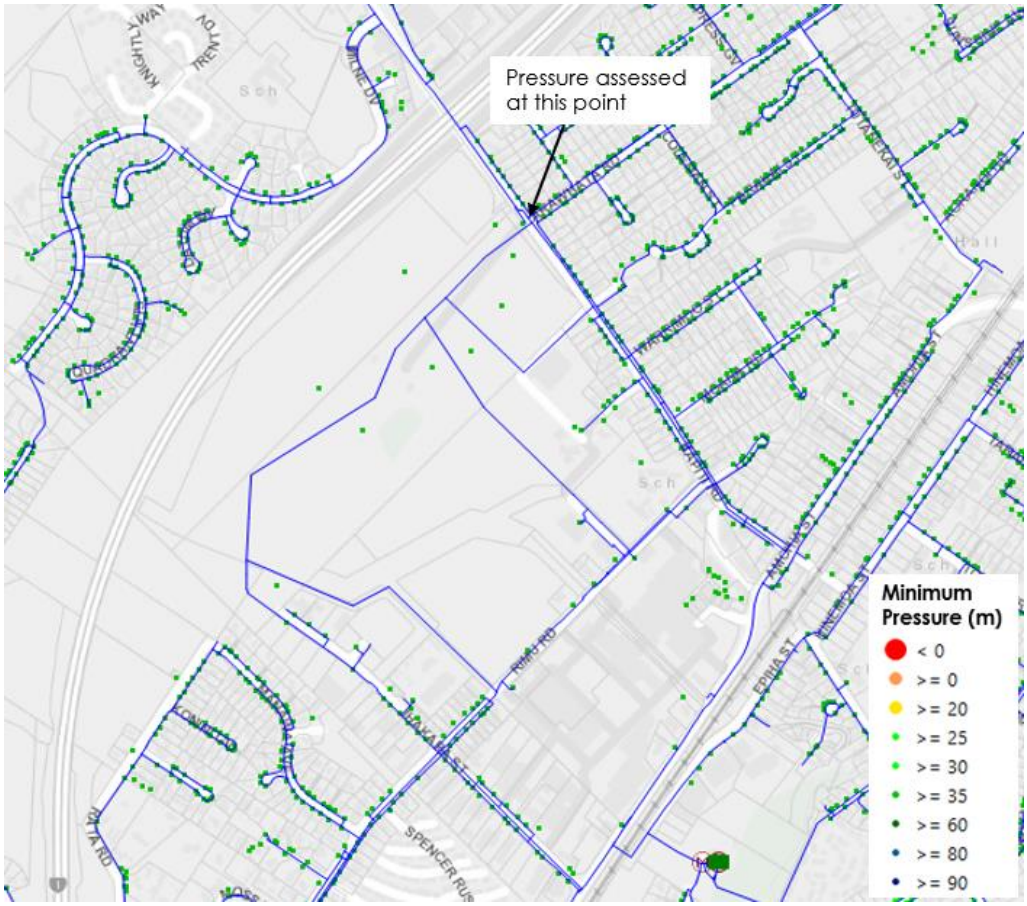


Figure 7-5: Pressure (m) in the proposed development (stage 3)

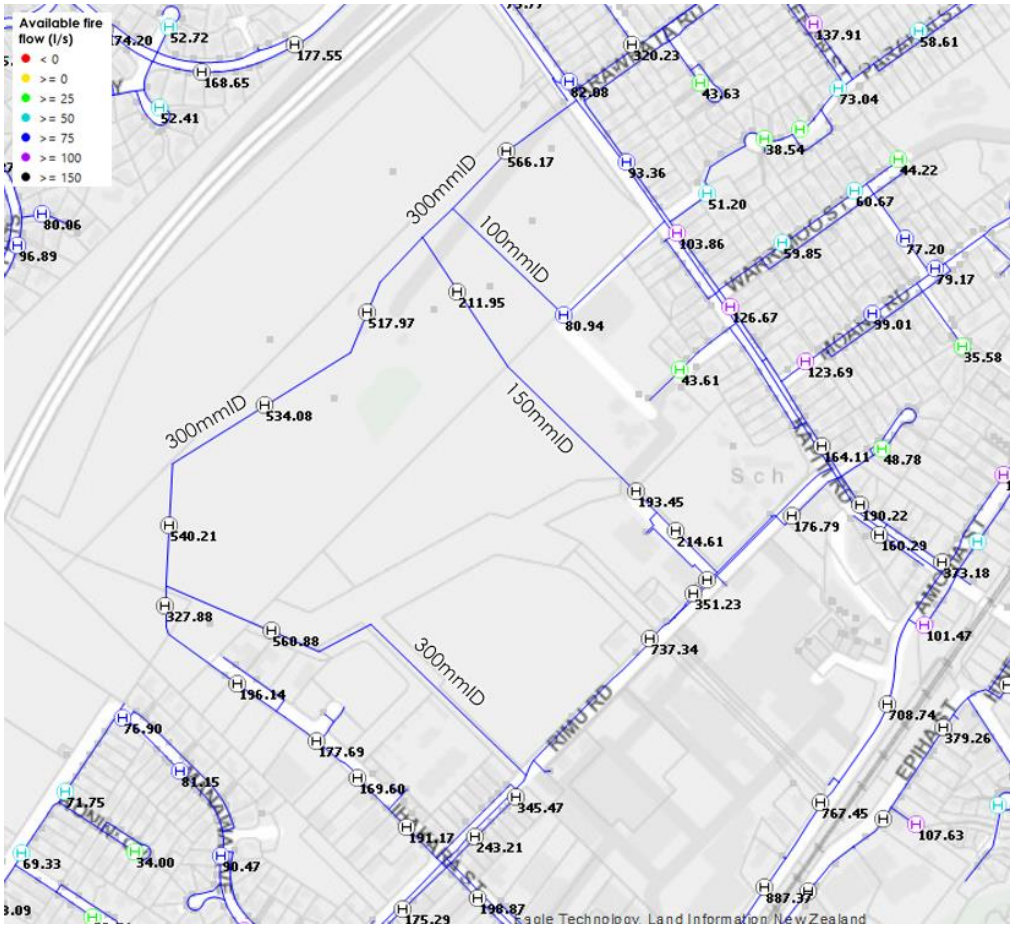


Figure 7-6: Fire flow within the proposed development

7.4 Fire flow resilience

In addition to staging requirements from the developer, KCDC has requested an assessment of fire flow resilience at each stage, looking at available fire flows if the 375mm main on Kapiti Road needs to be isolated. The fire flow results at each stage are shown below.

Please note: should the 375mm on Kapiti Road be isolated, the currently closed valve on the Otaihanga Road 375mm PVC main will need to be opened to facilitate flow to the Raumati, Kapiti and Mazengarb DMAs.

7.4.1 STAGE 1

Fire flow at the hydrants proposed in Stage 1 can be seen in Figure 7-7. Fire flow within the development is only enough to support FW2, however for buildings within 135m of Kapiti Road (measured along the road) the Fire Service could tap into the 90 l/s fire flow available in Kapiti Road to assist with fire fighting.

Based on this, if there is a meaningful chance of fire flow during an outage of the Kapiti Road 375mm main (e.g. if the main is anticipated to be out of service for a significant period of time), it may be a good idea to skip Stage 1 and move straight to Stage 2 or 3.

Pressure remains above 25m.

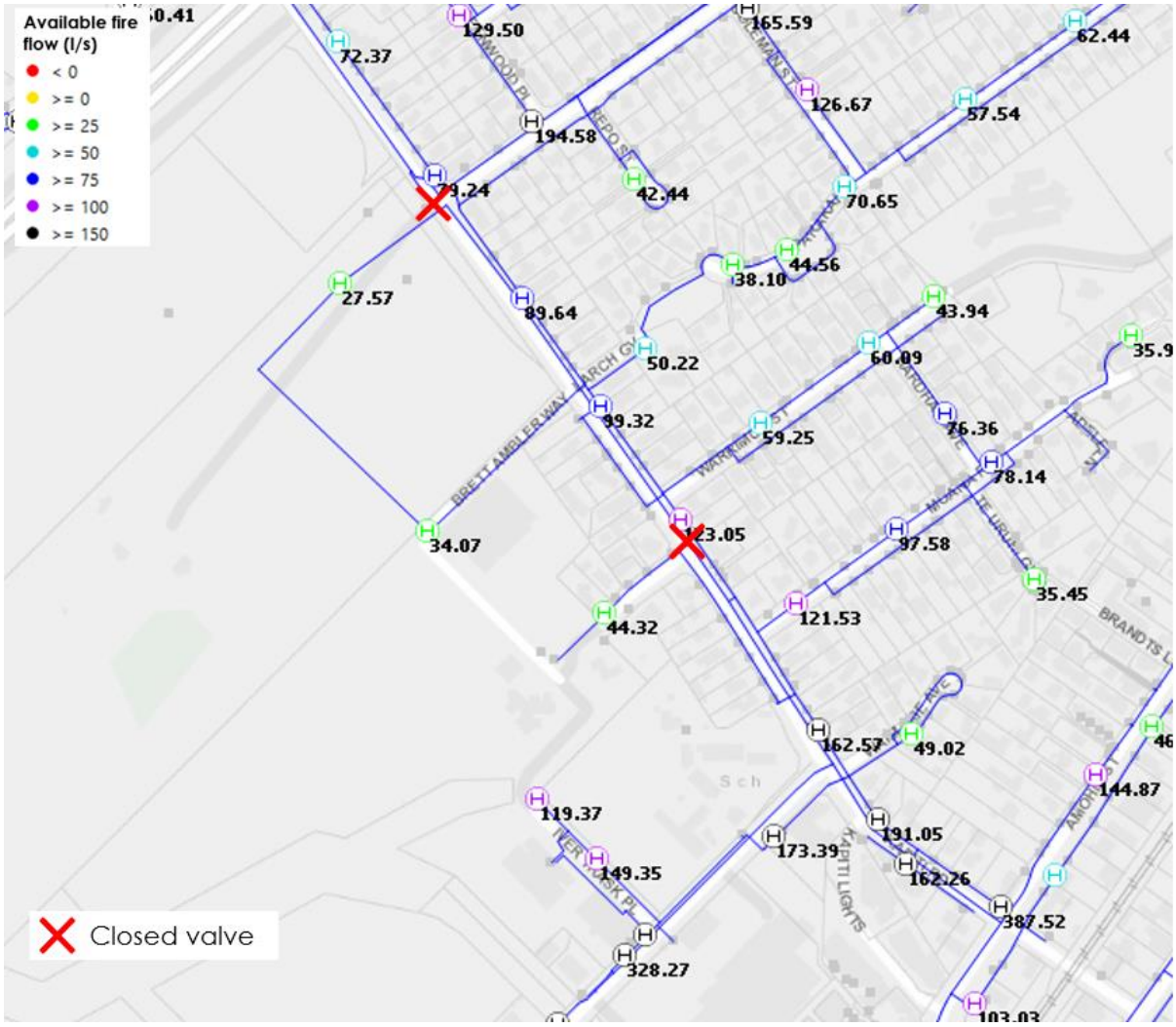


Figure 7-7: Fire flow (l/s), Stage 1, with the Kapiti Road 375mm isolated

7.4.2 STAGE 2

With the proposed Stage 2 network fire flow is enough to support FW3 with the Kapiti Road 375mm isolated. The model suggests that the proposed 300mmID can deliver up to 90l/s (Figure 7-8) – note this would require multiple hydrants.

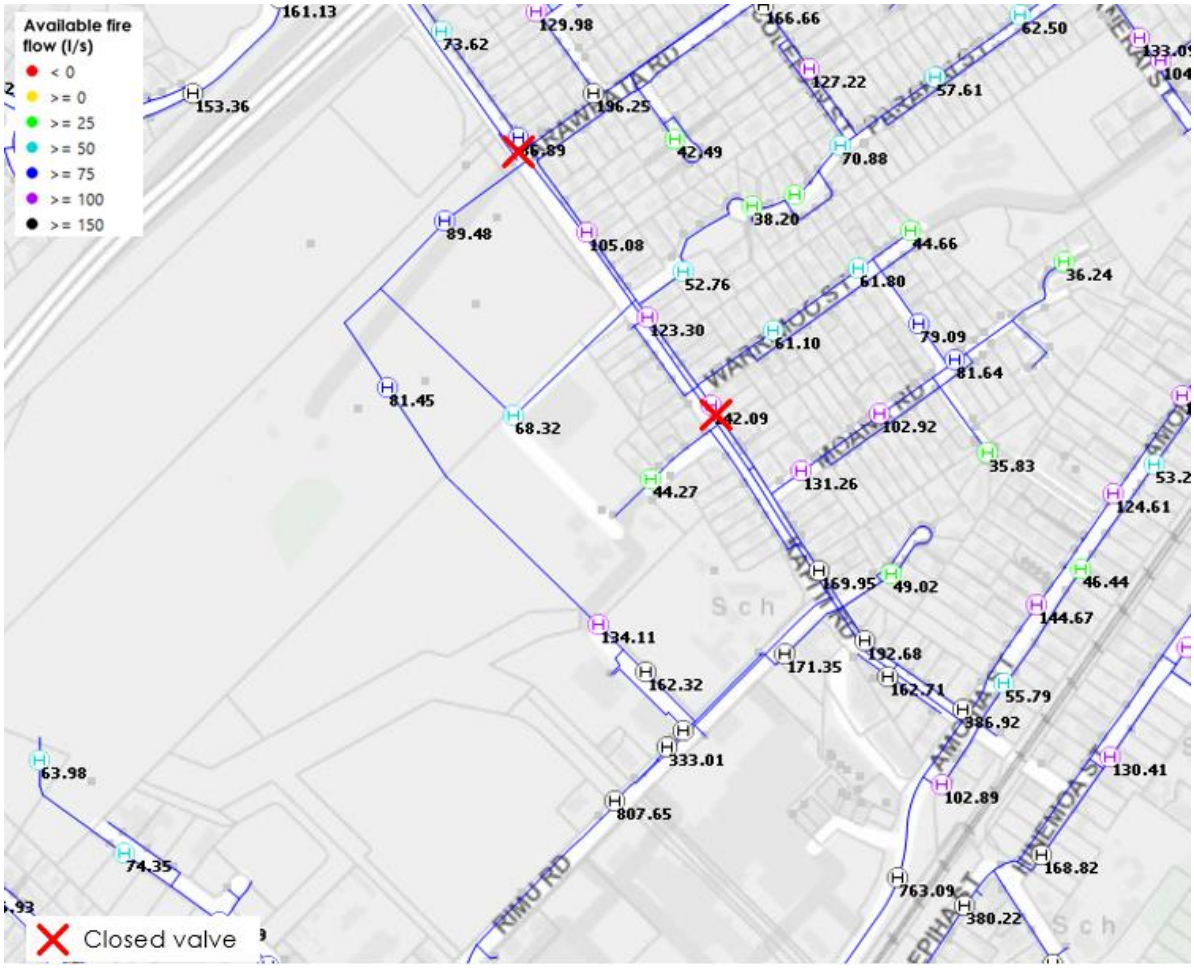


Figure 7-8: Fire flow (l/s), Stage 2, Kapiti Road 375mmID isolated

7.4.3 STAGE 3

Fire flow is enough to support FW4 when the Kapiti Road 375mm is isolated. The model suggests that the 300mmID main in the development can deliver up to a maximum of 405l/s – note this would require multiple hydrants.

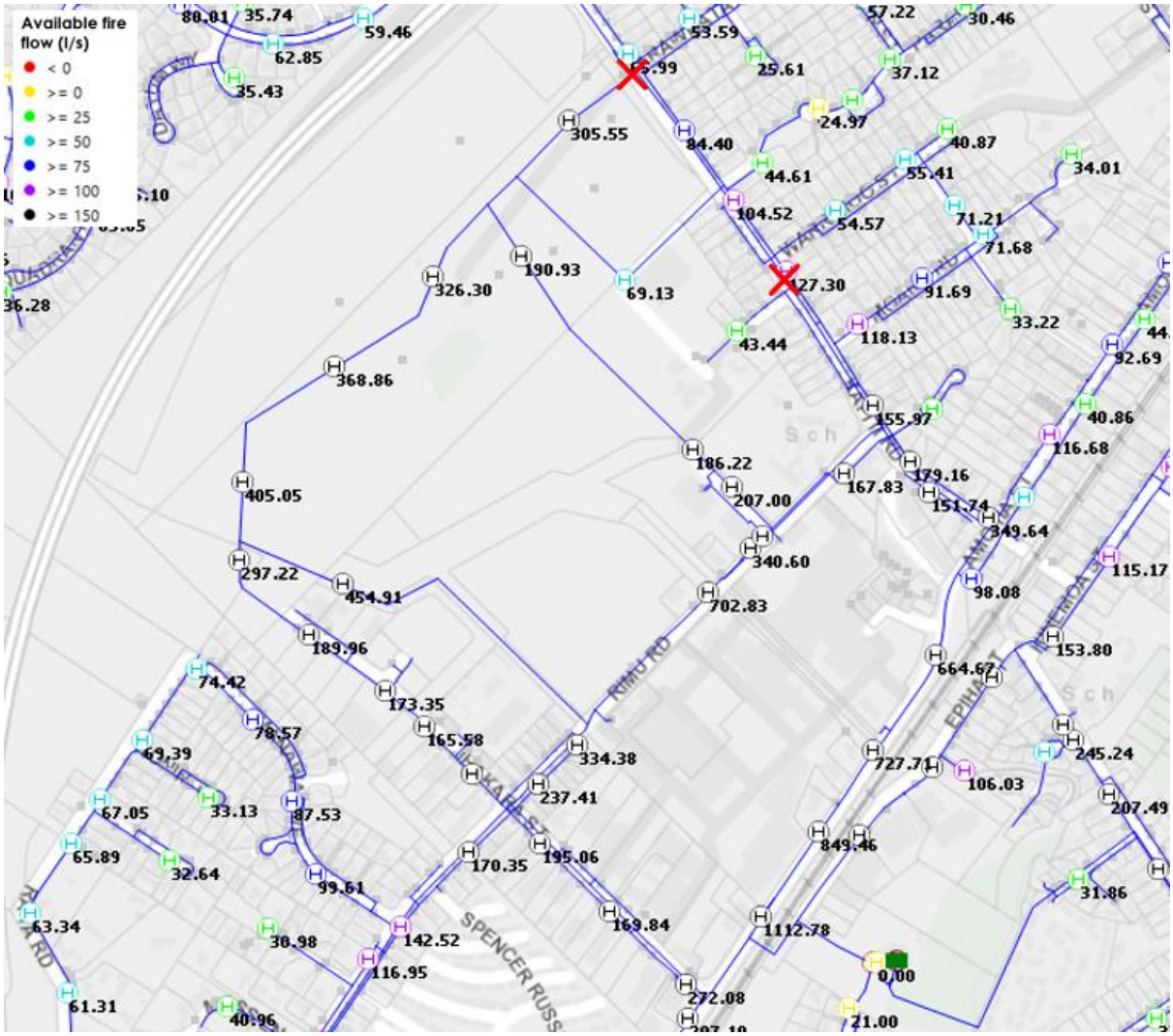


Figure 7-9: Fire flow (l/s), Stage 3, Kapiti Road 375mmID isolated

8 Findings – Future Peak Day Scenario (2051)

8.1 Future network performance

Pressure was assessed at each stage of the development with future growth. Pressure in the existing network is lower than in current scenario, approximately 46m. However, this is not significantly affected by the addition of the development (Figure 8-1).

Because the development has 5 proposed connection points into the existing network, a break in any one main through the development will not cause a loss of service to customers.

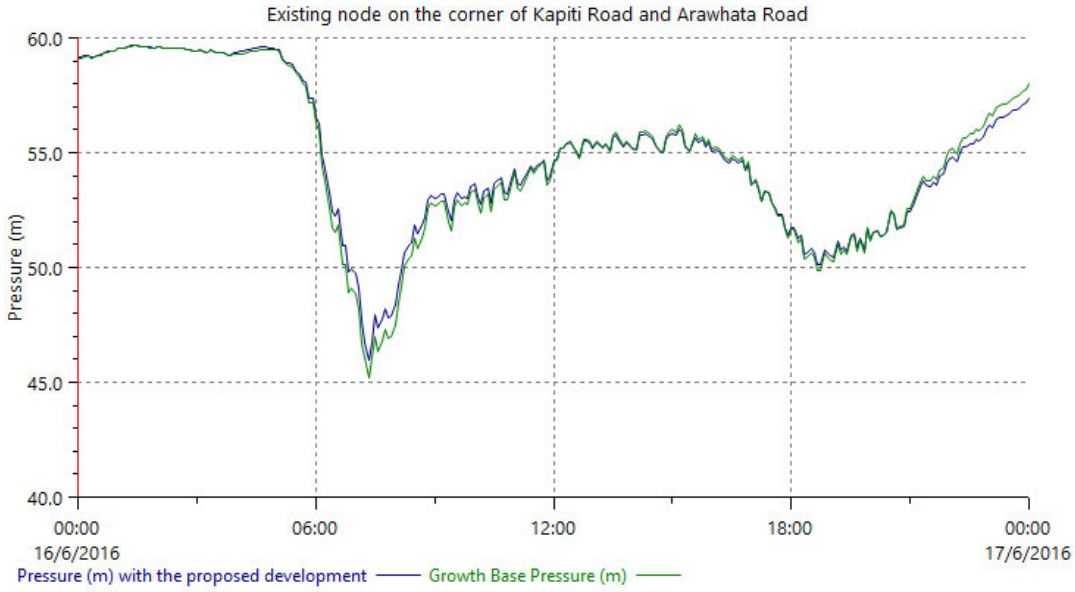


Figure 8-1: Pressure comparison with the proposed development

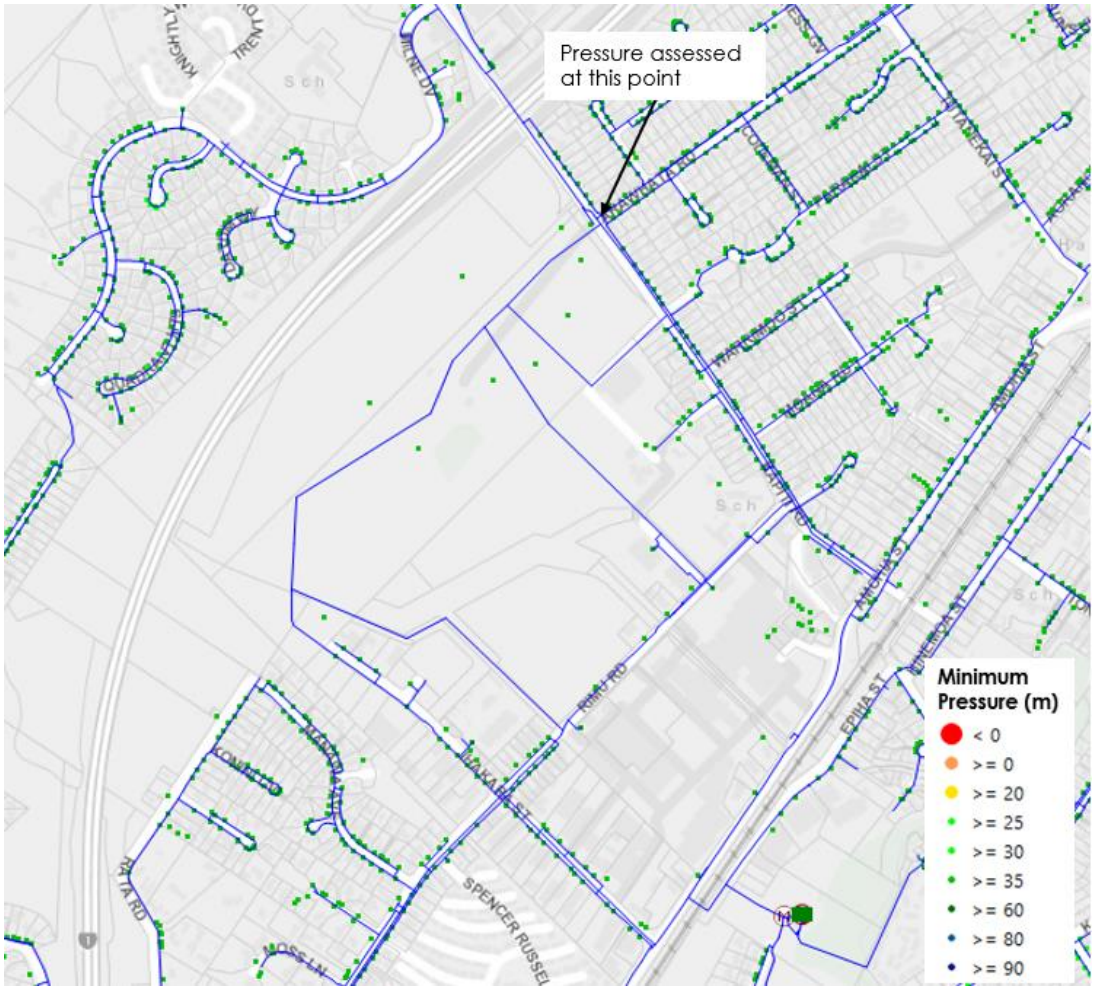


Figure 8-2: Future pressure (m) with the proposed development

9 Storage

Current peak summer day outflow from Riwai Reservoir is around 13.1 ML/day. In 2051, the model indicates daily outflow from Riwai will increase to 17.8 ML/day.

Riwai Reservoir has 11.25 ML storage, but this can be supplemented by Otaihanga Reservoir, which has an additional 5.68 ML storage, so there is 16.93 ML storage available.

As set out in Section 3.3.4 the average demand in the full development on a peak summer day should be around 15.3 l/s, equivalent to around 1.32 ML/day.

These numbers are used to develop the graph in Figure 9-1, which shows how the additional demand will affect when a new reservoir may be required. This assumes straight-line growth between 2016 and 2051.

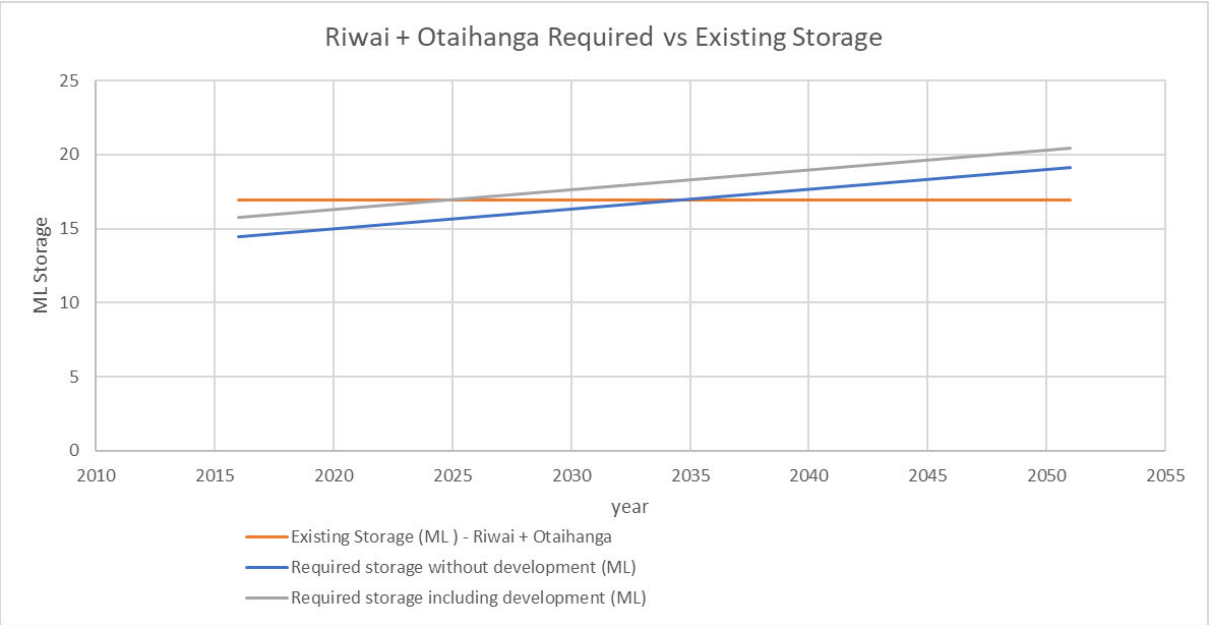


Figure 9-1 : Available and Required Storage for Paraparaumu / Raumati System

This shows that with the Sense Partners expected growth but no development, existing storage will be sufficient until around 2035. At this time, additional storage may need to be built.

When the new development is added to the Sense Partners expected growth, this requirement is brought back to around 2025.

If the growth associated with the new development has already been considered in the Sense Partners figures, then the total storage required by 2051 may be less than that shown by the grey line in the graph. However, either way the development accounts for around half of the growth that can be supported by the existing reservoirs.

10 Conclusion

A network layout has been proposed for the development on Kapiti Road and modelling results suggest the network will continue to meet the Level of Service for minimum pressure and fire flow.

This assessment shows that the impact of the proposed development is expected to be minor for the current peak day scenario and future development in the network is not predicted to reduce pressures further. The assessment also lays out the minimum pipes required for staging and shows that this configuration should easily meet the fire flow requirements at each stage.

An additional study was undertaken to determine the level of fire flow coverage in the event of an outage of the existing Kapiti Road 375mm main. This significantly reduced fire flow availability within the development under Stage 1 development, and if a prolonged outage of this main is anticipated it may be preferred to skip Stage 1 and move straight to Stage 2 or 3.

In terms of storage, this study has shown the development accounts for around half of the growth that could be supported by the existing reservoirs.