To:	Summerset Group Holdings Ltd / Fast-track Project Team	**Date:**	20 October 2026
From:	Kylin Gunkel - Senior Engineer	**CC:**	Project Team
Reviewed:	Joseph Allely – Civil Engineer	**CKL Ref:**	A25556
Re:	Summerset Retirement Village - Water Supply Hydraulic Modelling Assessment – Rev 2		

STATEMENTS OF EXPERIENCE AND CODE OF CONDUCT

Kylin Gunkel (Senior Engineer)

I am a Senior Civil Engineer with over 17 years of experience in the civil engineering industry and am a Chartered Member of Engineering New Zealand. My experience includes civil infrastructure design, assessment and construction-phase support, with a particular focus on water and wastewater infrastructure for residential, commercial and industrial developments in New Zealand.

I have experience in water and wastewater servicing assessments, infrastructure master planning, complex hydraulic calculations and infrastructure options assessment. My design experience extends from concept through to detailed design and includes wastewater pump stations and rising mains, gravity wastewater networks, water supply systems, backflow prevention and storage infrastructure. I also have extensive construction and contract administration experience. I regularly prepare engineering reports, calculations and design plans to support resource consenting and engineering plan approvals for both private and public-sector clients.

My professional qualifications are as follows:

BEng Tech (Civil Engineering)

My professional memberships are as follows:

Chartered Member of Engineering New Zealand (CMEngNZ - Engineering Technologist)

My involvement in this project has included providing input into and reviewing the wastewater servicing strategy, and the preparation of the water servicing strategy and associated hydraulic modelling assessment. This has included review of the proposed wastewater servicing approach, assessment of water demand and network capacity, development of the proposed water servicing strategy, hydraulic modelling of the internal water reticulation, and preparation of supporting engineering documentation.

I confirm that I have read and agree to comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses (Practice Note 2023). I am a Chartered Member of Engineering New Zealand and confirm that the opinions expressed in this report are within my area of expertise and have been prepared in accordance with my professional obligations.

1 Purpose and assessment outcome

This memo documents the water-supply demand assessment and internal hydraulic modelling undertaken for the proposed Summerset Otaihanga Village at 65 and 73 Ratanui Road, Paraparaumu. It is intended to support the substantive Fast-track application and should be read with the current CKL water reticulation drawings and wider Infrastructure Design Report.

The assessment reconciles the current village layout with the KCDC-commissioned Stantec public-network assessment, confirms the adopted water-demand envelope, includes the proposed boundary backflow arrangements and associated hydraulic losses, and assesses the internal network under 2023 and 2053 peak-day and firefighting conditions.

Assessment outcome: The proposed internal network maintains pressures above the adopted minimum level-of-service criteria for both PDD (Peak Daily Demand) and firefighting conditions. The 2053 firefighting case is the governing pressure scenario.

2 Background

The proposed development is a comprehensive care retirement village comprising 257 independent-living units (ILUs) and a 90-person main-building care component comprising 40 serviced apartments, 30 care beds and 20 memory-care suites.

The site is located on Ratanui Road, Paraparaumu. CKL Drawing A25556-6000 identifies an existing 20 mm water connection (asset 14MC186802) crossing to the existing 375 mm AC watermain in Ratanui Road. The existing connection is proposed to be upgraded to DN150 to form the development point of supply.

KCDC previously commissioned Stantec to assess the capacity of the public water network to service the site. That assessment considered the connection point only and expressly excluded the proposed internal development network. The purpose of the CKL modelling is therefore to extend the assessment through the proposed private reticulation and demonstrate internal level of service.

3 Information reviewed

Table 1: Guiding information provided.

Source	Document / information
Stantec	Water modelling assessment for the development at 65–73 Ratanui Road, Paraparaumu, Project 310101208, final issued 10 October 2024.
Woods	Civil Engineering Infrastructure Assessment – Ratanui Plan Change, 65 & 73 Ratanui Road, final 29 November 2024.
Woods	Preliminary Water Demand, P22-323, dated 8 November 2024.
Summerset	Civil Client Brief, Version 1 Revision D, September 2025.
Summerset	Current masterplan / staging plan dated 17 September 2026.

Source	Document / information
CKL	Water drawings A25556-6000 to A25556-6002, Revision 1, resource consent issue.

4 Standards and design criteria

The water-supply assessment has been prepared with reference to the following standards and project requirements:

- Kāpiti Coast District Council (KCDC) Land Development Minimum Requirements (LDMR), including Schedule 6 water-supply requirements and local modifications to NZS 4404.
- NZS 4404:2010 Land Development and Subdivision Infrastructure – Section 6 Water Supply.
- SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice.
- Summerset Civil Client Brief, Version 1 Revision D, including Section 4.5 Potable Water and Section 4.6 Fire Supply.
- AS/NZS 4130 for polyethylene pressure pipe materials, as applicable to the proposed private network.

Table 2: Minimum requirements for water supply

Scenario	Criterion	Adopted value	Basis
Peak daily demand (PDD)	Minimum pressure	25 m	KCDC LDMR 4404 Schedule 6 Addendum
Peak daily demand (PDD)	Maximum pressure	90 m	KCDC LDMR 4404 Schedule 6 Addendum
Firefighting	Minimum residual pressure	10 m (100 kPa)	SNZ PAS 4509 and Stantec assessment criterion
New pipes	Indicative unit headloss	<5 m/km	NZS4404

5 Proposed water-supply network

The proposed internal network is private and generally comprises a DN150 principal main, DN50 rider mains and DN20 service connections to the individual units. A dedicated DN150 fire-sprinkler main is provided to the main building. Hydrants are distributed through the site to provide FW2 (standard residential fire rating) coverage in accordance with SNZ PAS 4509.

The current proposal includes separate DN150 boundary branches for the potable/hydrant supply and the dedicated main-building sprinkler supply. The dedicated sprinkler main follows the potable-main corridor generally in parallel through the site to the sprinkler valve room at the main building. Irrigation branches separately from the private potable system and is to have its own dedicated backflow protection. Backflow prevention shall be provided as per Section 8.

The proposed water layout is shown on Drawings A25556-6000 to A25556-6002.

6 Network modelling context and adopted strategy

6.1 Stantec public-network assessment

Stantec was engaged by KCDC to assess public-network capacity at the development connection. The study used KCDC model WS MPL07 C04, updated and verified in 2024, and assessed both current (2023) and future (2053) peak daily demand (PDD) and fire flow scenarios. Internal reticulation was specifically excluded.

Stantec adopted 350 L/person/day for resident accommodation, 50 L/person/day for staff and visitors, an instantaneous peaking factor of 2.5, and a standard residential demand pattern. The Stantec fire case was approximately 44 L/s at the connection, comprising 25 L/s FW2 hydrant demand, approximately 2.3 L/s coincident domestic demand and 17 L/s sprinkler demand.

Table 3: Resultant pressures as per Stantec modelling

Stantec scenario	Reported result	Connection pressure
2023 PDD	Present day: Residual pressure at connection during PDD	~51 m
2023 Fire	Present day: Residual pressure at connection during Fire	~33 m
2053 PDD	Future: Residual pressure at connection during PDD	~48 m
2053 Fire	Future: Residual pressure at connection during Fire	~31 m

Stantec concluded that the development has little effect on the wider network and that no public-network pressure or fire-flow issue was identified. The report also records approximately 165 m^3/day development demand in the system-performance narrative, while the detailed unit-demand table reproduces approximately 140 m^3/day. CKL has used the detailed unit rates and peaking factor as the reproducible demand basis, while maintaining the Stantec modelled pressure and fire-flow constraints as the governing public-network envelope.

6.2 Plan Change calculations

Following completion of Stantec's capacity assessment, issued on 10 October 2024, Woods Ltd prepared water-demand calculations dated 8 November 2024 to support the Plan Change. Woods adopted 350 L/person/day for all resident and care categories, a peaking factor of 2.2, and a 25 L/s preliminary sprinkler allowance, resulting in a total daily demand of 154 m^3/day and a calculated peak domestic demand of 3.92 L/s.

The Woods figures are retained as supporting context but are not adopted as the controlling hydraulic basis. The Stantec assessment remains the controlling public-network benchmark because it was commissioned by KCDC specifically to assess servicing of the development. The current domestic and firefighting demands are materially consistent with the hydraulic demands previously assessed by Stantec, while irrigation is addressed separately as an off-peak operating demand.

6.3 Adopted CKL strategy

- Retain the Stantec/KCDC public-network assessment as the controlling external-network benchmark.
- Retain Stantec's 350 L/person/day for ILUs and 2.5 instantaneous peaking factor.

- Apply the current Summerset Civil Client Brief allowance of 200 L/person/day to serviced apartments, care and memory-care residents, and 50 L/person/day to staff.
- Retain the Stantec-modelled FW2 demand of 25 L/s and sprinkler allowance of 17 L/s for the proposed-stage assessment. The 17 L/s allowance is considered reasonable for a building of this scale and will be confirmed by the project fire engineer during the building-consent / detailed-design stage.
- Model the internal private network using the Stantec 2023 and 2053 boundary pressure conditions, including the Stantec fire-residual pressure at the connection for the fire scenarios.

7 Water demand assessment

The current water-demand assessment is based on the proposed masterplan. The detailed demand calculations are provided in the infrastructure report.

Table 4: Water demand assessment summary

Demand component	Count	Occupancy	Population	Rate (L/p/d)	Daily Demand (m^3/d)	Average Flow (L/s)	PDD (L/s)
Independent living villas	257	1.3	334	350	116.94	1.353	3.383
Serviced apartments	40	1	40	200	8	0.093	0.231
Care beds	30	1	30	200	6	0.069	0.174
Memory care suites	20	1	20	200	4	0.046	0.116
Staff	40	1	40	50	2	0.023	0.058
Guests / visitors	45	1	45	50	2.25	0.026	0.065
TOTAL			**509**		**139.19**	**1.611**	**4.027**

The calculated ultimate domestic and operational demand is approximately 139 m^3/day, corresponding to an average flow of approximately 1.61 L/s and a PDD of approximately 4.03 L/s. This is slightly below the approximately 140 m^3/day derived from the detailed Stantec demand schedule and remains below the later Woods Plan Change demand of approximately 154 m^3/day.

For the firefighting assessment, 60% of the calculated PDD has been combined with the required FW2 fire flow and the adopted 17 L/s sprinkler allowance. This gives a theoretical total fire-flow scenario of approximately 44.42 L/s. The EPANET model uses rounded distributed nodal demands and therefore reports a total boundary flow of approximately 44.44 L/s, which is effectively consistent with the approximately 44 L/s fire-flow envelope previously assessed by Stantec. The 17 L/s sprinkler allowance is retained from the KCDC-commissioned Stantec assessment for the proposed stage modelling; final sprinkler flow and pressure requirements will be confirmed by the project fire engineer during the building-consent / detailed-design stage.

7.1 Irrigation

The current proposed water layout provides irrigation from the private potable water network. Accordingly, irrigation forms an additional potable-water demand on the KCDC supply.

For the purposes of this assessment, a preliminary peak-summer irrigation allowance of 100 m³/day has been adopted, consistent with the guidance provided in the Summerset Civil Client Brief for a typical retirement village. Assuming irrigation is undertaken over an 8-hour overnight period, this corresponds to an average irrigation flow of approximately 3.5 L/s.

Irrigation has therefore been treated as a separate off-peak operating demand and has not been assumed to occur concurrently with the adopted daytime PDD or firefighting scenarios. An operating allowance of approximately 3.5 L/s over the 8-hour overnight irrigation period is considered appropriate for this proposed stage assessment and is not added to the daytime PDD or firefighting demand.

On the basis of the current potable-supply arrangement, the preliminary peak-summer volumetric demand could therefore comprise approximately 139 m³/day of domestic and operational demand plus 100 m³/day of irrigation demand, giving a potential total of approximately 239 m³/day during periods of peak irrigation use. This irrigation demand is likely to decrease over time as vegetation is established.

The final irrigation demand will be confirmed during detailed landscape and irrigation design once the actual irrigated area, application rates, irrigation efficiency and operating programme are known.

Individual rainwater reuse tanks are not proposed as part of the current servicing strategy due to the distributed infrastructure and ongoing maintenance requirements across the village, together with the relatively limited reuse demand expected at individual villas. Rainwater reuse may be considered at detailed design for larger communal buildings where a more consistent non-potable demand can be established. An on-site bore may also be investigated as an alternative or supplementary source for irrigation and other suitable non-potable uses.

8 Backflow prevention and hydraulic losses

The boundary arrangement follows the Summerset standard philosophy of separate DN150 potable/hydrant and low-risk sprinkler branches. The potable/hydrant branch is protected by a DN150 reduced pressure zone backflow device (RPZ) due to the high-risk classification for the site activities (e.g. medical care, wastewater pumping station). The dedicated fire-sprinkler branch is protected by a DN150 double check valve (DCV). Irrigation is separately protected downstream of the potable system.

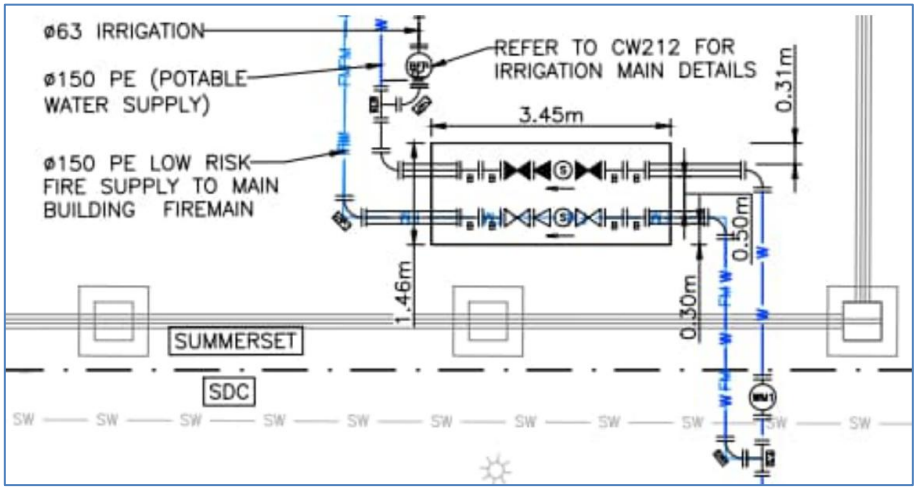


Figure 1: Summerset standard boundary backflow arrangement (schematic).

Table 5: Proposed design parameters for backflow prevention

Branch	Device	Proposed product	Assessment flow
Potable / hydrant branch	DN150 Reduced Pressure Zone device	Zurn Wilkins 375 RPZ	27.4 L/s fire-case branch flow
Sprinkler branch	DN150 Double Check Valve	Zurn Wilkins 350L DCV	17.0 L/s sprinkler flow

Table 6: Calculated headloss – backflow devices

Assembly / scenario	Flow (L/s)	Headloss (m)	Loss (kPa)	Basis
RPZ assembly – fire	27.43	4.77	46.8	Device + 2 bends + 2 isolation valves + 3.45 m DN150 pipe
DCV assembly – fire	17.0	1.96	19.2	Device + 2 bends + 2 isolation valves + 3.45 m DN150 pipe
RPZ assembly – PDD	4.06	~9.25	~90.8	EPANET GPV result using supplied manufacturer curve at low flow

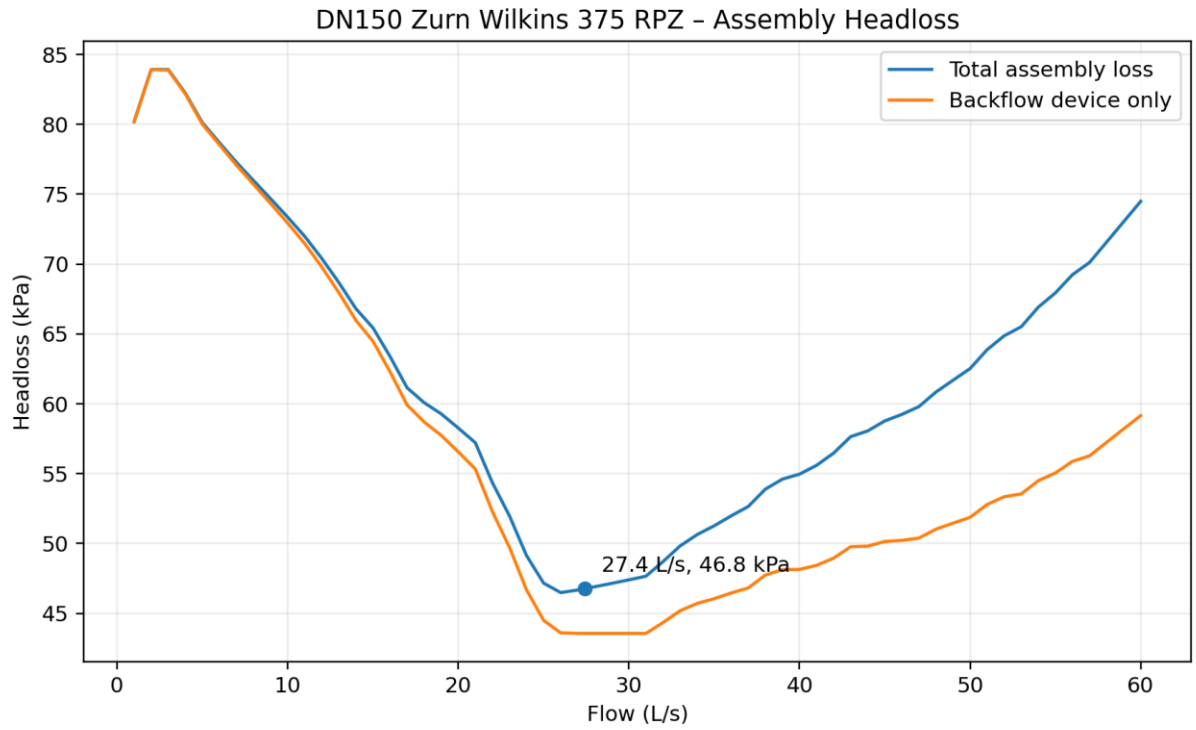


Figure 2: DN150 Zurn Wilkins 375 RPZ total assembly headloss curve.

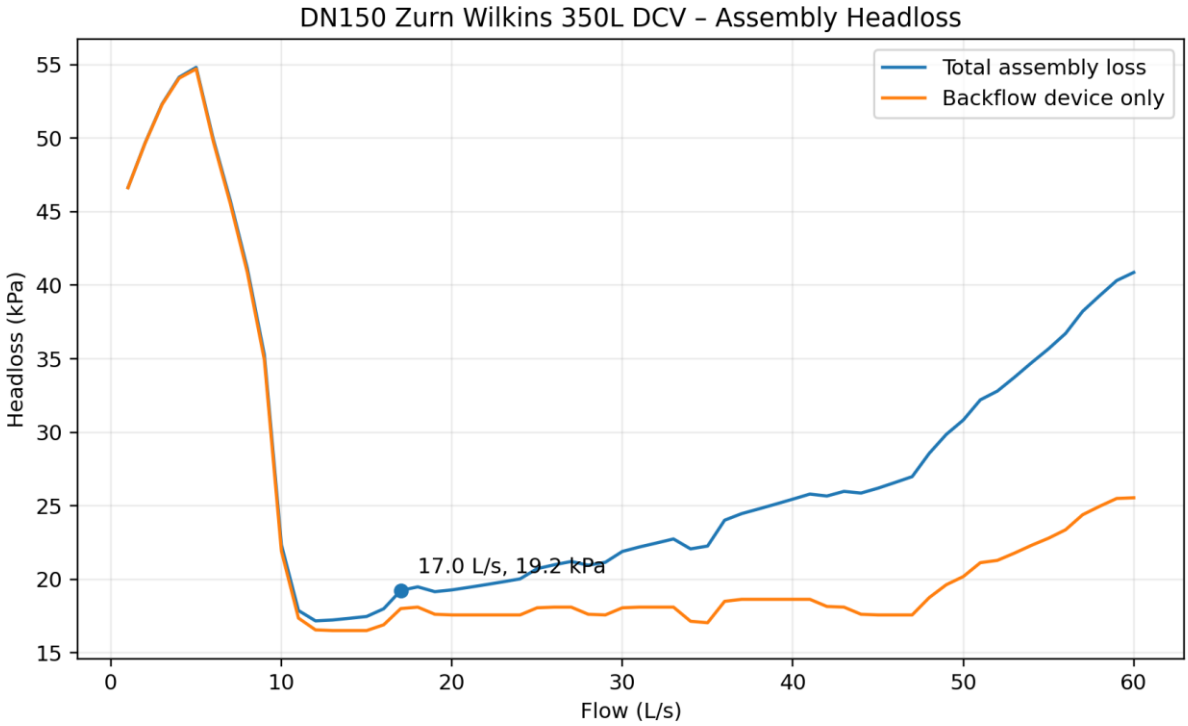


Figure 3: DN150 Zurn Wilkins 350L DCV total assembly headloss curve

Final losses are to be checked against the selected meter, valve and fitting manufacturers during detailed design.

9 EPANET hydraulic model

An internal network model has been created using EPANET, based on the following inputs and assumptions.

Table 7: Internal network model – inputs

Parameter	Model input / assumption
Software	EPANET-JS / EPANET hydraulic engine
Flow units	L/s
Headloss method	Darcy-Weisbach
Demand model	Demand Driven Analysis (DDA)
Principal main	DN150 PE; model ID 135.9 mm
Rider main	DN50 PE; model ID 42.4 mm
Lot service	20 mm PE service; modelled where represented in network
Pipe roughness	0.015 mm adopted in current model (conservative for new PE; confirm at final QA)

Parameter	Model input / assumption
Connection elevation	RL 6.35 m NZVD2016, consistent with Stantec connection node
PDD demand pattern	Constant 1.0; base demands already represent PDD
Fire domestic demand	60% PDD, constant during fire assessment
FW2 demand	25 L/s total; 12.5 L/s from each of two hydrants
Sprinkler demand	17 L/s at sprinkler valve-room node
Boundary devices	DN150 RPZ on potable/hydrant branch; DN150 DCV on sprinkler branch using GPV headloss curves

For PDD assessments, the 2023 and 2053 time-varying boundary pressure profiles (Figure 4) were derived from the Stantec public-network results at the development connection. Stantec (Figure 5) provides the the 2053 future peak-day profile. The profiles were digitised and converted to EPANET reservoir head patterns using the Stantec connection-node elevation of RL 6.35 m NZVD2016. This allows the internal model to respond to the same daily variation in upstream pressure that was reported by Stantec, rather than assuming a single static source pressure.

Table 8: Residual network pressure at proposed connection point for present and future scenario

Model year	Network residual pressure	Pattern basis	Critical period
2023	67.756 m	Digitised Stantec 2023 connection pressure profile	~10:00 am
2053	67.180 m	Digitised Stantec 2053 connection pressure profile	~10:00 am

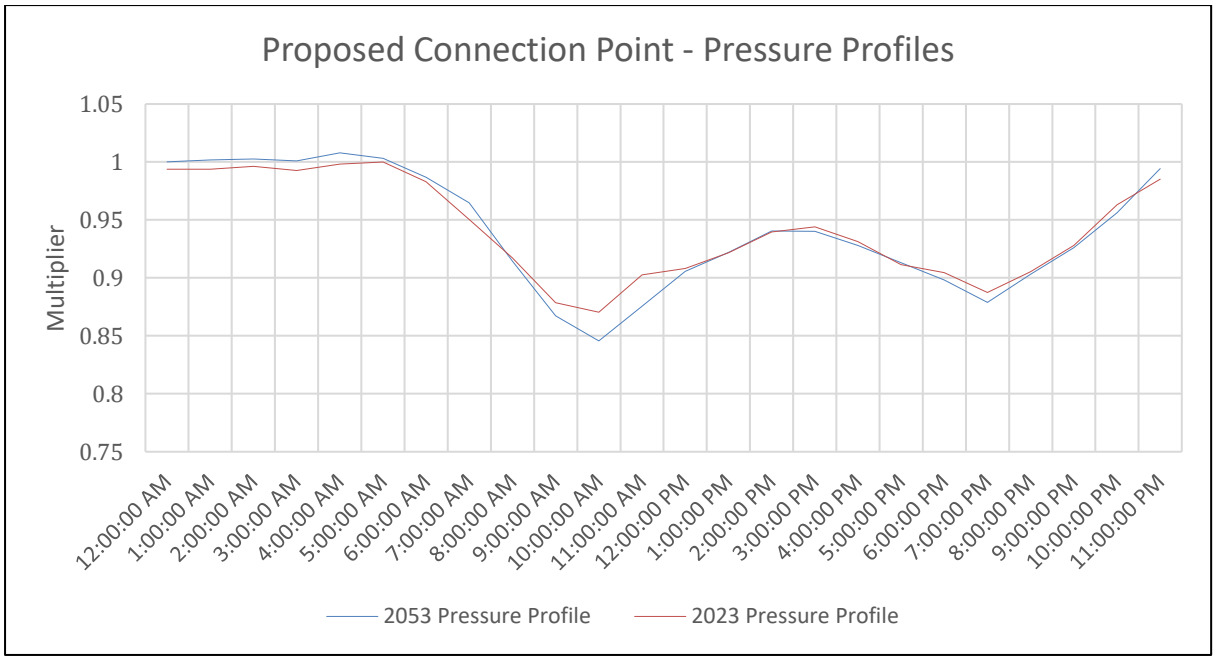


Figure 4: 2023 and 2053 Pressure Profiles

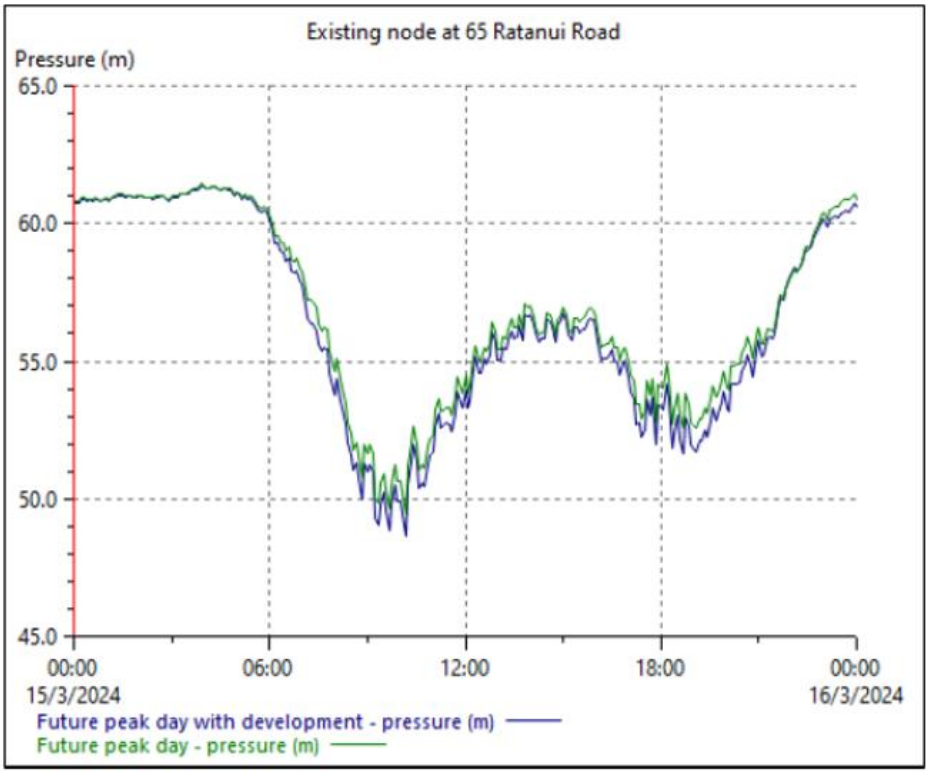


Figure 5: Stantec 2053 future peak-day pressure profile at the Ratanui Road development connection (source: Stantec, Figure 5-4).

The 2053 graphed values above are representative of the source-pressure variation applied to the EPANET model. The minimum occurs during the morning peak at approximately 10:00, which is also the critical timestep identified in the internal-network assessment. For the firefighting assessment, the internal network model uses the same time-varying 2023 and 2053 peak-day pressure profiles derived from the Stantec assessment at the development connection. The firefighting scenarios then apply 60% of PDD together with 25 L/s FW2 demand and 17 L/s sprinkler demand within the proposed internal network.

9.2 Modelled scenarios

Table 9: Summary of scenarios considered

Scenario	Boundary condition	Domestic	Fire Flows	
			FW2	Sprinkler
2023 PDD	2023 public-network PDD boundary pattern	100% PDD	None	None
2023 Fire	Stantec 2023 fire residual at connection (~33 m)	60% PDD	25 L/s	17 L/s
2053 PDD	2053 public-network PDD boundary pattern	100% PDD	None	None
2053 Fire	Stantec 2053 fire residual at connection (~31 m)	60% PDD	25 L/s	17 L/s

10 Hydraulic results and level-of-service assessment

The exported model results have been reviewed over the full 24-hour simulation period. The minimum internal network pressure occurs at approximately 10:00 am in each scenario, corresponding with the modelled peak-demand period. Full EPANET time-series outputs are available on request.

Table 10: Internal network modelling results

Scenario	Critical Time	Min pressure (m)	Max pressure (m)	Criterion	Result
2023 PDD	10:00 am	41.39	60.94	25–90 m	PASS
2023 Fire	10:00 am	19.72	41.43	≥10 m	PASS
2053 PDD	10:00 am	39.73	61.47	25–90 m	PASS
2053 Fire	10:00 am	17.72	41.62	≥10 m	PASS

The 2053 fire case is the critical pressure condition, with a minimum internal residual pressure of approximately 17.72 m at node n485. This exceeds the adopted 10 m minimum fire-flow residual pressure by approximately 7.7 m. The 2053 PDD case gives a minimum internal pressure of approximately 39.73 m, comfortably above the 25 m PDD minimum.

The 2023 scenarios provide greater pressure margin. The results therefore indicate that the proposed DN150/DN50 internal network is hydraulically capable of meeting the adopted pressure level-of-service requirements under the assessed ultimate-demand and firefighting conditions.

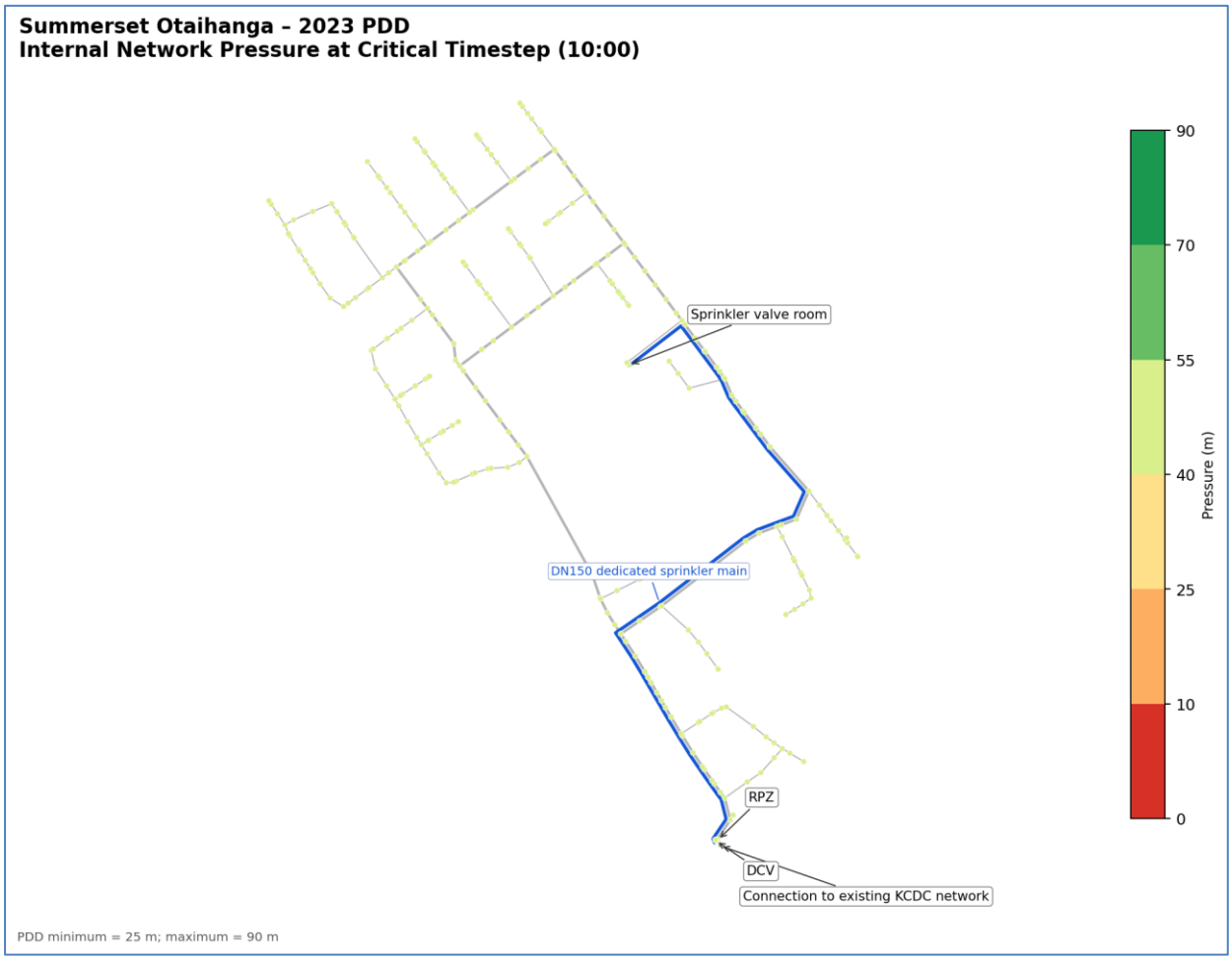


Figure 6: 2023 PDD internal-network pressure at critical timestep (10:00 am). The blue line shows the dedicated DN150 sprinkler main routed generally parallel to the potable-main corridor.

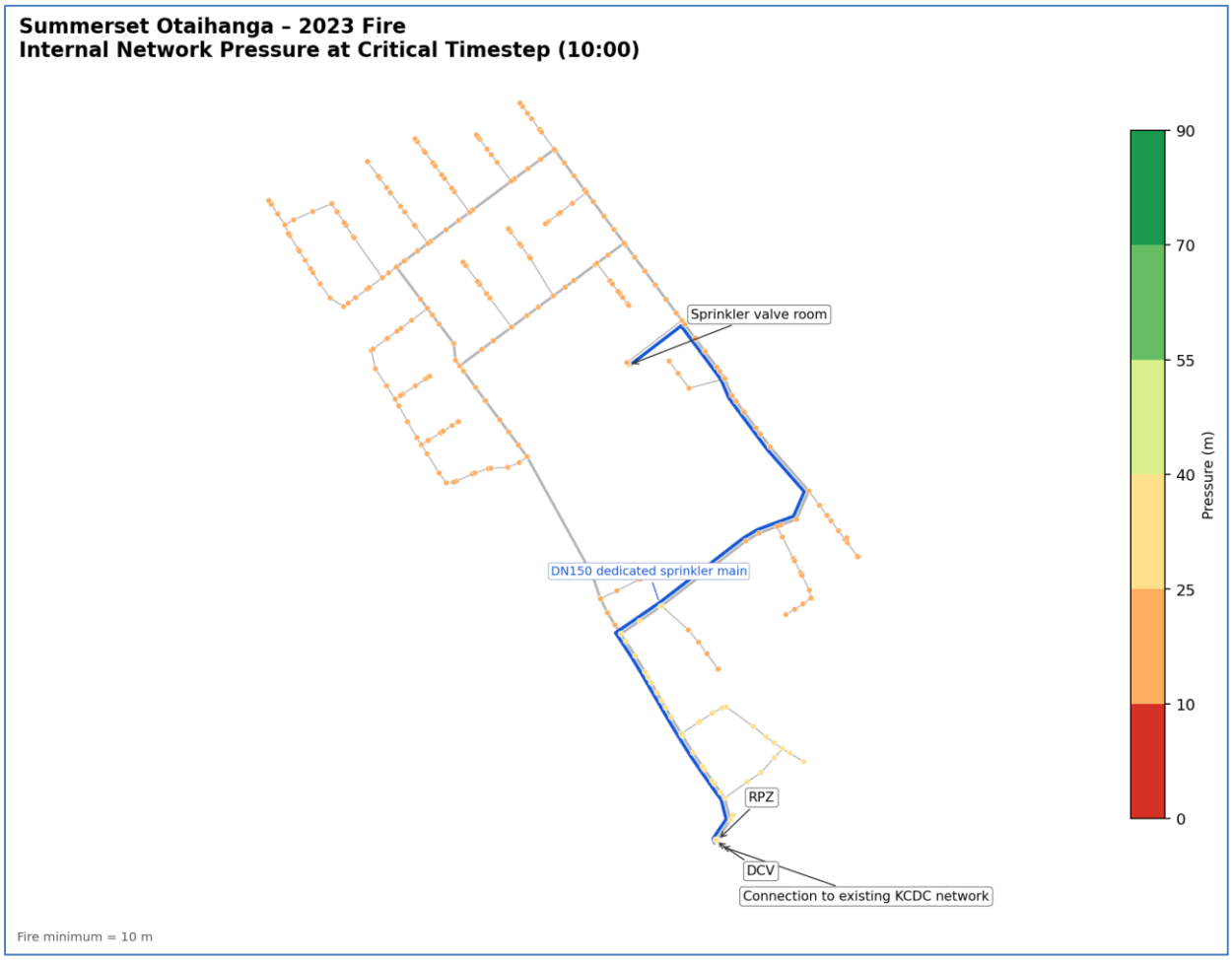


Figure 7: 2023 fire scenario internal-network pressure at critical timestep (10:00 am). The blue line shows the dedicated DN150 sprinkler main routed generally parallel to the potable-main corridor.

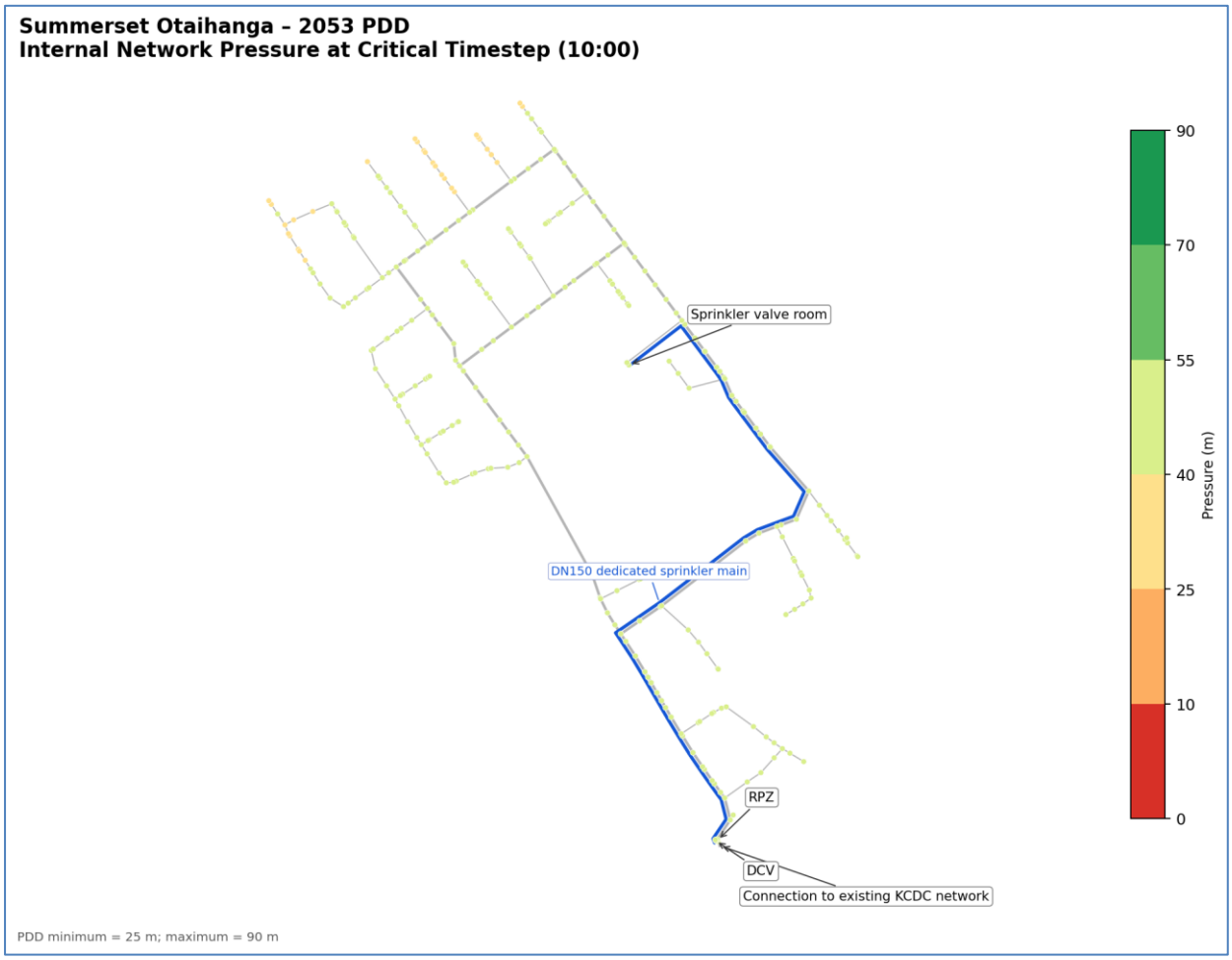


Figure 8: 2053 PDD internal-network pressure at critical timestep (10:00 am). The blue line shows the dedicated DN150 sprinkler main routed generally parallel to the potable-main corridor.

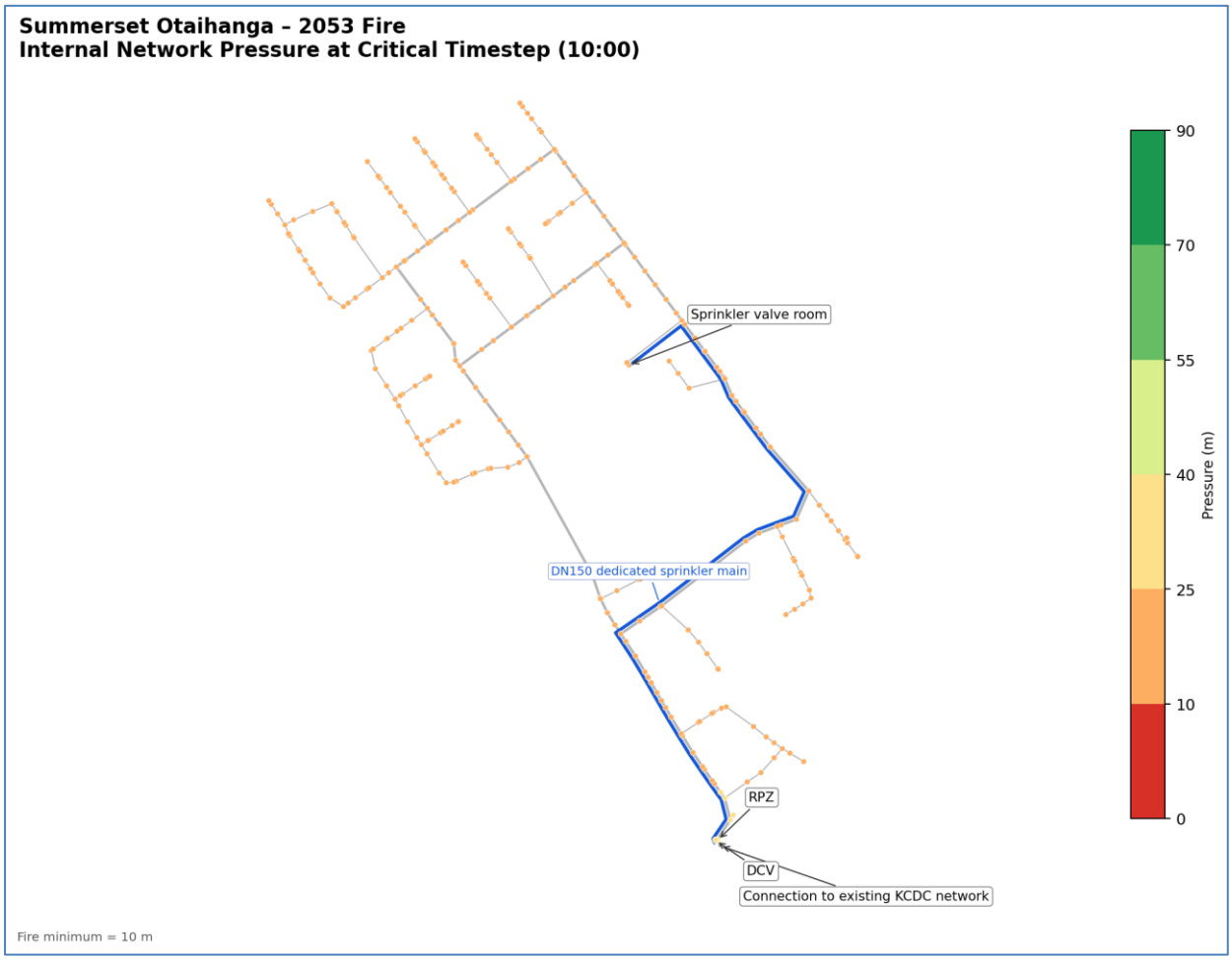


Figure 9: 2053 fire scenario internal-network pressure at critical timestep (10:00 am). The blue line shows the dedicated DN150 sprinkler main routed generally parallel to the potable-main corridor.

12 Conclusion

The water-supply assessment demonstrates that the proposed development can be serviced from the existing KCDC reticulated water network without any identified requirement for upstream public-network upgrades.

The current ultimate domestic and operational demand has been calculated at approximately 139 m^3/day, with an average flow of approximately 1.61 L/s and a PDD of approximately 4.03 L/s. This remains within the demand envelope previously assessed by Stantec and below the later Woods Plan Change demand allowance.

For firefighting, the adopted design scenario comprises 60% of PDD + 25 L/s FW2 + 17 L/s sprinkler allowance, giving a theoretical total demand of approximately 44 L/s. The modelling confirms that the proposed internal network can convey the adopted fire-flow demand while maintaining the required residual pressures, consistent with the servicing conclusions of the earlier Stantec assessment. The 17 L/s sprinkler allowance is retained from the KCDC-commissioned Stantec assessment and will be confirmed by the project fire engineer during the building-consent / detailed-design stage; detailed sprinkler-system pressure adequacy is outside the scope of this assessment.

The current proposal provides irrigation from the private potable network. A preliminary peak-summer allowance of 100 m³/day, equivalent to approximately 3.5 L/s over an 8-hour overnight irrigation period, has therefore been adopted. Irrigation is treated as a separate off-peak operating condition and is not assumed to coincide with the daytime PDD or firefighting scenarios. This provides a practical means of managing irrigation demand without increasing the critical peak hydraulic loading on the public network.

The assessment therefore identifies a clear and feasible servicing solution for the development. The proposed connection, internal reticulation, backflow arrangements, firefighting supply and off-peak irrigation strategy can all be accommodated within the current proposed design, with no fundamental water-supply constraint identified that would prevent the development from proceeding.

Accordingly, from a water-supply servicing perspective, the proposed development is considered feasible and suitable to support the Fast-track application, with the remaining matters relating to final irrigation demand, detailed reticulation design, final sprinkler requirements and operational controls being matters that can appropriately be confirmed during subsequent detailed design and consenting stages.

13 Reference documents

REFERENCE DOCUMENTS
Water Supply Layout Plans – CKL Sheet 6000 - 6002
Water Demand Calculations and Stantec/Woods Reconciliation
Backflow Prevention Arrangement and Headloss Calculations
Stantec Water Modelling Assessment, final issued 10 October 2024
Notes: 1) Refer to Infrastructure Report for reference documents above 2) EPANET Model Outputs (including full workbook) can be provided upon request