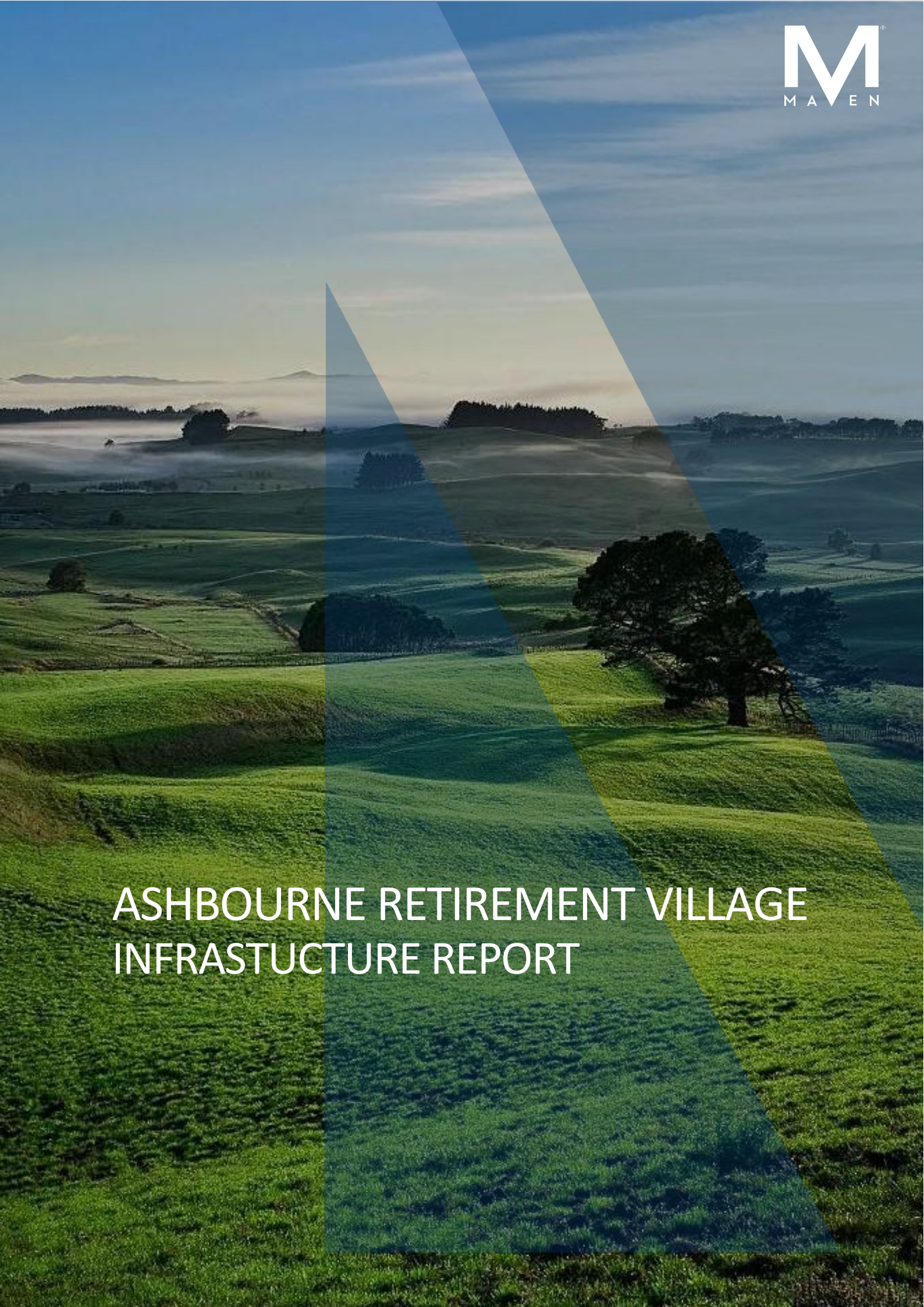

ASHBOURNE RETIREMENT VILLAGE INFRASTUCTURE REPORT

PROJECT INFORMATION

CLIENT	UNITY DEVELOPMENTS LTD
PROJECT	J00606 – STATION ROAD, MATAMATA, MATAMATA-PIAKO

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CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

Maven Matamata Ltd have been engaged by Unity Developments Ltd to undertake the infrastructure design in support of Ashbourne Retirement Village development at Station Road, Matamata.

This report is provided to support a 20.0 hectare (ha) retirement village comprising of 218 villas, an aged care hospital and other supporting facilities.

1.2. PURPOSE OF THIS REPORT

The purpose of this report is to outline the design specifications and considerations for the earthworks and supporting infrastructure needed to accommodate the proposed retirement village and ensure it meets the necessary standards as per the Waikato's Regional Infrastructure Technical Specification (RITS) Design Standards, Waikato Regional's Erosion and Sediment Control guide, and Matamata Piako District Council (MPDC) Development Manual.

The information provided herein outlines the methodology associated with the proposed infrastructure onsite.

This report is to be read in conjunction with the Engineering Drawings and Calculations and is to accompany the resource consent application.

1.3. SITE DESCRIPTION

The Ashbourne Retirement Village area is circa 20 ha block of land within Matamata Piako District. It is located in a predominantly rural area, on the outskirts of Matamata, approximately 1.8 kilometers south-west of the center of Matamata in the Waikato region

The current site access is opposite 190 Station Road, through a steel and wire gate, and is not an official vehicle crossing.

The site adjoins with the new Highgrove Development to the north-east, an existing dwelling to the west and the remainder of the site is surrounded by pastoral land.

Most of the site is low-lying flat farmland, that is interspersed with artificial farm drains.

There is an existing stormwater swale that follows the northeast boundary and the Waitoa river which runs south to north, approximately 500m to the west of the subject site.

Figure 1: Site Locality Map

1.4. LEGAL DESCRIPTION

The site is legally described as the following:

Address	Lot	Appellation	Area (ha)
247 Station Road	Lot 2	DP 21055	27.38

Table 1: Legal Descriptions with Area

The development site comprises an area of 20ha of the 27.38ha.

2. CONSTRUCTION STAGING

The proposed development will comprise of 218 units, an aged care hospital, and other supporting facilities to accommodate the retirement village.

The development will include private stormwater, wastewater and water supply infrastructure, as well as power, fibre and street lighting.

15 new roads, and 28 common accessways are proposed to provide access to all proposed dwellings and facilities. These roads and accessways will not be vested to council.

A staged approach is proposed, from north to south, to establish a high-quality development. Refer to Proposed Site Overview plan C1100 in Engineering drawings for the development stages.

The 20.0-ha site is currently divided into ten stages. Stage 1 occupies approximately 3.4ha of the site, which will be developed first, and other stages will follow suit.

3. EARTHWORKS

Earthworks will be undertaken in accordance with NZS4431:2022 Engineered fill construction for lightweight structures, to facilitate the development outcome and will include re-contouring, excavations for services, drainage reticulation, formation of building platforms, roading, and accessway construction.

3.1.GEOTECHNICAL INVESTIGATION

A site-specific geotechnical investigation has been undertaken for the development site by CMW Geosciences dated 4th July 2024.

The published geological maps for the area generally align with the geology encountered onsite as comprised of cross-bedded pumice sand, silt and gravel of the Hinuera Formation. Ground water was encountered at 1.6m with the maximum depth of more than 2.6m near the western boundary.

From the ground investigations undertaken by CMW, they have summarized the site geology results in Table 2 below.

Unit	Depth to base (m)		Thickness (m)**	
	Min	Max	Min	Max
Topsoil/Fill	0.1	0.5	0.1	0.5
Stiff to Very Stiff Silt (Hinuera Formation)	1.0	1.1	0.5	1
Dense to Very Dense Sand with interbedded Silt (Hinuera Formation)	5.9	17.3	4.9	16.3
Very Stiff to Hard Silt/Clay (Walton Subgroup)	0.1	18.1	9*	18*
Very Dense Silty Sand (Walton Subgroup)	-	-	**	**
Notes: * Strata not encountered within all test locations. **Thickness only recorded were base of strata has been confirmed.				

Table 2: Summary of Strata Encountered

Upon completion of the proposed earthworks an Earthworks Completion Report will be prepared by the Geotechnical Engineer. This report will certify the adequacy of earthworks and make recommendations on bearing strengths for foundation design purposes.

Ground water level adopted for the design is RL 64.35, Northeast of the development and RL 65.31 South West.

Adopted Soakage rate results of 206.5mm/hr and 100mm/hr design soakage rate with a 0.5 factor conservatism.

A subgrade CBR of 6 was adopted based on Geotech result Hand Auger Borehole logs within the retirement village area.

3.2. BULK EARTHWORKS

The Engineering Drawings (Refer to Appendix A) detail the extent of the earthworks, refer to engineering plan C2400.

The bulk earthwork for whole site is summarized in table below:

Bulk Earthworks (excluding topsoil strip)	
Total area of ground disturbance	214,800 m² (21.4ha)
Total volume of cut	43500 m^3
Total volume of fill	77300 m^3
Total Volume (net fill)	33800 m^3
Maximum CUT and FILL depth	2.8m FILL / 3.4m CUT
Others	
Topsoil Stripping (200mm)	42,960 m^3

Table 3: Bulk Earthwork Summary

3.3. EROSION AND SEDIMENT CONTROL

Erosion and sediment controls are subject to the Waikato Regional Council 'Sediment and Erosion Control Guideline' and plans outline proposed measures are provided in the engineering plan C2300.

Prior to commencing earthwork operations, it is anticipated that a pre-construction meeting with the WRC monitor team will take place. During this meeting, the erosion and sediment control measures will be discussed and confirmed to ensure that the potential impacts of earthworks and erosion are effectively mitigated.

For a comprehensive understanding of the specific application of sediment and erosion control measures for each area of earthworks, please consult the Construction Management Plan (CMP) which provides detailed guidance on these measures.

4. TRANSPORTATION

4.1. DESIGN STANDARDS

All roads have been designed to accommodate the development and considering RITS, MPDC Development Manual and the Austroads design guidelines with the recommendations of Commute Kiwi transportation consultants.

The design of the road strongly supports a low-speed environment for the retirement village with an emphasis to support vulnerable road users and to encourage walking and cycling. It is conceptual in nature for resource consent purpose only. Finer design details will be confirmed at engineering approval stage.

4.1.1. ENGINEERING EXCEPTION DECISIONS

- No engineering exceptions are proposed for this application.

4.2. DUE DILIGENCE ASSESSMENT – TRAFFIC

Due Diligence Assessment (Traffic) was carried out by Commute Kiwi considering the traffic and transportation effects of the proposed residential development.

For further details, please refer Commute Kiwi Due Diligence Assessment – Traffic.

4.3. PROPOSED ACCESS

There are two entrances to the retirement village. The main entrance will be at the northern end of the development on Station Road frontage where proposed Road 1 (primary main loop) will connect to. This road will provide primary access to the development. Another entrance will be formed at the southern end connecting to the residential site of this development and will be part of Stage 8 of the development.

4.4. ROAD TYPOLOGY AND DESIGN

Road 1 is contained within a 13.5m corridor and include a carriageway width of 7.0m and design of:

- 30mm DG10 asphaltic concrete (on full Grade 5 Primecoat)
- 350mm granular pavement of 100mm AP40 / 250mm GAP 65
- On compacted natural subgrade to a design subgrade of CBR 6

Road 4 and 6 is contained within a 11.0m corridor and include a carriageway width of 7.0m and design of:

- 30mm DG10 asphaltic concrete (on full Grade 5 Primecoat)
- 350mm granular pavement of 100mm AP40 / 250mm GAP 65
- On compacted natural subgrade to a design subgrade of CBR 6

Road 2 to 3, 5, 7 to 13, and 15 are contained within 10.0m corridor and include a carriageway width of 6.0m and design of:

- 30mm DG10 asphaltic concrete (on full Grade 5 Primecoat)
- 350mm granular pavement of 100mm AP40 / 250mm GAP 65
- On compacted natural subgrade to a design subgrade of CBR 6

Road 14 is contained within 9.0m corridor and include a carriageway width of 5.0m and design of:

- 30mm DG10 asphaltic concrete (on full Grade 5 Primecoat)
- 350mm granular pavement of 100mm AP40 / 250mm GAP 65
- On compacted natural subgrade to a design subgrade of CBR 6

There are 28 Accessways varying in width of 4m, 5m, 6m, and 7m wide to accommodate the retirement village access to units.

4.5. PARKING

One parking space is to be provided per dwelling unit. Additional parking is provided throughout the development however none provided within carriageway

4.6. WALKING AND CYCLING

Interconnected footpaths are provided throughout with widths of 1.5m to all the proposed roads. Cyclists would be expected to share the road with motorised vehicles.

5. STORMWATER

5.1. DESIGN STANDARDS

The MPDC Council Development Manual sets out design and construction standards for stormwater and requires all land development projects to be provided with a means of stormwater disposal.

Stormwater systems have been designed in accordance with RITS and other relevant standards including the MPDC Development Manual 2010 and caters for the primary soakage system up to the 10-year event as well as the secondary system and overland flow paths to manage excess runoff that cater for events exceeding the capacity of the primary soakage system for events exceeding the 10-year event.

5.1.1. ENGINEERING EXCEPTION DECISIONS

- No engineering exceptions are proposed for this application.

5.2. EXISTING RETICULATION

There is no existing public network located near the site identified on MPDC GIS data. The existing stormwater infrastructure within the site is limited to farm/roadside swales, culverts and streams. There is an existing stormwater swale located along the eastern and northern boundaries of the site to maximum depth of 2m.

The proposed development will have new stormwater systems.

5.3. STORMWATER MANAGEMENT PLAN (SMP)

The proposed Stormwater Management Plan (SMP) has been prepared to support a discharge consent application for the proposed overall Ashbourne Development, which includes:

- Retirement Village (related to this Infrastructure Report);
- Residential Development and;

- Northern and Southern Solar Farms.

Each site has been considered in detail through hydrological and hydraulic modelling, including sensitivity scenarios under future climate conditions.

For further details, please refer to the Stormwater Management Plan (SMP) prepared by Maven Waikato Ltd which outlines the proposed management of stormwater within this development.

5.4. SOAKAGE SYSTEM

Ashbourne Retirement Village will be serviced by an under road soakage trench up to 10-year stormwater event. Flows exceeding the 10-year soakage capacity are redirected back into the road carriageway and discharged at the designated downstream Stormwater Ponds. Please refer to the appended engineering plans for further detail.

Adopted Soakage rate results of 206.5mm/hr and 100mm/hr design soakage rate with a 0.5 factor conservatism has been adopted into design.

5.4.1. PROPOSED SOAKAGE SYSTEM

The stormwater runoff for this development will be soaked into the ground via a soakage trench up to 10-year stormwater event. For storm events exceeding the 10-year ARI storm event, the excess flows will bubble up into the road, where it will form part of the overland flow paths where it will eventually discharge into the designated downstream stormwater ponds.

5.4.2. UNIT CONNECTIONS

- Each lot will contain its own soakage Rainsmart unit.

5.4.3. OVERLAND FLOW PATHS (OLFPS)

Additional branches of OLFPs will be created as roading corridors are formed. The following measures will be adopted to mitigate their effects of these overland flowpaths on the proposed development.

- Identify and maintain natural overland flow/watercourse locations to convey concentrated stormwater from the site.
- Utilise existing culverts (where possible) to maintain the same discharge locations, post development.
- Identify and retain any upstream OLFPs and/or watercourses to avoid any upstream flooding.
- Ensure OLFPs are to be designed where possible within the roading network and discharge into watercourses and detention devices.

The preliminary OLFP design is shown in Maven Matamata Ltd drawings C4900 contained within Appendix A. Summary of results provided below and detailed design of the OLFPs will be provided at future detail design stage following the approval of the resource consent.

An assessment of the post development overland flow paths (OLFPs) has been carried out to evaluate the behaviour of surface runoff in the road carriageway under the proposed stormwater management system. The design scenario is based on the 2081-2100 RCP8.5 climate change scenario, incorporating all proposed soakage and treatment devices and the assessment is done through Autodesk Hydroflo

software. The OLFPs represents the conveyance of surface runoff because of the proposed system during the 100-year storm event.

Flow depths and velocities were assessed at key locations throughout the development covering all the various road/accessway typologies ensuring and confirming conveyance of the OLFP is viable through proposed carriageway. See below table showing results at the key locations.

	CATCHMENT AREA (HA)	SECTION	FLOW RATE m^3/s	MAX DEPTH m	VELOCITY m/s	DEPTH x VELOCITY
CATCHMENT 02	4.64	A	0.513	0.156	0.71	0.11
		B	0.33	0.141	0.6	0.09
		C	0.33	0.205	0.614	0.13
		D	0.635	0.179	0.679	0.12
		E	0.205	0.125	0.536	0.067
		F	0.505	0.128	0.705	0.09
CATCHMENT 04	4.05	G	0.835	0.191	0.696	0.132
		H	1.240	0.171	1.132	0.193
		I	0.371	0.141	0.635	0.089
CATCHMENT 05	3.16	O	0.360	0.149	0.476	0.070
CATCHMENT 06	5.69	J	0.270	0.133	0.507	0.067
		K	0.330	0.142	0.604	0.085
		L	0.250	0.139	0.501	0.069
		M	0.170	0.097	0.473	0.045
		N	0.320	0.107	0.440	0.047

Table 4: OLFP Results

For OLFP plans, please refer to Appendix A – Engineering Plans.

All OLFP sections comply with standard design thresholds and does not exceed 200mm maximum depth threshold.

Depth x velocity (m^2/s) values remain well below critical safety thresholds defined in Austroads 2012 Part 5, which specify:

- < $0.4m^2/s$ for pedestrian safety
- < $0.6m^2/s$ for vehicle safety

The highest recorded value was $0.193m^2/s$ confirming safe flow conveyance for both pedestrians and vehicles under design conditions. Flow is primarily routed along proposed roads conveyed into roadside treatment and 10-year mitigation devices prior to spilling back (during event above the 10-year) onto the road and get discharged into the proposed ponds or greenway.

It is noted that a separate flood sensitivity analysis has been completed using HEC-RAS 2D modelling assuming all stormwater devices are fully blocked. The assessment detailed in section 7 of SMP, evaluates overland flow behaviour under worst case flooding conditions within and surrounding the site.

5.5.CAPACITY AND QUALITY

Stormwater Strategy for Lot Areas

Roof runoff is managed using inert roofing materials, while driveway runoff is directed through a catch pit with a sump for pre-treatment before disposal into a private Rainsmart soakage units, ensuring effective onsite management. Overflow is located in the catchpit system for flows surpassing the 10-year event within the lot areas. Excess flows will be diverted into the downstream pond via the road carriageway.

Stormwater Strategy for Road Carriageway

The initial runoff volume (WQV) is treated via proposed roadside raingardens. To address water quality, treatment measures are designed to capture and treat the first flush - 1/3 of the 2-year, 24-hour storm event. Rain gardens will be implemented as the primary treatment device, providing filtration and improving stormwater quality prior to infiltration. The proposed rain gardens are integrated with the dedicated subsurface soakage systems combined to cater for the 10-year event. Flows exceeding the 10-year soakage capacity are redirected back into the road carriageway and get discharged at the downstream stormwater ponds.

Stormwater Strategy for SW Dry Detention Ponds 1, and 2

These ponds forms critical part of the overall stormwater Mitigation system.

Dry detention ponds will be incorporated into the stormwater system to manage peak flows from 10-year return period storm events. These ponds are designed to temporarily store runoff during storm events and release it at a controlled rate, thereby reducing downstream flooding risk and protecting receiving environments.

Key design considerations include:

- Sizing based on 10-year storm event runoff volume from contributing impervious areas
- Detention time and outlet control to achieve desired attenuation
- No permanent pool, allowing the pond to remain dry between storm events
- Freeboard and spillway design to safely pass extreme events, such as the 100-year ARI storm

5.6.FLOODING

The WRC hazard portal has indicated there is potential flooding along the eastern side of the development and boundary with Highgrove Development in the 100 year ARI storm event, however there is no flooding indicated within the subject development. No flood modelling assessment has been undertaken, as part of the fast-track application. A flood modelling assessment will be undertaken, as part of the future detailed design phase.

5.7.CONNECTION POINTS AND STAGING

- Stage 1 to 4 (Part of 3) - These stages collectively form catchments 2 and 5, which is serviced by the proposed dry Stormwater Pond 1. The proposal allows for the construction of Stormwater Pond 1 during stage 1. This will ensure that required stormwater devices are in place before establishment of future stages within catchment 2 and 5. Stage 2 to 4 will follow, completing the remainder of stages within Catchments 2, and 5.
- Stage 5 to 6 (Part of 3) - These stages form the extent of catchment 6, which is serviced by stormwater Pond 2. The proposal allows for the construction of Stormwater Pond 2 during stage 3. This will ensure that required stormwater devices are/is in place before establishment

of future stages within catchment 6. Stage 5 to 6 will follow, completing the remainder of stages within Catchment 6.

- The earlier stages will enable the construction of these Stormwater mitigation devices, with the later stages to follow.
- Stage 7 - This stage forms part of Catchment 4 and will be serviced by SW Pond 1.
- Stage 8 - This stage forms part of Catchment 4 and 6 and will be serviced by both SW Pond 1 and 2.
- Stage 9 to 10 - This stage forms part of Catchment 3 and 4, will be serviced by SW Pond 1.

6. WASTEWATER

6.1. DESIGN STANDARDS

The RITS Wastewater Design Standard sets out design and construction standards for wastewater and requires all land development projects to be provided with a suitable means of wastewater disposal.

The existing public wastewater network near the development is currently at capacity as advised by MPDC therefore the retirement village will have its own wastewater treatment to manage and treat wastewater on site.

6.1.1. ENGINEERING EXCEPTION DECISIONS

- No engineering exceptions are proposed for this application.

6.2. CATCHMENT AREA

The proposed development consists of 218 villas, one Aged Care Hospital, and other facilities across approx. 16 ha. The wastewater design has been based on 45 persons per hectare as per the requirements of RITS.

6.3. DESIGN FLOWS

Calculations for wastewater demand indicate a peak wet weather flow (PWWF) discharge to the proposed wastewater treatment plant of 10.74 l/s. Refer to Wastewater Demand Calculations in Appendix B.

6.4. RETICULATION

6.4.1. EXISTING RETICULATION

There is no existing reticulation at the proposed site.

6.4.2. PROPOSED RETICULATION

MPDC have confirmed that the public wastewater system does not have enough capacity to service this development. This means all wastewater infrastructure within the development will not be vested to be council and will be managed and treated on site.

The wastewater system proposed is based on a gravity sewer inlet and conventional pump station. It will be sized to accommodate associated peak wet weather flows as calculated in wastewater demand calculation in Appendix B.

A range of new 150mmØ and 225mmØ reticulation lines are proposed for this development as shown on C5000-C5003 plans.

These reticulation lines will gravity feed into the proposed pump station (SSMH A1) which pressurise the sewage into the rising main. The rising main will then discharge the wastewater into the proposed wastewater treatment plant (WWTP) located on the northwest corner, directly outside of the western boundary.

Refer to Inno flow concept design provided in Appendix C for more information on the WWTP.

The specification and design of the new wastewater pump station and WWTP will be provided in detailed design.

6.5. UNIT CONNECTIONS

All units will be serviced with connections as per RITS guidelines and specifications.

6.6. CONNECTION POINTS AND STAGING

- Stage 1 – Gravity reticulation network will be provided. The wastewater would then be conveyed to the new wastewater pump station within Stage 2, servicing up to 52 lots for stages 1 and 2. As part of Stage 1, the WWTP will be constructed.
- Stage 2 to 10 – All stages will contain new gravity reticulation network that would be directed to the new wastewater pumpstation then to the WWTP.

7. WATER SUPPLY

7.1. DESIGN STANDARDS

The RITS Water Supply Design Standard sets out design and construction standards for water reticulation, potable water supply and firefighting supply in accordance with SNZPAS 4509:2008 (NZ Fire Service Fire Fighting Water Supply Code of Practice).

7.2. EXISTING PUBLIC INFRASTRUCTURE

MPDC have confirmed that the existing water supply network in Matamata will not have enough capacity to service the retirement village. This means that all water supply infrastructure within the development will not be vested to be council and will be managed and treated on site.

7.3. DESIGN FLOWS

An estimate of water demand from the proposed building development has been made using the methodology set out in RITS 6.2.3 – Ordinary Supply Requirements.

Calculations for water demand indicate a calculated peak demand of:

- 6.56 l/s for the residential dwellings
- 0.65 l/s for the facilities and;
- 1.31 l/s for hospital – night day facility.

Refer to Water Demand Calculations in Appendix B.

7.4. PROPOSED WATER SUPPLY

The retirement village will be serviced by a proposed 120m deep borehole located near the western boundary, approximately 50m from the indicative wastewater treatment and disposal field.

The groundwater extracted from the 120m deep borehole will be distributed through a network of 16 water tanks and a treatment facility before being pumped via a 200mm OD HDPE PN 12.5 main from the pump station to the supporting riser main, ensuring a reliable and potable water supply for development.

Refer to engineering drawing C6000-C6003 plans for Water Supply layout plans.

The drawings C6000-C6003 plans show the proposed water supply systems. It ensures adequate water supply for all dwellings and other facilities, along with fire hydrants and valves to meet minimum requirement detailed in Section 7.5 below.

7.4.1. PROPOSED BOREHOLE AND STORAGE TANKS

A comprehensive assessment of the council's water main has confirmed that boreholes and storage tanks have sufficient pressure to support the development up to Stage 10, including all associated fire flow requirements.

The assessment of the water storage tanks confirmed that the Borehole water supplied by a borehole pump is capable of meeting water supply demand. There are 16 heavy-duty water tanks proposed to meet this demand. Potable water supply for the proposed development will be provided via a storage tank integrated with additional treatment processes(if needed). Water will be distributed through a pump station and a 200mm OD water reticulation system. The primary water network will comprise of 180mm OD mains, reducing to 125mm OD for subsequent development stages

As per the RITS demand for water age calculations, the water age is to be less than 72 hours. The water model confirms storage duration is below 45 hours.

Refer to Water Storage and EPANET Model calculations in Appendix B.

7.5. FIRE FIGHTING SUPPLY

The minimum firefighting water supply classification required by the RITS is to be in accordance with SNA PAS 4509 NZ Fire Service Fire Fighting Water Supply Code of Practice

Minimum water supply is specified as FW2. Therefore, the proposed residential development must meet the following water supply requirements:

- A primary water flow of 25L/s within a distance of 135m.
- An additional secondary flow of 25L/s within a distance of 270m.
- The required flow must be achieved from a maximum of 3 hydrants operating simultaneously.
- A minimum firefighting residential running pressure shall be 100kPa.
- A minimum working residential water pressure shall be 300kPa.

Based on the fire hydrant flow and pressure test following NZS 3500 Clause 3.2.3 and Table 3.2.3, a FW2 and 125mmOD HDPE is suitable to ensure fire safety. This is shown in the calculations, resulting in a flow rate of 1500 L/min. Eight fire hydrants have been proposed for the entire development to meet compliance with the above fire fighting supply requirements.

Aged care Hospital and Facilities will have sprinklers installed to improve fire safety within these facilities.

Refer to Water Demand Calculations in Appendix B.

8. SERVICES

It is noted that a utility service network is present in the surrounding area and HPA will liaise with utility providers for new underground services such as power, and fibre networks.

C7000 services plan provided in the engineering drawings is indicative and will be confirmed by the HPA group.

All streetlighting will be confirmed by HPA group.

9. CONCLUSIONS

Based on this engineering report we consider that the proposed development can be accommodated at the subject site without generating any adverse effects on the existing infrastructure and stormwater receiving environment.

Stormwater drainage can be provided for the development through overland flowpaths, rain gardens, soakage devices, and stormwater dry ponds. Overland flow paths will be managed through the development, and it will reduce any potential flooding risks to properties. An overarching stormwater strategy has been developed, and this sets out the high-level, best practice approach for stormwater management within the catchment.

Wastewater drainage can be provided for the development though piped networks to intermediary pump stations that will transfer wastewater through the site for discharge into the new Wastewater Treatment Plant.

Potable water for the development will be supplied via an on-site bore, supported by storage tanks and pumps designed to meet demand as required. This approach has been adopted following confirmation from MPDC and WSP that there is no available capacity within the existing council network.

Additional investigation work and detailed reporting for three waters and earthworks will be required to support future structure plans.

10. LIMITATIONS

The calculations and assessments included in this report are a 'desktop' analysis and are preliminary in nature based on information available at time of issue. To the best of our knowledge, it represents a reasonable interpretation of available information.

Depending on the outcome of the high-level structure plan, further community; stakeholder engagement, and feasibility investigations, including engineering design and calculations, will be required to determine the suitability of the areas proposed for the retirement village development.

This report is solely for our clients use for the purpose for which it is intended in accordance with the agreed scope of work. It may not be disclosed to any person other than the client and any use or reliance by any person contrary to the above, to which Maven has not given its prior written consent, is prohibited.

This report must be read in its entirety and no portion of it should be relied on without regard to the limitations and disclaimers set out.

Maven makes no assurances with respect to the accuracy of assumptions and exclusions listed within this report and some may vary significantly due to ongoing stakeholder engagement.

APPENDIX A – ENGINEERING DRAWINGS

APPENDIX B – ENGINEERING CALCULATIONS

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	1	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 1		Regional Council	Waikato/BOP
Contributing Catchment	34213	m^2		
Max Slope Angle	5	%		
Length of Slope	330	m		
Storage Volume Per Ha	300	m^3/ha		
Required Volume	1,026	m^3		
Required Forebay Volume	103	m^3	*10% of Pond volume*	
Dead storage Vol. Required	308	m^3	*30% of Pond Volume*	
Live storage Vol. Required	718	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.0m and 1.5m. Desired Depth = 1.0m)
@ Emergency Spillway	1.30	m	
@ Crest	1.50	m	

Side Batters 1: 3 V: H

Width

Base (A)	15.0	m
Primary Spillway	21.0	m
Crest (B)	24.0	m

Length

Base (C)	60.0	m
Primary Spillway	66.0	m
Crest (D)	69.0	m

Volume at Primary Spillway 1134 m^3

> Required Volume? OK

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Pond L to W ratio: OK

Forebay

Side Batters 1: 3 V: H

Depth	1.00	m	Base (A)	18 m
Width (E)	8.0	m	Base (C)	2 m
Length (F)	24	m		
Volume	108.0			

> Required Volume? OK

Decant

Requred Rate	10.3	l/s (3l/s/ha of contributing catchment)
No of holes	452	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	2	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 2		Regional Council	Waikato/BOP
Contributing Catchment	18980	m^2		
Max Slope Angle	5	%		
Length of Slope	200	m		
Storage Volume Per Ha	200	m^3/ha		
Required Volume	380	m^3		
Required Forebay Volume	38	m^3	*10% of Pond volume*	
Dead storage Vol. Required	114	m^3	*30% of Pond Volume*	
Live storage Vol. Required	266	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.0m and 1.5m. Desired Depth = 1.0m)
@ Emergency Spillway	1.30	m	
@ Crest	1.50	m	

Side Batters 1: 3 V: H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	19.0	m

Length

Base (C)	45.0	m
Primary Spillway	51.0	m
Crest (D)	54.0	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway 624 m^3

> Required Volume? OK

Pond L to W ratio: OK

Forebay

Side Batters 1: 3 V: H

Depth	1.00	m	Base (A)	6 m
Width (E)	8.0	m	Base (C)	2 m
Length (F)	12	m		
Volume	48.0			

> Required Volume? OK

Decant

Requred Rate	5.7	l/s (3l/s/ha of contributing catchment)
No of holes	251	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

	Maven BOP Ltd	Job Number	Sheet	Rev
		J00606	3	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 3		Regional Council	Waikato/BOP
Contributing Catchment	26340	m^2		
Max Slope Angle	5	%		
Length of Slope	250	m		
Storage Volume Per Ha	300	m^3/ha		
Required Volume	790	m^3		
Required Forebay Volume	79	m^3	*10% of Pond volume*	
Dead storage Vol. Required	237	m^3	*30% of Pond Volume*	
Live storage Vol. Required	553	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	60.0	m
Primary Spillway	66.0	m
Crest (D)	70.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	817	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3			
	V:	H			
Depth	1.00	m	Base (A)	14	m
Width (E)	8.0	m	Base (C)	2	m
Length (F)	20	m			
Volume	88.0				
> Required Volume?	OK				

Decant

Requred Rate	7.9	l/s (3l/s/ha of contributing catchment)
No of holes	348	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	4	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 4		Regional Council	Waikato/BOP
Contributing Catchment	17332	m^2		
Max Slope Angle	5	%		
Length of Slope	250	m		
Storage Volume Per Ha	300	m^3/ha		
Required Volume	520	m^3		
Required Forebay Volume	52	m^3	*10% of Pond volume*	
Dead storage Vol. Required	156	m^3	*30% of Pond Volume*	
Live storage Vol. Required	364	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	60.0	m
Primary Spillway	66.0	m
Crest (D)	70.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	817	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3			
	V:	H			
Depth	1.00	m	Base (A)	14	m
Width (E)	8.0	m	Base (C)	2	m
Length (F)	20	m			
Volume	88.0				
> Required Volume?	OK				

Decant

Requred Rate	5.2	l/s (3l/s/ha of contributing catchment)
No of holes	229	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	5	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 5		Regional Council	Waikato/BOP
Contributing Catchment	16876	m^2		
Max Slope Angle	5	%		
Length of Slope	200	m		
Storage Volume Per Ha	200	m^3/ha		
Required Volume	338	m^3		
Required Forebay Volume	34	m^3	*10% of Pond volume*	
Dead storage Vol. Required	101	m^3	*30% of Pond Volume*	
Live storage Vol. Required	236	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	60.0	m
Primary Spillway	66.0	m
Crest (D)	70.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	817	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3			
	V:	H			
Depth	1.00	m	Base (A)	14	m
Width (E)	8.0	m	Base (C)	2	m
Length (F)	20	m			
Volume	88.0				
> Required Volume?	OK				

Decant

Requred Rate	5.1	l/s (3l/s/ha of contributing catchment)
No of holes	223	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	6	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name			Regional Council	Waikato/BOP
Contributing Catchment	15379	m^2		
Max Slope Angle	5	%		
Length of Slope	200	m		
Storage Volume Per Ha	200	m^3/ha		
Required Volume	308	m^3		
Required Forebay Volume	31	m^3	*10% of Pond volume*	
Dead storage Vol. Required	92	m^3	*30% of Pond Volume*	
Live storage Vol. Required	215	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	45.0	m
Primary Spillway	51.0	m
Crest (D)	55.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	624	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3		
	V:	H		
Depth	1.00	m	Base (A)	6 m
Width (E)	8.0	m	Base (C)	2 m
Length (F)	12	m		
Volume	48.0			
> Required Volume?	OK			

Decant

Requred Rate	4.6	l/s (3l/s/ha of contributing catchment)
No of holes	203	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	7	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 7		Regional Council	Waikato/BOP
Contributing Catchment	16545	m^2		
Max Slope Angle	5	%		
Length of Slope	200	m		
Storage Volume Per Ha	200	m^3/ha		
Required Volume	331	m^3		
Required Forebay Volume	33	m^3	*10% of Pond volume*	
Dead storage Vol. Required	99	m^3	*30% of Pond Volume*	
Live storage Vol. Required	232	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	45.0	m
Primary Spillway	51.0	m
Crest (D)	55.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	624	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3		
	V:	H		
Depth	1.00	m	Base (A)	6 m
Width (E)	8.0	m	Base (C)	2 m
Length (F)	12	m		
Volume	48.0			
> Required Volume?	OK			

Decant

Requred Rate	5.0	l/s (3l/s/ha of contributing catchment)
No of holes	218	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	8	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

STAGE 8 AND 9

Site Characteristics

Device Name	Stage 8		Regional Council	Waikato/BOP
Contributing Catchment	25339	m^2		
Max Slope Angle	5	%		
Length of Slope	350	m		
Storage Volume Per Ha	300	m^3/ha		
Required Volume	760	m^3		
Required Forebay Volume	76	m^3	*10% of Pond volume*	
Dead storage Vol. Required	228	m^3	*30% of Pond Volume*	
Live storage Vol. Required	532	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	60.0	m
Primary Spillway	66.0	m
Crest (D)	70.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	817	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3			
	V:	H			
Depth	1.00	m	Base (A)	14	m
Width (E)	8.0	m	Base (C)	2	m
Length (F)	20	m			
Volume	88.0				
> Required Volume?	OK				

Decant

Requred Rate	7.6	l/s (3l/s/ha of contributing catchment)
No of holes	334	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Maven BOP Ltd	Job Number	Sheet	Rev
	J00606	9	A

		Author	Date	Checked
Job Title	Eldonwood Retirement Village, Matamata			
Calculation Title	Sediment Retention Pond Design	KQ	16/04/2025	SB

Site Characteristics

Device Name	Stage 9		Regional Council	Waikato/BOP
Contributing Catchment	11066	m^2		
Max Slope Angle	5	%		
Length of Slope	150	m		
Storage Volume Per Ha	200	m^3/ha		
Required Volume	221	m^3		
Required Forebay Volume	22	m^3	*10% of Pond volume*	
Dead storage Vol. Required	66	m^3	*30% of Pond Volume*	
Live storage Vol. Required	155	m^3	*70% of Pond Volume*	

Pond Dimensions

Relative Depths

@ Base	0.00	m	
@ Primary Spillway	1.00	m	(May vary between 1.5m and 2m. Desired Depth = 1.5m)
@ Emergency Spillway	1.50	m	
@ Crest	1.80	m	

Side Batters	1:	3
	V:	H

Width

Base (A)	10.0	m
Primary Spillway	16.0	m
Crest (B)	20.8	m

Length

Base (C)	45.0	m
Primary Spillway	51.0	m
Crest (D)	55.8	m

Pond should be no less than 3:1 ratio and no more than 5:1 ratio

Volume at Primary Spillway	624	m^3
> Required Volume?	OK	
Pond L to W ratio:	OK	

Forebay

Side Batters	1:	3		
	V:	H		
Depth	1.00	m	Base (A)	6 m
Width (E)	8.0	m	Base (C)	2 m
Length (F)	12	m		
Volume	48.0			
> Required Volume?	OK			

Decant

Requred Rate	3.3	l/s (3l/s/ha of contributing catchment)
No of holes	146	

The standard decant flow is 4.5l/s which is achieved by drilling 6 rows of 10mm diameter holes at 60mm spacings along the 2m decant arm.

Ensure dead storage is a minmum of 30% of the total sediment retention pond storage by positioning the lowest decant at 0.5m above the invert level of the retention pond

Winter Works Design

Is the pond required for Winter works? No

Live storage must hold 1% AEP 24 hour rainfall event

SRP Live storage volume **	-
Rainfall depth for 1% AEP 24hour event (mm) ***	
Coefficient of Runoff	-
Catchment area that can be exposed in Winter period	-

Project Name	Ashbourne Retirement Village
Site Address	Station Road, Matamata
Client	Ashbourne Retirement Village
Prepared By	SB
Reviewed By	NP
Date	16/04/2025
Calculation Title	Flexible Pavement Design for Moderate-Heavy Design
Calculation No.	1

Maven Matamata

Flexible Pavement Design for Moderate-Heavy Design Traffic Loading Using AUSTROADS "Guide to Pavement Technology - Part 2 Pavement Structural Design" (AGPT02-17)

Parameter	Symbol	Reference
Annual Average Daily Traffic:	AADT	Typically estimated as 10 movements per day per lot within the subdivision.
Design Period:	P	Section 7.4.2, Table 7.2
Lane Distribution Factor:	LDF	Section 7.4.3, Table 7.3
Direction Factor:	DF	Section 7.4.4, Equation 30
Average Percentage of Heavy Vehicles:	%HV	Section 7.4.4, Equation 30
Initial Daily Heavy Vehicles in Design Lane	N_i	Section 7.4.4, Equation 30
Annual Growth Rate	R	Section 7.4.5, Table 7.4
Cumulative Growth Factor	CGF	Section 7.4.5, Equation 31
Design Traffic in Cumulative Heavy Vehicles	N_{HV}	Section 7.4.5, Equation 32
Average Number of Axle Groups per Heavy Vehicle	N_{HVAG}	Section 7.4.7, Equation 35, Table 7.6
Heavy Vehicle Axle Groups in Design Lane Over Design Period	N_{DT}	Section 7.4.7, Equation 35
Equivalent Single Axles per Heavy Vehicle Axle Group	ESA/HVAG	Section 12.7.1, Table 12.2
Design Equivalent Single Axle Groups	DESA	Section 7.6.2, Equation 37
Thickness of Base Material	-	Section 8.3.1, Figure 8.4
Thickness of Basecourse	-	Section 8.3.1, Figure 8.4 with CBR set to 30

Equations Used

Equation 30:

$$N_i = AADT \times DF \times \%HV/100 \times LDF$$

Equation 31:

$$CGF = \frac{(1+0.01R)^P - 1}{0.01R} \text{ for R>0, } CGF = P \text{ for R=0}$$

Equation 32:

$$N_{HV} = 365 \times CGF \times N_i$$

Equation 35:

$$N_{DT} = N_{HV} \times N_{HVAG}$$

Equation 37:

$$DESA = ESA/HVAG \times N_{DT}$$

Thickness of Base Material:

$$t = [219 - 211(logCBR) + 58(logCBR)^2] \times \log(^{DESA}/_{120})$$

Thickness of Basecourse:

$$t = [219 - 211(log30) + 58(log30)^2] \times \log(^{DESA}/_{120})$$

AADT

Description			Movements	Contingency
Road Description	No of Lots / Units	Equivalent Car Movements	Total Vehicle Movements Per Day for all Lanes	10% Contingency
Main Road (CBR 3)	240	10	2400	2640
Ring Roads (CBR 3)	28	10	280	308
Main Road (CBR 6)	240	10	2400	2640
Ring Roads 3 (CBR 6)	28	10	280	308

Design Traffic

(AustRoads Pavement Design Manual - Chapter 7 & Chapter 12)

Lanes	Design Period	LDF	AADT/Lane	DF	%HV	N_i	R	CGF	Days	N_{HV}	Design Check	N_{HVAG}	N_{DT}	ESA/HVAG	Design ESA	Design Check
No of Lanes	Design Period	Lane Distribution Factor	Average Annual Daily Traffic per Lane	Direction Factor	Average Percentage of Heavy Vehicles	Initial Daily Heavy Vehicles	Annual Growth Rate %	Cumulative Growth Factor	Days per Year of Traffic	Cumulative Heavy Vehicles	Check Design Lane Operating Below Capacity Over Design Life	No of Axle Groups per Heavy Vehicle	Cumulative HVAG in Design Lane over Deign Period	Equivalent Single Axles per Heavy Vehicle Axle Group	Design Equivalent Single Axles	Design Traffic Loading Check
1	25	1	2640	1	3	79.2	1	28	365	8.09E+05	YES	2.0	1.6E+06	0.2	3.24E+05	OK
1	25	1	308	1	3	9.24	1	28	365	9.44E+04	YES	2.0	1.9E+05	0.2	3.78E+04	Low DESA, see AGPT02-17 Sec. 12.8
1	25	1	2640	1	3	79.2	1	28	365	8.09E+05	YES	2.0	1.6E+06	0.2	3.24E+05	OK
1	25	1	308	1	3	9.24	1	28	365	9.44E+04	YES	2.0	1.9E+05	0.2	3.78E+04	Low DESA, see AGPT02-17 Sec. 12.8

Pavement Design

(AustRoads Pavement Design Manual - Chapter 8)

CBR	Granular Material	Basecourse	Sub-base
Design Subgrade CBR	**Thickness of Material (mm)**	AP40 Basecourse (mm)	GAP65 Sub-base (mm)
3	**451**	116	335
3	**329**	100	229
6	**309**	116	192
6	**225**	100	165

Adopted Design

Base	Basecourse	Sub-base
Thickness of Granular material (mm)	AP40 Basecourse (mm)	GAP65 Sub-base (mm)
475	125	350
350	100	250
325	125	200
275	100	175

Project Specifications

Project Name: Ashbourne Retirement Village
Client Name: Ashbourne Retirement Village
Location: Matamata

CIRTEX GAIN MORE GROUND

CAPLab2020

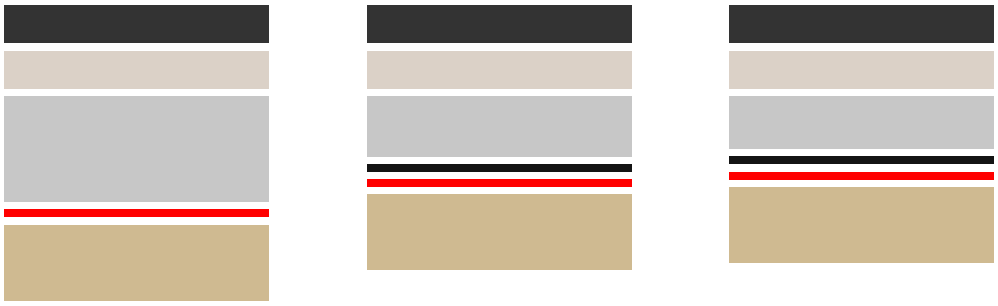
CBR Value	**3%**	DESA Value	**3.24E5**	D85 Aggregate	**<65**
Cost of Geogrid	**$6.2**	Width of Pavement	**7m**	Length of Pavement	**1000m**
Cost of Material Delivered	**$85**	Placement & Compaction Cost	**$20**	Excavation & Disposal Cost	**$20**

Layers	Austroads Fig. 8.4	NZTA Section	Optimised Section
Base Course:	120mm	120mm	120mm
Sub Base:	340mm	190mm	170mm
Geogrid:	N/A	Tenax 3D T	Tenax 3D T
Geotextile:	DuraForce® AS410	DuraForce® AS410	DuraForce® AS410

Cost Savings

Savings/m2:	$0.00	$12.18	$14.68
Total savings:	$0.00	$85,246	$102,746

Cross Sections:



You must make your own enquiries and seek independent advice from a suitably qualified pavement engineer and other relevant industry professionals before relying or acting on any information made available in this report or otherwise through CAPLab2020.

Subbase aggregate must be well graded crushed rock, base course material must be M/4 AP40 base course or as directed by the project engineer. Compaction must be in lifts of no more than 200mm to 98% MDD. Site engineer to confirm characteristic subgrade strength before starting construction.

Best practice for pavement construction as regards drainage and detailing must be followed as set out in the applicable local regulations and project documents.

Important note: Refer to the information section of the CAPLab2020 program for details of the design methodology and derivation of the figures used. This suggested pavement layout is not to be used for construction until approved by a suitably qualified engineer.

Report generated on : Wed Apr 16 2025 05:06:45 GMT+1200 (New Zealand Standard Time)

Project Specifications

Project Name: Ashbourne Retirement Village
Client Name: Ashbourne Retirement Village
Location: Matamata

CIRTEX GAIN MORE GROUND

CAPLab2020

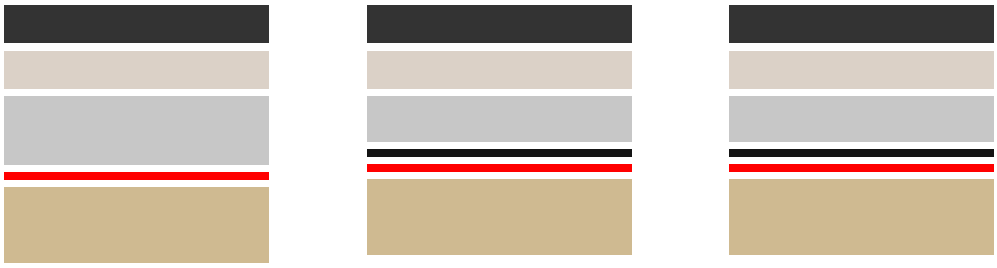
CBR Value	**5%**	DESA Value	**3.24E5**	D85 Aggregate	**<65**
Cost of Geogrid	**$6.2**	Width of Pavement	**7m**	Length of Pavement	**1000m**
Cost of Material Delivered	**$85**	Placement & Compaction Cost	**$20**	Excavation & Disposal Cost	**$20**

Layers	Austroads Fig. 8.4	NZTA Section	Optimised Section
Base Course:	120mm	120mm	120mm
Sub Base:	230mm	150mm	150mm
Geogrid:	N/A	Tenax 3D T	Tenax 3D T
Geotextile:	DuraForce® AS280	DuraForce® AS280	DuraForce® AS280

Cost Savings

Savings/m2:	$0.00	$3.43	$3.43
Total savings:	$0.00	$23,996	$23,996

Cross Sections:



You must make your own enquiries and seek independent advice from a suitably qualified pavement engineer and other relevant industry professionals before relying or acting on any information made available in this report or otherwise through CAPLab2020.

Subbase aggregate must be well graded crushed rock, base course material must be M/4 AP40 base course or as directed by the project engineer. Compaction must be in lifts of no more than 200mm to 98% MDD. Site engineer to confirm characteristic subgrade strength before starting construction.

Best practice for pavement construction as regards drainage and detailing must be followed as set out in the applicable local regulations and project documents.

Important note: Refer to the information section of the CAPLab2020 program for details of the design methodology and derivation of the figures used. This suggested pavement layout is not to be used for construction until approved by a suitably qualified engineer.

Report generated on : Wed Apr 16 2025 05:33:28 GMT+1200 (New Zealand Standard Time)

Maven BOP Ltd	Job Number J606	Sheet 1	Rev A
Job Title Eldonwood Retirement Village, Matamata **Calculation Title** Flexible Pavement Design - using Austroads	**Author** SB	**Date** 28-Jan	**Checked** NP

Design Traffic

Road Name / No.	Road 1
No of Lots	218
ECMs per lot	2
Traffic generated by subdvision	436
Existing Traffic (if applicable)	0
Total Vehs/day (AADT)	436

Using table 7.9 from Section 7.4 of Austroads AP-T36-06 Pavement Design

Table 7.9: Indicative heavy vehicle axle group volumes for lightly trafficked urban streets

Street type	AADT two-way	Percent heavy vehicles	Design AADHV (single lane)	Design period (years)	Annual growth rate (%)	Cumulative growth factor (Table 7.4 of the Guide)	Axle groups per heavy vehicle	Cumulative HVAG over design period	ESA/HVAG	Indicative design traffic (ESA)
Minor with single lane traffic	30	3	0.9	20	0	20	2.0	13,140	0.2	3×10^3
				40	0	40	2.0	26,280	0.2	5×10^3
Minor with two lane traffic	90	3	1.35	20	0	20	2.0	19,710	0.2	4×10^3
				40	0	40	2.0	39,420	0.2	8×10^3
Local access with no buses	400	4	8	20	1	22.0	2.1	128,480	0.3	4×10^4
				40	1	48.9	2.1	285,576	0.3	9×10^4
Local access with buses	500	6	15	20	1	22.0	2.1	240,900	0.3	8×10^4
				40	1	48.9	2.1	535,455	0.3	1.5×10^5
Local access in industrial area	400	8	16	20	1	22.0	2.3	256,960	0.4	1.5×10^5
				40	1	48.9	2.3	571,152	0.4	3×10^5
Collector with no buses	1200	6	36	20	1.5	23.1	2.2	607,068	0.6	4×10^5
				40	1.5	54.3	2.2	1,427,004	0.6	10^6
Collector with buses	2000	7	70	20	1.5	23.1	2.2	1,180,410	0.6	8×10^5
				40	1.5	54.3	2.2	2,774,730	0.6	2×10^6

Note: Direction factor is 0.5, except for minor street with single lane traffic where DF= 1.0

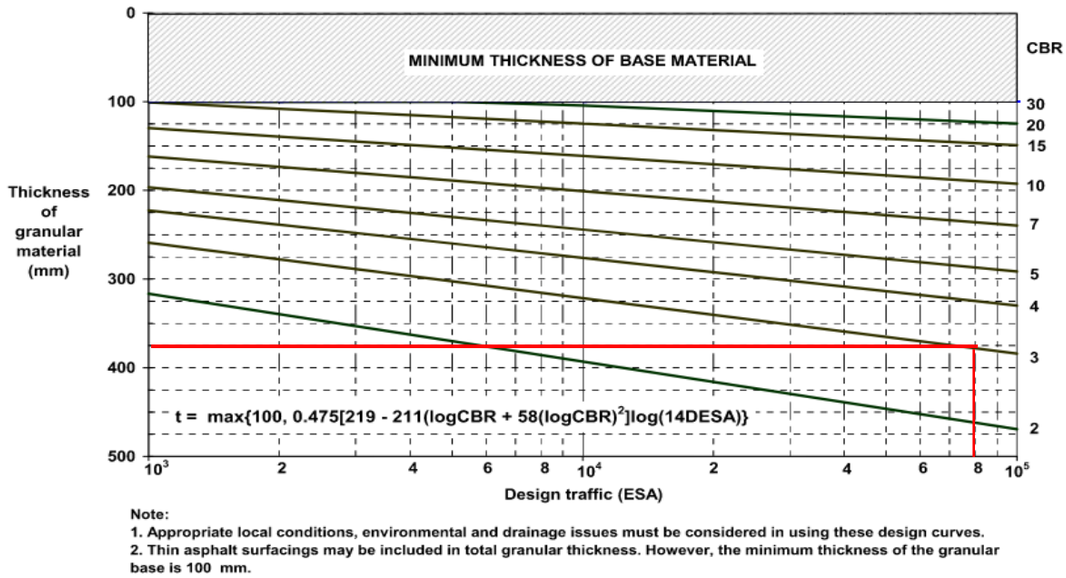
Interpolated ESA value 8×10^4

Pavement Thickness

Design CBR 3 As recommended in Geotech Report or assume a min. value of 3

Maven BOP Ltd	Job Number J606	Sheet 2	Rev A
Job Title Eldonwood Retirement Village, Matamata **Calculation Title** Flexible Pavement Design - using Austroads	**Author** SB	**Date** 28-Jan	**Checked** NP

Using Figure 8.5 of Austroads AP-T36-06 Pavement Design, The Design Traffic and Design CBR, determine the minimum thickness of pavement



Note:
1. Appropriate local conditions, environmental and drainage issues must be considered in using these design curves.
2. Thin asphalt surfacings may be included in total granular thickness. However, the minimum thickness of the granular base is 100 mm.

Figure 8.5: Light traffic design chart for granular pavements with thin bituminous surfacings

Pavement Thickness Min, 375 mm

Pavement Design

	Thickness	Type
Surfacing*	0	3/5 Chip Seal
Basecourse**	100	AP40
Subbase***	275	GAP65

* If chipseal is to be use, the chipseal thickness is 0mm as its not to be included in the pavement thickness

** Basecourse must have a minimum thickness of 100mm, and layer thickness should be at least 2.5 x maximum stone dimension

*** Subbase layer thickness must be at least 2.5 x maximum stone dimension (i.e. GAP65 requires at least 163mm depth)

Maven BOP		Job Number J606	Sheet 1	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Rain Data	Author SB	Date 17/04/2025	Checked NP

Adjusted for climate change 3.8°C to 2100-2120
Storm Scenario = NIWA HIRDS RCP8.5 2081-2100
Pre development use historical data
HIRDS V4 Depth-Duration-Frequency Results

	Pre Dev	Post Dev	
Water Quality 2Yr 24h	27.3mm	34.8mm	WQV = 1/3 of 2y 24h Storm (<= 30 mm), TR20-07 Clsue 7.3.1.1
10Yr 24H event	127.0mm	166.1mm	
100Yr 24H event	198.0mm	262.7mm	

	Maven BOP	Job Number J606	Sheet 2	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Water Qaulity	Author SB	Date 17/04/2025	Checked NP

Rain Data for Water Qaulity

	Pre Dev	Post Dev	
Water Quality 2Yr 24h	27.3mm	34.8mm	WQV = 1/3 of 2y 24h Storm (<= 30 mm), TR20-07 Clsue 7.3.1.1

Use 30mm

Water Quality Design Flow -> 2 year, 10 minute as per NZWERF On-site Stormwater Management Guideline 2004, Section 3.6.4

Rain Gardens will be used to treat the stormwater qaulity

TR20-07 - Table 6.5

Table 6-5: Soil and suitability of various stormwater management devices

Ponds/ Wetlands				
Sand Filters				
Rain Gardens				
Infiltration				
Swales/Filter strips				
	Sand	Loam	Silty Clay	Clay
Blue colour denotes acceptable device range related to soil types				

As this is an retirement village the contamination generation will be lower compare to a residential development

Table 6-7: Stormwater management devices related to catchment areas

Stormwater management device	0	2	4	6	8	10	12	14	20	40	(in hectares)	Controlling factor for use
Ponds												Catchment area to maintain normal pool of water
Wetlands												Catchment area to maintain hydric soils
Sand filters												Volume of runoff
Rain gardens												Volume of runoff
Infiltration												Soils, slope, stability, etc.
Swales and filter strips												Rate of runoff and slope
Suitable for use				...arginal for use								

Refer to drawing C4051 for the catchment areas

Maven BOP Ltd	Job Number J606	Sheet 3	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calculation Title: Rain Garden Volume Calculations	Author SB	Date 16/04/2025	Checked NP

P24 = 24 hr rainfall depth
S = Potential soil storage
Ia = Initial rainfall abstraction

Q24 = Avg Runoff 24h
V24= Vol over 24h

NAME	Area	Area Impr	Imperv	Perv CN	Imprv CN	Weighted	P24 (mm)	S (mm)	Ia (mm)	Q24 (mm)	V24 (m³)	Ext Det (m³)	Live V (m³)	
Catchment 1	23200	0	0%	74	98	74.0	30	89.24	17.85	1.46	33.78	40.54	13.51	Swale
Catchment 2	28375	21996	78%	74	98	92.6	30	20.28	4.06	14.56	413.12	495.74	165.25	
Catchment 3	36200	0	0%	74	98	74.0	30	89.24	17.85	1.46	52.72	63.26	21.09	Swale
Catchment 4	30800	19930	65%	74	98	89.5	30	29.70	5.94	10.77	331.61	397.93	132.64	
Catchment 5	28205	8790	31%	74	98	81.5	30	57.73	11.55	4.47	126.06	151.27	50.42	
Catchment 6	37525	26090	70%	74	98	90.7	30	26.09	5.22	12.07	453.08	543.69	181.23	

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \left(\frac{1000}{CN} - 10\right) 25.4 \quad (mm) \qquad \text{Ia} = 0.2\ \text{S}.$$

Summary				
Name	Total Length of raingarden, based on 2m wide	Use 4m long rain garden (Number off)	Provide on site	Check
Catchment 2	412	103	412	OK
Catchment 4	265	66.25	265	OK
Catchment 5	102	25.5	102	OK
Catchment 6	302	75.5	302	OK

Refer to C4051

	Maven BOP Ltd	Job Number	Sheet	Rev
		J606	4	A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calculation Title	Rain Garden Design for Catchment 2	SB	16/04/2025	NP

Flow Rate for Water Quality Treatment			
Stormwater WQV	137.71	m³	1/3 Vol of 2-Year 24-Hour Storm (TR20-07 Page 1
Required Storage Volume	0	m³	

Parameters for sizing WQD based on TR20-07

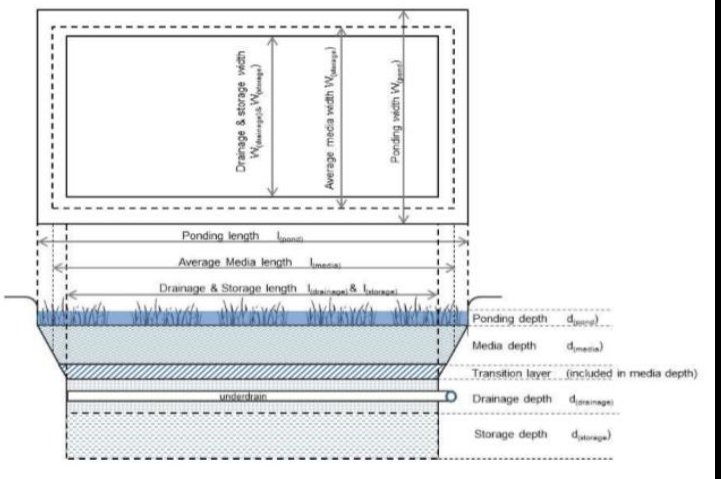
Water Quality Treatment Device (WQD)			
Retention Time of WQD	1.00	days	1Day (TR20-07 Page 155)
Permeability of Bioretention Media (K)	0.75	m/day	0.75m/day (TR20-07 Page 155)
Revised Area from Decreased Depth	AREA OK		0.5 (GD01 C3.2.3.2)
Calculated Area of WQD	164.28	m²	$A = \frac{WQV \times d_{rg}}{k \times (h + d_{rg}) \times t_{rg}}$

WQD area using rain garden base area for drainage

Rain Garden Capacity		
Device Top Length	412.3	m
Device Top Width	2	m
Side Slope	4	:1 (H:V)
Design Rain Garden Treatment Area	164.28	m²
Required Treatment Area Achieved	0.00	m² needed
Total Attenuation Provided	271.39	m³
Required Storage Volume Achieved	YES	

Rain Garden Dimensions

Ponding Depth	200	mm	300mm max (BOPRC 2012/01 9.5.9 3)
Planting Soil Depth (incl transition)	850	mm	850mm standard (TR20-07 Page 155)
Transition Layer Depth	100	mm	100mm (GD01 C3.2.3.2)
Drainage Layer Depth	200	mm	200-300mm (GD01 C3.2.3.2)
Underdrain Cover Depth	50	mm	50mm minimum (TCC IDC DS-5.5.17.1)



	Maven BOP Ltd	Job Number J606	Sheet 5	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author SB	Date 16/04/2025	Checked NP
Calculation Title	Rain Garden Design for Catchment 4			

Flow Rate for Water Quality Treatment			
Stormwater WQV	132.64	m³	1/3 Vol of 2-Year 24-Hour Storm (TR20-07 Page 1
Required Storage Volume	0	m³	

Parameters for sizing WQD based on TR20-07

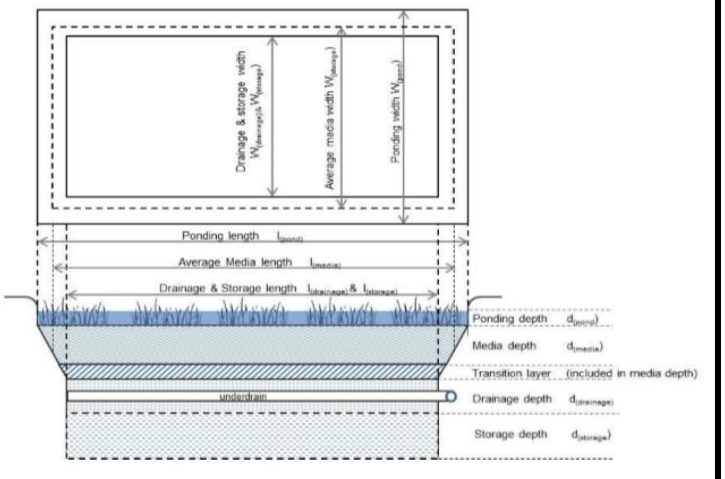
Water Quality Treatment Device (WQD)			
Retention Time of WQD	1.50	days	1Day (TR20-07 Page 155)
Permeability of Bioretention Media (K)	0.75	m/day	0.75m/day (TR20-07 Page 155)
Revised Area from Decreased Depth	AREA OK		0.5 (GD01 C3.2.3.2)
Calculated Area of WQD	105.49	m²	$A = \frac{WQV \times d_{rg}}{k \times (h + d_{rg}) \times t_{rg}}$

WQD area using rain garden base area for drainage

Rain Garden Capacity		
Device Top Length	265.3	m
Device Top Width	2	m
Side Slope	4	:1 (H:V)
Design Rain Garden Treatment Area	105.49	m²
Required Treatment Area Achieved	0.00	m² needed
Total Attenuation Provided	174.55	m³
Required Storage Volume Achieved	YES	

Rain Garden Dimensions

Ponding Depth	200	mm	300mm max (BOPRC 2012/01 9.5.9 3)
Planting Soil Depth (incl transition)	850	mm	850mm standard (BOPRC 2012/01 9.5.9 3)
Transition Layer Depth	100	mm	100mm (GD01 C3.2.3.2)
Drainage Layer Depth	200	mm	200-300mm (GD01 C3.2.3.2)
Underdrain Cover Depth	50	mm	50mm minimum (TCC IDC DS-5.5.17.1)



	Maven BOP Ltd	Job Number J606	Sheet 6	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author SB	Date 16/04/2025	Checked NP
Calculation Title	Rain Garden Design for Catchment 5			

Flow Rate for Water Quality Treatment			
Stormwater WQV	50.42	m³	1/3 Vol of 2-Year 24-Hour Storm (TR20-07 Page 1
Required Storage Volume	0	m³	

Parameters for sizing WQD based on TR20-07

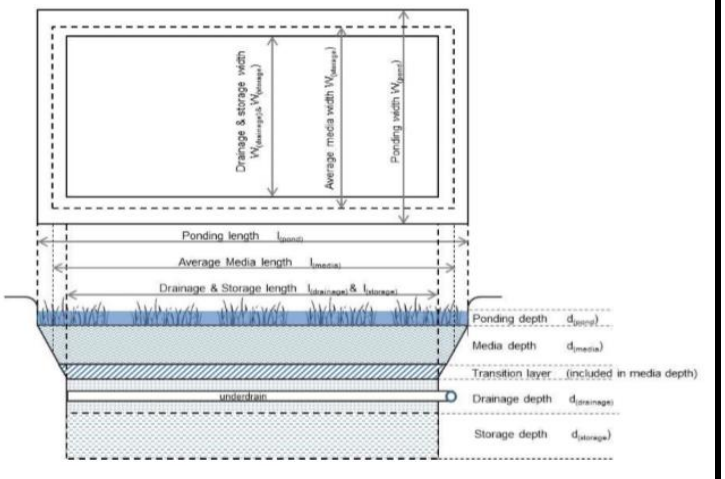
Water Quality Treatment Device (WQD)			
Retention Time of WQD	1.50	days	1Day (TR20-07 Page 155)
Permeability of Bioretention Media (K)	0.75	m/day	0.75m/day (TR20-07 Page 155)
Revised Area from Decreased Depth	AREA OK		0.5 (GD01 C3.2.3.2)
Calculated Area of WQD	40.10	m²	$A = \frac{WQV \times d_{rg}}{k \times (h + d_{rg}) \times t_{rg}}$

WQD area using rain garden base area for drainage

Rain Garden Capacity		
Device Top Length	101.9	m
Device Top Width	2	m
Side Slope	4	:1 (H:V)
Design Rain Garden Treatment Area	40.10	m²
Required Treatment Area Achieved	0.00	m² needed
Total Attenuation Provided	66.84	m³
Required Storage Volume Achieved	YES	

Rain Garden Dimensions

Ponding Depth	200	mm	300mm max (BOPRC 2012/01 9.5.9 3)
Planting Soil Depth (incl transition)	850	mm	850mm standard (BOPRC 2012/01 9.5.9 3)
Transition Layer Depth	100	mm	100mm (GD01 C3.2.3.2)
Drainage Layer Depth	200	mm	200-300mm (GD01 C3.2.3.2)
Underdrain Cover Depth	50	mm	50mm minimum (TCC IDC DS-5.5.17.1)



	Maven BOP Ltd	Job Number J606	Sheet 7	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author SB	Date 16/04/2025	Checked NP
Calculation Title	Rain Garden Design for Catchment 5			

Flow Rate for Water Quality Treatment			
Stormwater WQV	151.03	m³	1/3 Vol of 2-Year 24-Hour Storm (TR20-07 Page 1
Required Storage Volume	0	m³	

Parameters for sizing WQD based on TR20-07

Water Quality Treatment Device (WQD)			
Retention Time of WQD	1.50	days	1Day (TR20-07 Page 155)
Permeability of Bioretention Media (K)	0.75	m/day	0.75m/day (TR20-07 Page 155)
Revised Area from Decreased Depth	AREA OK		0.5 (GD01 C3.2.3.2)
Calculated Area of WQD	120.11	m²	

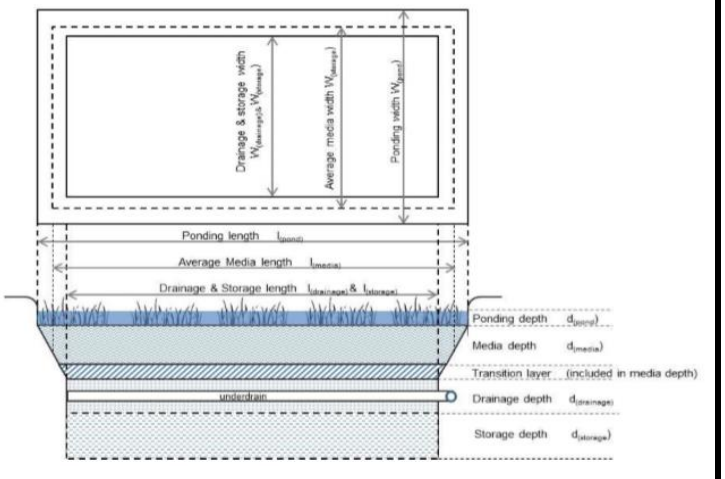
WQD area using rain garden base area for drainage

$$A = \frac{WQV \times d_{rg}}{k \times (h + d_{rg}) \times t_{rg}}$$

Rain Garden Capacity		
Device Top Length	301.9	m
Device Top Width	2	m
Side Slope	4	:1 (H:V)
Design Rain Garden Treatment Area	120.11	m²
Required Treatment Area Achieved	0.00	m² needed
Total Attenuation Provided	198.64	m³
Required Storage Volume Achieved	YES	

Rain Garden Dimensions

Ponding Depth	200	mm	300mm max (BOPRC 2012/01 9.5.9 3)
Planting Soil Depth (incl transition)	850	mm	850mm standard (BOPRC 2012/01 9.5.9 3)
Transition Layer Depth	100	mm	100mm (GD01 C3.2.3.2)
Drainage Layer Depth	200	mm	200-300mm (GD01 C3.2.3.2)
Underdrain Cover Depth	50	mm	50mm minimum (TCC IDC DS-5.5.17.1)



Maven BOP		Job Number J606	Sheet 8	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata 10Yr Site Soakage	Author SB	Date 17/04/2025	Checked NP

Allow up to 10Yr soakage on the roads, Villas, Facilities and Agecare
As per HPA drawing rev 12

Type	Area
BS	125m²
NB	125m²
CS	135m²
CN	135m²
CS	148m²
CN	148m²
D	186m²

Add an additional 100m² as an impervious layout
Total Area 286m²

Geotech soakage 200mm/hr for the sand layer.
Design rate will be 100mm/h
This is inline with TR20-7.

FROM TR20-7 GUIDELINES

Table 6-4: Infiltration rate for various soil textural classes

Texture Class	Approximate Infiltration Rate in mm/hour
Sand	210
Loamy sand	61
Sandy loam	26
Loam	13
Silt loam	7
Sandy clay loam	4.5
Clay loam	2.5
Silty clay loam	1.5
Sandy clay	1.3
Silty clay	1.0
Clay	0.5

Maven BOP

Job Number	Sheet	Rev
J606	9	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Tank Design for Villa	SB	16/04/2025	NP

Design Storm Return Period	10 Year ARI

Proposed Site (Post-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		286	0.0286	
Pervious - Gardens / Lawns			0.0000	0.25
Impervious - Timber Decking			0.0000	0.6
Impervious - Roof Area (to Soakage)		186	0.0186	0.85
Impervious - Hardstanding Carpark (to Soakage)		100	0.0100	0.8
Impervious - Hardstanding Footpaths			0.0000	0.85

Impervious %		100.0%		0.83

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.83	103	0.0286	6.84
10yr-20min		0.83	74	0.0286	4.89
10yr-30min		0.83	60	0.0286	3.98
10yr-1hr		0.83	42	0.0286	2.78
10yr-2hr		0.83	29	0.0286	1.90
10yr-6hr		0.83	15	0.0286	0.99
10yr-12hr		0.83	10	0.0286	0.63
10yr-24hr		0.83	6	0.0286	0.40
10yr-48hr		0.83	4	0.0286	0.24
10yr-72hr		0.83	3	0.0286	0.18

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

Existing Site (Pre-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		286	0.0286	
Pervious - Gardens / Lawns		286	0.0286	0.3
Impervious - Gravel			0.0000	0.8
Impervious - Roof Area (to Soakage)			0.0000	0.85
Impervious - Hardstanding Driveway / Footpath			0.0000	0.9

Impervious %		0.0%		0.30

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.30	103	0.0286	2.47
10yr-20min		0.30	74	0.0286	1.76
10yr-30min		0.30	60	0.0286	1.44
10yr-1hr		0.30	42	0.0286	1.00
10yr-2hr		0.30	29	0.0286	0.68
10yr-6hr		0.30	15	0.0286	0.36
10yr-12hr		0.30	10	0.0286	0.23
10yr-24hr		0.30	6	0.0286	0.14
10yr-48hr		0.30	4	0.0286	0.09
10yr-72hr		0.30	3	0.0286	0.06

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

	Maven BOP	Job Number	Sheet	Rev
		J606	10	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Tank Design for Villa	SB	16/04/2025	NP

Pre-Development vs. Post-Development Flows - 10 Year ARI

Critical Storm Event	2 hr

Post Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	286	0.0286	
Pervious - Gardens / Lawns	0	0.0000	0.25
Impervious - Timber Deck	0	0.0000	0.6
Impervious - Roof Area (to Soakage)	186	0.0186	0.85
Impervious - Hardstanding Carpark (to Soakage)	100	0.0100	0.8
Impervious - Hardstanding Footpaths	0	0.0000	0.85
Impervious %	100.0%		0.83

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)	
Q = 2.78*C*i*A	0.83	28.675	0.0286	1.90	2.00	13.67	
10 Yr Soakage Volume (From Soak. Pit Calcs)						4.58	
Storage Volume (m³)						9.56	
10 Yr Post Dev. - 10 Yr Soakage Volume						**-0.47**	**(Storage Volume OK)**

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Pre Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	286	0.0286	
Pervious - Gardens / Lawns	286	0.0286	0.3
Impervious - Roof Area	0	0.0000	0.85
Impervious - Hardstanding Driveway / Footpath	0	0.0000	0.9
Impervious - Hardstanding Timber Deck	0	0.0000	0.8
Impervious - Hardstanding Cobbles	0	0.0000	0
Impervious %	0.0%		0.30

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)
Q = 2.78*C*i*A	0.30	28.675	0.0286	0.68	2.00	4.92

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Maven BOP	Job Number	Sheet	Rev
	J606	11	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Soakage Tank Sizing Calculations for Villa	SB	16/04/2025	NP

Proposed Rain Smart System

Pit Dimensions

Width (m)	**4**	Base area	22.9	m²
Length (m)	**5.72**	**System**	Crate	
Depth (m)	**0.44**	**Void ratio**	95	%
Storage Volume (m³)	9.56			

Critical Storm Event	2 hr		
Storm Duration	**2.00** hrs	**Storm Event**	10 Year ARI
Runoff Q	**1.90** l/s	**← Value from SW Runoff Calcs**	
Rc	13.7 m³		
Design Soakage Rate	**100** mm/hr	**←Design soakage rate to be provided by Geotech**	

Volume of Water disposed by soakage (m³) 4.6 m³

$$V_{soak} = A_{sp}S_r/1000$$

Volume of Storage Required (m³) 9.09 m³

$$V_{stor} = R_c - V_{soak}$$

Tank Size check OK

Depth Calcs

Cover (m)	1.04
Depth (m)	0.44
Total Depth (m)	1.48
Zone of Influence (m)	2.96

Tank Sizing Check for Critical Storm Duration

Event	Duration (Hrs)	C	I (mm/hr)	Area (ha)	Q Event (l/s)	Q Event (m³/s)	Q Soak (m³/s)	Storage Required	Check
10yr-10min	0.17	0.83	103.37	0.0286	6.84	4.2	0.39	3.8	OK
10yr-20min	0.33	0.83	73.89	0.0286	4.89	5.8	0.76	5.1	OK
10yr-30min	0.5	0.83	60.18	0.0286	3.98	7.2	1.14	6.0	OK
10yr-1hr	1	0.83	42.01	0.0286	2.78	10.0	2.29	7.7	OK
10yr-2hr	2	0.83	28.68	0.0286	1.90	13.7	4.58	**9.1**	OK
10yr-6hr	6	0.83	14.97	0.0286	0.99	21.4	13.73	7.7	OK
10yr-12hr	12	0.83	9.58	0.0286	0.63	27.4	27.46	0.0	OK
10yr-24hr	24	0.83	5.98	0.0286	0.40	34.2	54.91	-20.7	OK
10yr-48hr	48	0.83	3.62	0.0286	0.24	41.4	109.82	-68.4	OK
10yr-72hr	72	0.83	2.66	0.0286	0.18	45.7	164.74	-119.0	OK

Maven BOP	Job Number	Sheet	Rev
	J606	12	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Tank Design for Agecare	SB	16/04/2025	NP

Design Storm Return Period	10 Year ARI

Proposed Site (Post-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		4500	0.4500	
Pervious - Gardens / Lawns			0.0000	0.25
Impervious - Timber Decking			0.0000	0.6
Impervious - Roof Area (to Soakage)		4500	0.4500	0.85
Impervious - Hardstanding Carpark (to Soakage)			0.0000	0.8
Impervious - Hardstanding Footpaths			0.0000	0.85

Impervious %		100.0%		0.85

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.85	103	0.4500	109.92
10yr-20min		0.85	74	0.4500	78.57
10yr-30min		0.85	60	0.4500	63.99
10yr-1hr		0.85	42	0.4500	44.67
10yr-2hr		0.85	29	0.4500	30.49
10yr-6hr		0.85	15	0.4500	15.92
10yr-12hr		0.85	10	0.4500	10.19
10yr-24hr		0.85	6	0.4500	6.36
10yr-48hr		0.85	4	0.4500	3.85
10yr-72hr		0.85	3	0.4500	2.83

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

Existing Site (Pre-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		4500	0.4500	
Pervious - Gardens / Lawns		4500	0.4500	0.3
Impervious - Gravel			0.0000	0.8
Impervious - Roof Area (to Soakage)			0.0000	0.85
Impervious - Hardstanding Driveway / Footpath			0.0000	0.9

Impervious %	0.0%		0.30

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.30	103	0.4500	38.79
10yr-20min		0.30	74	0.4500	27.73
10yr-30min		0.30	60	0.4500	22.58
10yr-1hr		0.30	42	0.4500	15.77
10yr-2hr		0.30	29	0.4500	10.76
10yr-6hr		0.30	15	0.4500	5.62
10yr-12hr		0.30	10	0.4500	3.60
10yr-24hr		0.30	6	0.4500	2.24
10yr-48hr		0.30	4	0.4500	1.36
10yr-72hr		0.30	3	0.4500	1.00

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

	Maven BOP	Job Number	Sheet	Rev
		J606	13	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Tank Design for Agecare	SB	16/04/2025	NP

Pre-Development vs. Post-Development Flows - 10 Year ARI

Critical Storm Event	2 hr

Post Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	4500	0.4500	
Pervious - Gardens / Lawns	0	0.0000	0.25
Impervious - Timber Deck	0	0.0000	0.6
Impervious - Roof Area (to Soakage)	4500	0.4500	0.85
Impervious - Hardstanding Carpark (to Soakage)	0	0.0000	0.8
Impervious - Hardstanding Footpaths	0	0.0000	0.85
Impervious %	100.0%		0.85

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)
Q = 2.78*C*i*A	0.85	28.675	0.4500	30.49	2.00	219.54
10 Yr Soakage Volume (From Soak. Pit Calcs)						72.07
Storage Volume (m³)						150.63
10 Yr Post Dev. - 10 Yr Soakage Volume						**-3.16** **(Storage Volume OK)**

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Pre Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	4500	0.4500	
Pervious - Gardens / Lawns	4500	0.4500	0.3
Impervious - Roof Area	0	0.0000	0.85
Impervious - Hardstanding Driveway / Footpath	0	0.0000	0.9
Impervious - Hardstanding Timber Deck	0	0.0000	0.8
Impervious - Hardstanding Cobbles	0	0.0000	0
Impervious %	0.0%		0.30

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)
Q = 2.78*C*i*A	0.30	28.675	0.4500	10.76	2.00	77.48

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Maven BOP	Job Number	Sheet	Rev
	J606	14	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Soakage Tank Sizing Calculations for Agecare	SB	16/04/2025	NP

Proposed Rain Smart System

Pit Dimensions

Width (m)	**18**	Base area	360.4	m²
Length (m)	**20.02**	**System**	Crate	
Depth (m)	**0.44**	**Void ratio**	95	%
Storage Volume (m³)	150.63			

Critical Storm Event	2 hr		
Storm Duration	**2.00** hrs	**Storm Event**	10 Year ARI
Runoff Q	**30.49** l/s	**← Value from SW Runoff Calcs**	
Rc	219.5 m³		
Design Soakage Rate	**100** mm/hr	**←Design soakage rate to be provided by Geotech**	

Volume of Water disposed by soakage (m³) 72.1 m³

$$V_{soak} = A_{sp} S_r / 1000$$

Volume of Storage Required (m³) 147.47 m³

$$V_{stor} = R_c - V_{soak}$$

Tank Size check OK

Depth Calcs

Cover (m)	1.04
Depth (m)	0.44
Total Depth (m)	1.48
Zone of Influence (m)	2.96

Tank Sizing Check for Critical Storm Duration

Event	Duration (Hrs)	C	I (mm/hr)	Area (ha)	Q Event (l/s)	Q Event (m³/s)	Q Soak (m³/s)	Storage Required	Check
10yr-10min	0.17	0.85	103.37	0.45	109.92	67.3	6.13	61.1	OK
10yr-20min	0.33	0.85	73.89	0.45	78.57	93.3	11.89	81.5	OK
10yr-30min	0.5	0.85	60.18	0.45	63.99	115.2	18.02	97.2	OK
10yr-1hr	1	0.85	42.01	0.45	44.67	160.8	36.04	124.8	OK
10yr-2hr	2	0.85	28.68	0.45	30.49	219.5	72.07	**147.5**	OK
10yr-6hr	6	0.85	14.97	0.45	15.92	343.9	216.22	127.7	OK
10yr-12hr	12	0.85	9.58	0.45	10.19	440.3	432.43	7.9	OK
10yr-24hr	24	0.85	5.98	0.45	6.36	549.1	864.86	-315.7	OK
10yr-48hr	48	0.85	3.62	0.45	3.85	665.3	1729.73	-1064.4	OK
10yr-72hr	72	0.85	2.66	0.45	2.83	734.2	2594.59	-1860.4	OK

Maven BOP

Job Number	Sheet	Rev
J606	15	A

Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calculation Title	Runoff Calculations for Soakage Tank Design for Facilities	SB	16/04/2025	NP

Design Storm Return Period 10 Year ARI

Proposed Site (Post-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		1060	0.1060	
Pervious - Gardens / Lawns			0.0000	0.25
Impervious - Timber Decking			0.0000	0.6
Impervious - Roof Area (to Soakage)		1060	0.1060	0.85
Impervious - Hardstanding Carpark (to Soakage)			0.0000	0.8
Impervious - Hardstanding Footpaths			0.0000	0.85

Impervious %		100.0%		0.85

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.85	103	0.1060	25.89
10yr-20min		0.85	74	0.1060	18.51
10yr-30min		0.85	60	0.1060	15.07
10yr-1hr		0.85	42	0.1060	10.52
10yr-2hr		0.85	29	0.1060	7.18
10yr-6hr		0.85	15	0.1060	3.75
10yr-12hr		0.85	10	0.1060	2.40
10yr-24hr		0.85	6	0.1060	1.50
10yr-48hr		0.85	4	0.1060	0.91
10yr-72hr		0.85	3	0.1060	0.67

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

Existing Site (Pre-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		1060	0.1060	
Pervious - Gardens / Lawns		1060	0.1060	0.3
Impervious - Gravel			0.0000	0.8
Impervious - Roof Area (to Soakage)			0.0000	0.85
Impervious - Hardstanding Driveway / Footpath			0.0000	0.9

Impervious %		0.0%		0.30

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.30	103	0.1060	9.14
10yr-20min		0.30	74	0.1060	6.53
10yr-30min		0.30	60	0.1060	5.32
10yr-1hr		0.30	42	0.1060	3.71
10yr-2hr		0.30	29	0.1060	2.53
10yr-6hr		0.30	15	0.1060	1.32
10yr-12hr		0.30	10	0.1060	0.85
10yr-24hr		0.30	6	0.1060	0.53
10yr-48hr		0.30	4	0.1060	0.32
10yr-72hr		0.30	3	0.1060	0.24

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

	Maven BOP	Job Number	Sheet	Rev
		J606	16	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Tank Design for Facilities	SB	16/04/2025	NP

Pre-Development vs. Post-Development Flows - 10 Year ARI

Critical Storm Event	2 hr

Post Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	1060	0.1060	
Pervious - Gardens / Lawns	0	0.0000	0.25
Impervious - Timber Deck	0	0.0000	0.6
Impervious - Roof Area (to Soakage)	1060	0.1060	0.85
Impervious - Hardstanding Carpark (to Soakage)	0	0.0000	0.8
Impervious - Hardstanding Footpaths	0	0.0000	0.85
Impervious %	100.0%		0.85

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)	
Q = 2.78*C*i*A	0.85	28.675	0.1060	7.18	2.00	51.71	
10 Yr Soakage Volume (From Soak. Pit Calcs)						17.39	
Storage Volume (m³)						36.34	
10 Yr Post Dev. - 10 Yr Soakage Volume						**-2.02**	**(Storage Volume OK)**

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Pre Development - 10 Year ARI Critical Storm Event (2 hr)

Catchment	A (m²)	A (ha)	C
Total Site Area	1060	0.1060	
Pervious - Gardens / Lawns	1060	0.1060	0.3
Impervious - Roof Area	0	0.0000	0.85
Impervious - Hardstanding Driveway / Footpath	0	0.0000	0.9
Impervious - Hardstanding Timber Deck	0	0.0000	0.8
Impervious - Hardstanding Cobbles	0	0.0000	0
Impervious %	0.0%		0.30

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)
Q = 2.78*C*i*A	0.30	28.675	0.1060	2.53	2.00	18.25

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Maven BOP	Job Number	Sheet	Rev
	J606	17	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Soakage Tank Sizing Calculations for Facilities	SB	16/04/2025	NP

Proposed Rain Smart System

Pit Dimensions

Width (m)	**6.4**	Base area	86.9	m²
Length (m)	**13.59**	**System**	Crate	
Depth (m)	**0.44**	**Void ratio**	95	%
Storage Volume (m³)	36.34			

Critical Storm Event	2 hr		
Storm Duration	**2.00** hrs	**Storm Event**	10 Year ARI
Runoff Q	**7.18** l/s	**← Value from SW Runoff Calcs**	
Rc	51.7 m³		
Design Soakage Rate	**100** mm/hr	**←Design soakage rate to be provided by Geotech**	

Volume of Water disposed by soakage (m³) 17.4 m³

$$V_{soak} = A_{sp} S_r / 1000$$

Volume of Storage Required (m³) 34.32 m³

$$V_{stor} = R_c - V_{soak}$$

Tank Size check OK

Depth Calcs

Cover (m)	1.04
Depth (m)	0.44
Total Depth (m)	1.48
Zone of Influence (m)	2.96

Tank Sizing Check for Critical Storm Duration

Event	Duration (Hrs)	C	I (mm/hr)	Area (ha)	Q Event (l/s)	Q Event (m³/s)	Q Soak (m³/s)	Storage Required	Check
10yr-10min	0.17	0.85	103.37	0.106	25.89	15.8	1.48	14.4	OK
10yr-20min	0.33	0.85	73.89	0.106	18.51	22.0	2.87	19.1	OK
10yr-30min	0.5	0.85	60.18	0.106	15.07	27.1	4.35	22.8	OK
10yr-1hr	1	0.85	42.01	0.106	10.52	37.9	8.69	29.2	OK
10yr-2hr	2	0.85	28.68	0.106	7.18	51.7	17.39	**34.3**	OK
10yr-6hr	6	0.85	14.97	0.106	3.75	81.0	52.17	28.8	OK
10yr-12hr	12	0.85	9.58	0.106	2.40	103.7	104.33	-0.6	OK
10yr-24hr	24	0.85	5.98	0.106	1.50	129.3	208.67	-79.3	OK
10yr-48hr	48	0.85	3.62	0.106	0.91	156.7	417.33	-260.6	OK
10yr-72hr	72	0.85	2.66	0.106	0.67	172.9	626.00	-453.0	OK

Maven BOP		Job Number	Sheet	Rev
		J606	18	A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calculation Title	Runoff Calculations for Soakage area for roads	SB	16/04/2025	NP

Design Storm Return Period	10 Year ARI

Proposed Site (Post-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		132000	13.2000	
Pervious - Gardens / Lawns		102245.7	10.2246	0.25
Impervious - Timber Decking		0	0.0000	0.6
Impervious - Road Area		24254.3	2.4254	0.85
Impervious - Hardstanding Carpark		0	0.0000	0.8
Impervious - Hardstanding Footpaths		5500	0.5500	0.85
Impervious %		22.5%		0.39

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.39	103	13.2000	1461.32
10yr-20min		0.39	74	13.2000	1044.61
10yr-30min		0.39	60	13.2000	850.70
10yr-1hr		0.39	42	13.2000	593.92
10yr-2hr		0.39	29	13.2000	405.38
10yr-6hr		0.39	15	13.2000	211.68
10yr-12hr		0.39	10	13.2000	135.50
10yr-24hr		0.39	6	13.2000	84.50
10yr-48hr		0.39	4	13.2000	51.19
10yr-72hr		0.39	3	13.2000	37.66

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

Existing Site (Pre-development)

Catchment		A (m²)	A (ha)	C
Total Site Area		132000	13.2000	
Pervious - Gardens / Lawns		132000	13.2000	0.3
Impervious - Gravel			0.0000	0.8
Impervious - Roof Area (to Soakage)			0.0000	0.85
Impervious - Hardstanding Driveway / Footpath			0.0000	0.9
Impervious %		0.0%		0.30

Runoff Calculations - Post Development

Storm Event		C	I (mm/h)	A (ha)	Q(l/s)
10yr-10min		0.30	103	13.2000	1137.96
10yr-20min		0.30	74	13.2000	813.46
10yr-30min		0.30	60	13.2000	662.46
10yr-1hr		0.30	42	13.2000	462.50
10yr-2hr		0.30	29	13.2000	315.68
10yr-6hr		0.30	15	13.2000	164.84
10yr-12hr		0.30	10	13.2000	105.52
10yr-24hr		0.30	6	13.2000	65.80
10yr-48hr		0.30	4	13.2000	39.86
10yr-72hr		0.30	3	13.2000	29.33

Rainfall intensity taken from HIRDS

Runoff rate determined using Rational Method (Q = 2.78*C*i*A)

	Maven BOP	Job Number	Sheet	Rev
		J606	19	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Runoff Calculations for Soakage Area for road	SB	16/04/2025	NP

Pre-Development vs. Post-Development Flows - 10 Year ARI

Critical Storm Event	20 min

Post Development - 10 Year ARI Critical Storm Event (20 min)

Catchment	A (m²)	A (ha)	C
Total Site Area	132000	13.2000	
Pervious - Gardens / Lawns	102246	10.2246	0.25
Impervious - Timber Deck	0	0.0000	0.6
Impervious - Roof Area (to Soakage)	24254	2.4254	0.85
Impervious - Hardstanding Carpark (to Soakage)	0	0.0000	0.8
Impervious - Hardstanding Footpaths	5500	0.5500	0.85
Impervious %	22.5%		0.39

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)	
Q = 2.78*C*i*A	0.39	73.892	13.2000	1044.61	0.33	1253.53	
10 Yr Soakage Volume (From Soak. Pit Calcs)						577.48	
Storage Volume (m³)						4157.88	
10 Yr Post Dev. - 10 Yr Soakage Volume						**-3481.83**	**(Storage Volume OK)**

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Pre Development - 10 Year ARI Critical Storm Event (20 min)

Catchment	A (m²)	A (ha)	C
Total Site Area	132000	13.2000	
Pervious - Gardens / Lawns	132000	13.2000	0.3
Impervious - Roof Area	0	0.0000	0.85
Impervious - Hardstanding Driveway / Footpath	0	0.0000	0.9
Impervious - Hardstanding Timber Deck	0	0.0000	0.8
Impervious - Hardstanding Cobbles	0	0.0000	0
Impervious %	0.0%		0.30

	C	I (mm/h)	A (ha)	Q(l/s)	Duration (hr)	Rc (m³/hr)
Q = 2.78*C*i*A	0.30	73.892	13.2000	813.46	0.33	976.15

Rainfall intensity taken from HIRDS + Climate Change Allowance derived from MPDC Table clause 4.8.1.3

Maven BOP	Job Number	Sheet	Rev
	J606	20	A

		Author	Date	Checked
Job Title	Ashbourne Retirement Village, Matamata			
Calculation Title	Soakage Tank Sizing Calculations for Roads	SB	16/04/2025	NP

Proposed Rock Soakage System

Pit Dimensions

Width (m)	**5**
Length (m)	**3464.90**
Depth (m)	**0.8**
Storage Volume (m³)	4157.88

Base area 17324.5 m²

System Rocks

Void ratio 30 %

Critical Storm Event 20 min

Storm Duration **0.33** hrs

Storm Event 10 Year ARI

Runoff Q **1044.61** l/s

← Value from SW Runoff Calcs

Rc 1253.5 m³

Design Soakage Rate **100** mm/hr

←Design soakage rate to be provided by Geotech

Volume of Water disposed by soakage (m³) 577.5 m³

$$V_{soak} = A_{sp}S_r/1000$$

Volume of Storage Required (m³) 676.05 m³

$$V_{stor} = R_c - V_{soak}$$

Tank Size check OK

Depth Calcs

Cover (m)	1.04
Depth (m)	0.8
Total Depth (m)	1.84
Zone of Influence (m)	3.68

Tank Sizing Check for Critical Storm Duration

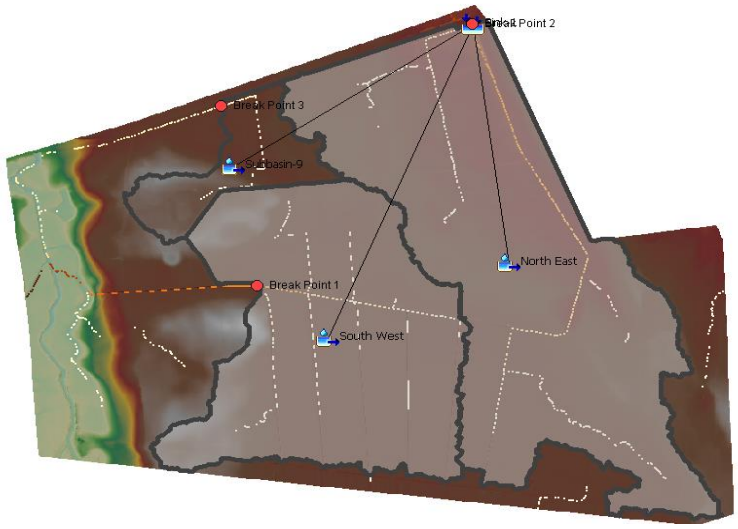
Event	Duration (Hrs)	C	I (mm/hr)	Area (ha)	Q Event (l/s)	Q Event (m³/s)	Q Soak (m³/s)	Storage Required	Check
10yr-10min	0.17	0.39	103.37	13.2	1461.32	894.3	294.52	599.8	OK
10yr-20min	0.33	0.39	73.89	13.2	1044.61	1241.0	571.71	**669.3**	OK
10yr-30min	0.5	0.39	60.18	13.2	850.70	1531.3	866.23	665.0	OK
10yr-1hr	1	0.39	42.01	13.2	593.92	2138.1	1732.45	405.7	OK
10yr-2hr	2	0.39	28.68	13.2	405.38	2918.7	3464.90	-546.2	OK
10yr-6hr	6	0.39	14.97	13.2	211.68	4572.2	10394.70	-5822.5	OK
10yr-12hr	12	0.39	9.58	13.2	135.50	5853.7	20789.40	-14935.7	OK
10yr-24hr	24	0.39	5.98	13.2	84.50	7300.5	41578.80	-34278.3	OK
10yr-48hr	48	0.39	3.62	13.2	51.19	8845.4	83157.60	-74312.2	OK
10yr-72hr	72	0.39	2.66	13.2	37.66	9761.3	124736.40	-114975.1	OK

	Maven BOP	Job Number J606	Sheet 21	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Full site Pre Vs Post Development	Author SB	Date 17/04/2025	Checked NP

HEC-HMS 4.2, was used to identify the catchment areas for the Pre-Development

Consider that the greenway will be constructed part of the residental Development

Pre-Development



	Area
Subbasin 1 (SW)	0.169km²
Subbasin 2 (NE)	0.308km²

Image above without greenway (Pre Dev)

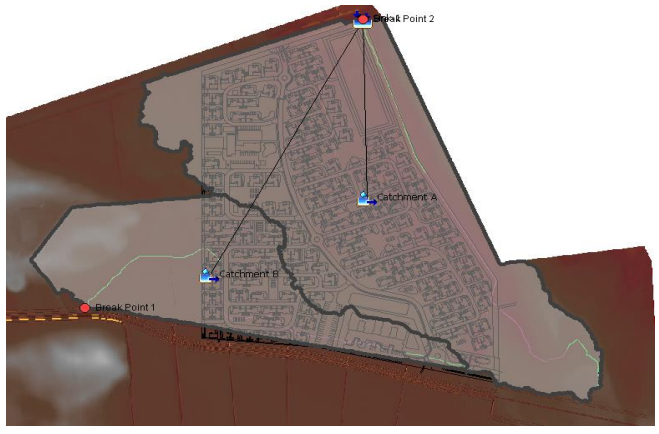


Image above with greenway at the South (Post dev)

Subbasin A (NE) 0.197km²

Subbasin B (SW) 0.084km²

Soil Class : B

Initial Abstraction : 5mm

CN : 61

The calc will be based on the greenway in order to reduce flooding

Using TP 108 for the 24h Storm events

Time to concentration (lag time)

Subbasin A (NE) 42.8min

Subbasin B (SW) 62.6min

Subbasin	Longest Flowpath Length (KM)	Longest Flowpath Slope (M/M)	Centroidal Flowpath Length (KM)	Centroidal Flowpath Slope (M/M)	10-85 Flowpath Length (KM)	10-85 Flowpath Slope (M/M)	Basin Slope (M/M)	Basin Relief (M)	Relief Ratio	Elongation Ratio	Drainage Density (KM/KM²)
Catchment A	0.87997	0.00395	0.29722	0.00132	0.65998	0.00372	0.03891	3.64579	0.00414	0.56955	0.00000
Catchment B	0.78344	0.00086	0.29603	0.00036	0.58758	0.00003	0.03288	3.08769	0.00394	0.41672	0.00000

Maven BOP		Job Number J606	Sheet 22	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author SB	Date 17/04/2025	Checked NP
Calc Title	TP108 Rain 2Yr 24h			

Pre Development 2Yr - 24H - Historical data

24Hr Depth 82mm

mm/hr (Average) 3.4mm

Time	Time interval (mins)	Normalised Rainfall Intensity (I/I24)	Intensity (mm/hr)	Depth per hour	Depth per 10min
00:00:00	360	0.34	1.2	6.97	0.19
06:00:00	180	0.74	2.5	7.59	0.42
09:00:00	60	0.96	3.3	3.28	0.55
10:00:00	60	1.4	4.8	4.78	0.80
11:00:00	30	2.2	7.5	3.76	1.25
11:30:00	10	3.8	13.0	2.16	2.16
11:40:00	10	4.8	16.4	2.73	2.73
11:50:00	10	8.7	29.7	4.95	4.95
12:00:00	10	16.2	55.4	9.23	9.23
12:10:00	10	5.9	20.2	3.36	3.36
12:20:00	10	4.2	14.4	2.39	2.39
12:30:00	30	2.9	9.9	4.95	1.65
13:00:00	60	1.7	5.8	5.81	0.97
14:00:00	60	1.2	4.1	4.10	0.68
15:00:00	180	0.75	2.6	7.69	0.43
18:00 - 24:00	360	0.4	1.4	8.20	0.23
			Total	82	OK

Maven BOP		Job Number J606	Sheet 23	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata TP108 Rain 10Yr 24h	Author SB	Date 17/04/2025	Checked NP

Pre Development 10Yr - 24H - Historical data
24Hr Depth 127mm
mm/hr (Average) 5.3mm

Time	Time interval (mins)	Normalised Rainfall Intensity (I/I24)	Intensity (mm/hr)	Depth per hour	Depth per 10min
00:00:00	360	0.34	1.8	10.80	0.30
06:00:00	180	0.74	3.9	11.75	0.65
09:00:00	60	0.96	5.1	5.08	0.85
10:00:00	60	1.4	7.4	7.41	1.23
11:00:00	30	2.2	11.6	5.82	1.94
11:30:00	10	3.8	20.1	3.35	3.35
11:40:00	10	4.8	25.4	4.23	4.23
11:50:00	10	8.7	46.0	7.67	7.67
12:00:00	10	16.2	85.7	14.29	14.29
12:10:00	10	5.9	31.2	5.20	5.20
12:20:00	10	4.2	22.2	3.70	3.70
12:30:00	30	2.9	15.3	7.67	2.56
13:00:00	60	1.7	9.0	9.00	1.50
14:00:00	60	1.2	6.4	6.35	1.06
15:00:00	180	0.75	4.0	11.91	0.66
18:00 - 24:00	360	0.4	2.1	12.70	0.35
			Total	127	OK

Maven BOP		Job Number J606	Sheet 24	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata TP108 Rain 100Yr 24h	Author SB	Date 17/04/2025	Checked NP

Pre Development 100Yr - 24H - Historical data

24Hr Depth 198mm

mm/hr (Average) 8.3mm

Time	Time interval (mins)	Normalised Rainfall Intensity (I/I24)	Intensity (mm/hr)	Depth per hour	Depth per 10min
00:00:00	360	0.34	2.8	16.83	0.47
06:00:00	180	0.74	6.1	18.32	1.02
09:00:00	60	0.96	7.9	7.92	1.32
10:00:00	60	1.4	11.6	11.55	1.93
11:00:00	30	2.2	18.2	9.08	3.03
11:30:00	10	3.8	31.4	5.23	5.23
11:40:00	10	4.8	39.6	6.60	6.60
11:50:00	10	8.7	71.8	11.96	11.96
12:00:00	10	16.2	133.7	22.28	22.28
12:10:00	10	5.9	48.7	8.11	8.11
12:20:00	10	4.2	34.7	5.78	5.78
12:30:00	30	2.9	23.9	11.96	3.99
13:00:00	60	1.7	14.0	14.03	2.34
14:00:00	60	1.2	9.9	9.90	1.65
15:00:00	180	0.75	6.2	18.56	1.03
18:00 - 24:00	360	0.4	3.3	19.80	0.55
			Total	198	OK

Maven BOP		Job Number J606	Sheet 25	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata TP108 Rain 2Yr 24h	Author SB	Date 17/04/2025	Checked NP

Pre Development 2Yr - 24H - RCP8.5 for the period 2081-2100
24Hr Depth 166mm
mm/hr (Average) 6.9mm

Time	Time interval (mins)	Normalised Rainfall Intensity (I/I24)	Intensity (mm/hr)	Depth per hour	Depth per 10min
00:00:00	360	0.34	2.4	14.11	0.39
06:00:00	180	0.74	5.1	15.36	0.85
09:00:00	60	0.96	6.6	6.64	1.11
10:00:00	60	1.4	9.7	9.68	1.61
11:00:00	30	2.2	15.2	7.61	2.54
11:30:00	10	3.8	26.3	4.38	4.38
11:40:00	10	4.8	33.2	5.53	5.53
11:50:00	10	8.7	60.2	10.03	10.03
12:00:00	10	16.2	112.1	18.68	18.68
12:10:00	10	5.9	40.8	6.80	6.80
12:20:00	10	4.2	29.1	4.84	4.84
12:30:00	30	2.9	20.1	10.03	3.34
13:00:00	60	1.7	11.8	11.76	1.96
14:00:00	60	1.2	8.3	8.30	1.38
15:00:00	180	0.75	5.2	15.56	0.86
18:00 - 24:00	360	0.4	2.8	16.60	0.46
			Total	166	OK

Maven BOP		Job Number J606	Sheet 26	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata TP108 Rain 100Yr 24h	Author SB	Date 17/04/2025	Checked NP

Post Development 100Yr - 24H - RCP8.5 for the period 2081-2100
24Hr Depth 263mm
mm/hr (Average) 11.0mm

Time	Time interval (mins)	Normalised Rainfall Intensity (I/I24)	Intensity (mm/hr)	Depth per hour	Depth per 10min
00:00:00	360	0.34	3.7	22.36	0.62
06:00:00	180	0.74	8.1	24.33	1.35
09:00:00	60	0.96	10.5	10.52	1.75
10:00:00	60	1.4	15.3	15.34	2.56
11:00:00	30	2.2	24.1	12.05	4.02
11:30:00	10	3.8	41.6	6.94	6.94
11:40:00	10	4.8	52.6	8.77	8.77
11:50:00	10	8.7	95.3	15.89	15.89
12:00:00	10	16.2	177.5	29.59	29.59
12:10:00	10	5.9	64.7	10.78	10.78
12:20:00	10	4.2	46.0	7.67	7.67
12:30:00	30	2.9	31.8	15.89	5.30
13:00:00	60	1.7	18.6	18.63	3.10
14:00:00	60	1.2	13.2	13.15	2.19
15:00:00	180	0.75	8.2	24.66	1.37
18:00 - 24:00	360	0.4	4.4	26.30	0.73
			Total	263	OK

Maven BOP		Job Number J606	Sheet 27	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	Pond Size	SB	17/04/2025	NP

	10Yr 24h			100Yr 24h		
Pre Development	Q (m^3/s)	Vol (m^3)	Pre 80%	Q (m^3/s)	Vol (m^3)	Pre 80%
North East Catchment A	0.869	10036	0.70	1.78	20215	1.42
South West Catchment B	0.394	4272	0.32	0.807	8602	0.65

The stormwater pond will be design in accordance to RITS
For the 100Year event 80% of the pre-development 100 year ARI event flow rates

Post-development without any attenuation or soakage

	10Yr 24h		100Yr 24h	
Post Development	Q (m^3/s)	Vol (m^3)	Q (m^3/s)	Vol (m^3)
North East Catchment A	2.099	19750	3.842	36229
South West Catchment B	1.263	9.456	2.331	17466

Stormwater soakage and attention will be needed to adhere to RITS design code
in order to adhere to the 100Yr 80% Pre development runoff
Gravel layer in pond use for addational storage

Use 100 mm/h soakage rate

	Soakage rate	#REF!	Soakage Vol Rate		Vol Storage
North East Pond	100 mm/h	6400m^2	640m^3/h	0.178m^3/s	4120m^3
North East Rain Smart	100 mm/h	3745m^2	374m^3/h	0.104m^3/s	1565m^3
North East Road Soakage	100 mm/h	13782m^2	1378m^3/h	0.383m^3/s	3308m^3
South West Pond	100 mm/h	4955m^2	496m^3/h	0.138m^3/s	2892m^3
South West Rain Smart	100 mm/h	1693m^2	169m^3/h	0.047m^3/s	708m^3
South West Road Soakage	100 mm/h	7008m^2	701m^3/h	0.195m^3/s	1682m^3

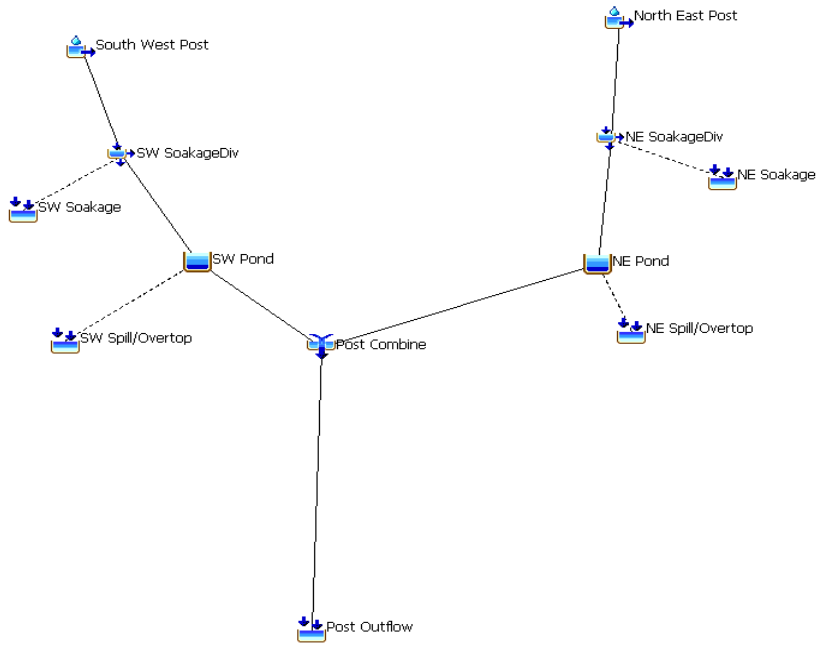
HMS Summary						
	10Yr 24h - Post - Spillway		10Yr 24h - Pre		Post vs 80% Pre	
	Q (m^3/s)	Vol (m^3)	Pre 80%	Vol (m^3)	Check Q	Check Vol
North East Catchment A	0	0	0.70	10036	OK	OK
South West Catchment B	0	0	0.32	4272	OK	OK

HMS Summary						
	100Yr 24h - Post - Spillway		100Yr 24h - Pre		Post vs 80% Pre	
	Q (m^3/s)	Vol (m^3)	Q (m^3/s)	Vol (m^3)	Check Q	Check Vol
North East Catchment A	1.332	1831	1.42	20215	OK	OK
South West Catchment B	0.628	550	0.65	8602	OK	OK

Pond depth was govern by the ground water level

	Maven BOP	Job Number J606	Sheet 28	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata HMS Model and Results	Author SB	Date 17/04/2025	Checked NP

Below is the setup for the HMS model



Global Parameter Summary - Subbasin

Area (KM2)

Element Name	Area (KM2)
North East Post	0.15
South West Post	0.09

Downstream

Element Name	Downstream
North East Post	NE SoakageDiv
South West Post	SW SoakageDiv

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
North East Post	0	78.4	2.7
South West Post	0	74	3.2

Transform: Scs

Element Name	Lag	Unitgraph Type
North East Post	10	Standard
South West Post	10	Standard

Maven BOP	Job Number J606	Sheet 29	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Pre-development - Catchment A	Author SB	Date 17/04/2025	Checked NP

1. Runoff Curve Number (CN) and initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (ha) 10000m2=1ha	Product of CN x area
B	Open Space (Sandy Loam or Silty Loam)	61	19.73	1203.41
* from Appendix B		Totals =	19.73	1203.41

CN (weighted) = total product / total area = 1203.41 / 19.73 = 61.0

Ia (weighted) = 5 x pervious area / total area = 5 x 19.73 / 19.73 = 5.0 mm

2. Time of Concentration

Channelisation factor C = 1 (From Table 4.2) natural channels

Catchment length L = 0.87997 km (along drainage path)

Catchment Slope Sc= 0.00395 m/m (by equal area method)

Runoff factor, CN / (200 - CN) = 61.0 / (200- 61.0) = 0.44

$t_c = 0.14\ C\ L^{0.66}\ (CN/200\text{-}CN)^{-0.55}\ Sc^{-0.30}$

= 0 1 0.92 1.57 5.26 = 1.065 hrs

SCS Lag for HEC-HMS…. $t_p = 2/3\ t_c$ = 0.713 hrs

OK
use
0.71 hrs

Worksheet 1: Runoff Parameters and Time of Concentration

Maven BOP	Job Number J606	Sheet 30	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Pre-development - Catchment B	Author: SB	Date: 17/04/2025	Checked: NP

1. Runoff Curve Number (CN) and initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (ha) 10000m2=1ha	Product of CN x area
B	Open Space (Sandy Loam or Silty Loam)	61	8.37	510.65
* from Appendix B		Totals =	8.37	510.65

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{510.65}{8.37}$ = 61.0

Ia (weighted) = $\frac{\text{5 x pervious area}}{\text{total area}}$ = $\frac{5 \times 8.37}{8.37}$ = 5.0 mm

2. Time of Concentration

Channelisation factor C = 1 (From Table 4.2) natural channels

Catchment length L = 0.78344 km (along drainage path)

Catchment Slope Sc= 0.00086 m/m (by equal area method)

Runoff factor, $\frac{CN}{200 - CN}$ = $\frac{61.0}{200-61.0}$ = 0.44

$t_c = 0.14\ C\ L^{0.66}\ (CN/200\text{-}CN)^{-0.55}\ Sc^{-0.30}$

= 0 1 0.85 1.57 8.31 = 1.558 hrs

SCS Lag for HEC-HMS…. $t_p = 2/3\ t_c$ = 1.044 hrs

OK
use
1.04 hrs

Worksheet 1: Runoff Parameters and Time of Concentration

Maven BOP	Job Number J606	Sheet 31	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Post-development - Catchment A	Author: SB	Date: 17/04/2025	Checked: NP

1. Runoff Curve Number (CN) and initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (ha) 10000m2=1ha	Product of CN x area
B	Roads and Footpaths	98	2.35	230.0
B	Building Roofs	98	4.7	465.4
B	Open Space lawns in Village and Open field	61	11.66	711.4
B				
* from Appendix B		Totals =	18.76	1406.9

CN (weighted) = total product / total area = 1406.85 / 18.759 = 75.0

Ia (weighted) = 5 x pervious area / total area = 5 x 11.66 / 18.76 = 3.1 mm

2. Time of Concentration

Channelisation factor C = 0.8 (From Table 4.2) Grass

Catchment length L = 0.87534 km (along drainage path)

Catchment Slope Sc= 0.00333 m/m (by equal area method)

Runoff factor, CN / (200 - CN) = 75.0 / (200- 75.0) = 0.60

$t_c = 0.14\ C\ L^{0.66}\ (CN/200\text{-}CN)^{-0.55}\ Sc^{-0.30}$

= 0.1 0.8 0.92 1.32 5.54 = 0.752 hrs

SCS Lag for HEC-HMS…. $t_p = 2/3\ t_c$ = 0.504 hrs

OK
use
0.504 hrs

Worksheet 1: Runoff Parameters and Time of Concentration

Maven BOP	Job Number J606	Sheet 32	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Post-development - Catchment B	Author: SB	Date: 17/04/2025	Checked: NP

1. Runoff Curve Number (CN) and initial Abstraction (Ia)

Soil name and classification	Cover description (cover type, treatment, and hydrologic condition)	Curve Number CN*	Area (ha) 10000m2=1ha	Product of CN x area
B	Roads and Footpaths	98	1.06	103.9
B	Building Roofs	98	2.1	205.1
B	Open Space lawns in Village and Open field	61	6.01	366.4
* from Appendix B		Totals =	9.16	675.4

CN (weighted) = total product / total area = 675.44 / 9.160 = 73.7

Ia (weighted) = 5 x pervious area / total area = 5 x 6.01 / 9.16 = 3.3 mm

2. Time of Concentration

Channelisation factor C = 0.8 (From Table 4.2) Grass

Catchment length L = 0.53581 km (along drainage path)

Catchment Slope Sc= 0.00635 m/m (by equal area method)

Runoff factor, CN / (200 - CN) = 73.7 / (200- 73.7) = 0.58

$t_c = 0.14\ C\ L^{0.66}\ (CN/200\text{-}CN)^{-0.55}\ Sc^{-0.30}$

= 0.1 0.8 0.66 1.34 4.56 = 0.455 hrs

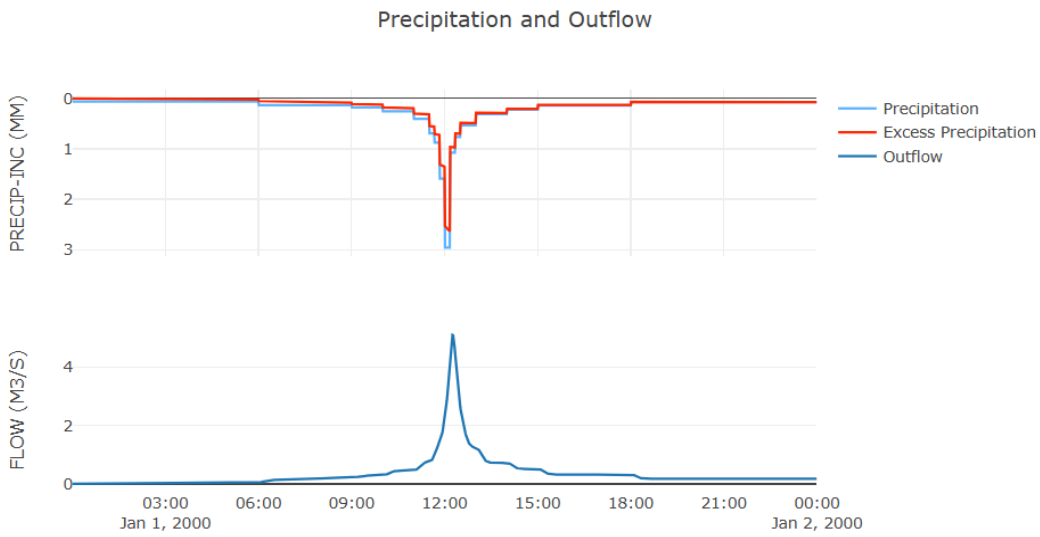
SCS Lag for HEC-HMS…. $t_p = 2/3\ t_c$ = 0.305 hrs

OK
use
0.305 hrs

Worksheet 1: Runoff Parameters and Time of Concentration

Maven BOP	Job Number J606	Sheet 33	Rev A
Job Title Calc Title Ashbourne Retirement Village, Matamata HMS Results : North East	Author SB	Date 17/04/2025	Checked NP

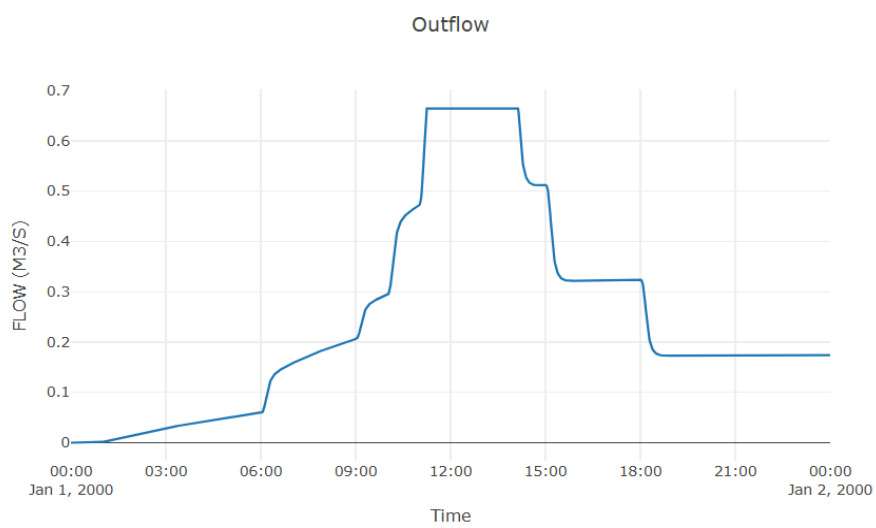
North East Catchment



Sink: NE Soakage

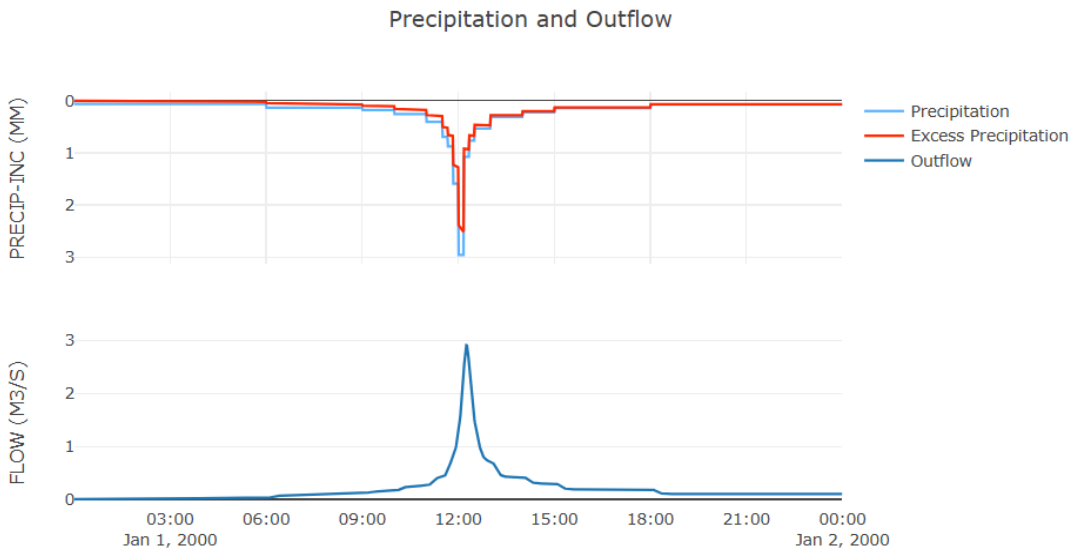
Results: NE Soakage

Peak Discharge (M3/S)	0.66
Time of Peak Discharge	01Jan2000, 11:15



Maven BOP	Job Number J606	Sheet 34	Rev A
Job Title Calc Title Ashbourne Retirement Village, Matamata HMS Results : South West	Author SB	Date 17/04/2025	Checked NP

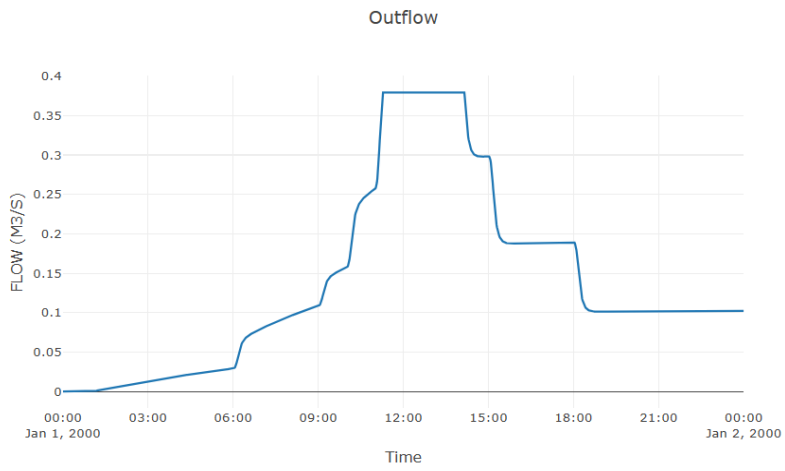
North East Catchment



Sink: SW Soakage

Results: SW Soakage

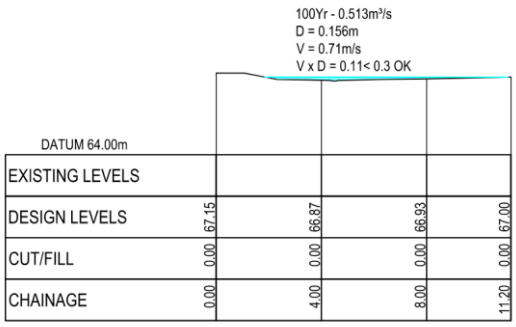
Peak Discharge (M3/S)	0.38
Time of Peak Discharge	01Jan2000, 11:17



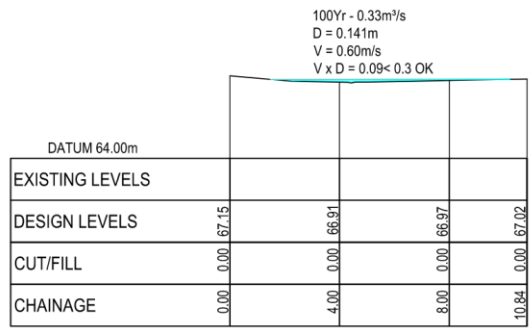
Maven BOP		Job Number J606	Sheet 35	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Overland Flow Paths	Author SB	Date 17/04/2025	Checked NP

Refer to drawing C4900 Series, which indicates the critical overflow paths for the 100Yr event
This has been designing as a sensitivity check for a 100Yr event without any soakage
We allowed for min of 300mm freeboard as per E1/AS1 on all villas
Manning's n value
Grass 0.03
Road 0.015
Slope of the road was considered
We consider V x D < 0.3 inculding the following parameters
V < 2m/s
D < 0.3m
V x D < 0.3 Low Hazard

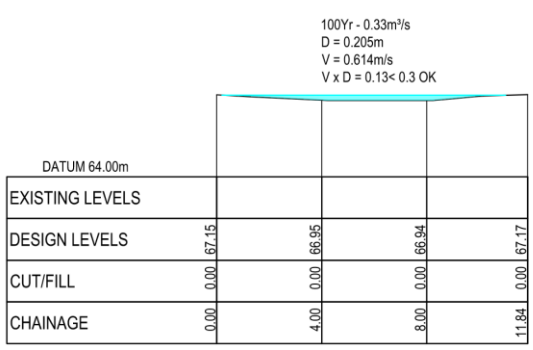
DV (m^2s^{-1})	Infants, small children (H.M ≤ 25) and frail/older persons	Children (H.M = 25 to 50)	Adults (H.M > 50)
0	Safe	Safe	Safe
0 – 0.4		Low Hazard[1]	
0.4 – 0.6		Significant Hazard; Dangerous to most	Low Hazard[1]
0.6 – 0.8	Extreme Hazard; Dangerous to all		Moderate Hazard; Dangerous to some[2]
0.8 – 1.2		Extreme Hazard; Dangerous to all	Significant Hazard; Dangerous to most[3]
> 1.2			Extreme Hazard; Dangerous to all



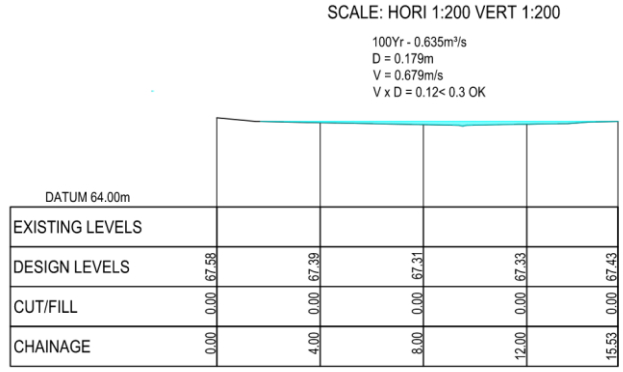
PV - OLF CROSS-SECTION-A
SCALE: HORI 1:200 VERT 1:200



PV - OLF -CROSS-SECTION-B
SCALE: HORI 1:200 VERT 1:200



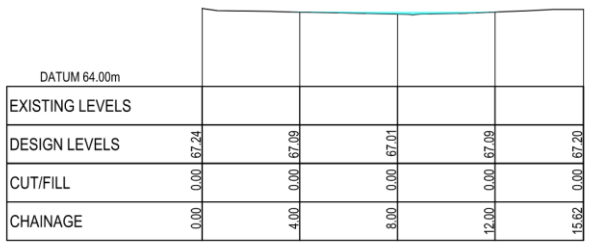
PV - OLF CROSS-SECTION C
SCALE: HORI 1:200 VERT 1:200



PV - OLF-CROSS-SECTION-D
SCALE: HORI 1:200 VERT 1:200

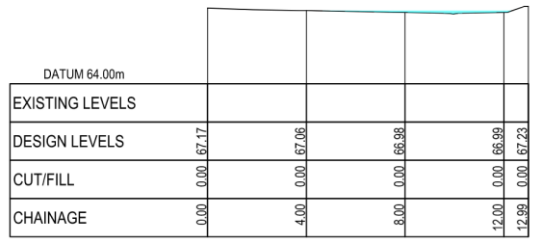
	Maven BOP	Job Number J606	Sheet 36	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Overland Flow Paths	Author SB	Date 17/04/2025	Checked NP

100Yr - 0.205m³/s
D = 0.125m
V = 0.536m/s
V x D = 0.067< 0.3 OK



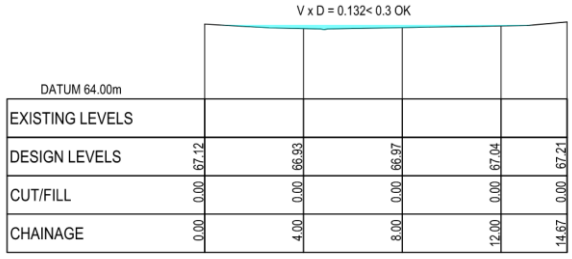
PV - OLF-CROSS-SECTION-E
SCALE: HORI 1:200 VERT 1:200

100Yr - 0.505m³/s
D = 0.128m
V = 0.705m/s
V x D = 0.09< 0.3 OK



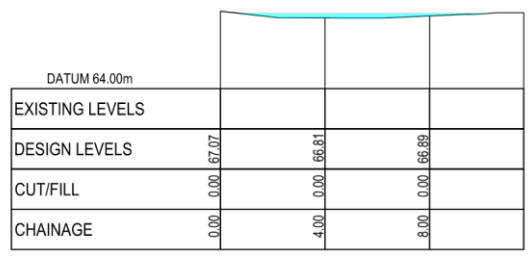
PV - OLF-CROSS-SECTION-F
SCALE: HORI 1:200 VERT 1:200

100Yr - 0.835m³/s
D = 0.191m
V = 0.696m/s
V x D = 0.132< 0.3 OK



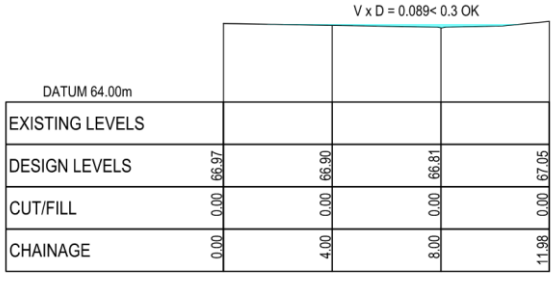
PV - OLF-CROSS-SECTION-G
SCALE: HORI 1:1000 VERT 1:1000

100Yr - 1.24m³/s
D = 0.171m
V = 1.132m/s
V x D = 0.193< 0.3 OK



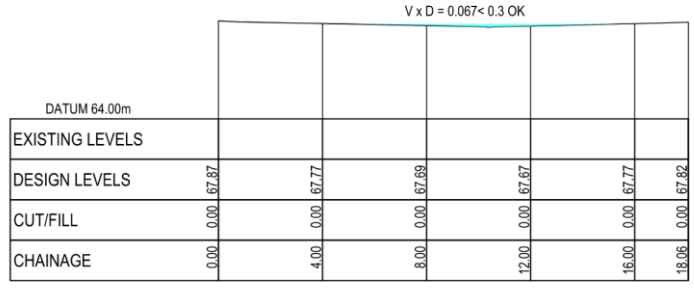
PV - OLF-CROSS-SECTION-H
SCALE: HORI 1:1000 VERT 1:1000

100Yr - 0.371m³/s
D = 0.141m
V = 0.635m/s
V x D = 0.089< 0.3 OK



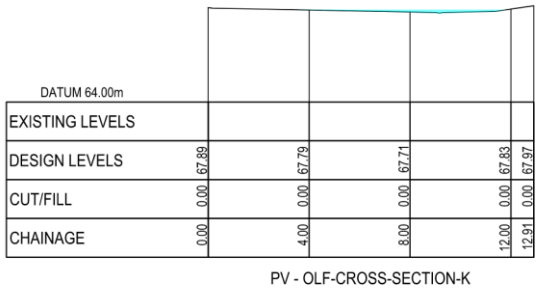
PV - OLF-CROSS-SECTION-I
SCALE: HORI 1:1000 VERT 1:1000

100Yr - 0.270m³/s
D = 0.133m
V = 0.507m/s
V x D = 0.067< 0.3 OK



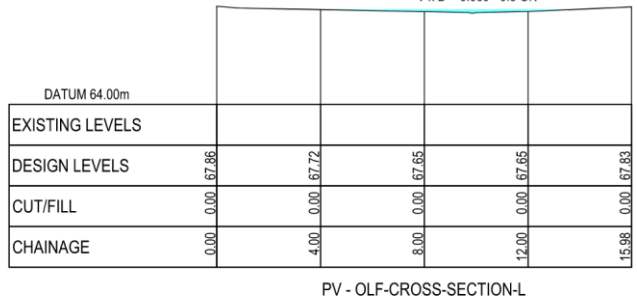
PV - OLF-CROSS-SECTION-J
SCALE: HORI 1:1000 VERT 1:1000

100Yr - 0.330m³/s
D = 0.142m
V = 0.604m/s
V x D = 0.085< 0.3 OK



PV - OLF-CROSS-SECTION-K
SCALE: HORI 1:1000 VERT 1:1000

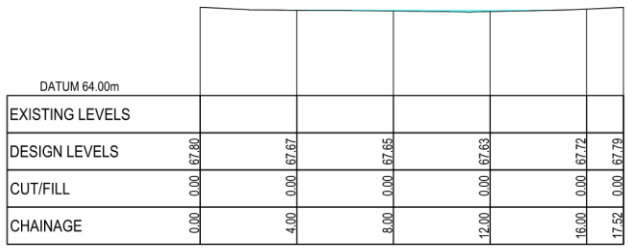
100Yr - 0.250m³/s
D = 0.139m
V = 0.501m/s
V x D = 0.069< 0.3 OK



PV - OLF-CROSS-SECTION-L
SCALE: HORI 1:1000 VERT 1:1000

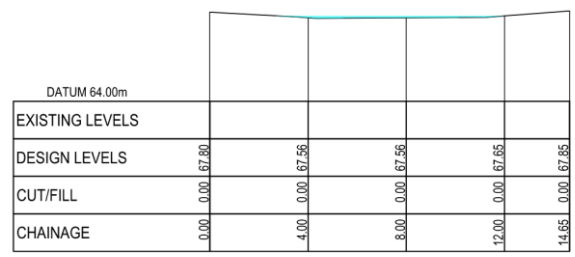
	Maven BOP	Job Number J606	Sheet 37	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata Overland Flow Paths	Author SB	Date 17/04/2025	Checked NP

100Yr - 0.170m³/s
D = 0.097m
V = 0.473m/s
V x D = 0.045< 0.3 OK



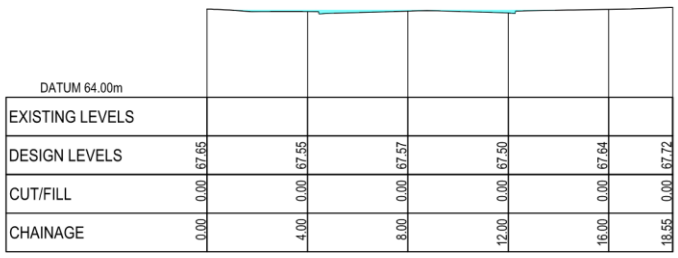
PV - OLF-CROSS SECTION-M
SCALE: HORI 1:200 VERT 1:200

100Yr - 0.320m³/s
D = 0.107m
V = 0.440m/s
V x D = 0.047< 0.3 OK



PV - OLF-CROSS SECTION-N
SCALE: HORI 1:200 VERT 1:200

100Yr - 0.360m³/s
D = 0.149m
V = 0.476m/s
V x D = 0.070< 0.3 OK



PV - OLF-CROSS SECTION-O
SCALE: HORI 1:200 VERT 1:200

Maven BOP	Job Number J00606	Sheet 1	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Wastewater Demand Calculations:	Author SB	Date 16/04/2025	Checked NP

As per Waikato Local Authority RITS standards - Clause 5.2.4.2:

Domestic Average Daily Flow (Water Consumption) =	200	*l/person/day*
Infiltration Allowance =	2,250	*l/Ha/day*
Surface Water Ingress =	16,500	*l/Ha/day*
No of dwellings =	218	
Person/dwellings =	2.7	
Retirement village - Person/dwellings =	1.6	

Villas Only, Retirement village will have 1.6x per dwelling

Catchment Area (Villa only)=	14.00	*Ha*
Population Equivalent as per Table 5-3=	45	*person per Ha*
	348.8	*persons*
Wastewater Peaking factor as per Table 5-2=	3.7	
Average Daily Flow (ADF)=	101.3	*m³/day*
Peak Daily Flow (PDF)=	3.352	*L/sec*
Peak Wet Weather Flow (PWWF)=	**6.026**	*L/sec*

Facilities - Consider wet retail

Catchment Area (Facilities - wet retail only)=	1.00	*Ha*
Population Equivalent as per Table 5-3=	30	*person per Ha*
	30.0	*persons*
Wastewater Peaking factor as per Table 5-2=	8	
Average Daily Flow (ADF)=	8.25	*m³/day*
Peak Daily Flow (PDF)=	0.582	*L/sec*
Peak Wet Weather Flow (PWWF)=	**0.773**	*L/sec*

Hospital - Night day facilitiy (24h operaion)
As this is more a care facility this number will be able to reduce to 1.6x per bed

Catchment Area (Hospital - Night day facilitiy (24h operaion))=	1.00	*Ha*
Number of Beds in Hospital	72	*Beds*
Population Equivalent as per Table 5-3=	1.6	*person per bed*
	120.0	*persons*
Wastewater Peaking factor as per Table 5-2=	3.5	
Average Daily Flow (ADF)=	26.250	*m³/day*
Peak Daily Flow (PDF)=	0.998	*L/sec*
Peak Wet Weather Flow (PWWF)=	**1.189**	*L/sec*

Summary			
Item	**PDF**	**PWWF**	***m³/day***
Villas	3.35l/s	6.03l/s	101.3
Facilities	0.58l/s	0.77l/s	8.25
Hospital	1.00l/s	1.19l/s	26.250
	4.93l/s	**7.99l/s**	**135.8m³/day**

Maven BOP	Job Number J00606	Sheet 2	Rev A
Job Title: Eldonwood RV, Station Road, Matamata Calc Title: Wastewater Demand Calculations:	Author SB	Date 16/04/2025	Checked NP

Colebrook white

v =	0.000001141	m²/s
Ks (uPVC) =	1.50	mm
g =	9.807	m/s²

PWW Flow	D Pipe dia (D)	J Gradient (J)	Capacity	Velocity	Check
l/s	*m*	*%*	*l/s*	*m/s*	*OK*
7.987	0.15	0.55	11.44	0.65	OK
7.987	0.225	0.40	28.76	0.72	OK

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From: Salma Rayan <salma@innoflow.co.nz>
Sent: Wednesday, 27 November 2024 3:23 pm
To: Stoffel Bakkes <StoffelB@maven.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Stoffel,

As discussed, see below budget estimate for a wastewater system based on a gravity sewer inlet (and associated higher wet weather peak flow rates).

Obviously we will refine and confirm all prices as part of detailed design. For the pump station, you will have to provide us the instantaneous flows for us to confirm the design, however, for pricing sake we have assumed 4.2L/s as our peak flows (as we have done at Tamahere & Matamata retirement village for Sanderson group)

Note that we can install the system in stages, but have provided full stage pricing as requested.

For ease, I've provided a table comparing the two options. Prices are excluding GST.

Option	1 Prelos (low pressure system) to AdvanTex WWTP and land application field **Based on: 75,575 L/day**	2 Gravity sewer, pump station AdvanTex WWTP and land application field **Based on: 120,920 L/day**
Inclusion	• 3 x grease traps • 3 x aged care facility pumped septic tanks • 27 x shared residential pumped septic tanks • 1.5km of low pressure sewer • Wastewater treatment plant • 15,115 sqm of dripline irrigation	• 3 x grease traps • Pump station • Wastewater treatment plant • 24,184 sqm of dripline irrigation
Capex	$1.67 million	$1.88 million* *(gravity sewer not included. Allow an amount for this. Last time we did something similar, gravity sewer ~ $1 million, bringing potential cost to $2.88 million for this option)
	$12,000	$15,000

Opex (annual). Preventative maintenance, effluent sample collection, remote monitoring		

Design parameters for gravity sewer option is shown below.

Links to pricing schedules for each option are as follows

- Option 1 (low pressure system WWTS): Ashbourn Retirement Village WWTP Pricing Schedule 20.11.24.pdf
- Option 2 (gravity sewer and conventional pump station WWTS): 2. Ashbourn Retirement Village AX1300 WWTP Pricing Schedule 27.11.24.pdf

Design Parameters

Daily Flows

Source	Number	Occupancy allowance	Total occupancy (pax)	Flow allowance (L/p/day)	Total (L/day)
Villas	218	1.6	349	165	57,585
Aged care hospital	1	72	72	220	15,840
Nurses			4	50	200
Staff			30	50	1,500
Visitors			30	15	450
				Peak dry weather flow (L/day)	75,575
				I&I Factor with Gravity Sewer	1.6
				Peak wet weather flow (L/day)	120,920

Influent Parameters
BOD_5: 490 mg/L
TSS: 550 mg/L
TKN: 77 mg/L

Target Effluent Quality
$cBOD_5$: 15 mg/L
TSS: 15 mg/L
Faecal Coliforms: 200 cfu/100mL

Land Application System
Method: Pressure compensating drip irrigation

Design loading rate: 5 L/sqm
Primary land application area required: 24,184 sqm

Wastewater System Components

Pre and primary treatment

- 3 x 10m^3 grease trap
- Pump station

Secondary and tertiary wastewater treatment

- 12 x 25m^3 septic tank
- 6 x 25m^3 pre-anoxic tank with effluent return pump
- 5 x 25m^3 (stage 1) recirculation tank with dosing pumps
- 10 x (stage 1) AX100 packed bed reactor pods
- 2 x 25m^3 (stage 2) recirculation tank with dosing pumps
- 3 x (stage 2) AX10 packed bed reactor pods
- 5 x 25m^3 treated effluent tank with irrigation pump
- 3 x pulse effluent flow meters
- 1 x UV disinfection unit
- 1 x TCOM

Land Treatment System

- 100m treated effluent rising main
- 2 x 6 sector sequencing valve
- 24,184 lineal meters of pressure compensating dripline irrigation (18 x 1,343 sqm sectors, laid at 1m centres)

Kind Regards

Salma Rayan
Technical Business Development Manager

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From: Stoffel Bakkes <StoffelB@maven.co.nz>
Sent: Wednesday, November 27, 2024 11:19 AM
To: Salma Rayan <salma@innoflow.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Salma

Can you please provide an official quote for the gravity system?
Maven will provide the gravity network to the pump station if Innoflow can take care of the pump station/ pump and the rest of the system.
At this stage, the pipes come in at 2.5 – 3m below EGL, this is the current worst-case hand calc.

Can you also give us a budget for the O&M for both sites per year?

Kind regards

Stoffel Bakkes
SENIOR CIVIL ENGINEER
B.Tech, CMEngNZ (Eng. Technologist)

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From: Stoffel Bakkes
Sent: Friday, 22 November 2024 10:10 am
To: Salma Rayan <salma@innoflow.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Based on the prelos (pumped septic)

From: Salma Rayan <salma@innoflow.co.nz>
Sent: Friday, 22 November 2024 10:08 am
To: Stoffel Bakkes <StoffelB@maven.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: Re: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Based on use of Prelos (pumped septic) or gravity sewer?

Salma Rayan
Technical Business Development Manager

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From: Stoffel Bakkes <StoffelB@maven.co.nz>
Sent: Friday, November 22, 2024 10:06:58 AM
To: Salma Rayan <salma@innoflow.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Salma

The O&M for this site, what will be the expected cost per year?
How often do the grinder pumps need to be replaced and what warranty on the pumps?

Cheers

Stoffel Bakkes
SENIOR CIVIL ENGINEER
B.Tech, CMEngNZ (Eng. Technologist)

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From: Salma Rayan <salma@innoflow.co.nz>
Sent: Thursday, 21 November 2024 11:49 am
To: Stoffel Bakkes <StoffelB@maven.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Stoffel,

The 6,000 L tanks is 2.67m in dia. Obviously will be underground. They can be installed under footpaths so long as there is access, and a self supporting slab on top (to avoid any load on the tank as they are not trafficable).

Are you available at 3pm today to go over the proposal?

Cheers

Salma Rayan
Technical Business Development Manager

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From: Stoffel Bakkes <StoffelB@maven.co.nz>
Sent: Thursday, November 21, 2024 11:42 AM
To: Salma Rayan <salma@innoflow.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Salma

Thank you for the information.

As the site bit constrained in space, what will be the estimated size of footprint size of the pre-treatment septic tank?

We will have a chat with the client and come back if we need any additional information.

Cheers

Stoffel Bakkes
SENIOR CIVIL ENGINEER
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Sent: Thursday, 21 November 2024 11:23 am
To: Stoffel Bakkes <StoffelB@maven.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Stoffel,

If you don't have shared primary tanks, then

- Primary treatment tanks at plant
- Wastewater treatment plant and land application system will be sized to be 1.6 x bigger to account for peak wet weather flows
- High level cost difference + $500,000 + GST plus added cost of gravity sewer and wet well

I'll have to spend some time designing this to confirm the cost above, but this is high level

Cheers

Salma Rayan
Technical Business Development Manager

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wastewater specialists

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From: Stoffel Bakkes <StoffelB@maven.co.nz>
Sent: Thursday, November 21, 2024 11:19 AM
To: Salma Rayan <salma@innoflow.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Salma

If we don't have a primary treatment, on a high level what will be the estimated cost?

We will provide gravity flow into a wet well where it will be pumped into your treatment.

Cheers

Stoffel Bakkes
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Sent: Thursday, 21 November 2024 10:43 am
To: Stoffel Bakkes <StoffelB@maven.co.nz>
Cc: Matthew Kerse <MatthewK@maven.co.nz>; Shanan Mowatt <ShananM@maven.co.nz>; Dean Morris <DeanM@maven.co.nz>; Brent Hawthorn <brent@innoflow.co.nz>
Subject: RE: J606 MDL - Hemmings Station Rd (Ashbourn retirement village)

Hi Stoffel and team,

Was the below what you are after?

Also, here is a set of drawings to visualise the system components.

Combined- Ashbourn Retirement Village Concept WWTP.pdf

Shout if you have any questions.

Cheers

Salma Rayan
Technical Business Development Manager

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Maven BOP		Job Number J00606	Sheet 1	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	Water Demand Calculations	SB	24/06/2025	NP

Water Catchment

As per RITS Standard 6.2.3:

Pop. Density	2	people per villa
Demand	260	litres/person/day

Demand Rates

Average Demand =	260	litres/person/day
Peak Demand (5x) =	1300	litres/person/day

Population	Dwellings	People	Occupancy
Proposed Dwellings	220	2.0	440
Demand	Persons	Rate (L/p/day)	Flow (L/s)
Average Water Demand	440	260	1.32
Peak Demand	Persons	Rate (L/p/day)	Flow (L/s)
Peak Water Demand	440	1300	**6.62**

Additional commercial usage

Facilities - Consider wet retail

15l per m² 1500m²

Avg Flow = 22500l/day = 0.26l/s

Peak flow 2.5x = **0.65l/s**

Hospital - Night day facilitiy (24h operaion)

Number of beds = 72

630Litres per bed per day

Avg Flow = 45360l/day = 0.53l/s

Peak flow 2.5x = **1.31l/s**

Summary		
Item	**Avg Flow**	**Peak flow**
Villas	1.32l/s	6.62l/s
Facilities	0.26l/s	0.65l/s
Hospital	0.53l/s	1.31l/s
	2.11l/s	**8.58l/s**

Fire Demand - NZS 4509:2008

Villas	FW 2
Facilities	FW 4
Agecare	FW 5

Age Care Hospital and facilities will need their own sprinkler design, that can be connected into the main network

Where structures are fitted with compliant fire sprinkler systems, the required water supply classification is no greater than FW2. NZS 4541 requires the fire sprinkler flows to be delivered concurrently with a flow of 1500 L/min (25 L/s) from the nearest fire hydrants at the pressure determined as part of the sprinkler system design and flow tests. By default a flow test should therefore be available that takes into account the effect of reduced pressure due to consumer demand.

Ref : https://promising-sparkle-d7f0c0cfc9.media.strapiapp.com/cop_water_chapter_8648e958c8.

Table 6.1.b - Other facility design occupancy allowances

Other facility types		*Design water flow allowance*
Hospitals	*Day facility (treatment facilities, wards)*	*320 Litres per bed per day*
	Night and day facility (24-hour operation)	*630 Litres per bed per day*
	Staff	*50 litres per employee per day*
Child day-care	*Children*	*45 Litres per child per day*
	Staff	*50 Litres per employee per day*
School (day students)	*Primary school*	*20 Litres per student per day*
	Secondary school	*25 Litres per student per day*
	Staff	*50 Litres per employee per day*
School (boarding)	*Secondary school*	*160 Litres per student per day*
Student accommodation		*160 Litres per person per day*
Hotels and motels	*Guests*	*200 Litres per room per day*
	Staff	*50 Litres per employee per day*
Community halls and churches and/or facilities with intermittent use		*12 Litres per seat per day*

Note:

For activities where a large number of people can be expected to use multiple water fixtures simultaneously e.g. community halls and conference halls, the Peaking Factor shall be based on the number of water fixtures / appliances, as per NZS 3500.2 Plumbing and Drainage: Part 2: Sanitary plumbing and drainage.

Water consumption allowances in this table include general irrigation (but not specific irrigation systems) and grounds upkeep.

Table 6.1.c – Wet and dry commercial assumed design allowances

Commercial activity type	*Design water flow allowance*
Dry retail (Note 1) (where kitchen/toilets are not normally made available to customers)	*1 person per 50m² net floor area at 65 litres per person per day.*
Office buildings and dry retail where toilet facilities, etc. are provided to customers.	*1 person per 15m² net floor area at 65 litres per person per day.*
Wet retail (Note 2): Food and or beverage retail/preparation e.g. coffee shop, restaurant, bar, butcher, fresh fruit and vegetable retail.	*15 litres per day per net m² of floor area (including kitchen and dining areas).*

Table notes:

1. *Dry retail is where water is normally only used by staff for their own personal food preparation / toileting needs. Examples include: clothes shop, hardware retail.*
2. *Wet retail is where water is used to prepare food product for customers. Examples include: café, lunch bar, restaurant, butchery, fresh fruit and vegetable, food court-bar and supermarkets.*
3. *Assuming no significant irrigation.*

Important:

Net floor area is the total floor area of the building (exclude any open land areas),, less non-productive areas, such as:
lobbies; lifts; machine rooms; electrical services; stairwells; fire escapes; corridors and other passages used in common with other occupiers; car parking areas; etc. If net area is unknown, and the type of buildings are unknown, it can be assumed that the Net floor area is = 80% of the gross floor area of the building.

As a guide to how activities will be assessed, commercial washing activities such as car / boat washing activities, etc. would be regarded as a "wet-industry" and not as a commercial - wet retail, as the water is being used as a part of a process (washing). Large-scale food-processing (i.e. for supply to commercial customers, as opposed to on-site retail customers) would be regarded as an industrial type activity. Preparation / manufacture of non-food based products, is also regarded as an industrial activity. Industry design flows are detailed in the section below.

Demand and pipe sizing

Usign NZS 3500 Clause 3.2.3, Table 3.2.3 to calculate the overall network pressure and pipe size.

218 Villas + 2 Nurse accommodation

Q = 801l/min For all 218 Villas + 2 Nurse accommodation

NOTE 2 Determination of PSD for dwellings exceeding the scope of this table may be estimated using the following equation:

$Q = 0.03\,n + 0.4554\,\sqrt{n}$

where

Q = flow rate, in litres per second

n = number of dwellings

Fire requirements

Villas	FW 2	2x FH	1500l/min	Combine FH Flow
Facilities	FW 2	2x FH	1500l/min	
Agecare	FW 2	2x FH	1500l/min	

Agecare Hospital and Facilities will have sprinklers installed to be able to use FW 2

Below avg demand, EPANET model provided more detail with the pattern demand

	Villas	Demand	Pipe size (ID)	Pipe Area	Velocity
Pump house	220	822l/min	169.9mm	0.023m²	0.60m/s
Stage 1	26	145l/min	106mm	0.009m²	0.27m/s
Stage 2	27	148l/min	106mm	0.009m²	0.28m/s
Stage 3	27	148l/min	106mm	0.009m²	0.28m/s
Stage 4	27	153l/min	106mm	0.009m²	0.29m/s
Stage 5	26	151l/min	106mm	0.009m²	0.28m/s
Stage 6	25	148l/min	106mm	0.009m²	0.28m/s
Stage 7	24	150l/min	106mm	0.009m²	0.28m/s
Stage 8	25	153l/min	106mm	0.009m²	0.29m/s
Stage 9	11	107l/min	106mm	0.009m²	0.20m/s
Stage 10	2	86l/min	106mm	0.009m²	0.16m/s

When applying a 2x FH (2 x 750l/min) the 125mm OD HDPE has been size correctly for FW2

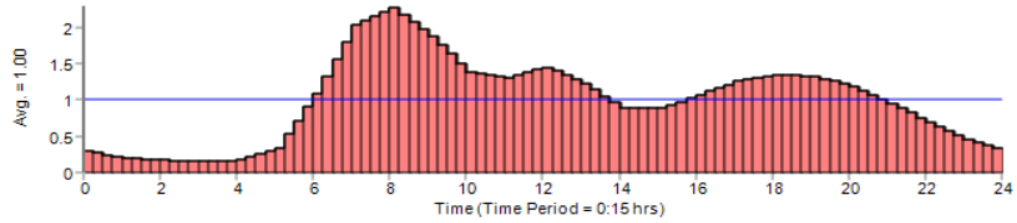
Maven BOP	Job Number J00606	Sheet 4	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: Fire Water Demand Calculations	Author SB	Date 24/06/2025	Checked NP

Fire demand for FW2 - Villas

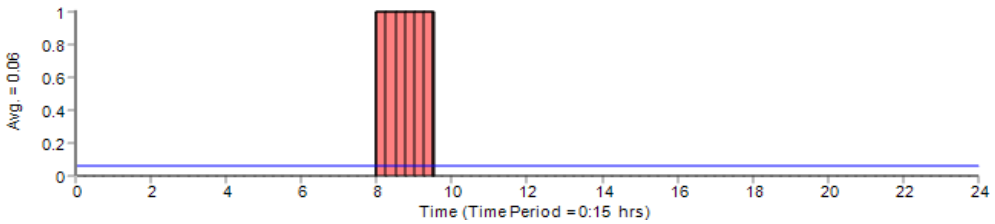
	Demand	Pipe size (ID)	Pipe Area	Velocity
Council	2301l/min	169.9mm	0.023m²	1.69m/s
Stage 1	1645l/min	106mm	0.009m²	3.10m/s
Stage 2	1648l/min	106mm	0.009m²	3.11m/s
Stage 3	1648l/min	106mm	0.009m²	3.11m/s
Stage 4	1653l/min	106mm	0.009m²	3.12m/s
Stage 5	1651l/min	106mm	0.009m²	3.11m/s
Stage 6	1648l/min	106mm	0.009m²	3.11m/s
Stage 7	1650l/min	106mm	0.009m²	3.11m/s
Stage 8	1653l/min	106mm	0.009m²	3.12m/s
Stage 9	1607l/min	106mm	0.009m²	3.03m/s

Fire demand for FW2 - Age care Hospital and facilities
Age Care Hospital and facilities will need their own sprinkler design, that can be connected into the main network
Network to adhere to minimum pressure per FH of 100kPA @ 750l/min
Allow 2x FH at 750l/min per FH and 1x 750l/min sprinklers
Alternatively 1x FH (750l/min) + 1500l/min sprinklers

Domestic Pattern demand will be include in the EPANET model



Fire Pattern demand will be include in the EPANET model, 60min



PE100 Pipe Dimensions

Standard AS/NZS 4130

	PN10 SDR 17					PN12.5 SDR 13.6			
Nominal Size	Mean OD	Mean Bore	T Min	T Max	Mass kg/m	Mean Bore	T Min	T Max	Mass kg/m
20	20.2	16.7	1.6	1.9	0.096	16.7	1.6	1.9	0.096
25	25.2	21.7	1.6	1.9	0.122	21.1	1.9	2.2	0.142
32	32.2	28.1	1.9	2.2	0.184	27.0	2.4	2.8	0.230
40	40.2	35.0	2.4	2.8	0.292	33.8	3.0	3.4	0.353
50	50.3	43.9	3.0	3.4	0.450	42.4	3.7	4.2	0.546
63	63.3	55.2	3.8	4.3	0.716	53.3	4.7	5.3	0.870
75	75.4	65.8	4.5	5.1	1.011	63.7	5.5	6.2	1.214
90	90.5	79.0	5.4	6.1	1.454	76.5	6.6	7.4	1.744
110	110.5	96.5	6.6	7.4	2.162	93.3	8.1	9.1	2.615
125	125.6	109.9	7.4	8.3	2.759	106.1	9.2	10.3	3.371
140	140.7	123.1	8.3	9.3	3.464	118.9	10.3	11.5	4.223
160	160.8	140.7	9.5	10.6	4.522	135.9	11.8	13.1	5.512
180	180.9	158.3	10.7	11.9	5.720	152.8	13.3	14.8	6.996
200	200.9	175.8	11.9	13.2	7.055	169.9	14.7	16.3	8.577
225	226.1	197.8	13.4	14.9	8.951	191.1	16.6	18.4	10.895
250	251.2	220.0	14.8	16.4	10.969	212.4	18.4	20.4	13.421

RITS

6.1.3 Level of Service

6.1.3.1 **On Demand Water Supply Area**

The design of the network shall conform to the Code of Practice for Fire Fighting Water Supplies (SNZ PAS 4509), and shall be such that a water supply connection can be provided for each lot.

The water supply network shall achieve the following standards:

a) The residual pressure and flow at point of supply to residential lots shall be a minimum of 200 kPa (20m) and 25 L/min. Some specific areas may require a higher Level of Service – check with the relevant Council.

b) The minimum fire supply service level shall be FW2 for residential areas and FW3 for all other areas. Some specific areas may require a higher level of service.

c) To protect level of service of new subdivisions, no more than 150 residential Lots shall be serviced, at any point from a single ended 150mm diameter watermain (unless water modelling proves that DN100 will be sufficient, but then no more than 40 residential lots). Connectivity of the water network is to be confirmed prior to further lots being brought forward for 224(c) release.

For the purpose of pipeline design, the maximum static pressure at ground level for each lot shall be considered to be 1000 kPa. Therefore the design pressure range for specific pipeline design is 100 kPa to 1000 kPa (10-100m).

NZS 4404:2010

Table 6.2 – Empirical guide for principal main sizing

Nominal diameter of main DN	Capacity of main (single direction feed only)			
	Residential (lots)	Rural residential (lots)	General/light industrial (ha)	High usage industrial (ha)
100	40	10	–	–
150	160	125	23	–
200	400	290	52	10
225	550	370	66	18
250	650	470	84	24
300	1000	670	120	35
375	1600	1070	195	55

6.3.7 Flow velocities

In practice it is desirable to avoid unduly high or low flow velocities. Pipelines shall be designed for flow velocities within the range of 0.5 to 2.0 m/s. In special circumstances, velocities of up to 3.0 m/s may be acceptable.

For pumping mains an economic appraisal may be required to determine the most economical diameter of pumping main to minimise the combined capital and discounted pumping cost. The resulting velocity will normally lie in the range 0.8 m/s to 3.0 m/s.

The following factors shall be considered in determining flow velocity:

(a) Stagnation;

(b) Turbidity (large fluctuations in flow rates can dislodge the biological slime or stir up settled solids in pipelines);

(c) Pressure;

(d) Surge;

(e) Pumping facilities;

(f) Pressure reducing devices;

(g) Pipe lining materials.

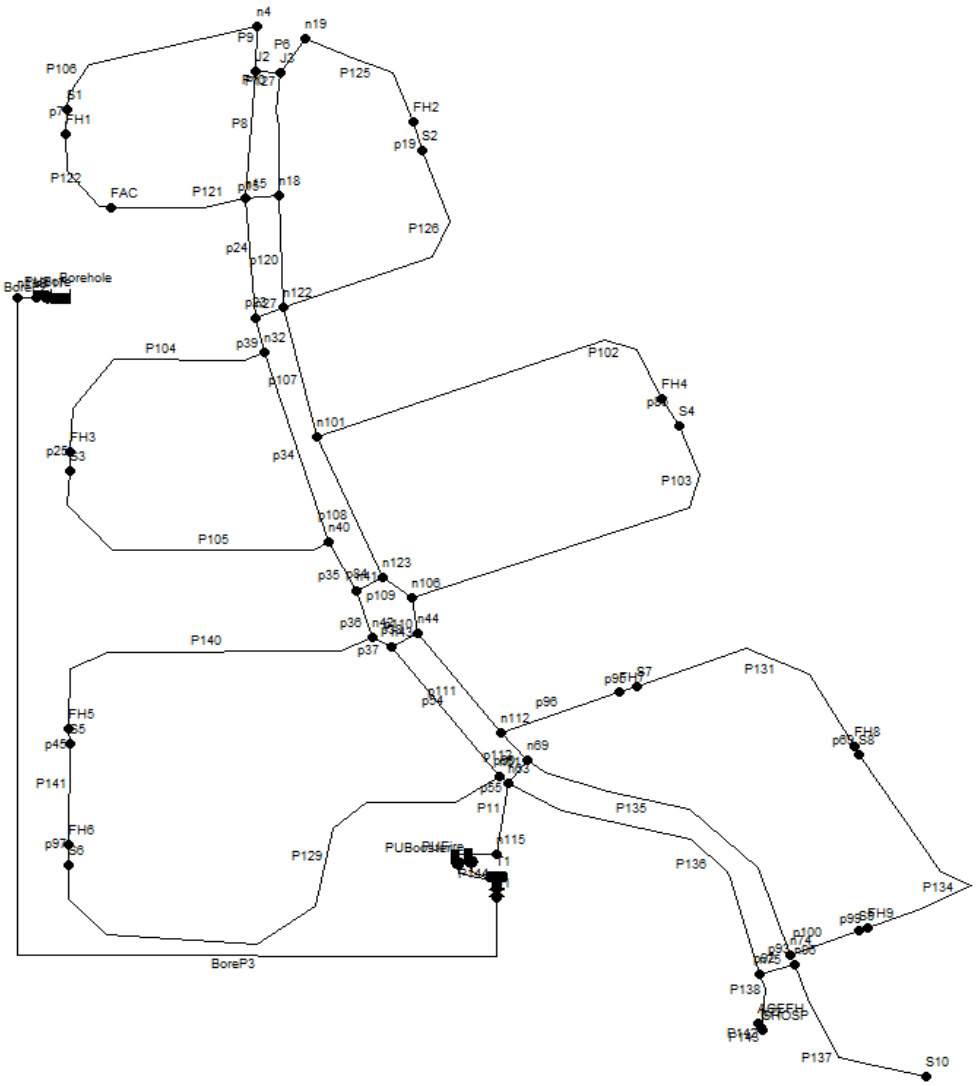
Following will be consider in the model
Borehole water, with a borehole pump to feed into tanks and ensure able to meet the demand
For water age, we consider using the RITS demand. The water age is less than 45hours
For pipe sizing we consider NZS 3500 with Fire demand

Maven BOP				Job Number J00606	Sheet 5	Rev A
Job Title	Ashbourne Retirement Village, Matamata			Author	Date	Checked
Calc Title	Water storage			SB	24/06/2025	NP

	Nr of Villas	Villas	Facility	Agecare	Water useage	Fire Demand	2x Day Water Tank size
Stage 1	25	13.0m³/day	7.5m³/day	0.0m³/day	20.5m³/day	90.0m³	131.m³
Stage 2	52	27.0m³/day	7.5m³/day	0.0m³/day	34.5m³/day		159.1m³
Stage 3	80	41.6m³/day	15.0m³/day	0.0m³/day	56.6m³/day		203.2m³
Stage 4	107	55.6m³/day	15.0m³/day	0.0m³/day	70.6m³/day		231.3m³
Stage 5	133	69.2m³/day	15.0m³/day	0.0m³/day	84.2m³/day		258.3m³
Stage 6	158	82.2m³/day	15.0m³/day	0.0m³/day	97.2m³/day		284.3m³
Stage 7	182	94.6m³/day	22.5m³/day	0.0m³/day	117.1m³/day		324.3m³
Stage 8	207	107.6m³/day	22.5m³/day	0.0m³/day	130.1m³/day		350.3m³
Stage 9	218	113.4m³/day	22.5m³/day	0.0m³/day	135.9m³/day		361.7m³
Stage 10	220	114.4m³/day	22.5m³/day	45.4m³/day	182.3m³/day		454.5m³

We will be using Heavy Duty Devan Tanks for water storage
Tansman tank can be consider in detail design

	Maven BOP	Job Number J00606	Sheet 6	Rev A
Job Title Calc Title	Ashbourne Retirement Village, Matamata EPANET Model	Author SB	Date 24/06/2025	Checked NP



EPANT V2.2

Pipe Roughness use 140

Material	Hazen-Williams C (unitless)	Darcy-Weisbach ε (millifeet)	Manning's n (unitless)
Cast Iron	130 - 140	0.85	0.012 - 0.015
Concrete or Concrete Lined	120 - 140	1.0 - 10	0.012 - 0.017
Galvanized Iron	120	0.5	0.015 - 0.017
Plastic	140 - 150	0.005	0.011 - 0.015
Steel	140 - 150	0.15	0.015 - 0.017
Vitrified Clay	110		0.013 - 0.015

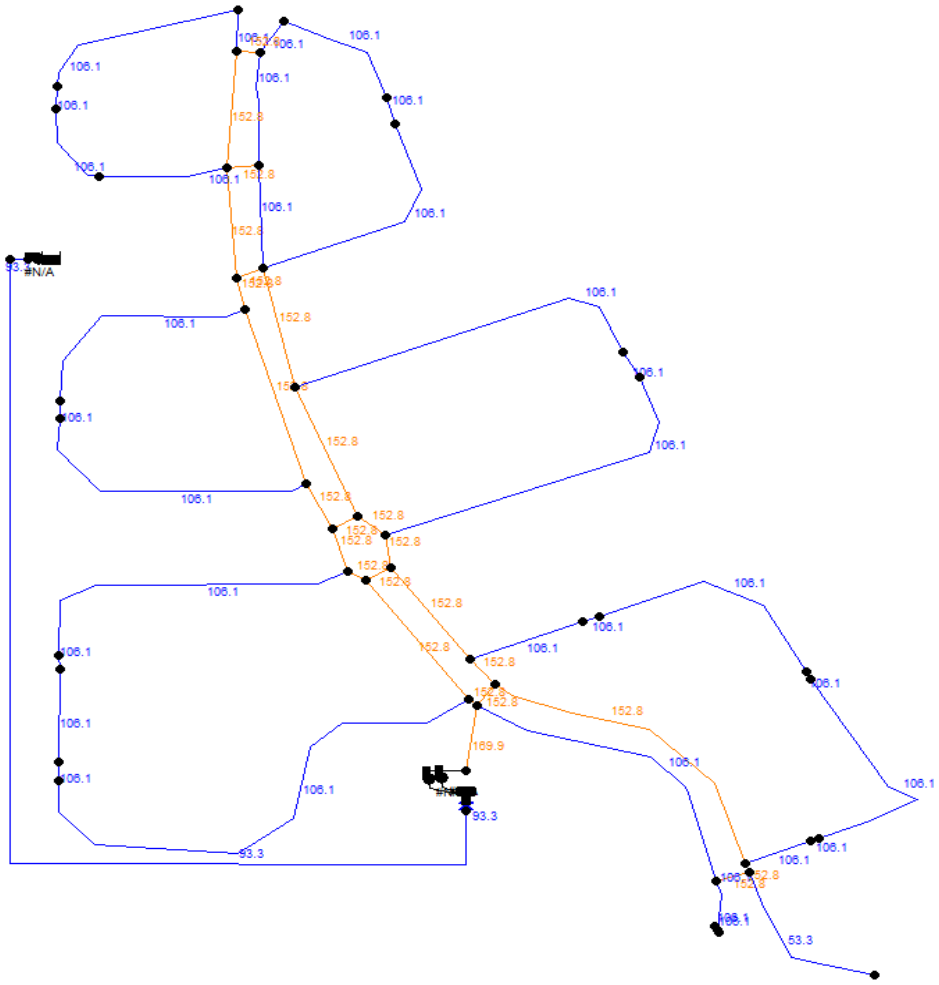
Minor Loss

Varies From 1.2 - 2.2

Valve or Fitting	Loss Coefficient
Globe valve, fully open	10.0
Angle valve, fully open	5.0
Swing check valve, fully open	2.5
Gate valve, fully open	0.2
Short-radius elbow	0.9
Medium-radius elbow	0.8
Long-radius elbow	0.6
45 degree elbow	0.4
Closed return bend	2.2
Standard tee −flow through run	0.6
Standard tee−flow through branch	1.8
Square entrance	0.5
Exit	1.0

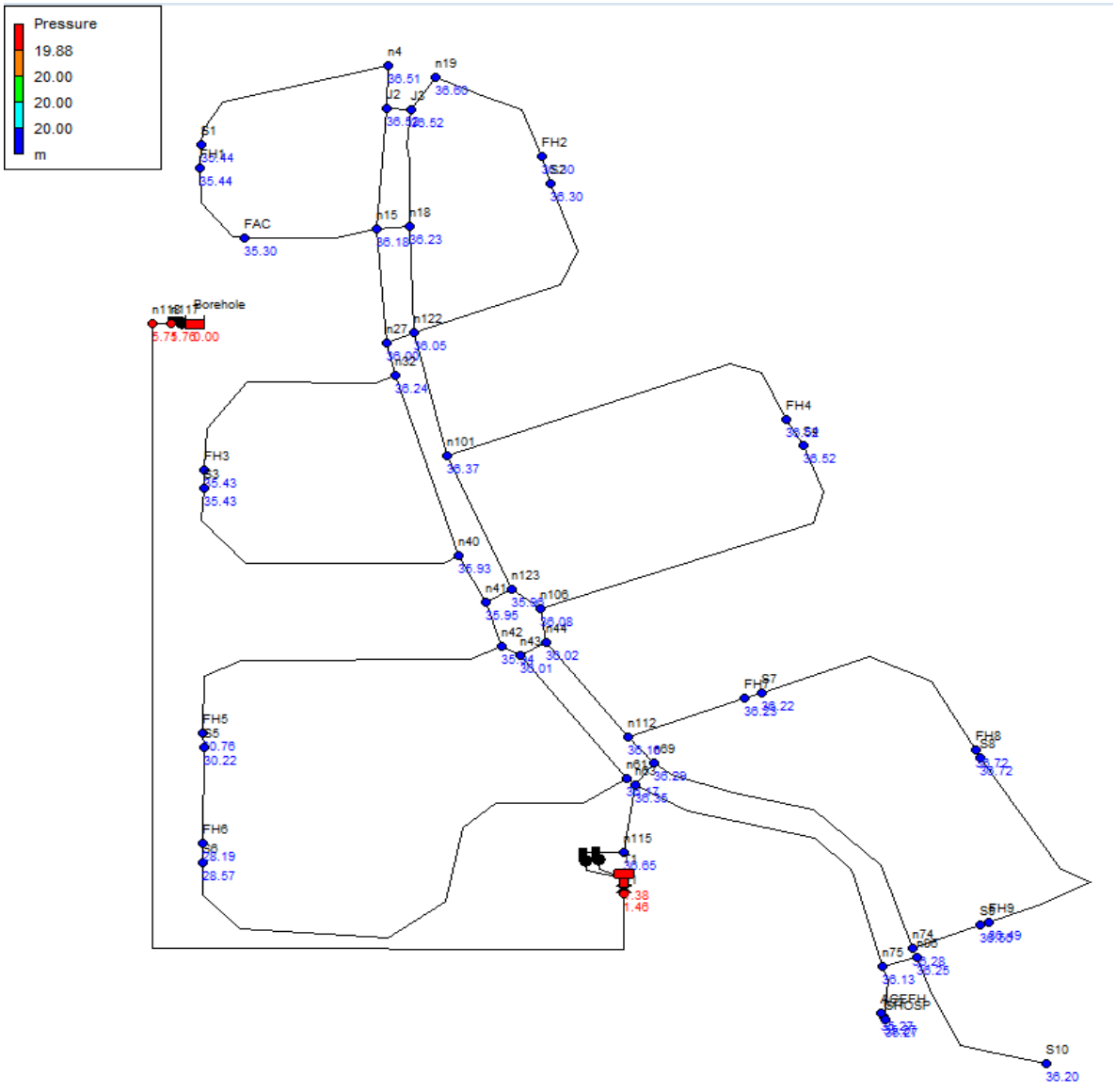
Maven BOP	Job Number J00606	Sheet 7	Rev A
Job Title: Ashbourne Retirement Village, Matamata Calc Title: EPANET Model : Pipe Size	Author SB	Date 24/06/2025	Checked NP

Pipe size



Maven BOP		Job Number J00606	Sheet 8	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	EPANET Model : Pressure Fire	SB	24/06/2025	NP

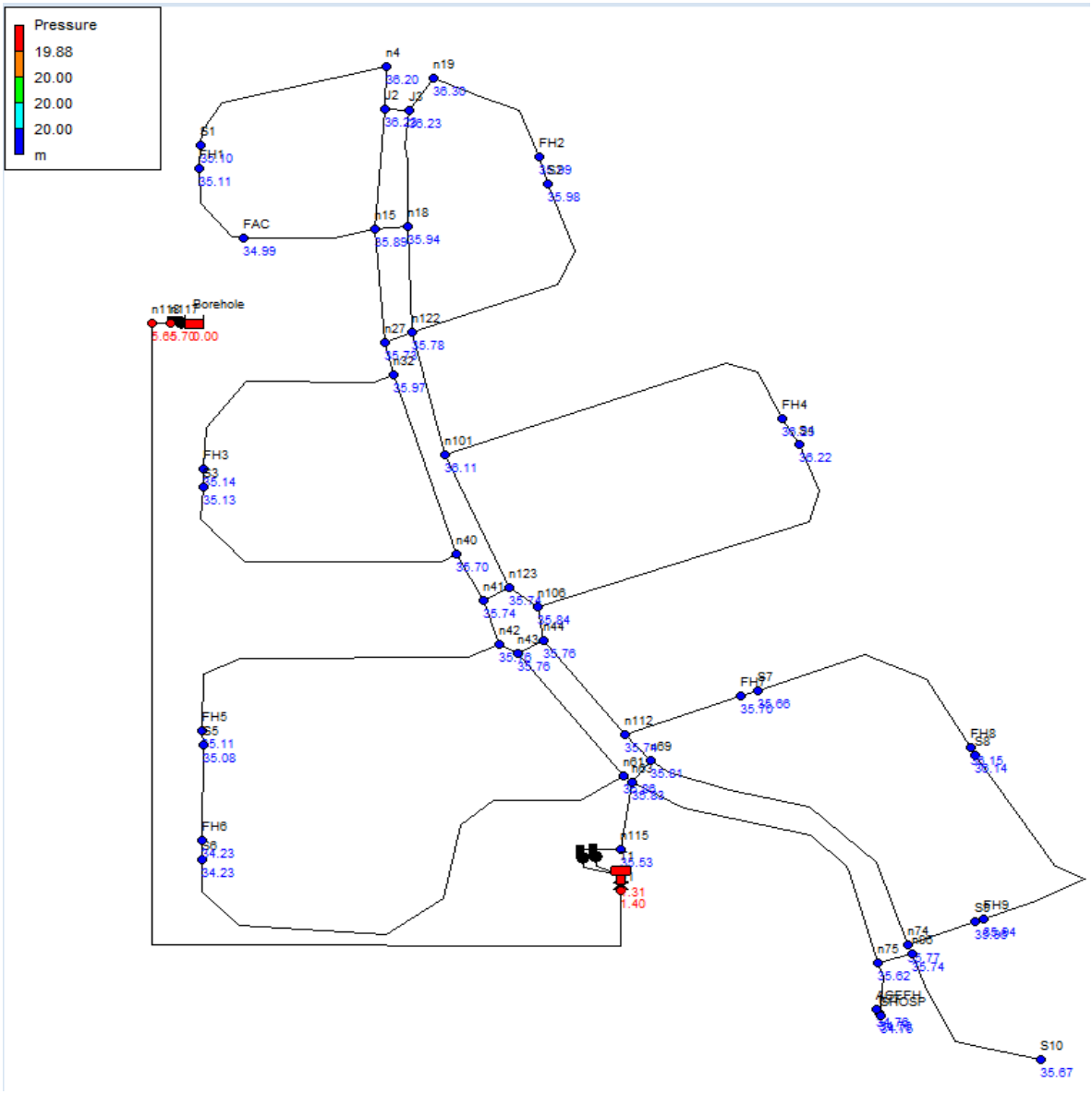
The model consider the worst pressure in the network
The model was considered for 2/3 domestic, facility and agecare with full fire,
refer to SNZ PAS 4509:2008



The lowest pressure will be if 2x FH be used in stage 6 + peak demand with domestic
28.57m head > 20m head domestic,

Maven BOP		Job Number J00606	Sheet 9	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	EPANET Model : Pressure Normal	SB	24/06/2025	NP

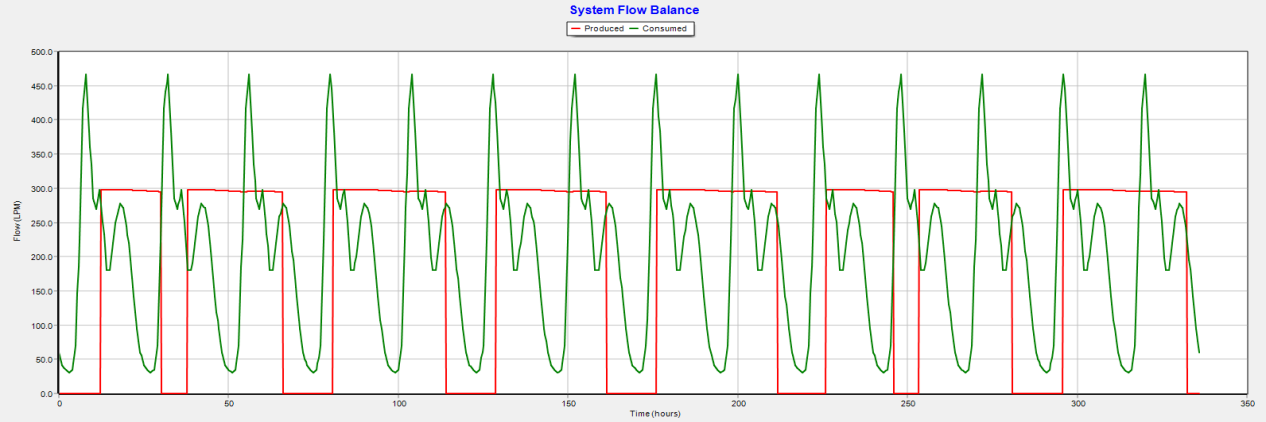
The model was considered only domestic, facility and agecare



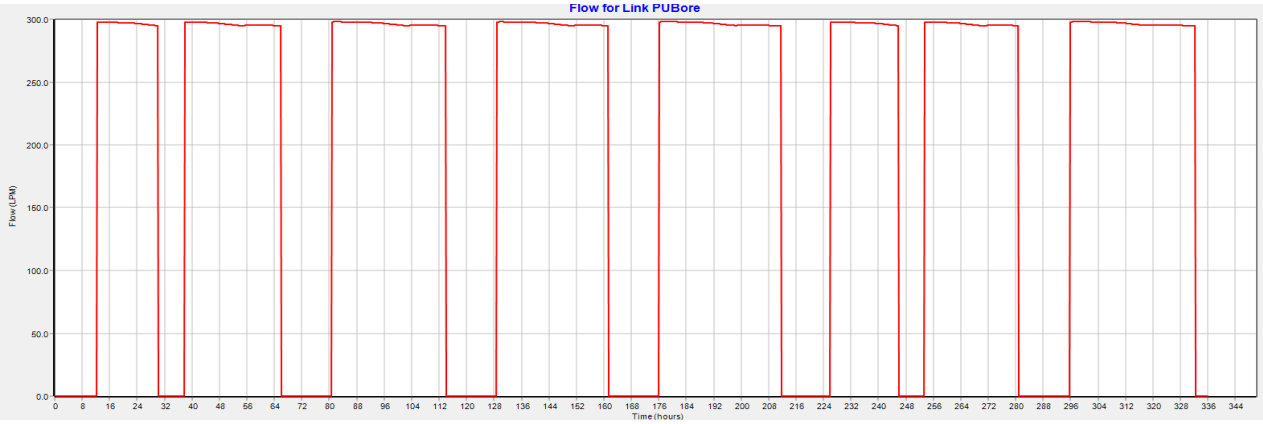
34.23m head > 20m head domestic,

	Maven BOP	Job Number J00606	Sheet 10	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	EPANET Model : Water age	SB	24/06/2025	NP

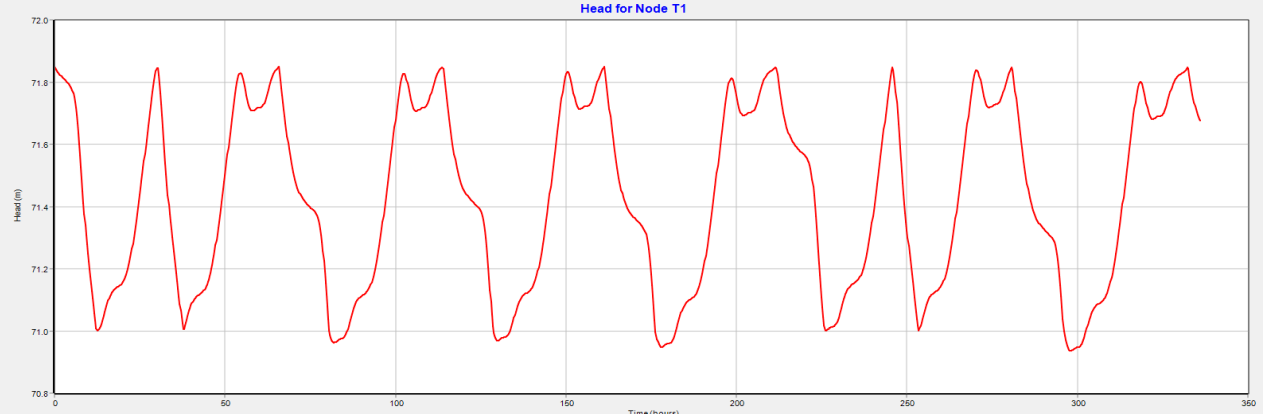
The water age was done over a 14 days to get an accurate water age
This model was using RITS model



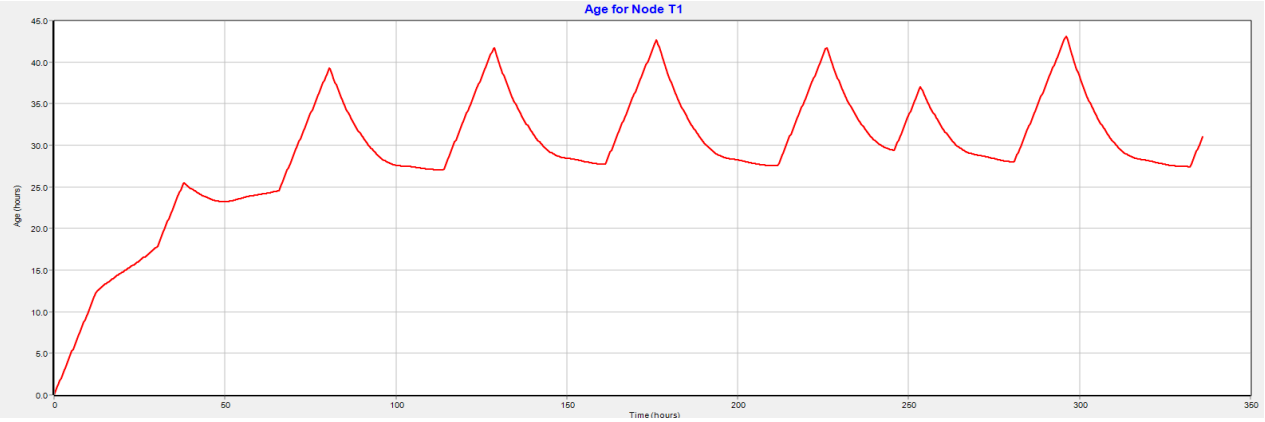
Borehole pump



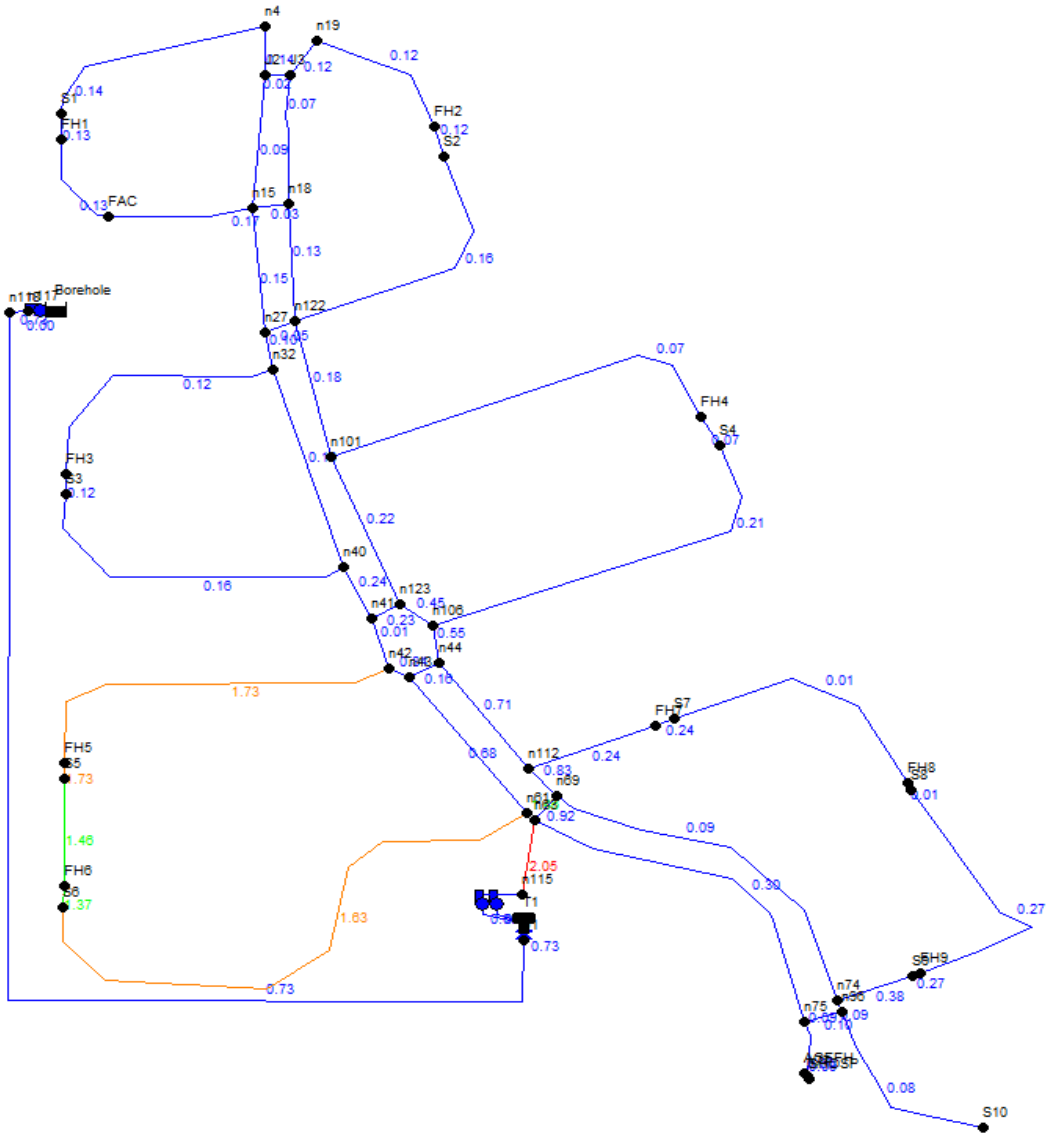
Tanks storage head



	Maven BOP	Job Number J00606	Sheet 11	Rev A
Job Title	Ashbourne Retirement Village, Matamata	Author	Date	Checked
Calc Title	EPANET Model : Water age	SB	24/06/2025	NP



Maven BOP	Job Number J00606	Sheet 12	Rev A
Job Title Calc Title Ashbourne Retirement Village, Matamata EPANET Model : Velocity	Author SB	Date 24/06/2025	Checked NP



Summary

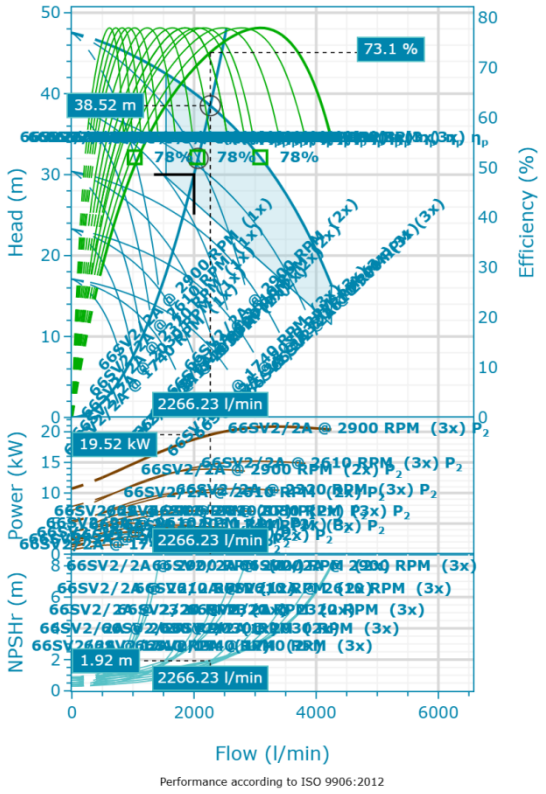
A comprehensive assessment of the council's water main has confirmed that boreholes and storage tanks have sufficient pressure to support the development up to Stage 10, including all associated fire flow requirements. The pipe network has been strategically designed and sized to achieve an optimal balance between economic efficiency and long-term scalability. This approach ensures that the system meets current demands while allowing for seamless future expansion. By implementing a well-planned and cost-effective water infrastructure, we are delivering a reliable and sustainable solution that supports the continued growth and resilience of the development.

xylem
Let's Solve Water

66SV2/2AG075T/D

Created On: 6/18/25

66SV2/2AG075T/D | Configuration Summary



Performance according to ISO 9906:2012

The Lowara e-SV vertical multistage pump is a highly reliable and technologically advanced multipurpose pump. It's capable of satisfying the needs of a wide variety of users and many different construction designs are available. The e-SV range feature models in eleven sizes with 1-3-5-10-15-22-33-46-66-92-125 m³/h nominal capacities.

PUMP

Installation	Pump Size
Complete Pump	66SV

MATERIALS

Pump Body Material	Impeller Material
Cast Iron	Stainless Steel (AISI 316L)

SEAL

Type of Seal	Rotating Face
Mechanical Seals	Silicon Carbide
Name	**Stationary Face**
Q1BEGG	Resin Impregnated Carbon
	Elastomers
	EPDM
	Springs
	AISI 316
	Metal Components
	AISI 316

STANDARD OPTIONS

PTC Sensor	Special Configuration
No	Please Select

MOTOR

Vendor	Power
Lowara PLM	7.5 kW
Frequency (Hz)	**Phase (~)**
50	3
Poles	**Voltage**
2	380-415/660-690 V
Efficiency	**Frame Size**
IE3	132 S

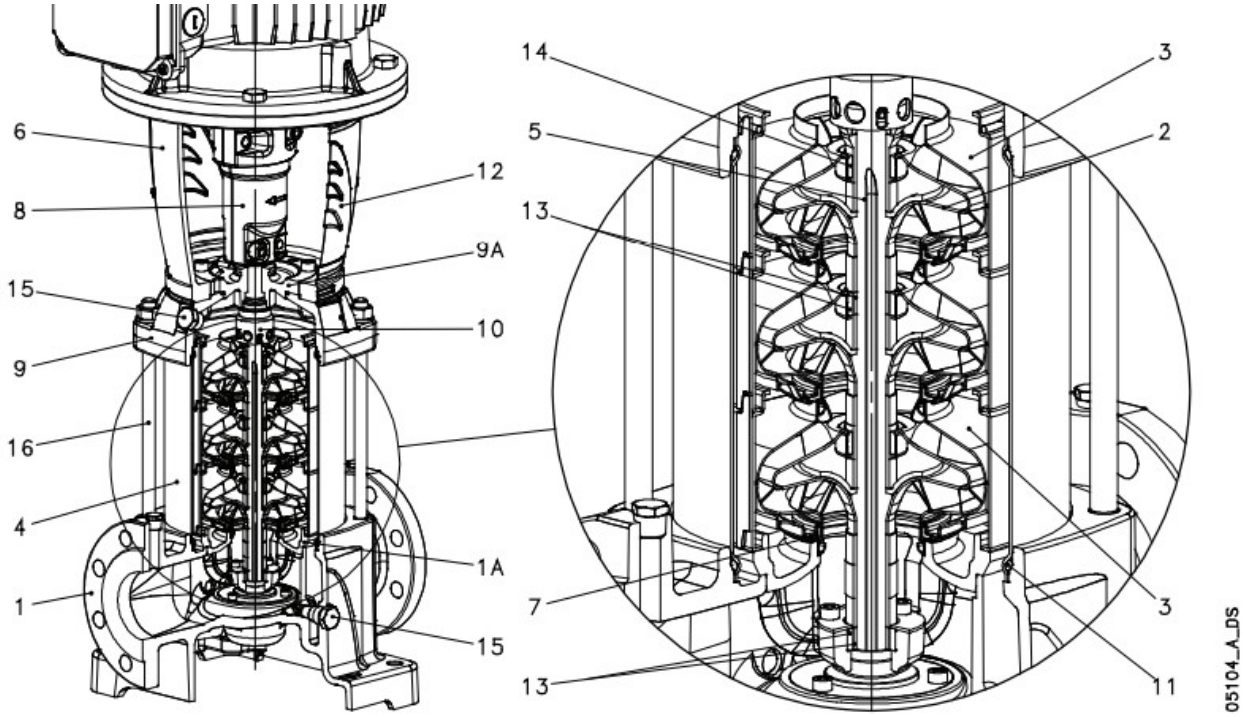
FLANGE

Flange

[G] = Round Flanges (AISI 304/Cast Iron)

Project:	Created By:	Created On:	Last Update:
66SV2/2AG075T/D	Niel Koegelenberg	6/18/25	-

66SV2/2AG075T/D | Product Details



Construction Materials

Pump body (1)
Cast iron / ASTM Class 35

Lower support (1A)
Cast iron / ASTM Class 35

Impeller (2)
Stainless steel / AISI 316L

Diffuser (3)
Stainless steel / AISI 304

Fill / Drain plugs (15)
Stainless steel / AISI 316

Tie rods (16)
Galvanized steel

Outer sleeve (4)
Stainless steel / AISI 304

Shaft (5)
Stainless steel / AISI 431

Adapter (6)
Cast Iron / ASTM Class 25

Wear ring (7)
Technopolymer PPS

Coupling (8)
Cast Iron / ASTM Class 25

Upper head (9)
Cast iron / ASTM Class 35

Seal housing (9A)
Cast iron / ASTM Class 35

Mechanical seal (10)
See Seal section

Elastomers (11)
See Seal section

Coupling protection (12)
Stainless steel / AISI 304

Shaft sleeve and bushing (13)
Tungsten carbide

Bushing for diffuser (14)
Carbon

Motor

Motor Name
PLM 132 B5 7.5 kW

Design
IM B5

Standard
IEC

Shaft Diameter
38 mm

L Shaft
80 mm

Phase
3

Rated power
7.5 kW

Service Factor
1

Voltage
380-415/660-690 V

Speed
2,920 rpm

IE Class
IE3

Enclosure
IP 55

Efficiency (%)
90.6

cos phi
0.85

Rated Current
14.1-8.16 A

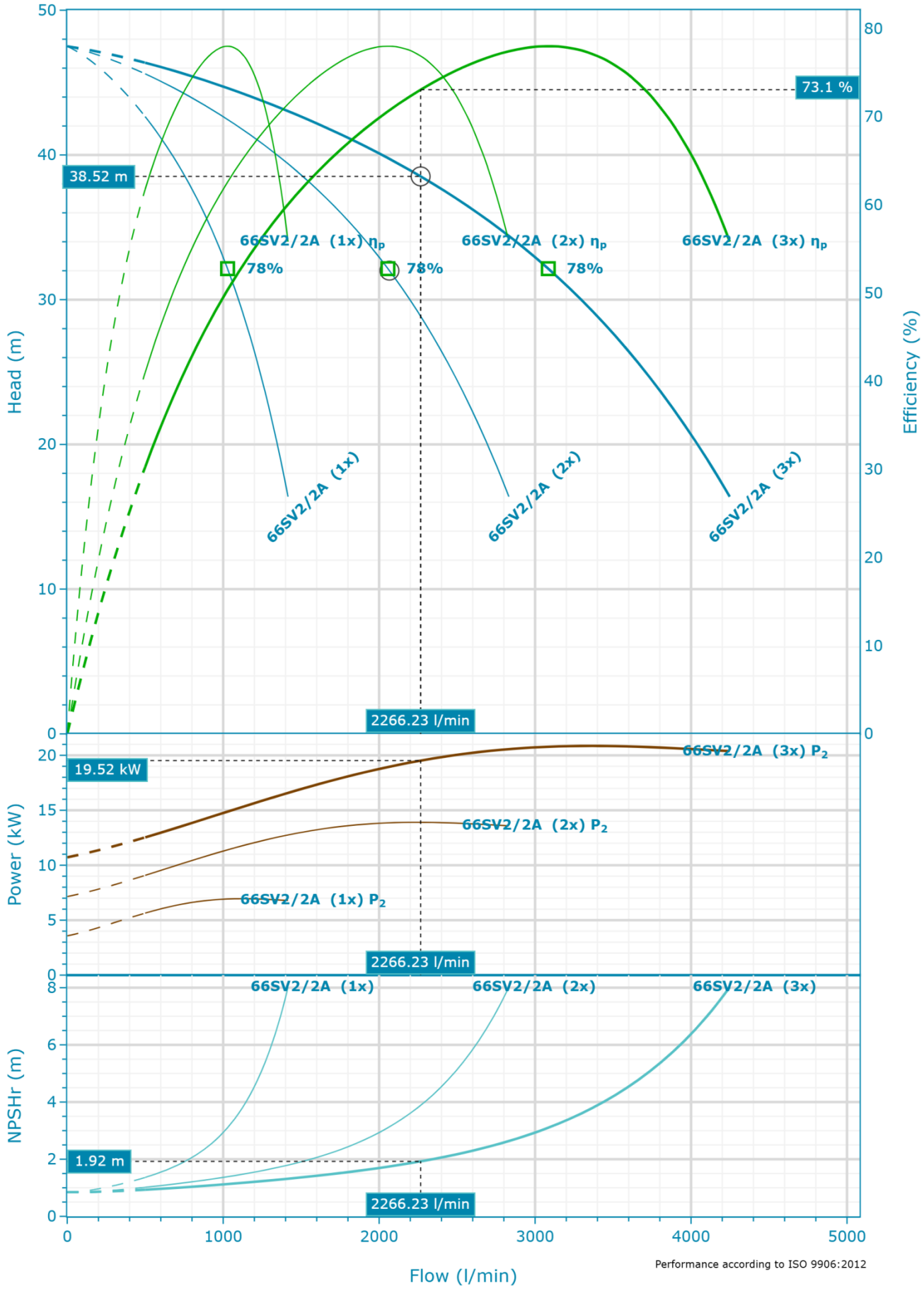
Frame Size
132 S

ICL
F

Start Mode
Star-delta

Motor Vendor
PLM

66SV2/2AG075T/D | Hydraulic Data & Performance Curve



Project:	Created By:	Created On:	Last Update:
66SV2/2AG075T/D	Niel Koegelenberg	6/18/25	-

Selection

Series e-SV	Pump Flow 1,000.00 l/min
Name 66SV2/2A 2900rpm	Pump Head 30.00 m
Stages 2	Acceptance Grade Manufacturer's Standard
Frequency 50 Hz	System Type Parallel Pumps
Impeller Diameters 2x 149mm	Operating Pumps 3
Total Flow 2,000.00 l/min	Standby Pumps No Standby Pump
Total Head 30.00 m	

Fluid

Fluid Type Water	Density 1,000 kg/m³
Fluid Temperature 4 °C	Dynamic Viscosity 0.001567 Pa·s
Specific Gravity 1	Fluid Vapor Pressure 8.135 mbar

Design Point - Single Pump

Flow (1x) 755.41 l/min	NPSHr (1x) 1.92 m
Head (1x) 38.52 m	Flow To BEP Ratio (1x) 73.5 %
Pump Efficiency (1x) 73.06 %	
Shaft power (P2) (1x) 6.51 kW	

Design Point - System

Flow 2,266.23 l/min	NPSHR 1.92 m
Head 38.52 m	Flow To BEP Ratio 73.5 %
Pump Efficiency (ηp) 73.06 %	
Shaft power (P2) 19.52 kW	

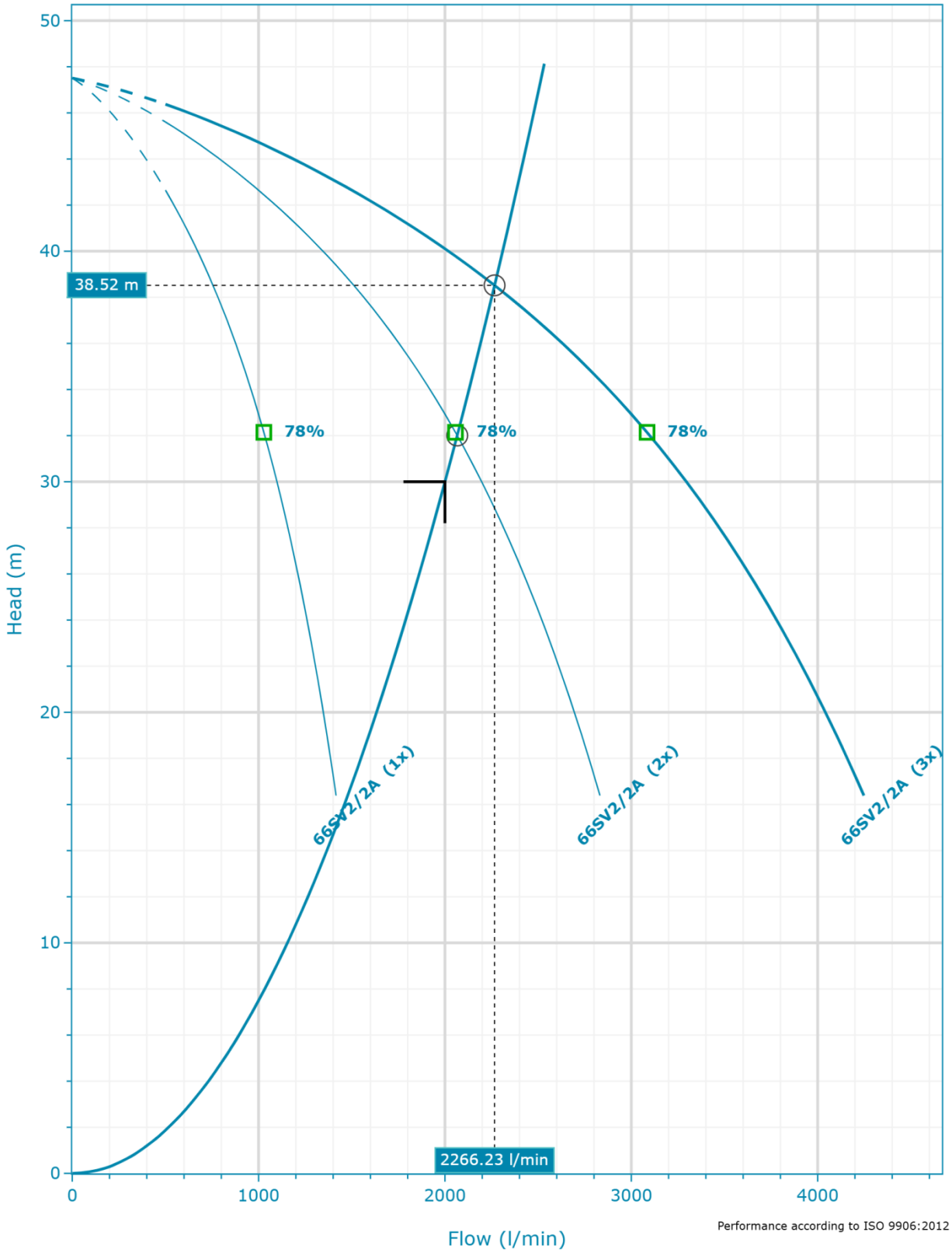
Design Curve - Single Pump

Rated Speed 2,900 RPM	BEP (1x) 78 %
Min Flow (1x) 500 l/min	BEP Flow (1x) 1,028.2 l/min
Max Flow (1x) 1,416 l/min	BEP Head (1x) 32.14 m
H@QMin (1x) 42.65 m	Max Operating Pressure (1x) 4,652.38 mbar
H@QMax (1x) 16.39 m	Max P2 (1x) 6.95 kW

Design Curve - System

Rated Speed 2,900 RPM	BEP 78 %
Min Flow 500 l/min	BEP Flow 3,084.6 l/min
Max Flow 4,248 l/min	BEP Head 32.14 m
H@QMin 46.37 m	Max Operating Pressure 4,652.38 mbar
H@QMax 16.39 m	Max P2 20.86 kW

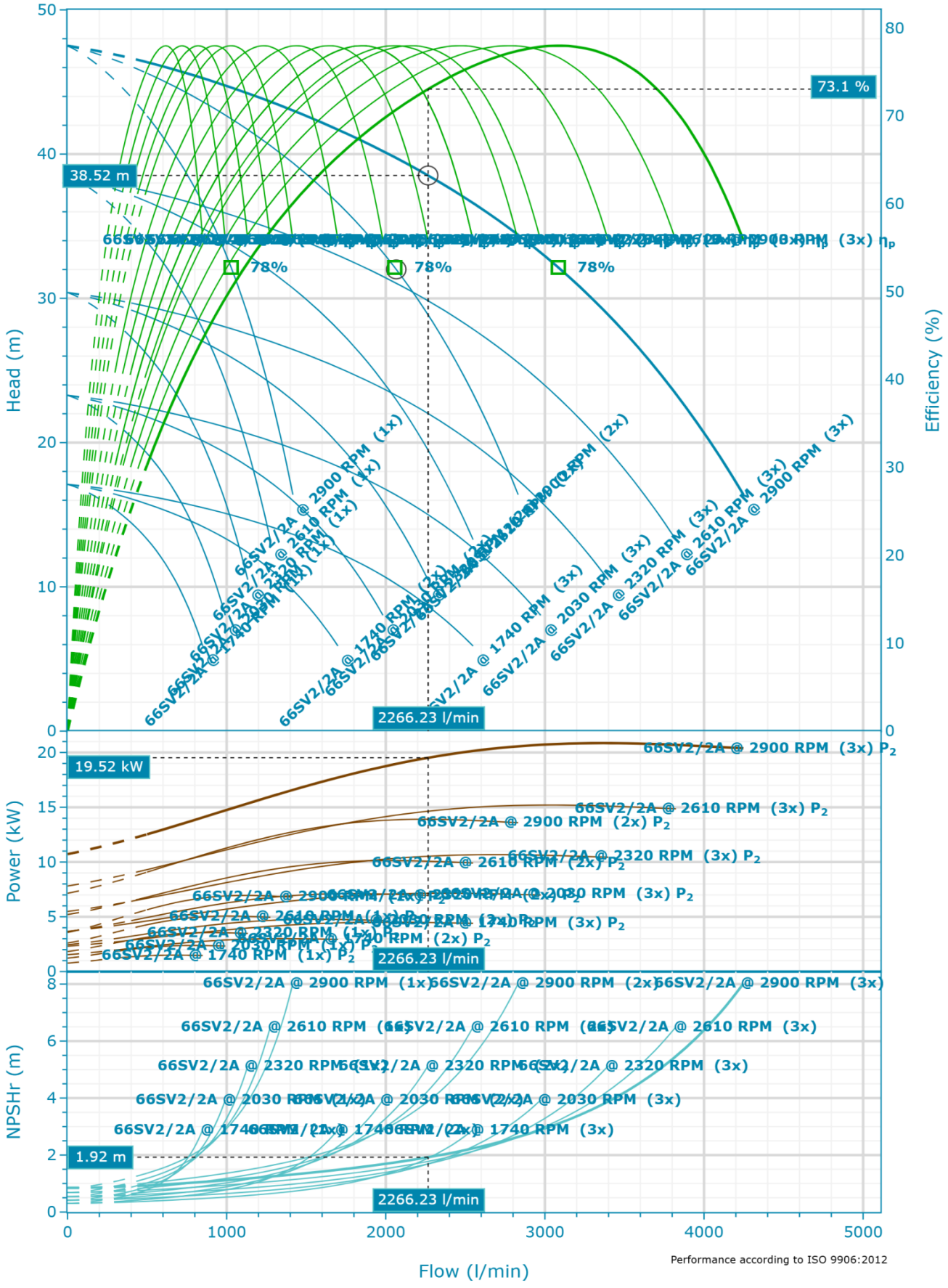
66SV2/2AG075T/D | Duty Analysis



Name	Q (1x) [l/min]	H (1x) [m]	P2 (1x) [kW]	Q [l/min]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92
DP @ 2x	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92
DP @ 3x	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92

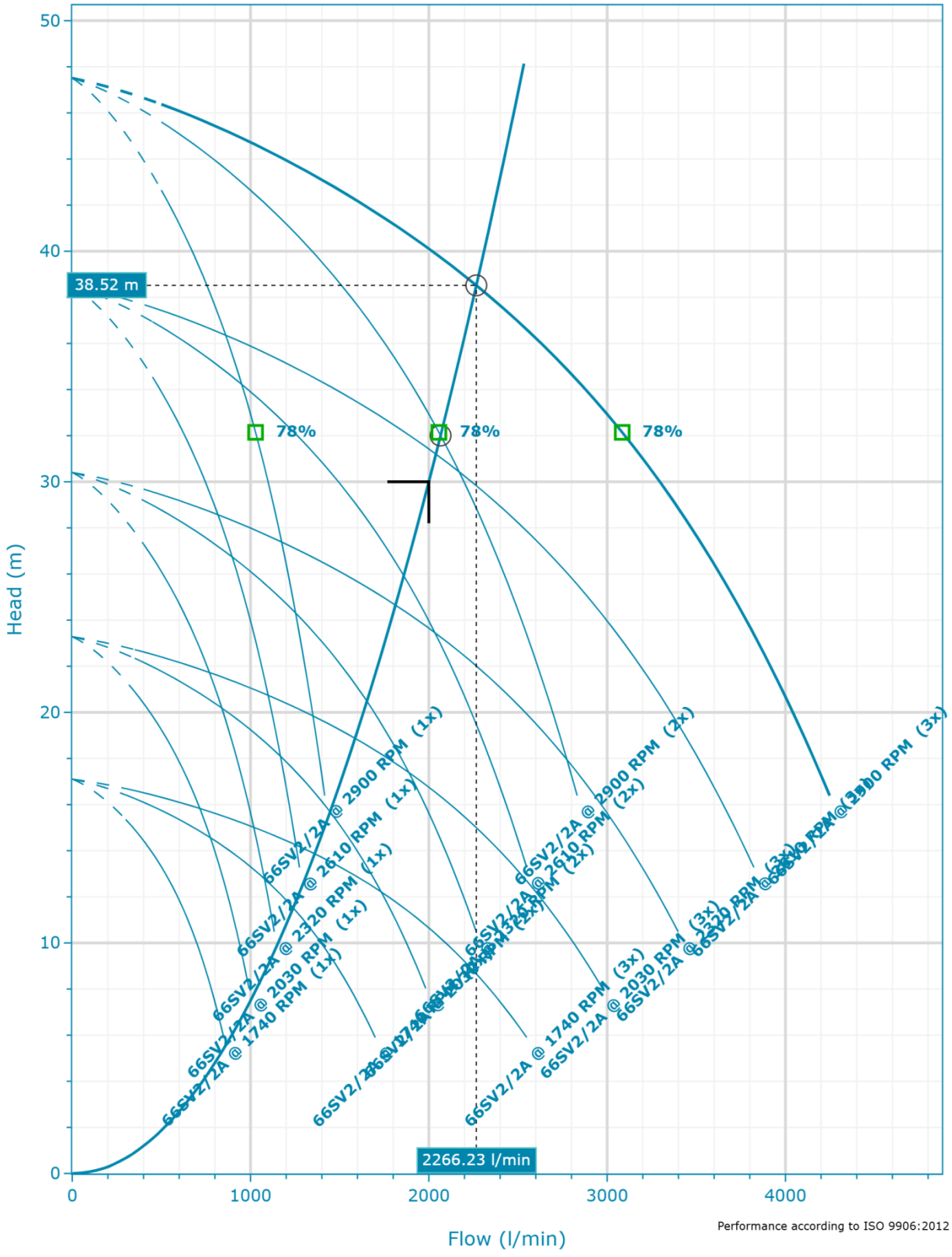
Project:	Created By:	Created On:	Last Update:
66SV2/2AG075T/D	Niel Koegelenberg	6/18/25	-

66SV2/2AG075T/D | Variable Speed Curve



Project:	Created By:	Created On:	Last Update:
66SV2/2AG075T/D	Niel Koegelenberg	6/18/25	-

66SV2/2AG075T/D | Variable Speed Analysis

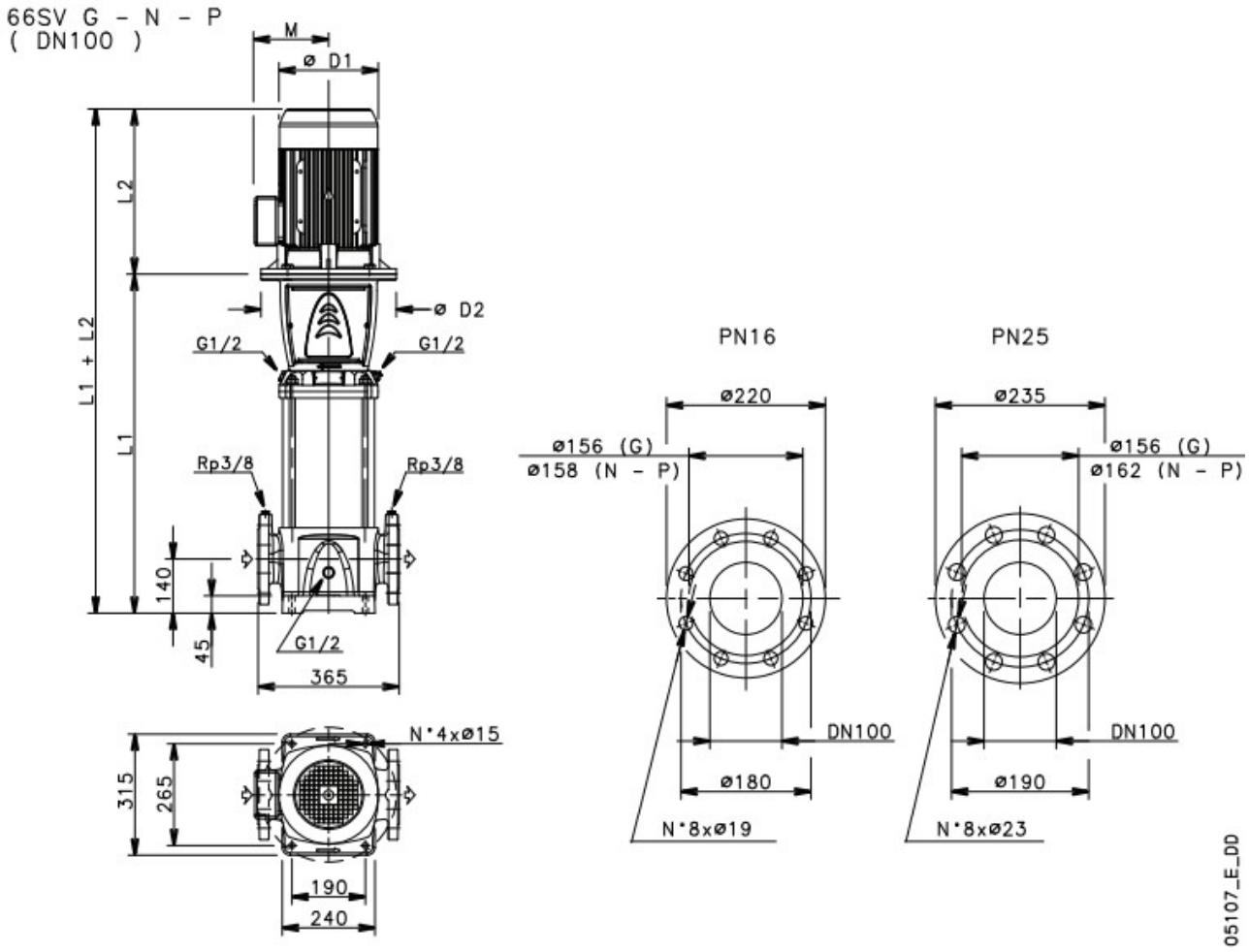


Name	Speed	Q (1x) [l/min]	H (1x) [m]	P2 (1x) [kW]	Q [l/min]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	1,740 RPM	453.25	13.87	1.41	1,359.74	13.87	4.22	73.06	0	0.69
DP @ 1x	2,030 RPM	528.79	18.87	2.23	1,586.36	18.87	6.7	73.06	0	0.94
DP @ 1x	2,320 RPM	604.33	24.65	3.33	1,812.99	24.65	9.99	73.06	0	1.23
DP @ 1x	2,610 RPM	679.87	31.2	4.74	2,039.61	31.2	14.23	73.06	0	1.56

Project:	Created By:	Created On:	Last Update:
66SV2/2AG075T/D	Niel Koegelenberg	6/18/25	-

DP @ 1x	2,900 RPM	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92
DP @ 2x	1,740 RPM	453.25	13.87	1.41	1,359.74	13.87	4.22	73.06	0	0.69
DP @ 2x	2,030 RPM	528.79	18.87	2.23	1,586.36	18.87	6.7	73.06	0	0.94
DP @ 2x	2,320 RPM	604.33	24.65	3.33	1,812.99	24.65	9.99	73.06	0	1.23
DP @ 2x	2,610 RPM	679.87	31.2	4.74	2,039.61	31.2	14.23	73.06	0	1.56
DP @ 2x	2,900 RPM	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92
DP @ 3x	1,740 RPM	453.25	13.87	1.41	1,359.74	13.87	4.22	73.06	0	0.69
DP @ 3x	2,030 RPM	528.79	18.87	2.23	1,586.36	18.87	6.7	73.06	0	0.94
DP @ 3x	2,320 RPM	604.33	24.65	3.33	1,812.99	24.65	9.99	73.06	0	1.23
DP @ 3x	2,610 RPM	679.87	31.2	4.74	2,039.61	31.2	14.23	73.06	0	1.56
DP @ 3x	2,900 RPM	755.41	38.52	6.51	2,266.23	38.52	19.52	73.06	0	1.92

66SV2/2AG075T/D | Dimensional Data & Drawing



Dimensions

D1
256 mm

D2
300 mm

L1
664 mm

L2
367 mm

M
191 mm

Weight (Pump Only)
77 kg

Total Weight
133 kg

Company	Brown Brothers Engineers
Contact	Niel Koegelenberg
Phone No.	0273100851
Email	niel.koegelenberg@brownbros.co.nz

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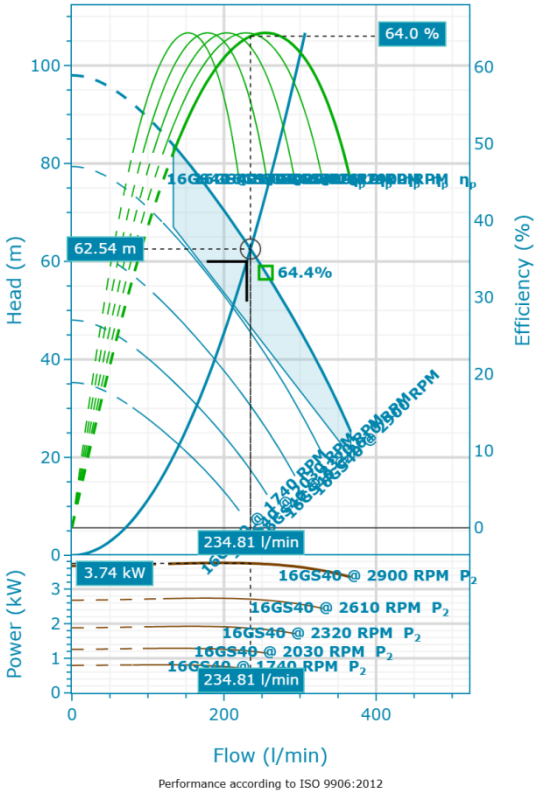
16GS40T-L4C

Created On: 6/18/25

16GS40T-L4C | Configuration Summary

Submersible multistage centrifugal 4 inch pumps suitable for clean water. High content of AISI 304 stainless steel. The floating impeller design ensures an excellent resistance to wear



PUMP

Installation	Stages
Liquid End + Motor	21

MATERIALS

Construction

Stainless Steel

STANDARD OPTIONS

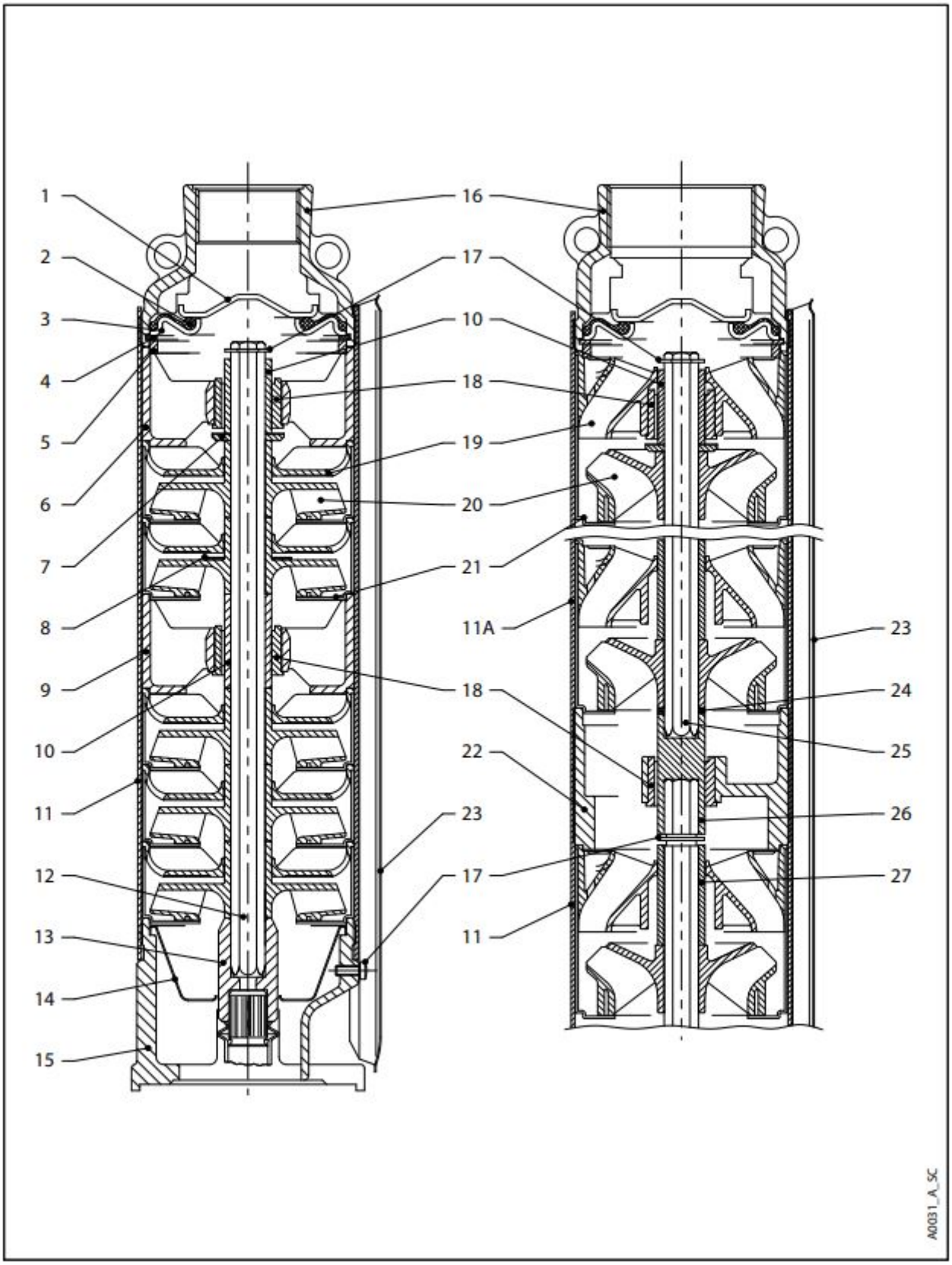
Cable Length

3 m

MOTOR

Frequency	Power
50	4 kW
Poles	**Phase (~)**
2	3
Motor Type	**Voltage**
Canned	220-240 V

16GS40T-L4C | Product Details



Construction Materials

Valve Cap (1)
Stainless steel / AISI 304

Valve Gasket (2)
NBR

Adapter Ring (5)
Technopolymer PPO

Upper Bush Bracket (6)
Technopolymer PPO

Intermediate Bush Bracket (9)
Technopolymer PPO

Shaft Sleeve (10)
Stainless steel / AISI 304

Pump Shaft (12)
Stainless steel / AISI 304

Coupling (13)
Stainless steel / AISI 304

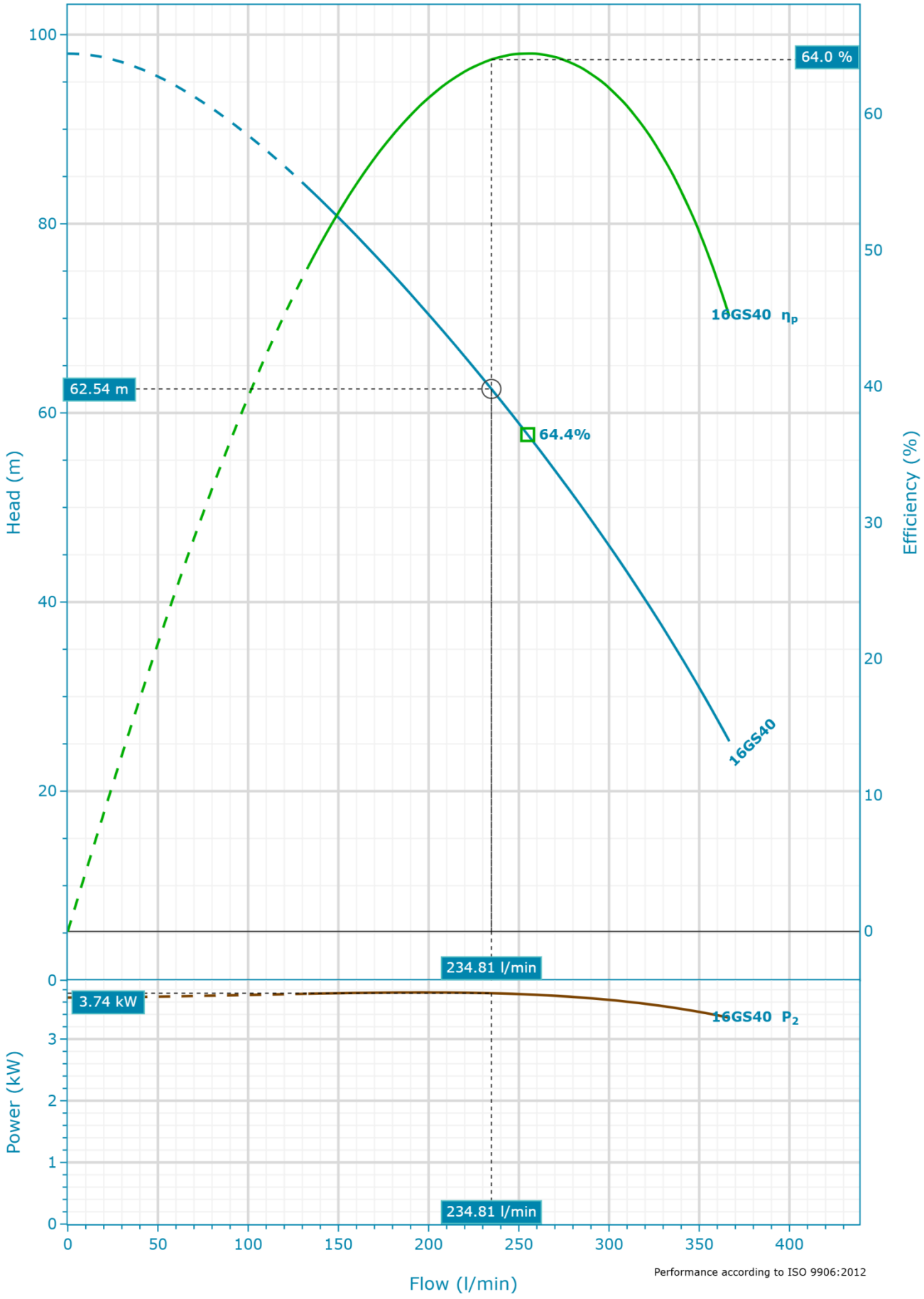
Project:	Created By:	Created On:	Last Update:
16GS40T-L4C	Niel Koegelenberg	6/18/25	-

Valve Flange (3) Stainless steel / AISI 304	Thrust Bearing (7) Stainless steel / AISI 304	Sleeve (11) Stainless steel / AISI 304	Strainer (14) Stainless steel / AISI 304
Valve Locking Ring (4) Stainless steel / AISI 302	Washer (8) Stainless steel / AISI 304	Upper Sleeve (11A) Stainless steel / AISI 304	Motor Adapter (15) Stainless steel / CF-8 ASTM A473
Discharge Head (16) Stainless steel / CF-8 ASTM A473	Impeller (20) Technopolymer PPO	Shim (24) Stainless steel / AISI 304	
Screws, Nuts, Washers (17) Stainless steel / AISI 316	Bowl (21) Stainless steel / AISI 304	Upper Pump Shaft (25) Stainless steel / AISI 304	
Bush (18) Technopolymer PU	Intermediate Bush Bracket (22) Stainless steel / CF-8 ASTM A473	Intermediate Coupling (26) Stainless steel / AISI 316	
Diffuser (19) Technopolymer PPO	Cable Guard (23) Stainless steel / AISI 304	Spacer (27) Stainless steel / AISI 304	

Motor

Motor Name L4C40T235	Rated power 4 kW	Service Factor 1	Speed 2,860 rpm
Phase 3	Enclosure IP 68	Voltage 220-240 V	Rated Current 16.9 A

16GS40T-L4C | Hydraulic Data & Performance Curve



Performance according to ISO 9906:2012

Project:	Created By:	Created On:	Last Update:
16GS40T-L4C	Niel Koegelenberg	6/18/25	-

Selection

Series e-GS	Pump Head 60.00 m
Name 16GS40 2900rpm	Acceptance Grade Manufacturer's Standard
Stages 21	System Type Single Pump
Frequency 50 Hz	Operating Pumps 1
Total Flow 230.00 l/min	Standby Pumps No Standby Pump
Total Head 60.00 m	
Pump Flow 230.00 l/min	

Fluid

Fluid Type Water	Density 1,000 kg/m³
Fluid Temperature 4 °C	Dynamic Viscosity 0.001567 Pa·s
Specific Gravity 1	Fluid Vapor Pressure 8.135 mbar

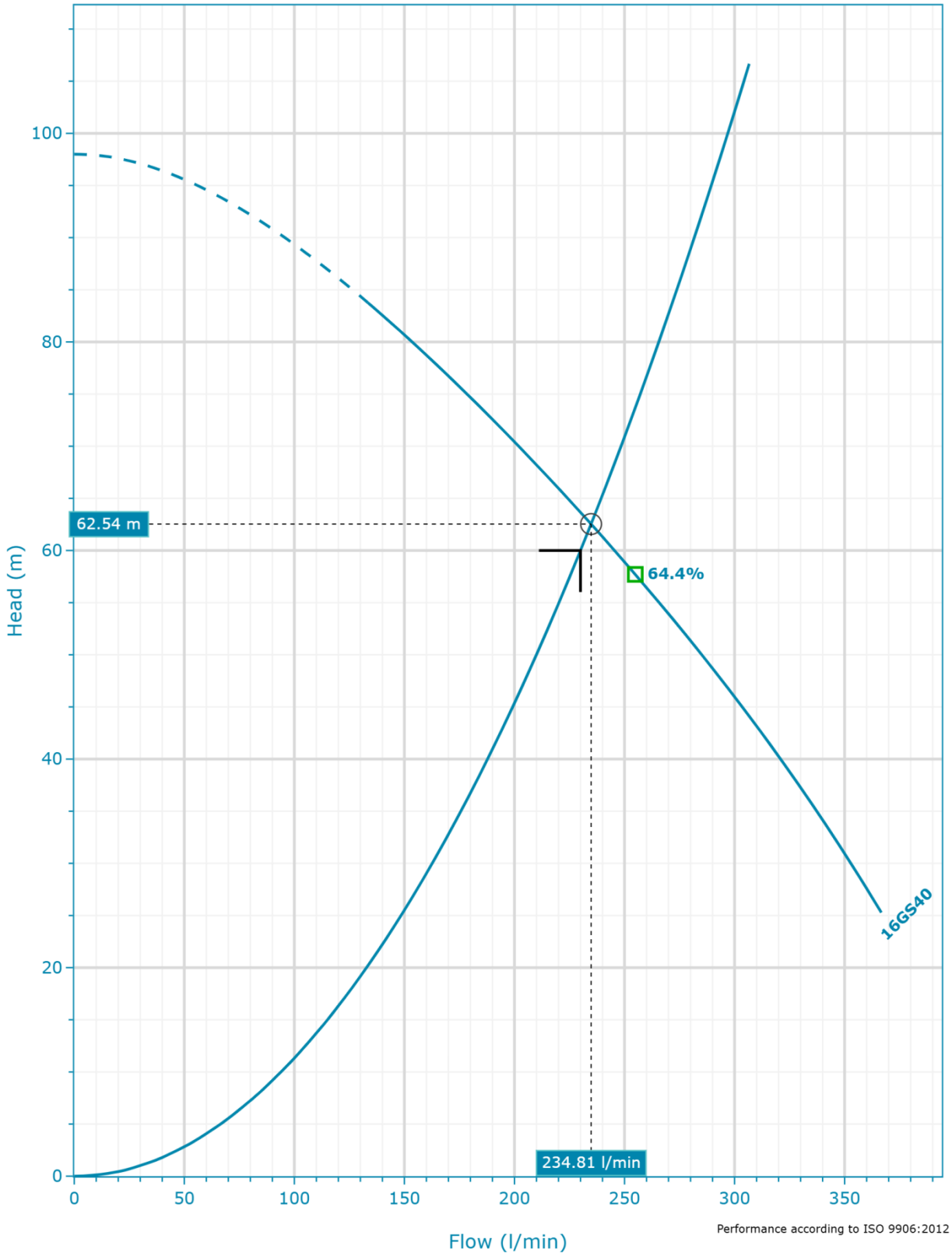
Design Point

Flow 234.81 l/min	
Head 62.54 m	
Pump Efficiency (ηp) 63.99 %	
Shaft power (P2) 3.74 kW	
Flow To BEP Ratio 92.1 %	

Design Curve

Rated Speed 2,900 RPM	BEP 64.4 %
Min Flow 133.33 l/min	BEP Flow 254.89 l/min
Max Flow 366.67 l/min	BEP Head 57.71 m
H@QMin 83.78 m	Max Operating Pressure 9,596.64 mbar
H@QMax 25.28 m	Max P2 3.76 kW

16GS40T-L4C | Duty Analysis



Name	Q (1x) [l/min]	H (1x) [m]	P2 (1x) [kW]	Q [l/min]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	234.81	62.54	3.74	234.81	62.54	3.74	63.99	0	0

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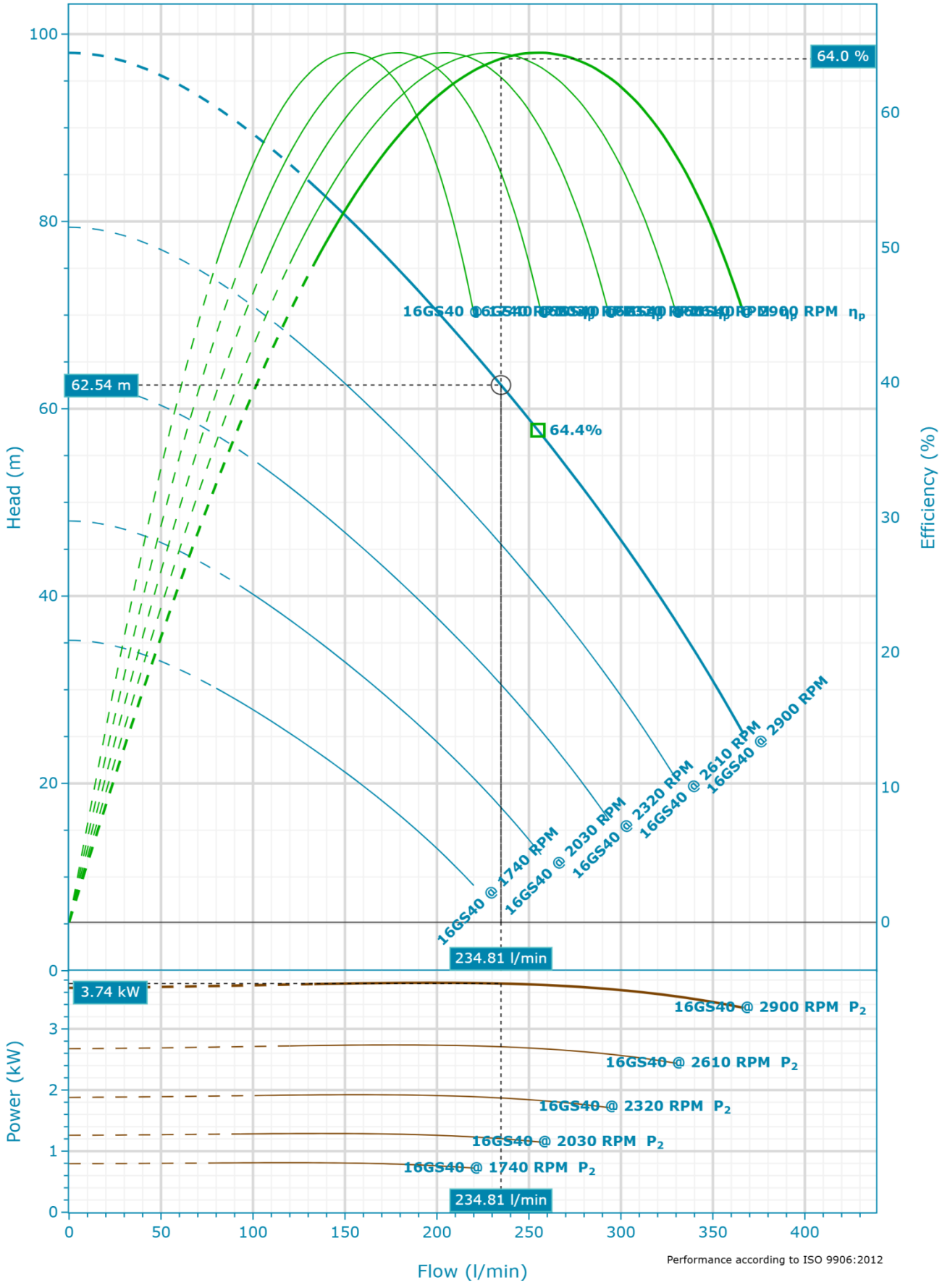
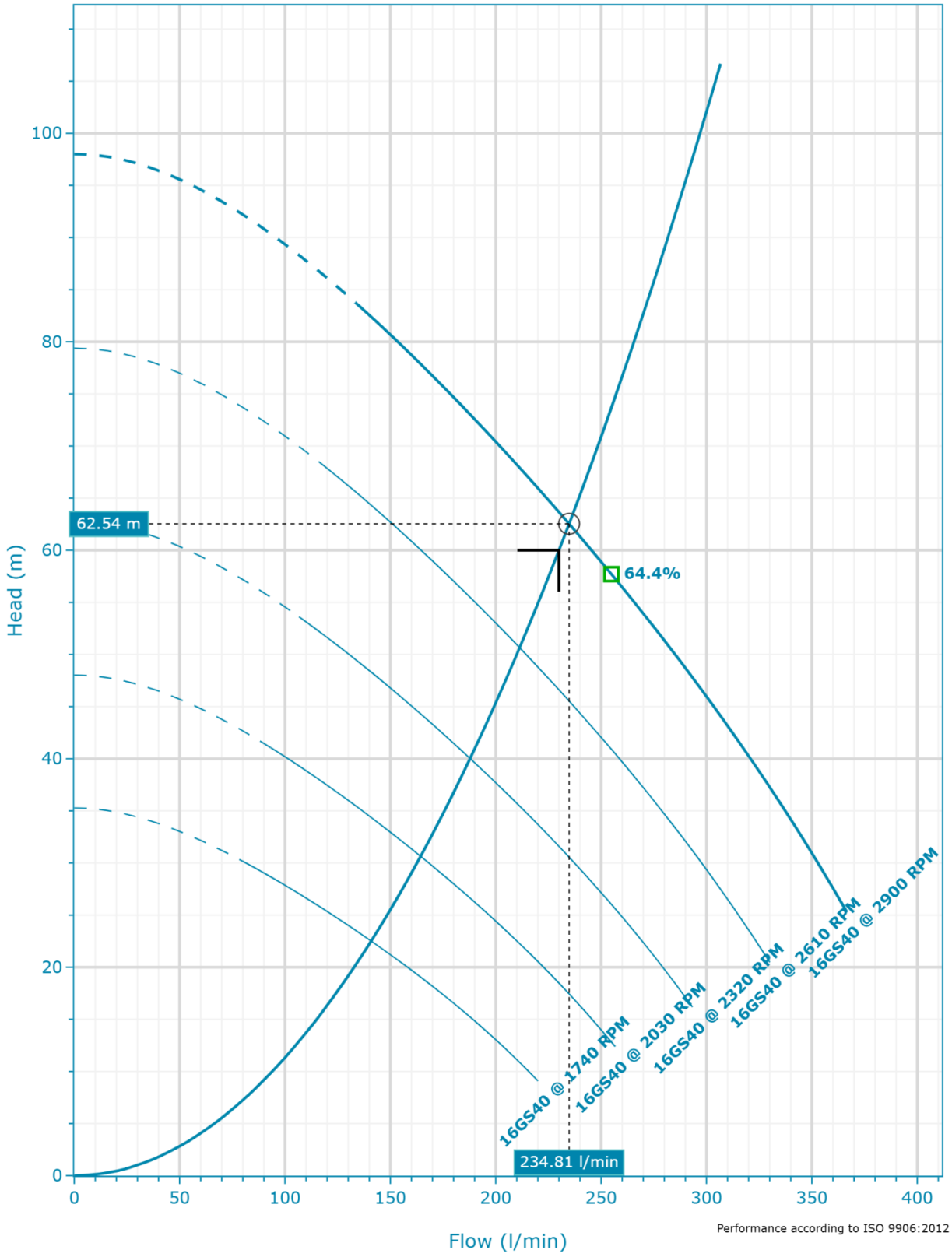
a xylem brand

16GS40T-L4C | Variable Speed Curve



Project:	Created By:	Created On:	Last Update:
16GS40T-L4C	Niel Koegelenberg	6/18/25	-

16GS40T-L4C | Variable Speed Analysis

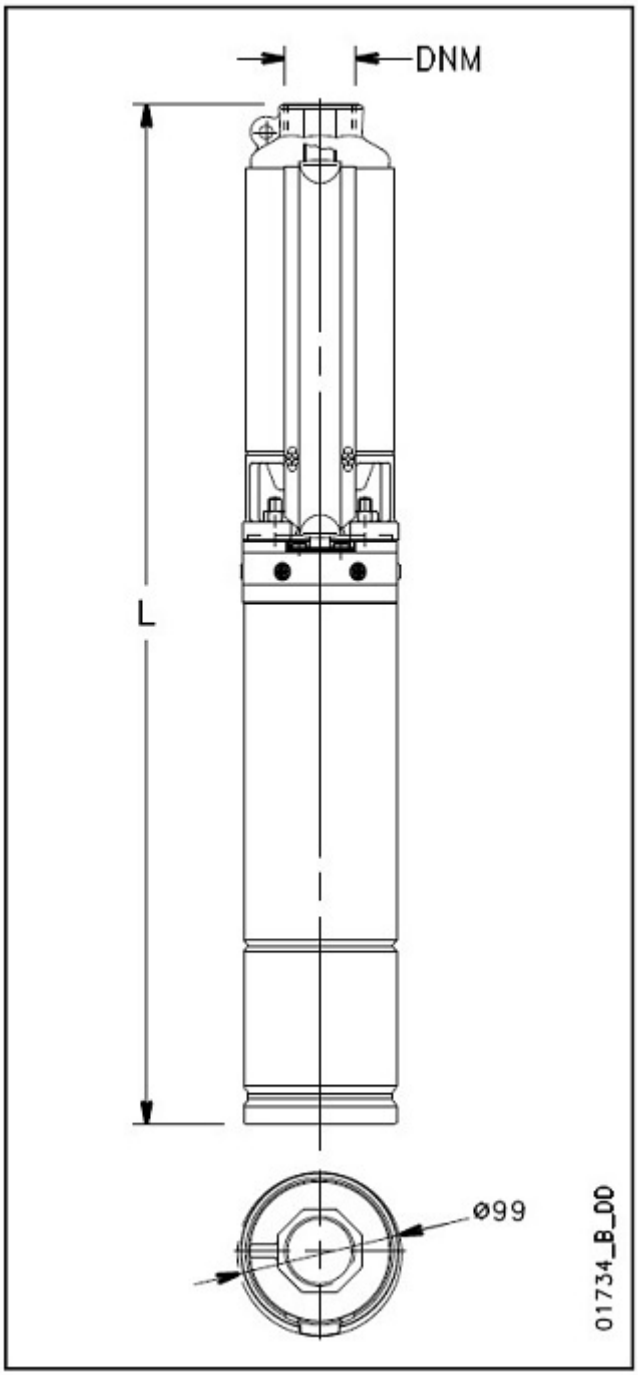


Name	Speed	Q (1x) [l/min]	H (1x) [m]	P2 (1x) [kW]	Q [l/min]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	1,740 RPM	140.89	22.51	0.81	140.89	22.51	0.81	63.99	0	0
DP @ 1x	2,030 RPM	164.37	30.64	1.28	164.37	30.64	1.28	63.99	0	0
DP @ 1x	2,320 RPM	187.85	40.02	1.92	187.85	40.02	1.92	63.99	0	0
DP @ 1x	2,610 RPM	211.33	50.65	2.73	211.33	50.65	2.73	63.99	0	0

Project:	Created By:	Created On:	Last Update:
16GS40T-L4C	Niel Koegelenberg	6/18/25	-

DP @ 1x	2,900 RPM	234.81	62.54	3.74	234.81	62.54	3.74	63.99	0	0

16GS40T-L4C | Dimensional Data & Drawing



Dimensions

L
2,233 mm

DNM (Rp/R/DN)
Rp 2"

Total Weight
38.2 kg

Company	Brown Brothers Engineers
Contact	Niel Koegelenberg
Phone No.	0273100851
Email	niel.koegelenberg@brownbros.co.nz

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Installation & Maintenance Guide

Devan Water Tanks

Please read these guidelines before installation begins.

Failure to properly prepare and install your tank correctly or continue with ongoing maintenance will void your warranty.

V1.1

CONTENTS

Devan Water Tanks. Made in New Zealand for New Zealand Conditions!

In order to gain maximum benefit from your Devan water tank, we have outlined the following instructions for installation and setup. Please read all these instructions carefully before installing your tank. The tank warranty will be void if the installation instructions are not adhered to.

DELIVERY OF YOUR DEVAN TANK

Devan water tanks are delivered by road to your gate. Transportation to the actual site and installation is the risk and responsibility of the purchaser. Where there is easy and suitable road access, our drivers may agree to off-load closer to the installation site, however this will be at the purchaser's risk. On arrival please make sure that somebody is available to help our drivers off-load your tank.

Our drivers will phone the person nominated at the time of order on the morning of delivery to confirm details. They will advise an approximate delivery time. If the driver is unable to get hold of the nominated contact person, the tank will be off-loaded at the most convenient location at the site and it will be the purchasers responsibility to relocate the tank at their risk and responsibility.

If you have special access issues, please make sure these are made known either to the Devan sales team or to the driver. Examples of such issues include truck only access in tight spaces, farm gate entry as opposed to main driveway or tanker track entry or no wet weather access.

FOUNDATION AND LOCATION

A full Devan tank is extremely heavy (up to 30 tonnes). Be thoughtful in selecting your tank location.

When installing the Devan tank, choose a firm and level area that is free from any projections. Elevated locations must have a solid floor and be strong enough to withstand wind loads in conjunction with the weight of a full tank.

A level foundation is required for tanks 5,000 litres and larger. Concrete, quarry fines (<7mm), pumice and sand are all suitable.

Sand is the recommended option. The sand base needs to be 100mm deep, 500mm greater than the tank diameter and most importantly, free from any sharp objects or projections such as rocks, roots or stones.

The sand base must be retained at all times. Pipe tank overflow well clear of the sand base to ensure overflowing water does not aid erosion.

In high wind areas such as hilltops, the Devan tank can be secured to the ground using all four lifting lugs. Do not overtighten the tie-downs or damage will result.

Devan water tanks are not designed for in-ground installation but can be buried up to 500mm and back filled with clean fill. If further depth is required tanks must not be buried any further than a maximum of 1000mm below ground level keeping a free space of at least 500mm around the tank. This space should have drainage installed and the gap filled with bark so it is not a trap hazard for small animals or children.

Devan tanks can be recessed into banks or similar, providing the tank is not backfilled against and there is free space of at least 500mm around the tank.

Do not install water tanks over buried pipes, cables or any other utility connections which may require servicing or maintenance.

Do not install water tanks over underground structures such as cellars, septic tanks, sewage canals, etc.

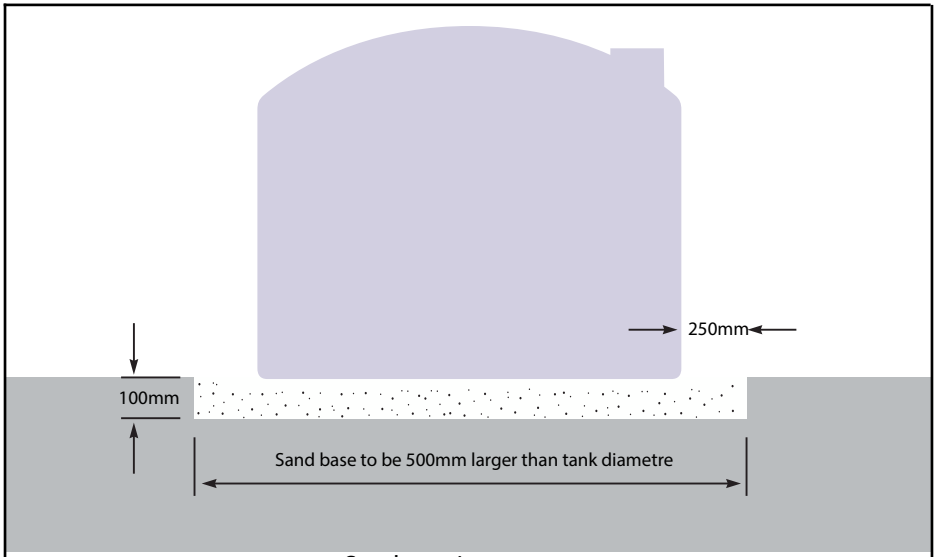
Do not install water tanks where they could pose a potential hazard to life or property. eg under foundations or within a building.

FOUNDATION AND LOCATION - CONTINUED

In areas prone to rabbit or other burrowing animals it is advisable to bury wire mesh to a depth of at least 600mm in a narrow trench around the foundation parameter.

In areas where livestock have access to the tank, the area surrounding the tank should be fenced to a minimum of 1.0 metre from the tank, to avoid any damage to the tank wall or outlet fittings.

Where the tank needs to be lifted into place, all four lifting eyes must be used in doing so. The lifting eyes are not rated sufficiently to be used with any water in the tank.



Sand requirements

30,000L	1.4m3
25,000L	1m3
15,000L	1m3
10,000L	0.75m3
5,000L	0.50m3

BOTTOM OUTLET PLUMBING GUIDELINES

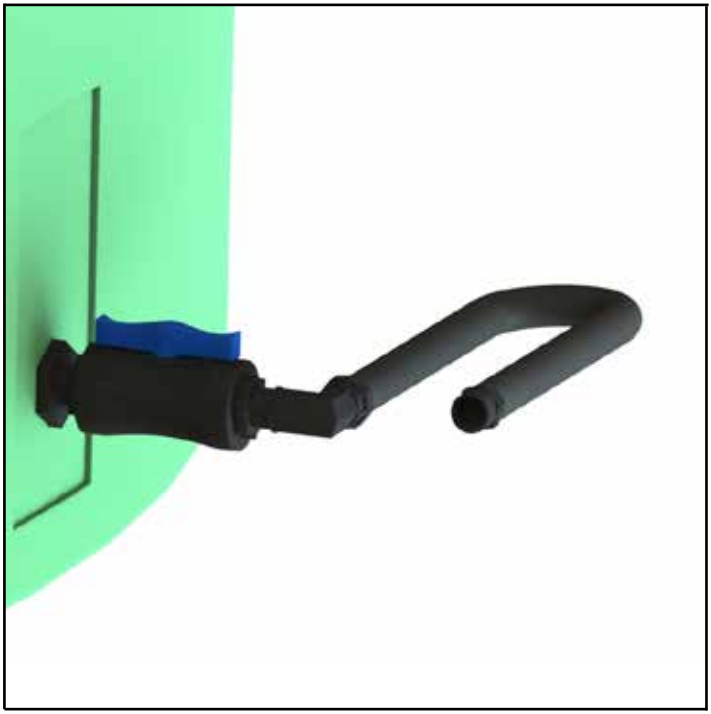
Bungs are screwed in loosley for transport only. If used permanently, please remove the bung and Teflon tape the threads and screw back in. Do not overtighten the bungs if they are to be refitted. This procedure must be completed before filling the tank.

Because polyethylene water tanks expand when full, plumbing to the tank must be flexible. Tanks will expand 30 to 40mm from new when filled for the first time. Tanks will contiune to expand up to 100mm over their life span.

All plumbing attached to the bottom of the tank must be done correctly with all base connections flexible and free from stress. Plumbing kits are recommended and are available from Devan in 25mm, 32mm and 50mm sizes.

Polyethylene pipe does not constitute flexible plumbing. Flexi-hose needs to be used to provide sufficient flexibility.

No extra penetrations are to be cut into the walls of the tank without written approval of the manufacturer. Doing so will seriously affect the structural integrity of the tank and could lead to premature failure.

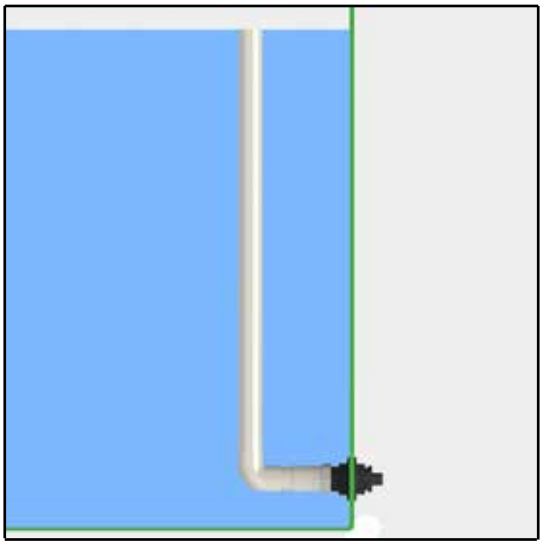


25mm Plumbing Kit - TAKPL25

BOTTOM OUTLET PLUMBING GUIDELINES - CONTINUED

There are specially designed mounting areas on the wall of the tank for outlet plumbing with brass fittings moulded-in for extra plumbing strength. These fittings are pre-drilled and tapped ready for use. These moulded-in fittings are raised off the bottom of the tank to prevent sludge pick-up and to retain sufficient weight (up to approx. one tonne in large tanks) making the tank more stable in exposed areas.

It is not recommended to install tank fittings anywhere else in the tank wall as this will create a stressed point in the tank structure and void the warranty. If an outlet fitting is required at a specific level, connect an internal vertical pipe to the desired level from the inside of the provided wall mounted outlet. These Restricted height outlets are available for purchase from Devan.



25mm Restricted Height outlet - RO25

All pipe fittings larger than 25mm must be supported independently to minimise stress on base. Please use only appropriate PVC or polyethylene fittings and make sure that all joints are flexibale and are well sealed and watertight with no light penetration.

Where a bottom outlet fitting of over 50mm is required it is strongly recommended that the tank be upgraded to heavy duty or extra heavy duty to accommodate the high-use nature of the application. If a larger fitting is installed in a standard tank it will void the warranty.

Any aftermarket fittings installed in the tank wall or base will void warranty.

TOP PLUMBING

Connecting to the dome

There are specially designed mounting areas on the dome of the tank, for inlet and overflow plumbing. We recommend the use of Universal seals® with all top plumbing and care should be taken when drilling the corresponding hole size. Proper hole saws must be used.

Universal seals® are available from Devan (25mm to 100mm).
The overflow should be piped away from the foundation to avoid erosion.

Overflows

An overflow must be installed in all instances to let excess water out of the tank. This is also important if the tank is filled from a float valve in case it sticks open.

A 'Hockey stick' shaped overflow will not provide sufficient out flow in instances of heavy rain and failure to allow could lead to the tank dome eventually vacuuming in.

Ninety degree overflow and vent pipe work is essential.

Rainwater Tank - example

TOP PLUMBING - CONTINUED

Venting

It is essential that you have more than adequate overflow and air venting for your operating conditions. Air and water must be able to exit the tank at the combined maximum rate that it can enter. If the tank is not sufficiently vented it will inevitably suck in the dome of the tank which will cause the tank to fail prematurely.

For high flow situations such as a wash down tank at a cowshed an appropriate size vent must be installed in the dome.

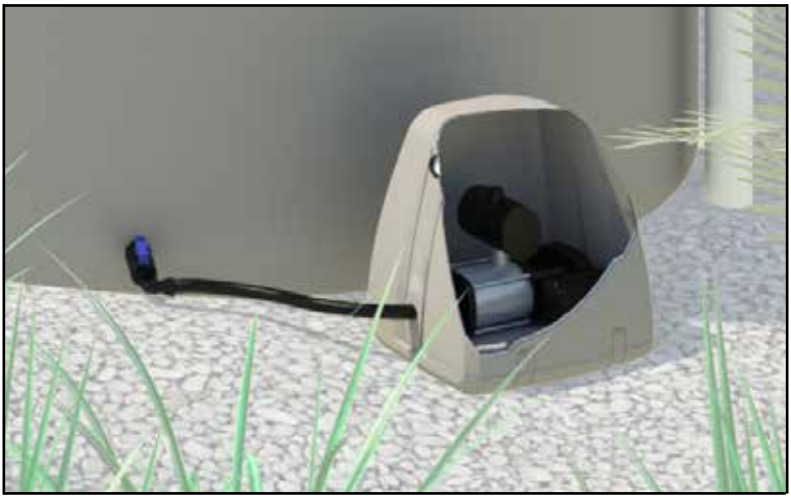
Venting options are available from Devan.

100mm Overflow vent kit- TAKOV100

WATER PUMP INSTALLATION

Do not directly install water pumps to the side of your water tank. The water pump and its motor must be self-supported on its own mount and connected to the tank via flexible hose to isolate any vibration or movement by the pumping unit itself. The tank outlet areas and their fittings must not be stressed by the weight of the water pump, motor or plumbing.

Remember to allow more than adequate overflow and venting when water pumps are used. Air and water must be able to enter or escape the tank at the same rate the water is being pumped in or out. Use the top plumbing areas when attaching overflow or vent plumbing to your water tank.



25mm Plumbing kit with Pump and Cover

WARRANTY POLICY

Your Devan product has been manufactured to the highest standards utilising advanced technology and production procedures. Devan Plastics Limited ("Devan") offers a warranty to the original purchaser that their products to be free of defects in workmanship or materials for the period defined in Appendix A, provided the provisions detailed below have been complied with.

A third party manufacturers' warranty applies to all other components used in the manufacture of Devan products. Third party manufacturer's warrant their products are free from defects in material and workmanship at the time of shipment and will make good, by repair or at its option replacement, any defects which occur during the warrantable period as defined in Appendix A provided the provisions below have been complied with.

Necessary provisions

In order for a warranty claim to be accepted by Devan or a third party manufacturer the following provisions must be met:

1) The equipment was correctly installed and in proper use as was intended by the manufacturer in accordance with the Installation and operating instructions supplied, and generally accepted code of practice or national standard/s.

2) The warranty period (as defined in Appendix A) from the date of invoice to the end user has not lapsed.

3) The claim for goods under warranty arises solely from faulty material or manufacturers' workmanship.

4) The customer or agent of the customer must return goods under warranty (where appropriate), stating the date and place of purchase promptly and within the product warranty period.

5) No repairs must be entered into by anybody other than a specified distributor or repairer as agreed and appointed by Devan.

6) Devan must be given a reasonable opportunity to inspect the tank and, if deemed necessary by Devan to have an independent engineering or other expert analysis of the cause of failure carried out.

Exclusions

Both the Devan warranty and third party manufacturer's warranty do not cover the following exclusions:

WARRANTY - CONTINUED

1) Except where otherwise stated by law, the manufacturer shall not be under liability for any injury, damage, or loss, including consequential damage or loss resulting from the use of its products, or resulting from defects therein. This may specifically refer to the cost of but not limited to lifting, installation, electrical or plumbing requirements.

2) Damage caused by abnormal operating conditions, war, violence, cataclysm, or any force majeure.

3) Damage caused by the equipment being used for an application for which it is not manufactured or recommended by the original manufacturer or Devan.

4) Damage caused by sand or abrasive materials, corrosion due to salt water, hazardous liquids, electrolytic action, and liquid temperatures beyond the recommended range, cavitation, and improper power supply voltage or outages.

5) Attempted repair, dismantling or any other tampering with any component of the system without the prior written approval of Devan will void any warranty.

6) If the Devan product or third party component has not been maintained in accordance with Devan.

7) Ingress of water or insect infestation to electrical components due to post-manufacture electrical penetrations not being appropriately protected.

8) Incorrect installation or negligent practices of the installer of the product.

9) Tank colour that may change or fade over time.

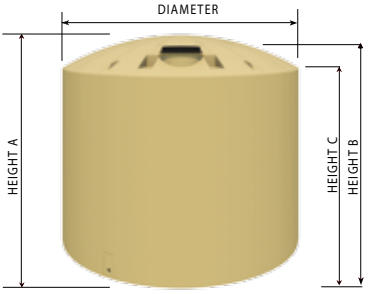
10) Any transport, insurance and freight costs.

This warranty does not exclude any condition or warranty implied by the Consumer Guarantees Act 1993, Fair Trading Act 1986, and the Commerce Act 1986 and is in addition to any rights the purchaser may have at law.

Appendix A - Product warranty periods

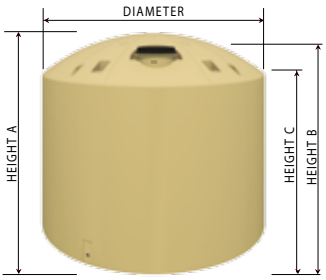
Product	Warranty Period
Water tanks (residential)	20 years
Water tanks (commercial)	10 years
Water tanks (custom made outlets - > 100mm)	1 year
Molasses tanks	10 years
Septic tanks	15 years
WWTS vessels	15 years
Grease traps	10 years
Flout tank	10 years
Detention/retention tanks	15 years
Drums	1 year
Refuse bins	1 year
Industrial bins	1 year
Third party components (WWTS)	1 year
Third party components (other)	1 year
Grundfos pumps	2 years

WATER TANK DIMENSIONS



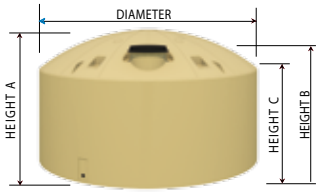
TT30 - 30,000 Litres

DIAMETER: 3.7 metres
HEIGHT A: 3.1 metres
HEIGHT B: 2.9 metres
HEIGHT C: 2.7 metres
WEIGHT: 475 kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP



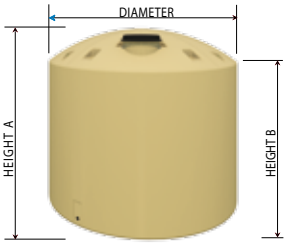
TT25 - 25,000 Litres

DIAMETER: 3.5 metres
HEIGHT A: 3.0 metres
HEIGHT B: 2.8 metres
HEIGHT C: 2.5 metres
WEIGHT: 375 kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP



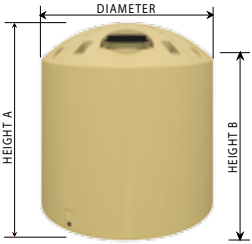
TT15 - 15,000 Litres - NORTH ISLAND

DIAMETER: 3.5 metres
HEIGHT A: 2.0 metres
HEIGHT B: 1.8 metres
HEIGHT C: 1.6 meters
WEIGHT: 250kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP



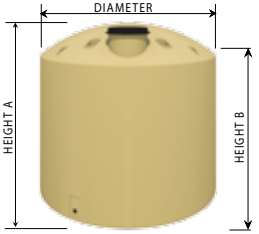
TT15 - 15,000 Litres - SOUTH ISLAND

DIAMETER: 2.9 metres
HEIGHT A: 2.6 metres
HEIGHT B: 2.2 metres
WEIGHT: 275 kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP



TT10 - 10,000 Litres - NORTH ISLAND

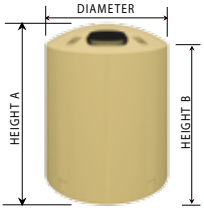
DIAMETER: 2.5 metres
HEIGHT A: 2.6 metres
HEIGHT B: 2.2 metres
WEIGHT: 225 kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP



TT10 - 10,000 Litres - SOUTH ISLAND

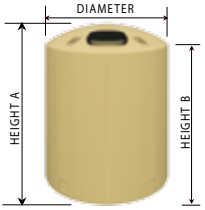
DIAMETER: 2.6 metres
HEIGHT A: 2.4 metres
HEIGHT B: 2.1 metres
WEIGHT: 225 kg
MANWAY: 435mm
OUTLETS: 2 x 50mm
THREAD: Brass BSP

WATER TANK DIMENSIONS - CONTINUED



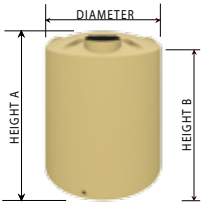
TT05 - 5,500 Litres - NORTH ISLAND

DIAMETER: 1.9 metres
HEIGHT A: 2.3 metres
HEIGHT B: 2.0 metres
WEIGHT: 112.5 kg
MANWAY: 435mm
OUTLETS: 1 x 50mm
THREAD: Brass BSP



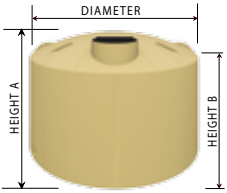
TT05 - 5,000 Litres - SOUTH ISLAND

DIAMETER: 1.9 metres
HEIGHT A: 1.9 metres
HEIGHT B: 1.8 metres
WEIGHT: 100 kg
MANWAY: 435mm
OUTLETS: 1 x 50mm
THREAD: Brass BSP



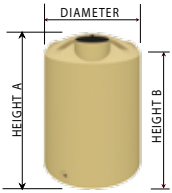
TT04 - 4,000 Litres

DIAMETER: 1.7 metres
HEIGHT A: 1.9 metres
HEIGHT B: 1.8 metres
WEIGHT: 75 kg
MANWAY: 383mm
OUTLETS: 1 x 50mm
THREAD: Brass BSP



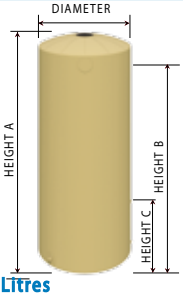
TT03 - 3,500 Litres

DIAMETER: 2.0 metres
HEIGHT A: 1.3 metres
HEIGHT B: 1.1 metres
WEIGHT: 75 kg
MANWAY: 383mm
OUTLETS: 1 x 50mm
THREAD: Brass BSP



TT02 - 2,000 Litres

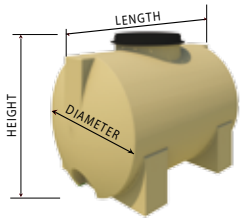
DIAMETER: 1.4 metres
HEIGHT A: 1.8 metres
HEIGHT B: 1.6 metres
WEIGHT: 50 kg
MANWAY: 383mm
OUTLETS: 1 x 50mm
THREAD: Brass BSP



TT01 - 1,000 Litres

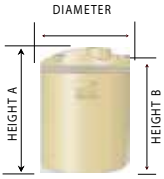
DIAMETER: 0.87 metres
HEIGHT A: 2.0 metres
HEIGHT B: 1.8 metres
HEIGHT C: 0.4 metres
WEIGHT: 35 kg
MANWAY: 150mm
OUTLETS: 2x50mm & 2x16mm
THREAD: Brass BSP

WATER TANK DIMENSIONS - CONTINUED



TT007 - 750 Litres

LENGTH: 1.3 metres
HEIGHT: 1.0 metres
DIAMETER: 0.9 metres
WEIGHT: 30 kg
MANWAY: 435mm



TT006 - 600 Litres

DIAMETER: 0.86 metres
HEIGHT A: 1.2 metres
HEIGHT B: 1.1 metres
WEIGHT: 20 kg
MANWAY: 190mm
OUTLET: 1 x 50mm
THREAD: Brass BSP

CLEANING AND MAINTENANCE

Depending on the cleanliness of your water source, your water tank should be cleaned on a regular basis.

What can end up in my water?
Algae growth is a common occurrence in water tanks. Devan water tanks are manufactured to strict quality tolerances, meaning that no light can penetrate the tank which will eliminate any algae growth, as algae need light to exist. Sometimes the nature of an installation can change this whereby an installer may cut oversized holes for inlets or overflows/venting. Blocking up any points for light to enter the tank will reduce or eliminate algae growth in the tank.

External debris are a much more visible source of contamination that will either float on the top of the water, of form sediment on the bottom of the tank. Such contaminants will consist of leaf litter, bird droppings, dead insects and even animals. This debris will build up on the bottom of your tank and require removal periodically.

Cleaning frequency
Devan recommend that you clean your tank out at least annually; however it is important to inspect your water tank on a quarterly basis to assess the level of contamination. A quality installation with the right pretreatment accessories could mean your tank remains in immaculate condition for a number of years before requiring cleaning. Cleaning of your tank will either take a bunch of your time or money and so the less frequently you need to clean it, the better. If you are noticing the rapid build up of sediment on the bottom of your tank, investigate the options for pre-treatment.

Devan tanks have outlet locations positioned up off the bottom of the tank which means you are not drawing off the contaminated water at the bottom of the tank for your day to day consumption. This is a precautionary measure only and should not be relied upon to prevent organic material entering your water supply.

Tank cleaning options

Professional contractors
The Yellow Pages and other online sources will provide the details of people providing 'Water Tank Services'.

Depending on your proximity to the nearest service provider, this is not a terribly expensive exercise with reports of $200-$300 plus the cost of a tank of water, which varies dramatically around the country.

CLEANING AND MAINTENANCE - CONTINUED

Although a self clean (described below) is a relatively straight forward exercise, it can be very time consuming, while a contractor will have it done in a couple of hours.

Do it yourself

Warning: If you will be getting into the tank to clean it, make sure there is adequate ventilation, and you have another person present at all times in case something should go wrong. Working in confined spaces is dangerous and should not be attempted by an individual working alone.

Draining the tank down to the last 1-2 thousand litres through the spare outlet will concentrate all contaminants into the bottom of the tank. The quickest and easiest way to then remove the concentrated contaminants is to hire a wet vacuum system or pump and stir up all the debris with a soft broom, which will then be sucked out by the vacuum or pump.

Siphoning off sediments may also be done using an inverted funnel (described below) or pool vacuum cleaner, by dragging it along the bottom of the tank.

1) Start with a piece of flexible plastic tubing long enough to reach into your tank. Then fix an ordinary kitchen funnel to one end.

2) Fill the tube with water from a garden hose, making sure there are no air spaces present and the funnel is partially filled.

3) Block up the open end with a watertight seal and hold the funnel end vertical so the water stays contained in the tube.

4) If you are unable to enter the tank, attach the funnel to a long pole that you can manoeuvre through the tank opening.

5) When ready, plunge the funnel end into the tank water, then position the outside end in bucket and remove the stopper.

6) Water should begin to flow out the tank into the bucket, and you can now suck up any accumulated debris on the tank floor.

Devan would like to credit Gisborne District Council for some written content and the pictorial siphon instructions, and the Ministry of Health for some written content.

Attach stamp

Devan Plastics Limited
PO Box 2602
Tauranga 3140

FOLD

WARRANTY REGISTRATION

Thank you for purchasing your tank from Devan, please take the time to fill out the warranty registration form. You can complete this online under 'warranty registration' or complete the form below and post it in.

Name .....

Address .....

.....

.....

.....

Phone .....

Email .....

Product Purchased .....

Serial or Sales Number .....

Installer (if used) .....

Description of tank use (stock water, home supply, molasses etc)

.....

.....

Check List

- ☐ Base outlets flexibly plumbed
- ☐ Overflow installed (larger than inflow)
- ☐ Base fill clean and level
- ☐ Tank vented correctly
- ☐ Depth of burial not exceeded

CUT

APPENDIX C – INTERGRATED TRANSPORTATION ASSESSMENT

ASHBOURNE DEVELOPMENT

Integrated Transportation Assessment

17 April 2025

commute
TRANSPORTATION CONSULTANTS

PROJECT	Ashbourne Development
REPORT TITLE	Integrated Transportation Assessment
DOCUMENT REFERENCE	Ashbourne ITA
DATE	17 April 2025

REPORT STATUS	PREPARED BY	REVIEWED BY	APPROVED BY
Draft Report	Hollie Yukich	Michelle Seymour	Leo Hills

4 Leek Street, Newmarket PO Box 128259, Remuera 1541, Auckland
Ph. 09 869 2825 | www.commute.kiwi

Table of Contents

1 Introduction

Commute Transportation Consultants (Commute) has been engaged by Unity Developments to prepare an Integrated Transport Assessment (ITA) for a Fast Track Proposal to provide for a comprehensive development proposal in Matamata (referred to as Ashbourne).

The proposal seeks to provide a multiuse development with four key precincts providing for a range activities including residential dwellings, a retirement village, small commercial hub and two areas of solar farms.

Included in this development are the following activities:

- 518 residential dwellings,
- A 0.75ha area of commercial activities,
- A retirement village of approximately 218 units and 71 care beds; and
- Approximately 27 ha of solar farm activities in two areas.

The site includes a number of development stages, and various activities proposed to be progressively provided on the site as part of a comprehensive development plan.

2 Existing Environment

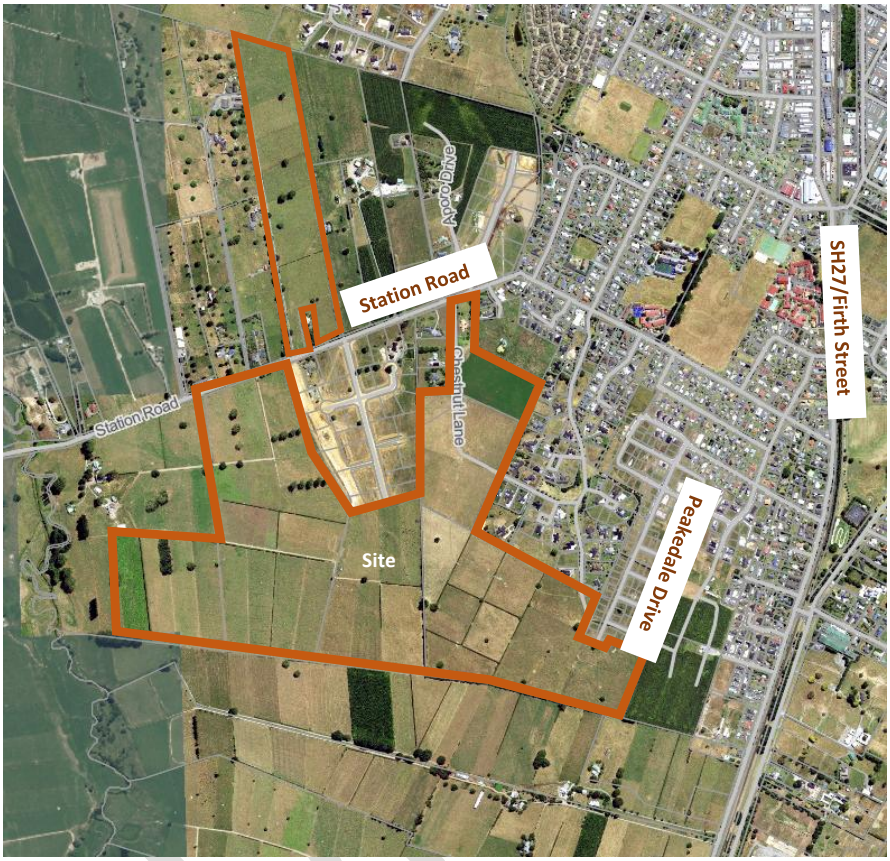
2.1 Development Location

Matamata is located in central Waikato, within the Matamata - Piako District. It is approximately two hours from Auckland, 55 mins from Hamilton, 45 mins from Tauranga and 55 mins from Rotorua.

Within Matamata, the site is located 2.5km to the west of the town centre (as a straight line, from the centre of the site), and is located adjacent to Station Road. The site connects to recently completed subdivisions to the east at Peakedale Drive.

Figure 2-1 shows the location of the site within Matamata.

Figure 2-1: Site Location and Context



As shown above, the surrounding area includes a mix of rural farmland and recently developed residential properties.

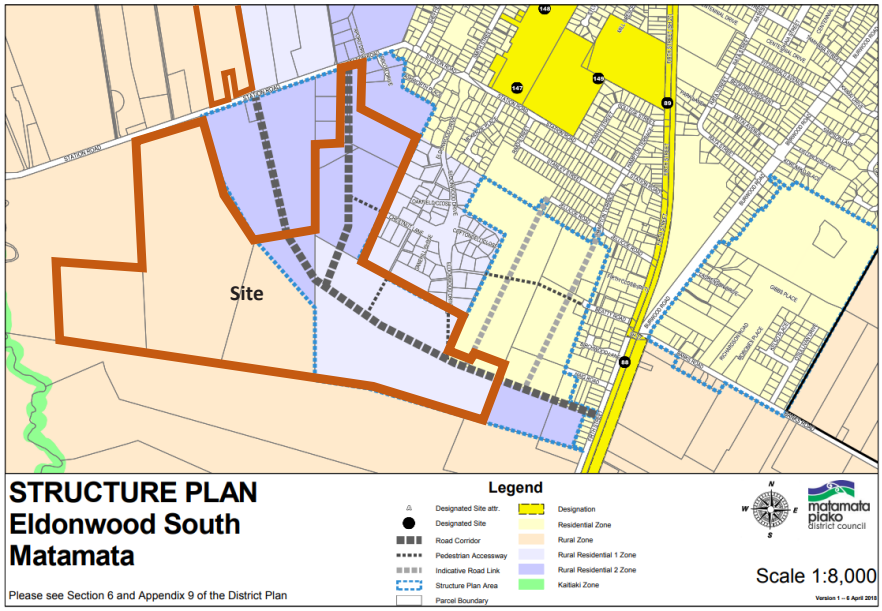
The site is proposed to have three connections to the existing road network, with two new intersections on Station Road and a connection to Peakedale Drive in the south.

2.2 Eldonwood Structure Plan

The site of the development proposal overlaps with the Eldonwood Structure Plan as shown in the Matamata Piako District Plan. This Structure Plan is shown below in Figure 2-2. As shown, there is a general expectation that the area immediately adjacent to the existing residential areas, will shift to rural residential, with road corridor spine travelling from SH27 through to Station Road.

The site is currently zoned a mix of Rural Residential 1, Rural Residential 2 and Rural zone.

Figure 2-2: Structure Plan: Eldonwood



3 Existing Transport Data

3.1 Existing Road Layout

The proposed development is located to the southwest of the current urban area of Matamata. The site adjoins the existing road network at several key locations, including Station Road via new road connections in two locations and Peakedale Road at the existing terminus.

3.1.1 Station Road

Station Road is classified as a Collector Road within the Matamata Piako District Plan (MPDP)[1]. The existing road reserve is 20.0 m wide, with a sealed width of 7.0 m, accommodating one traffic lane in each direction. Adjacent to the site, there are no footpaths or cycle provisions on Station Road, which is commensurate with the existing rural nature of the corridor.

Station Road has a posted speed limit of 50 km per hour at the most eastern extent, increasing to 80km per hour at Odium Drive, and increasing to 100km per hour at 200 Station Road.

Station Road in proximity to the intersection of Highgrove Avenue currently carries in the region of 620[2] vehicles per day (five-day ADT).

. . . . . .

[1] Section 9.1.1

[2] Tube Traffic counts completed week of 18 March 2024.

Figure 3-1: Station Road looking east

Figure 3-2: Station Road looking west

3.1.2 Firth Street

Firth Street is classified as a State Highway in the Matamata Piako District Plan (SH27). The corridor is approximately 21.5m wide with a 12.5m carriageway. A 1.5m footpath is provided on the western side, and a railway line is located on the eastern side of the corridor. The corridor includes two traffic lanes, and a flush median which provides for right turn bays along the corridor.

The posted speed limit varies on this corridor, with the speed in the vicinity of the site ranging from 50km/hr to 100km/hr as per the following:

- 50km/hr north of Jellicoe Road
- 70km/hr between Jellicoe Road and 229 Firth Street
- 100km/hr south of 229 Firth Street

Figure 3-3: Firth Street (SH27) looking north

3.1.3 Peakedale Drive

Peakedale Road, is not identified within the Matamata Piako District Plan as a significant, arterial or collector road and is therefore classified as a local road. This corridor is approximately 20m wide, with a sealed carriageway of approximately 10m. The road also provides for 1.5m wide footpaths on both sides.

Figure 3-4: Peakedale Drive looking south

3.2 Traffic Volumes

Intersection counts have been completed for the several key intersections including:

- Intersection of Jellicoe Road and Firth Street (SH27)

- This intersection is currently give way controlled, with priority to Firth Street, and a flush median and right turn bay provided on Firth Street.

- Intersection of Station Road and Firth Street (SH27)
  - This intersection is currently stop controlled with priority to Firth Street, and a flush median and right turn bay provided on Firth Street.

Intersections counts were completed on 14 March 2024 and are summarised in the figures below.

Figure 3-5: Turning Movement Vehicle volumes at Station Road and Firth Street (SH27)

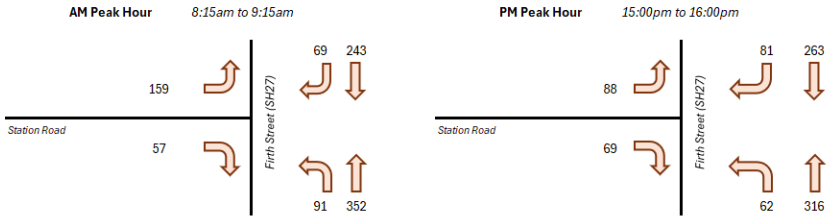
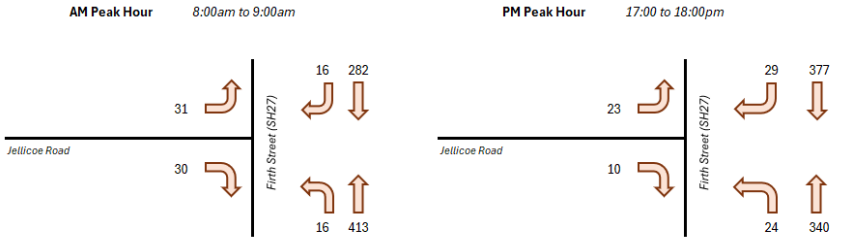


Figure 3-6: Turning Movement Vehicle Volumes at Jellicoe Road and Firth Street (SH27)



As shown above the peak hour of the Station Road and Firth Street intersection occurs slightly later than the Jellicoe Street intersection, and in the case of the afternoon peak this occurs much earlier. This is likely due to the closer proximity of Station Road to two schools, including Firth Primary School and Matamata College. The overall peak hours of the network nearby were found to be 8:00-9:00AM and 3:00-4:00PM.

3.3 Existing Intersection Performance

The existing performance of the intersections of Firth Street with Station Road and Firth Street with Jellicoe Road have been modelling utilising SIDRA. The movement summary for these intersections in the morning peak and evening peak are shown in the figures below. As can be seen, both intersections currently operate well with limited delay.

Figure 3-7: Morning Peak Period - Station Road and Firth Street (08:15 – 09:15)

MOVEMENT SUMMARY

Site: 101 [AM Peak Station Road and Firth Street (SH27) (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Firth Street (SH27)														
1	L2	91	3	96	3.3	0.259	4.7	LOS A	0.0	0.0	0.00	0.11	0.00	48.7
2	T1	352	47	371	13.4	0.259	0.1	LOS A	0.0	0.0	0.00	0.11	0.00	49.2
Approach		443	50	466	11.3	0.259	1.0	NA	0.0	0.0	0.00	0.11	0.00	49.1
North: Firth Street (SH27)														
8	T1	243	40	256	16.5	0.146	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	69	2	73	2.9	0.068	6.6	LOS A	0.3	2.0	0.50	0.67	0.50	45.0
Approach		312	42	328	13.5	0.146	1.5	NA	0.3	2.0	0.11	0.15	0.11	48.8
West: Station Road														
10	L2	159	8	167	5.0	0.310	6.7	LOS A	1.4	10.5	0.57	0.77	0.64	44.2
12	R2	57	6	60	10.5	0.310	14.7	LOS B	1.4	10.5	0.57	0.77	0.64	43.7
Approach		216	14	227	6.5	0.310	8.8	LOS A	1.4	10.5	0.57	0.77	0.64	44.1
All Vehicles		971	106	1022	10.9	0.310	2.9	NA	1.4	10.5	0.16	0.27	0.18	47.8

Figure 3-8: Afternoon Peak Period - Station Road and Firth Street (15:00 – 16:00)

MOVEMENT SUMMARY

Site: 101 [PM Peak Station Road and Firth Street (SH27) (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Firth Street (SH27)														
1	L2	62	3	65	4.8	0.220	4.7	LOS A	0.0	0.0	0.00	0.09	0.00	48.1
2	T1	316	38	333	12.0	0.220	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	49.4
Approach		378	41	398	10.8	0.220	0.8	NA	0.0	0.0	0.00	0.09	0.00	49.1
North: Firth Street (SH27)														
8	T1	263	35	277	13.3	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	81	7	85	8.6	0.077	6.4	LOS A	0.3	2.4	0.47	0.64	0.47	44.6
Approach		344	42	362	12.2	0.154	1.5	NA	0.3	2.4	0.11	0.15	0.11	48.6
West: Station Road														
10	L2	88	6	93	6.8	0.272	6.4	LOS A	1.2	8.7	0.61	0.77	0.67	43.0
12	R2	69	8	73	11.6	0.272	14.4	LOS B	1.2	8.7	0.61	0.77	0.67	42.8
Approach		157	14	165	8.9	0.272	10.0	LOS A	1.2	8.7	0.61	0.77	0.67	42.9
All Vehicles		879	97	925	11.0	0.272	2.7	NA	1.2	8.7	0.15	0.23	0.16	47.7

Figure 3-9: Morning Peak Period - Jellicoe Road and Firth Street (08:00 – 09:00)

MOVEMENT SUMMARY

Site: 101 [AM Peak Jellicoe Road and Firth Street (SH27) (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Firth Street (SH27)														
1	L2	15	2	16	13.3	0.249	4.8	LOS A	0.0	0.0	0.00	0.02	0.00	48.3
2	T1	413	47	435	11.4	0.249	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach		428	49	451	11.4	0.249	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.7
North: Firth Street (SH27)														
8	T1	282	48	297	17.0	0.169	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	16	0	17	0.0	0.015	6.3	LOS A	0.1	0.4	0.48	0.60	0.48	44.8
Approach		298	48	314	16.1	0.169	0.4	NA	0.1	0.4	0.03	0.03	0.03	49.6
West: Jellicoe Road														
10	L2	31	0	33	0.0	0.107	6.3	LOS A	0.4	2.7	0.59	0.76	0.59	43.4
12	R2	30	0	32	0.0	0.107	12.1	LOS B	0.4	2.7	0.59	0.76	0.59	43.4
Approach		61	0	64	0.0	0.107	9.2	LOS A	0.4	2.7	0.59	0.76	0.59	43.4
All Vehicles		787	97	828	12.3	0.249	1.0	NA	0.4	2.7	0.06	0.08	0.06	49.1

Figure 3-10: Afternoon Peak Period - Jellicoe Road and Firth Street (17:00 – 18:00)

MOVEMENT SUMMARY

Site: 101 [PM Peak Jellicoe Road and Firth Street (SH27) (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Firth Street (SH27)														
1	L2	24	2	25	8.3	0.210	4.7	LOS A	0.0	0.0	0.00	0.04	0.00	48.3
2	T1	340	35	358	10.3	0.210	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	49.7
Approach		364	37	383	10.2	0.210	0.4	NA	0.0	0.0	0.00	0.04	0.00	49.6
North: Firth Street (SH27)														
8	T1	347	17	365	4.9	0.193	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	29	0	31	0.0	0.025	5.9	LOS A	0.1	0.7	0.44	0.59	0.44	44.9
Approach		376	17	396	4.5	0.193	0.5	NA	0.1	0.7	0.03	0.05	0.03	49.5
West: Jellicoe Road														
10	L2	23	0	24	0.0	0.049	5.9	LOS A	0.2	1.3	0.52	0.65	0.52	44.1
12	R2	10	1	11	10.0	0.049	12.9	LOS B	0.2	1.3	0.52	0.65	0.52	43.9
Approach		33	1	35	3.0	0.049	8.0	LOS A	0.2	1.3	0.52	0.65	0.52	44.0
All Vehicles		773	55	814	7.1	0.210	0.8	NA	0.2	1.3	0.04	0.07	0.04	49.3

3.4 Accessibility

3.4.1 Private Vehicles

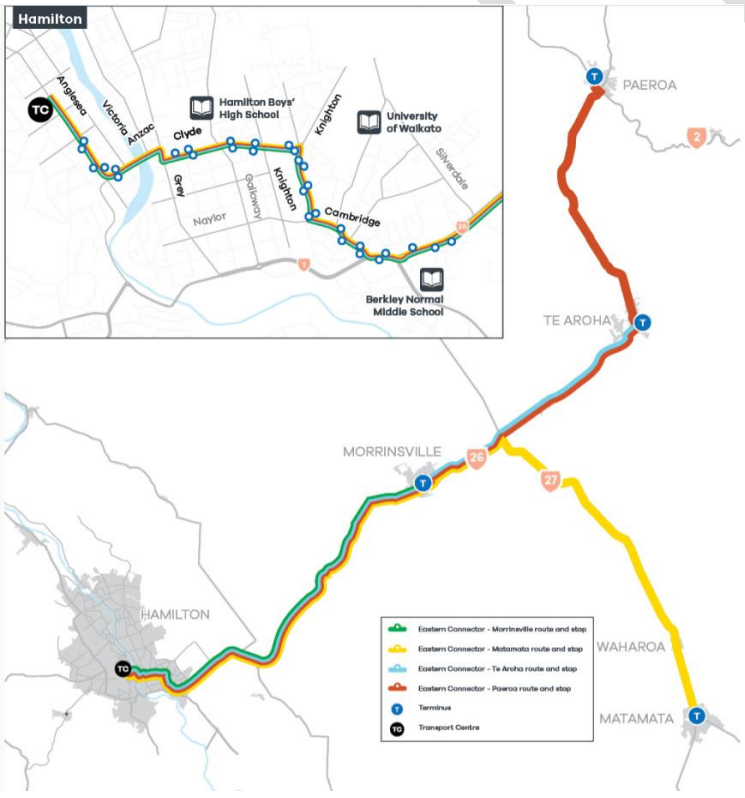
The proposed development area is well located in terms of connections to the roading network. Matamata is located at the intersection of State Highway 24 and State Highway 27, and the proposed plan change connects to Station Road, which in turn connects to SH27.

At a wider level, Ashbourne is located approximately 45mins to an hour to several regional centres, including Hamilton, Tauranga and Rotorua.

3.4.2 Public Transport

There is limited local Matamata bus services, although there are several buses linking to Hamilton and Morrinsville. As shown below in Figure 3-11, the Eastern Connector (in yellow), travels to Hamilton from Matamata on weekdays, with an internal loop through the Matamata town centre.

Figure 3-11: Bus Service between Matamata and Hamilton



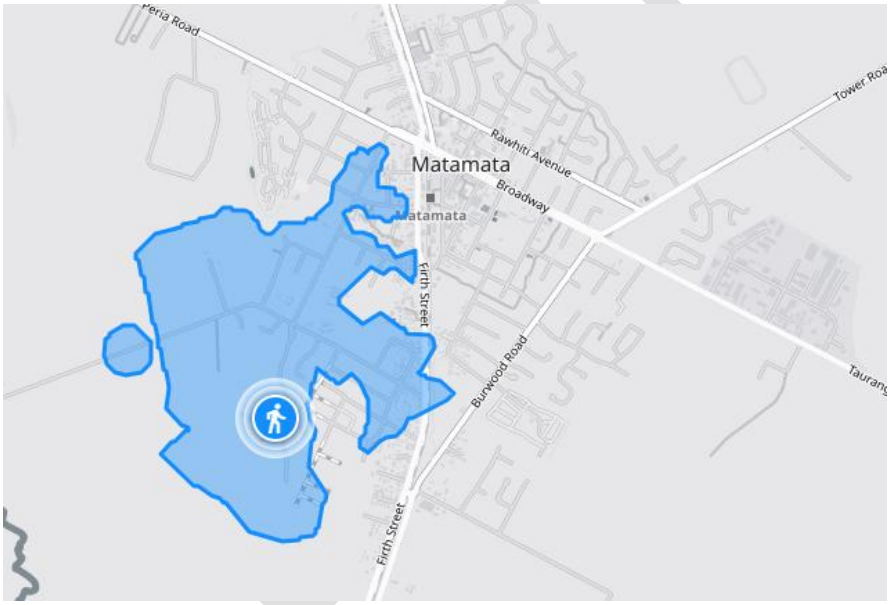
3.4.3 Walking

Using a practical walking distance of 1.5 kilometres and the 15th percentile walking speed of a typical fit, healthy adult of 1.2 m/s, gives a journey time of approximately 20 minutes. This is generally in line with New Zealand data in the Pedestrian Planning and Design Guide, which states that for walking trips, half are more than 10 minutes and 18% are more than 20 minutes. The primary catchment area for pedestrians has therefore been based on a 1.5km walking distance from the site as shown in Figure 3-12 below.

As can be seen from the centre of the Plan Change area (currently rural) a 20min walk will be slightly short of the Matamata centre. It is noteworthy however that as development progresses additional connections will be provided improving permeability for walking in these areas.

Within 20mins walk is Firth Primary School, Matamata Intermediate School and Matamata College. Within 25mins walk is the Matamata urban centre and associated community facilities.

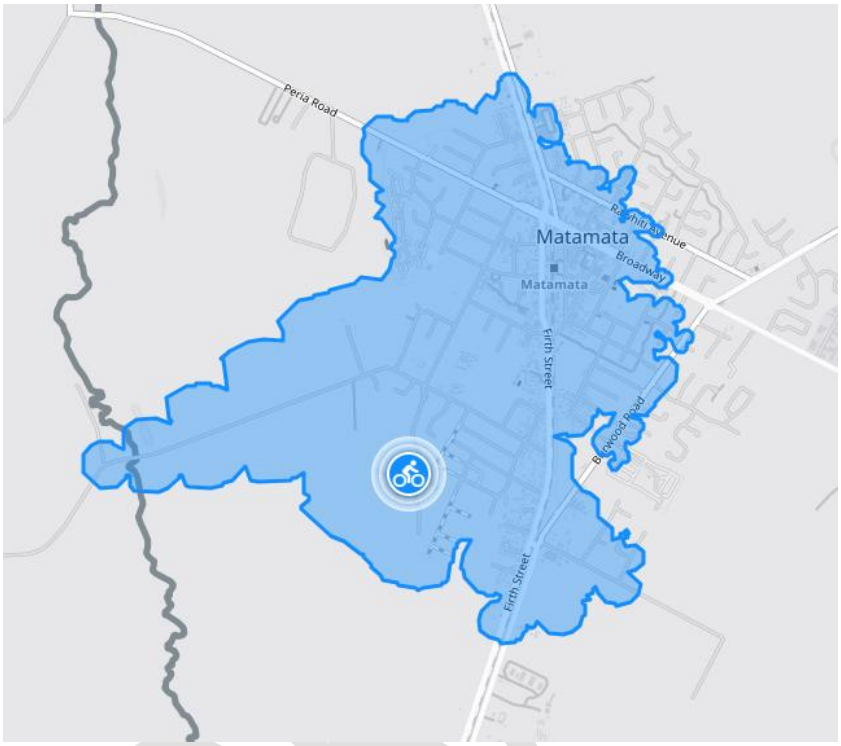
Figure 3-12: Walking Catchment



3.4.4 Cycling

Based on NZTA's Research Report 426, the average cycling trip length is approximately 3 kilometres. Based on a cycle speed of 20km/hr, Figure 3-13 shows an indicative cycling catchment for the site. As shown, the majority of Matamata is able to be reached by bike within approximately 10mins (ie within 3km).

Figure 3-13: Cycle Catchment



3.5 Road Safety Assessment

An assessment of the surrounding area's safety record has been carried out using the Waka Kotahi CAS database, for the five-year period between 2019 and 2023 plus any crashes entered into the system for 2024. The search included all reported crashes on Station Road and at the intersections of Jellicoe Road with Firth Street and Station Road with Firth Street. A total of 4 crashes were reported within the search criteria, including

- Car turning right from Firth Street to Station Road, hit by an oncoming cyclist (Minor Injury)
- Car on Firth Street lost control turning right, driver under instruction (No injury)
- Truck on Jellicoe Street hit car undertaking driveway manoeuvre (No injury)
- Car on Station Road lost control, car travelling over speed limit (No injury)

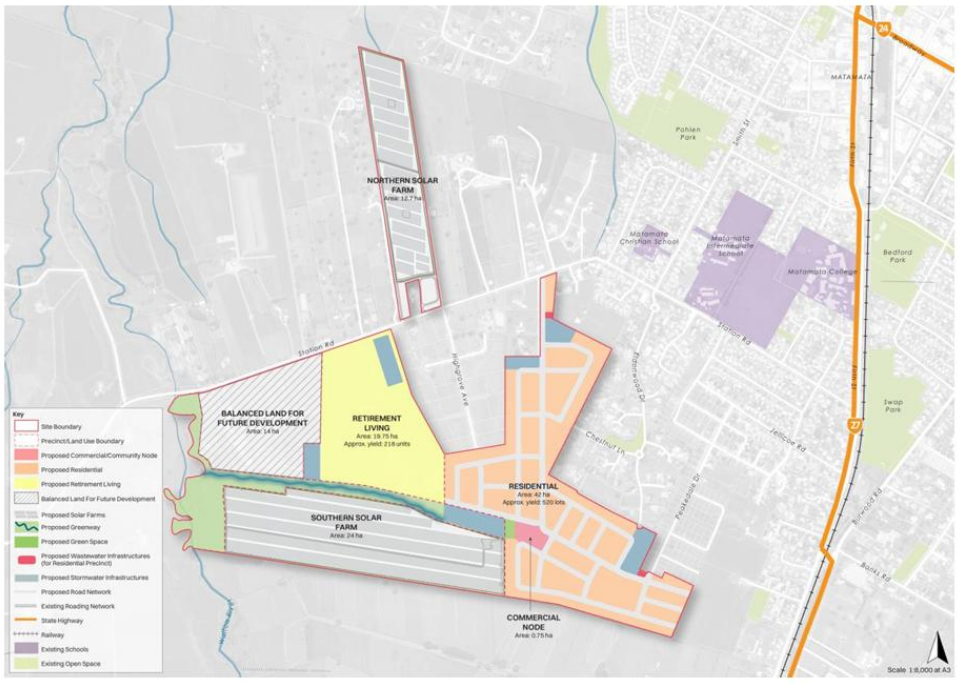
Based on the above, no definitive patterns or safety concerns are identifiable, and as such no road safety matters related to the proposed development have been identified.

4 Proposed Development

Ashbourne is a multi-use development that includes four key precincts:

- A new residential community, comprising 518 new residential units with a variety of densities, a green space and a commercial node;
- The commercial node is proposed to include the following activities
  - Childcare facility with an overall site of 500m^2 (capacity of approximately 100 children);
  - Café/Restaurants of approximately 150m^2;
  - Dairy/Convenience store approximately 300m^2; and
  - Shops/Retail approximately 900m^2.
- A multi-functional greenway that connects the neighbourhood centre and commercial node to the Waitoa River on the site's western boundary with an active-mode pathway along the length;
- A retirement living core, comprising of 218 units, an aged care service and supporting facilities that will be provided across a staged development; and
- Two solar farms which will provide a sustainable energy resource onsite, with the potential to integrate into the wider electricity network to generate energy outside of the immediate development.

Figure 4-1: Ashbourne Development Master Plan



4.1 Proposed Staging

Given the size of the development proposal, the development is proposed to be implemented in stages. Each separate development area within the full development proposal will be subject to a standalone staging, with the implementation of the retirement village, the residential components and the solar farms to be progressed independently.

4.1.1 Residential and Commercial Staging

The residential and commercial stages are proposed to be delivered in eight stages, that progress from the Peakedale Road end of the development, through to a connection at Station Road in the North.

Figure 4-2: Residential and Commercial Development Staging

4.1.2 Retirement Village Staging

As shown in Figure 4-3 below the Retirement Village is proposed to be developed from north to south in ten incremental stages. The timing of the stages will be largely dependent on market demands.

Figure 4-3: Proposed Retirement Village Staging

4.1.3 Solar Farm Staging

The Solar Farms are proposed to be developed in two stages, with the Northern Farm accessed from Station Farm being delivered first, and the Southern Farm being delivered second – with a longer term delivery horizon.

5 Trip Generation

In New Zealand, the RTA Guide is frequently used for assessing the traffic generating potential of residential developments. For residential dwellings such as those proposed, the RTA predicts 0.85 trips / dwelling for peak hour trips and 9.0 trips / dwelling for daily trips. Similarly, the RTA predicts a trip generation rate of 0.2 trips per dwelling in the evening peak for housing for aged and disabled persons. This rate has been adopted for the retirement village for both the AM and PM peak periods.

The RTA Guide is also used for assessing the traffic generating potential of commercial activities, and therefore was used for the childcare, café/restaurant, convenience store and dairy. With regard to the solar farm component of the development, once operational, this is estimated to generate in the vicinity of 4 trips per day based on the trip generation of other solar farms in New Zealand.

The total estimated traffic generation is summarised below in Table 5-1.

Table 5-1: Expected Traffic Generation

Activity	Quantity	Unit	RTA Rate	Internal Capture	Trips	
				AM and PM	AM	PM
Residential	518	Dwellings	0.85 trips per dwelling for peak hour	0	440	440
Solar Farm	2	Areas	2 trips per area in the peak hour	0	4	4
Retirement Village	218 71	Units Beds	0.2 trips per dwelling in the peak hour 0.15 trips per bed in the peak	0	55	55
Commercial Activities	150	Children	500m2 Childcare- Assume 100 Children, and 0.8 trips per child in the peak hour	80%	16	16
	150	m2	Café/Restaurant – 5 trips per 100m2	20%	6	6
	300	m2	Convenience Store/Dairy – 4.6 trips per 100m2	20%	11	11
	900	m2	Retail - 4.6 trips per 100m2	20%	33	33
Total					*565*	*565*

Internal capture has been included for the commercial activities, given the neighbourhood centre is located within the residential suburb. Generally, a 20% internal capture rate was adopted, with the exception of the childcare for which an 80% internal capture rate was adopted. The proposed childcare is anticipated to service the residents of the wider development and adjacent suburbs, and therefore these trips are likely to be via alternate modes (ie walking) or already captured in the residential trips.

These trips are assumed to split into inbound/outbound trips based on and these ratios are:

- 25/75 for the morning peak hour for residential
- 75/25 for the evening peak hour for residential
- 40/60 for the morning peak hour for retirement units

- 60/40 for the evening peak hour for retirement units
- 50/50 for both peak periods for commercial activities (due to the mixed use of activities, this is assumed to reflect the mixed activities)

This creates a total trip generation of the following

Figure 5-1: Traffic Generation by Direction

Activity	Trips	Morning Peak		Evening Peak	
		IN	OUT	IN	OUT
Residential	440	110	330	330	110
Retirement Village	55	22	33	22	33
Commercial Activities (including Solar Farm)	69	35	35	35	35
TOTAL	*565*	*167*	*398*	*167*	*398*

5.1 Traffic Distribution

Information from the census information[3] demonstrates that majority of trips related to school and employment in the peak hour are local trips. There is a number of external trips arriving at the area from the wider area (7%), but the vast majority of arrivals into Matamata, originate in Matamata (63%).

Based on this, the trip distribution has been completed with the majority of trips (90%) heading northeast, to connect with schools and employment opportunities. The remaining 10% are assumed to travel to the west or the south, with an equal distribution (5%) in each of these directions.

It is noted that the traffic expected from this application has been distributed based on the following assumptions:

- All retirement village trips were assumed to enter/exit the village via Station Road, noting that the intent is for the retirement village to be built from the north to the south.
- The retirement village trips with an origin/destination in the north/east were assumed to travel via Smith Street, noting the volume of retirement village trips are low (less than 50 peak hour trips).
- All other residential and commercial trips enter/exit the subdivision via Peakedale Drive. This aligns with the intended staging, where Stage 1 will be accessed via Peakedale Drive. Upon full buildout the spine road will allow vehicles to access the network directly onto Station Road, and therefore the assessment is conservative.
- The residential and commercial trips with an origin/destination in the north/east were all assumed to travel via Jellicoe Road and then Firth Street. Again, this is conservative acknowledging that some trips may travel via Smith Street.

The distribution of the trips across the network can be found in Appendix A.

[3] Commute Waka, 2018

5.2 Background Growth

Historic Census data has been reviewed to gain an understanding of residential growth in Matamata. The population of the Matamata-Piako District over the three most recent censuses dates[4] (for which data is available) is as follows:

- 2006 the population was 30,483
- 2013 the population was 31,536
- 2018 the population was 34,404

As such, over the 12-year period between 2006 and 2016, the population of the Matamata-Piako District increased by 3,921 people or 12.9%. This is equivalent to 1.1% growth per year.

A review of the average annual daily traffic (AADT) volumes on Firth Street (SH27) has also been undertaken to understand traffic growth. The NZTA site between College Street and Station Road was reviewed between 2019 and 2023 with the following average annual daily traffic volumes reported[5]:

- 2019 the AADT was 8,468
- 2020 the AADT was 8,000
- 2021 the AADT was 8,053
- 2022 the AADT was 7,867
- 2023 the AADT was 8,457

The drop in vehicle volumes on this corridor between 2019 and 2020 is likely a result of COVID-19. In 2020 and 2021 numerous lockdowns occurred as a result of the pandemic, and both regional and interregional vehicle movements were restricted.

The drop in vehicle movements between 2021 and 2022 is more difficult to explain, however it may have been a result of the SH27 upgrades near the Mangawhero Stream[6] which resulted in a section of the corridor being closed for 3 months. The detour route for these works still routed vehicles along Firth Street, however some trips may have diverted, and some trips may have not happened all together.

As such, over the 5-year period from 2019-2023 the vehicle movements on Firth Street fluctuated, however the volume did not grow.

Based on both the residential growth, and the nearby vehicle traffic growth, a conservative 1% annual growth rate has been applied to the existing network for a 10-year period. While the population has grown by 1.1%, the proposal will provide a large portion of the residential growth, and therefore a full additional 1% is already considered conservative.

[4] https://www.stats.govt.nz/tools/2018-census-place-summaries/matamata-piako-district
[5] https://experience.arcgis.com/experience/a09cd3ec9bdd4068b45c818a69601775#data_s=id%3AdataSource_1-192bc3bd297-layer-84%3A4878 , Site ID 02700075
[6] https://www.nzta.govt.nz/media-releases/sh27-south-of-matamata-detoured-10-january-to-14-april-2022/

5.3 Assessment of Traffic Effects

5.3.1 General Traffic Effects

Based on the access points available at Stage 1, the key existing wider network intersections include:

- Jellicoe Road / Firth Street (SH27) intersection
- Station Road / Firth Street (SH27) intersection

With regard to new intersections, two new intersections have been assumed on Station Road, referred to as:

- Spine Road/Station Road
- Retirement Village/Station Road

All intersections have been tested under the assumption of full build out, conservative network connections, and a background traffic increase of 10% on all existing movements. It is noted that the Spine Road has conservatively been assumed to not carry traffic, and therefore intersection modelling of this intersection has not been undertaken. Notwithstanding this, should 50% of the site trips use this access once it is provided (approximately 280 peak hour vehicle movements), the intersection could operate acceptably.

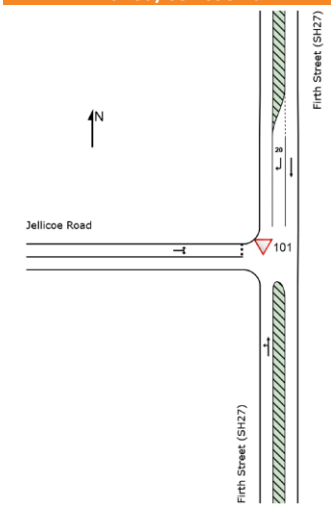
The default SIDRA parameters were generally retained, with the exception of the right turn gap acceptance out of the minor road at the Jellicoe Road / Firth Street intersection. The critical acceptance gap was reduced to 5 seconds and the follow-up headway was reduced to 3 seconds in accordance with Austroads[7]. The default gap acceptance parameters for the right turn out of the retirement village were conservatively retained given the higher speed environment on Station Road in this location as well as the road users accessing the network in this location.

The intersection layouts modelled are shown in Figure 5-2, and the performance of these intersections are summarised in the SIDRA results in Figure 5-3 to Figure 5-5.

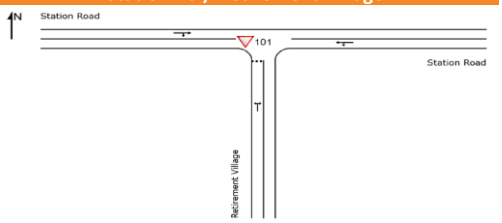
[7] Austroads Guide to Road Design Part 4A, Unsignalised and Signalised Intersections, Table 3.5: Critical acceptance gaps and follow-up headways

Figure 5-2: Intersection Layouts Modelled

Firth St / Jellicoe Rd



Station Rd / Retirement Village



It is noted that these intersections have been conservatively modelled without right hand turn bays, however given the speed environment, and in the case of the retirement village - older drivers, right hand turn bays have been proposed at both the intersection of Station Road and Spine Road and Station Road and the Retirement Village. The results as shown below can therefore be considered to be a "worst case" scenario, and the intersections will very likely perform better than reported.

Should the speed environment be reduced on Station Road to 50kph at a later date prior to the implementation of the proposed upgrades, the requirement for a right turn bay could be reevaluated.

Figure 5-3: SIDRA Movement Summary for Jellicoe Road / Firth Street Intersection in the AM Peak Hour

Site: 101 [AM Peak Jellicoe Road and Firth Street (SH27) (Site Folder: RG Assessment March 2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Firth Street (SH27)															
1	L2	All MCs	26	1.0	26	1.0	0.266	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	48.5
2	T1	All MCs	479	4.0	479	4.0	0.266	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	49.7
Approach			505	3.8	505	3.8	0.266	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.6
North: Firth Street (SH27)															
8	T1	All MCs	328	4.0	328	4.0	0.173	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	All MCs	156	1.0	156	1.0	0.148	6.8	LOS A	0.6	4.5	0.53	0.71	0.53	44.5
Approach			484	3.0	484	3.0	0.173	2.2	NA	0.6	4.5	0.17	0.23	0.17	48.0
West: Jellicoe Road															
10	L2	All MCs	383	1.0	383	1.0	0.539	9.0	LOS A	3.8	26.7	0.68	0.96	1.08	42.9
12	R2	All MCs	54	1.0	54	1.0	0.539	19.8	LOS C	3.8	26.7	0.68	0.96	1.08	42.8
Approach			437	1.0	437	1.0	0.539	10.3	LOS B	3.8	26.7	0.68	0.96	1.08	42.9
All Vehicles			1426	2.7	1426	2.7	0.539	4.0	NA	3.8	26.7	0.27	0.38	0.39	46.8

Figure 5-4: SIDRA Movement Summary for Jellicoe Road / Firth Street Intersection in the PM Peak Hour

Site: 101 [PM Peak Jellicoe Road and Firth Street (SH27) (Site Folder: RG Assessment March 2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Firth Street (SH27)															
1	L2	All MCs	42	1.0	42	1.0	0.240	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	48.4
2	T1	All MCs	414	4.0	414	4.0	0.240	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	49.6
Approach			456	3.7	456	3.7	0.240	0.5	NA	0.0	0.0	0.00	0.05	0.00	49.5
North: Firth Street (SH27)															
8	T1	All MCs	349	4.0	349	4.0	0.184	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	All MCs	378	1.0	378	1.0	0.338	7.1	LOS A	1.9	13.1	0.57	0.74	0.63	44.3
Approach			727	2.4	727	2.4	0.338	3.7	NA	1.9	13.1	0.30	0.38	0.33	46.9
West: Jellicoe Road															
10	L2	All MCs	161	1.0	161	1.0	0.361	7.3	LOS A	1.8	12.4	0.67	0.85	0.85	42.6
12	R2	All MCs	58	1.0	58	1.0	0.361	20.7	LOS C	1.8	12.4	0.67	0.85	0.85	42.5
Approach			219	1.0	219	1.0	0.361	10.9	LOS B	1.8	12.4	0.67	0.85	0.85	42.6
All Vehicles			1402	2.6	1402	2.6	0.361	3.8	NA	1.9	13.1	0.26	0.35	0.30	46.9

Site: 101 [AM Peak Station Road and Retirement Village (Site Folder: RG Assessment March 2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Retirement Village															
1	L2	All MCs	1	1.0	1	1.0	0.023	4.7	LOS A	0.1	0.5	0.18	0.53	0.18	45.6
3	R2	All MCs	26	1.0	26	1.0	0.023	4.9	LOS A	0.1	0.5	0.18	0.53	0.18	45.4
Approach			27	1.0	27	1.0	0.023	4.9	LOS A	0.1	0.5	0.18	0.53	0.18	45.4
East: Station Road															
4	L2	All MCs	18	1.0	18	1.0	0.036	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	48.0
5	T1	All MCs	51	1.0	51	1.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	49.2
Approach			68	1.0	68	1.0	0.036	1.2	NA	0.0	0.0	0.00	0.14	0.00	48.9
West: Station Road															
11	T1	All MCs	56	1.0	56	1.0	0.030	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.9
12	R2	All MCs	1	1.0	1	1.0	0.030	4.6	LOS A	0.0	0.1	0.01	0.01	0.01	48.4
Approach			57	1.0	57	1.0	0.030	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.9
All Vehicles			153	1.0	153	1.0	0.036	1.5	NA	0.1	0.5	0.04	0.16	0.04	48.6

Figure 5-5: SIDRA Movement Summary for Station Road / Retirement Village Intersection in the PM Peak Hour

Site: 101 [AM Peak Station Road and Retirement Village (Site Folder: RG Assessment March 2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Retirement Village															
1	L2	All MCs	1	1.0	1	1.0	0.023	4.7	LOS A	0.1	0.5	0.18	0.53	0.18	45.6
3	R2	All MCs	26	1.0	26	1.0	0.023	4.9	LOS A	0.1	0.5	0.18	0.53	0.18	45.4
Approach			27	1.0	27	1.0	0.023	4.9	LOS A	0.1	0.5	0.18	0.53	0.18	45.4
East: Station Road															
4	L2	All MCs	18	1.0	18	1.0	0.036	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	48.0
5	T1	All MCs	51	1.0	51	1.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	49.2
Approach			68	1.0	68	1.0	0.036	1.2	NA	0.0	0.0	0.00	0.14	0.00	48.9
West: Station Road															
11	T1	All MCs	56	1.0	56	1.0	0.030	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.9
12	R2	All MCs	1	1.0	1	1.0	0.030	4.6	LOS A	0.0	0.1	0.01	0.01	0.01	48.4
Approach			57	1.0	57	1.0	0.030	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.9
All Vehicles			153	1.0	153	1.0	0.036	1.5	NA	0.1	0.5	0.04	0.16	0.04	48.6

As shown in Figure 5-3 and Figure 5-4, the SIDRA model shows all movements at the intersection of Jellicoe Street and Firth Street operating at LOS C or better. The average delay experienced by a vehicle is 4 seconds in

both peak periods, with the intersection having remaining capacity available with a V/C ratio of 0.54-0.36 in the AM and PM peak hour respectively. As such, this intersection is considered to operate well within the industry desired performance thresholds.

The retirement village access is shown to operate well within the industry desired performance thresholds, as per the output summaries shown in **Error! Reference source not found.** and Figure 5-5. All movements operate at LOS A with an overall average delay less than 2 seconds.

5.3.2 Structure Plan Roading Assessment

The Eldonwood Structure Plan requires a specific infrastructure to be provided to support development, and also identifies specific corridors which require assessment. Assessment against the Eldonwood Structure Plan rules is provided in Table 5-2 and

Table 5-3.

Table 5-2: Rule 9.2.2 Additional Performance Standards for subdivision or development

Criteria	Assessment
(i) Any subdivision or development within the Structure Plan area shall provide for a collector road between Firth Street and Station Road with two links provided to Station Road.	One public connection is proposed to Station Road, as well as a private connection to Station Road within the retirement village. A second public connection to Station Road is not considered to be required, with the Peakedale Drive and the new Station Road connection providing sufficient capacity for the proposal. Pedestrian connectivity is provided to both Highgrove Avenue and Eldonwood Drive.
(ii) A minimum number of two roading links shall be provided between the collector road and Jellicoe Street.	The northern portions of these link roads are constructed, being Peakedale Drive and Hampton Terrace. The proposal includes extending Peakedale Drive to the southern extent of the Structure Plan Area. The southern portion of Hampton Terrace is not within the subject site and therefore beyond this application, however east-west connections to the Lot to the east are proposed in order to allow for future connectivity.
(iii) Pedestrian/cycle linkages shall be provided between the collector road, the existing Eldonwood subdivision and Firth Street.	Pedestrian footpaths, of at least 1.8m width, are provided on both sides of all new roads. Furthermore, a 2.5m wide shared path is proposed between Station Road and the southeastern boundary.

Table 5-3: Rule 9.2.4 Infrastructure and Servicing Schedule

Road	Assessment of Effect
Station Road East	From a traffic perspective this corridor can accommodate the additional traffic. The following upgrades are proposed to urbanise the corridor and improve the safety of the corridor: • Right turn bay at the new spine road access. To be provided when the Station Road connection is constructed. • Pedestrian footpath along the site frontage • Kerb and channel along the site frontage From the Spine Road to the Retirement Village access • A bridle path along the southern side of Station connecting to the Retirement Village retaining a rural standard
Hampton Terrace	The proposal does not connect directly to Hampton Terrace. As such, the effects of the proposal on Hampton Terrace are considered minimal.
Smith Street	From a traffic perspective this corridor can accommodate the additional traffic. Smith Street already provides pedestrian footpaths on both sides with kerbs and channels.
Haig Road	The proposal does not connect directly to Hampton Terrace. As such, there are no effects of the proposal on Haig Road.
Intersection Upgrades	As above, the intersections can operate acceptably in their current form. Right turn bays are already provided on Firth Street and therefore no upgrades are recommended at these intersections.
Additional Widening of Collector Road	Some widening has been proposed on Station Road at the intersection of Spine Road and the Retirement Village access to enable the formation of a right turn bay.

6 Future Network Connections

It is proposed that the roads within the retirement village will all be private roads. All other roads are to be vested and will be public roads.

External access to the proposal is proposed via two new intersections onto Station Road as well as an extension to Peakedale Drive. Allowance has also been made for two future east-west roading connections to the east of the residential subdivision at the eastern end of Road 1 and Road 16.

6.1 Proposed Roading Cross Sections

The proposed internal road network has been designed with consideration to the Regional Infrastructure Technical Specification (RITS) document and the Matamata-Piako District Council Development Manual 2010 (MPDCDM).

It is noted that the site is generally flat, and as such the proposed gradients all fall within the 14% maximum grade permitted by the MPDCDM.

6.1.1 Residential and Commercial Roading Network

The proposed residential and commercial activities will be serviced via a network of 16 new public roads that will be vested to Council. Road 1 and Road 7 will act as local collector roads and have a 20m road reserve, with the rest proposed to be local roads and having an 18m road reserve. The cross section of these roads is shown below.

The cross-sectional requirements of new roads are detailed in Table 3.1 of the MPDCDM. Those relevant to the proposal are summarised in Table 5 below.

It is noted that the site is currently zoned Rural and Rural Residential, however the proposed application is for an urban environment rather than a rural environment. Rural road cross-sections in Table 3.1 are typically suited to speed environments of 100km/hr and provide no kerbside parking, pedestrian or cyclist facilities, with metal shoulders and swales. Use of an urban cross-section for the proposed subdivision is considered more appropriate given the proposed density, location and layout. Posted speeds of 50 km/hr are expected.

Table 6-1: Cross Section requirements Matamata- Piako District Council MPDCDM (Table 3.1)

Road Type	Du's / vpd served	Road reserve	Carriageway width (excl. parking)	Footpaths	Parking
Rural and Rural Residential Zone					
Local Road	>25 or 48-350 vpd	20m	6m	n/a	n/a
Collector Road	250 – 1,500 vpd		6-7m		
Residential Zones					
Local Road (cul-de-sac)	7-25 du or 56-200 vpd	18m	3.5m	1.5m one side	2.5m one side
Local Road (residential)	>25 du or 200 – 1,000 vpd	20m	4-6m	1.5m both sides	2.5m both sides
Sub collector (residential)	800 – 1,200 vpd		7m		

6.1.1.1 Road 1 and 7 Cross-section

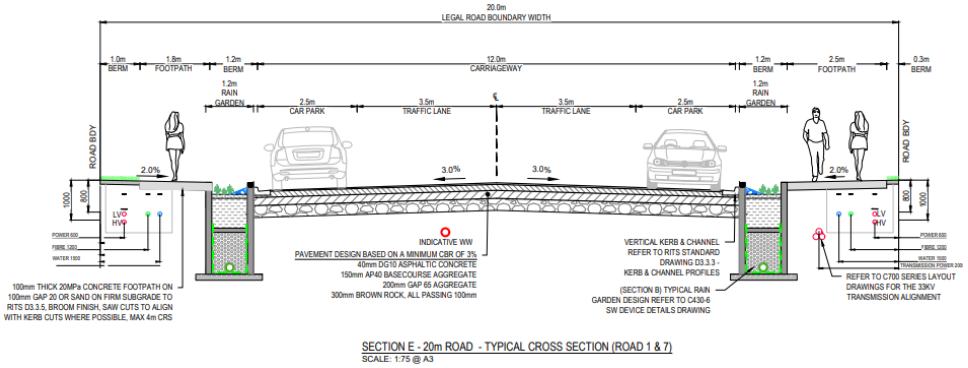
Road 1 provides the main access from Station Road into the site, with Road 7 providing the main southern entrance from Road 1 to the retirement village. Based on the definitions in Table 3.1 of the MPDCDM, Road 1 is anticipated to act as a sub collector road and Road 7 as a local road.

The Road 1 and Road 7 cross-section will consist of:

- 20m road reserve
- two x 3.5m traffic lanes;
- 1.8m wide footpath on one side of the carriageway and 2.5m on the other side of the carriageway
- 2.5m wide on both sides of the carriageway for the use of either parallel parking or berm build outs.

Figure 6-1 shows the proposed Road 1 and Road 7 cross-section.

Figure 6-1: Proposed Road 1 and 7 cross-section



This meets the road reserve, carriageway and parking dimensional requirements of the MPDCDM and exceeds the pedestrian requirements, thus is considered acceptable.

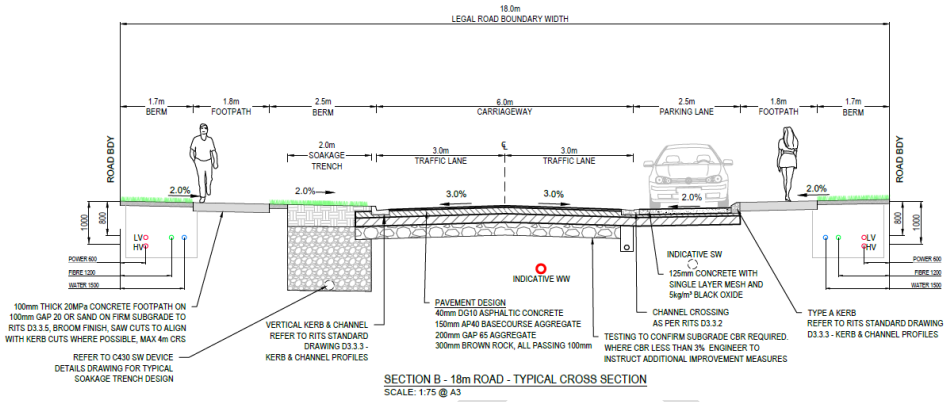
6.1.1.2 Other road cross-sections

All other road cross-sections within the residential and commercial aspects of the site will consist of:

- 18m road reserve
- two x 3.0m traffic lanes;
- 1.8m wide footpath on both sides of the carriageway; and
- 2.5m wide provision on both sides of the carriageway to be used as either kerb buildouts near intersections or parallel parking.

Figure 6-2 shows the proposed cross-section.

Figure 6-2: All other residential and commercial aspect road cross-sections



This meets the carriageway, parking and pedestrian requirements of the MPDCDM. It does not meet the overall road reserve width requirements of the MPDCDM (20m required versus 18m proposed). To accommodate this, a reduced overall berm width is proposed. This will not impact the parking or movement of vehicles or pedestrians, as such from a traffic and transport perspective this reduced reserve width is considered acceptable.

6.1.2 Retirement Village Roading Network

The proposed retirement village will be serviced via a network of 6-7m wide private roads. An overview of these roads is shown below

Figure 6-3: Proposed Roading Layout of Retirement Village

The cross section of these roads is shown below.

- Road 1 and Road 9: 7.0 m carriageway, with a 2.0 m berm and a 1.5 m footpath
- Roads 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13 and Road 15: 6.0m carriageway, no dedicated footpath
- Road 14 - 5.0 m carriageway with no dedicated footpath.

Figure 6-4: Cross Section for Road 1

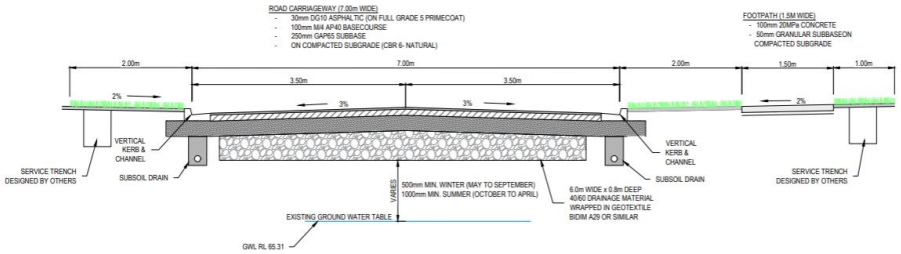


Figure 6-5: Cross Section for Roads 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13 and Road 15

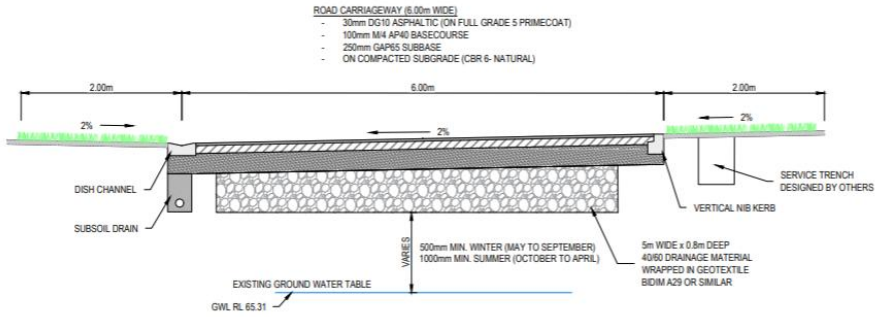
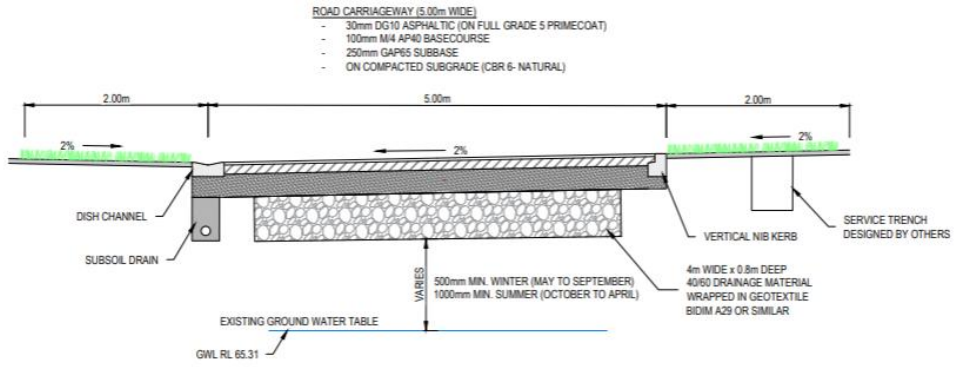


Figure 6-6: Cross Section for Road 14



The proposed cross sections of these roads will provide for a low-speed road environment, and given the low vehicle movements typically experienced within a retirement village setting, they will be appropriate for the intended use.

6.2 Intersections

All intersections have been designed to accommodate an 11.5m truck as per the RITS.

Within the residential component, those intersections with Road 1 can accommodate an 11.5m truck within the lane on Road 1, with an allowance for some crossing of the centreline on the minor road when turning into it.

All minor intersections in both the residential subdivision and retirement village require an 11.5m truck to cross the centreline. Whilst the 11.5m truck does not stay wholly within the lane as it turns into the minor roads this is considered acceptable as this will only occur once a week for the purpose of waste collection, vehicle speeds and volumes will be low at the minor intersections and this enables a much tighter intersection to be constructed, reducing pedestrian crossing distances and promoting slow vehicle navigation speeds.

6.2.1 External Intersections

Two new external intersections are proposed on Station Road, one would be 40m west of Aporo Drive and provide access to a new public road (Road 1) serving the residential, commercial and solar farms aspects of the proposal. The other would provide access to a new private road within the retirement village and be located 335m west of Highgrove Avenue. The location and layout of these can be seen in Figure 6-7 and Figure 6-8.
Both intersections are proposed to provide right turn bays to facilitate safe turning movements. No specific cycle provision is provided, but pedestrian paths will be provided on the southern side of Station Road between the proposed new Road 1 intersection and the existing pedestrian path which currently ends on Station Road near Sheffield Street. Tracking for these intersections is shown in Appendix B.

Figure 6-7: Proposed New Residential intersection

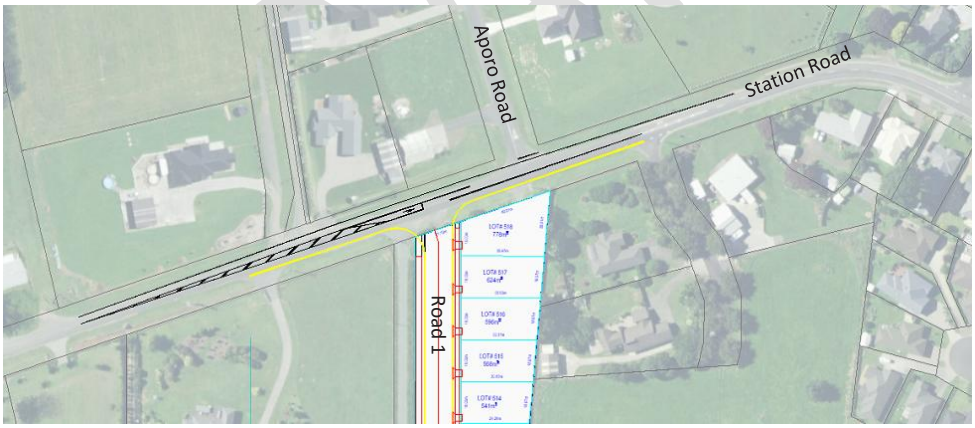
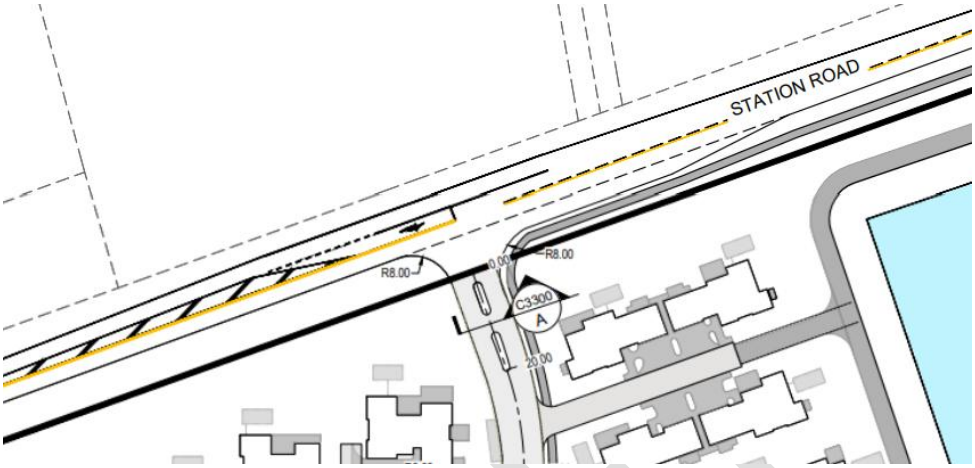


Figure 6-8: Proposed New Retirement Village intersection



6.2.1.1 Intersection Spacing

Section 3.7.1 a) of the MPDCDM gives minimum intersection spacing standards for intersections on opposite sides of the road in Residential and Rural Residential zones. For an 80 km/hr operating speed on collector / local roads this requires a spacing of 30m.

The proposed Road 1 intersection will be some xxm from the nearby Aporo Road intersection and the Retirement Village centre intersection will be 335m from Highgrove Avenue, thus both intersections meet this.

6.2.1.2 Proximity to vehicle crossings

Section 3.12.3 Table 3C of the MPDCDM gives minimum separation distances between rural vehicle crossings and intersections (such as those already on Station Road in the vicinity of the site).

For Station Road, which has a posted speed of 80 km/hr this is 45m when measured from the centre of the intersection to the centre of the vehicle crossing. Intersection spacing standards for intersections on opposite sides of the road in Residential and Rural Residential zones require that for an 80 km/hr operating speed on collector / local roads this requires a spacing of 30m.

For the proposed new retirement village intersection, the nearest existing vehicle crossings are 180m to the east and 490m to the west thus complies with this.

For the proposed new Road 1 intersection the nearest vehicle crossing are xx to the east and xx to the west thus does not comply with this. As discussed below, due to the existing topography, the intersection location excellent sight distance in both directions. Furthermore, the intersection is not the sole entrance to the development, with the southern portion of the development expected to reach the surrounding network via Peakedale Road. The intersection has also been located as far from the existing vehicle crossing as is practicable to maximise available distance, while still providing a core spine road in accordance with the indicative Structure plan. As such the intersection location to the vehicle crossing is considered acceptable.

Commented [MS1]: Need confirmation of where the intersection ends up. Still unlikely to comply.

Table 3B shows the minimum vehicle crossing separation standards. For a local road with an 85th percentile operating speed of 50 km/h, the MPDCDM states that one crossing is permitted per title irrespective of spacing, and 15.0 metres minimum spacing for second or multiple entrances.

It is proposed each dwelling has no more than one vehicle crossing, and therefore all dwellings comply with the MPDCDM.

6.2.1.3 Intersection Sight distance

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads Part 4A) provides sight distance requirements at intersections. In regard to the local roads, for a design speed of 80 kph and with a reaction time of 2 seconds a safe intersection sight distance (SISD) of 181 m is required. In addition, an approach sight distance (ASD) of 114m is required. The MPDCDM requires a minimum sight distance of 175m for an 80km/hr operating speed environment.

Given the existing topography, available SISD for both the retirement village access and the residential access is in excess of 181m required. The available site distance from the proposed Spine Road intersection to the east is the shortest available (190m) and is shown below in Figure 6-9.

Figure 6-9: Available Sight Distance to the East – Proposed Spine Road

6.2.2 Internal intersections

Internally a total of 29 intersections are proposed within the public roading aspect of the proposal. Of these six will be formed as cross-roads intersections and 23 as T-intersections. All intersections will be priority controlled.

Within the private roading network in the retirement village a total of 11 intersections are proposed with the main road through the site. Of these eight will be formed as T-intersections and three as roundabouts. These have been designed with a minimum radius of 6.0m. These will also contribute to creating a slower speed environment.

6.2.2.1 Intersection Spacings

Internally within the residential subdivision where the operating speed is expected to be between 50 and 60 km/hr a spacing of 60m is required for intersections on the same side of the road and 30m for intersections on opposite sides of the road. It is proposed that all intersections on the same side of the road as each other will have a spacing of 70m or greater and all intersections on opposite sides of the road will have a spacing of 45m or greater.

Some of the roading intersections within the retirement village do not meet the spacing requirements of the MPDCDM. This is considered acceptable as all retirement village roads are proposed to be private and low speed. Users will be familiar with these, and traffic volumes will be significantly lower due to the absence of no public through traffic.

6.2.2.2 Intersection Sight Distance

Residential Development
Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads Part 4A) provides sight distance requirements at intersections. In regard to the local roads, for a design speed of 40 - 50 kph and with a reaction time of 2 seconds a safe intersection sight distance (SISD) of 73m - 97m is required. In addition, an approach sight distance (ASD) of 40 - 50m is required.

All of the intersections have been assessed for available sight distance, and due to the curve in the road, following do not provide sufficient sight distances. It is recommended that traffic calming be investigated at detailed design around the commercial centre on Road 1 to encourage lower speeds, both to improves sight distance and improve walking outcomes around the centre.

Location	Direction	Available SISD	Comment
Intersection of Road 1 and Road 7	Looking south from Road 7 along Road 1	75m	Recommend that street furniture and landscaping in front the commercial area is below 0.8m
Intersection of Road 1 and Road 10	Looking north from Road 10	50m	Recommend that traffic calming is investigated about the commercial centre to encourage a slower speed environment.

Retirement Village
The speed environment within the Retirement Village is proposed to be 20kph. This will be managed via appropriate speed signage and enforced by management of the Retirement Village. This would require a SISD of approximately 15m[8]. This is readily available at all intersections within the Retirement Village.

6.2.2.3 Intersection Design for Future Consideration

The following future design iterations are recommended at detailed design to improve intersection layouts

- Intersection Road 1 and Road 9 – investigate opportunities to align closer to 90 degrees
- Intersection of Road 14 and Road 10 – investigate opportunities to provide a standard T intersection.

6.3 Proposed Pedestrian Connections

Pedestrian connections have been provided through the development. All publicly vested roads will have footpaths on both sides, and pram crossings will be provided at all intersections.

6.3.1 Residential and Commercial

As mentioned above all publicly vested roads are proposed to be provided with 1.8m footpaths on both sides of the road. In addition to this, dedicated pedestrian connections within the residential area have been provided in the following locations:

- From Road 5 to Highgrove Avenue
- From Road 5 to Eldonwood Drive in two locations
- From Road 14 along the proposed Greenway

6.3.2 Retirement Village

Overall, it is intended that the roading network within the village is retained in private ownership. A pedestrian network within the village is proposed and connections from residences to the facilities, and to the neighbouring commercial centre have been provided. Pedestrian connections to the greenway facility have also been provided – enabling recreational walking for residents.

All driveway access that runs to the main road through the site has been developed to have a pedestrian connection provided to maximise walkability within the site and minimise “dead ends” for pedestrians.

6.4 Vehicle tracking

As detailed above, vehicle tracking has been completed for the proposed road network to demonstrate that an appropriate design has been provided. This tracking has been completed utilising 90 percentile car and a 90 percentile truck as per the MPDC Development Manual Figure 3A and 3B. This vehicle tracking is shown in Appendix X.

[8] Based on Austroads Part 4a, 20km/hr speed, 0% grade, reaction time of 2 seconds.

7 Access

7.1.1 Crossing Separation

Table 3-B of the MPDCDM shows the minimum vehicle crossing separation standards. For a local road with an 85th percentile operating speed of 50 km/h, the MPDCDM states that one crossing is permitted per title irrespective of spacing, and 15.0 metres minimum spacing for second or multiple entrances.

It is proposed each dwelling has no more than one vehicle crossing, and therefore all dwellings comply with the MPDC DM.

7.1.2 Crossing Distances from Intersections

Table 3-C of the MPDCDM shows the minimum separation between vehicle crossings and intersections. For a road with an 85th percentile operating speed of 50 km/h, the MPDCDM states that 20 metres of separation is required (as measured from the centreline of the intersecting road).

33 of the proposed 39 vehicle crossings comply with the MPDCDM, meaning that a total of 6 vehicle crossings do not comply with the minimum separation distance. These vehicle crossing locations are considered to be acceptable in this instance due to the following:

- The low-speed environment expected within the proposed development;
- The estimated low traffic volumes along the internal roads of the proposed development; and
- The available sight lines between vehicles exiting these crossings and vehicles likely to be within each intersection.

It is noted that the minimum separation between vehicle crossings within the development and McGowan Street is approximately 24.1 metres, meaning that the non-complying vehicle crossings within the development are only located within internal intersections.

7.1.3 Crossing Design

MPDC DG 308 shows the vehicle crossing design for all urban vehicle crossings. The proposed vehicle crossing designs comply with these designs in the urban areas.

The northern solar farm will be designed to meet Drawing DG 307 as a rural crossing on a District Road.

7.1.4 Crossing Site Distances

Vehicle crossing site distances have been assessed for all residential lots. All vehicle crossings provide sufficient sight distances, of at least 28m as per Table 3A of the MPDC DM - with the exception of Lot 123. It is recommended that the vehicle crossing be moved in order to achieve the compliant sight distance.

8 Parking

The following assessments have been undertaken against the Matamata-Piako District Plan, specifically Part B, Section 9.1: Roading of the Matamata-Piako District Council District Plan. Part B, Section 9.1.4 outlines the on-site parking requirements for residential developments. This states that:

"Every person who proposes to erect, re-erect, construct or substantially reconstruct, alter or add to a building on a site or who changes the use of any land or building, shall provide suitable areas for the parking of vehicles as required below, except for within the urban areas of the Towns of Matamata, Morrinsville and Te Aroha which include all landuse within the Residential, Business and Industrial Zones."

As the site falls within the rural areas of the town of Matamata minimum parking provisions apply.

8.1 Residential Parking

8.1.1 District Plan Parking Requirements

The MPDP requires that two parking spaces per dwelling are provided.

Residential parking is proposed to be contained on site for each dwelling. With the sites ranging in size from 350m2 to 800m2, there is sufficient on-site space to provide for parking a variety of ways to meet the MPDP requirements.

With regard to the smaller lots, concept plans have been developed to demonstrate how onsite parking will be provided for these dwellings. These can be found in the suite of application documents, and an example is shown below in Figure 8-1.

Figure 8-1: Indicative House Layout and Parking Provision on 350m2 lot

8.2 Commercial Parking

8.2.1 District Plan Parking Requirements

The parking requirements for the commercial parking area are shown below in Table 8-1.

Table 8-1: Matamata Piako District Plan Parking Requirements

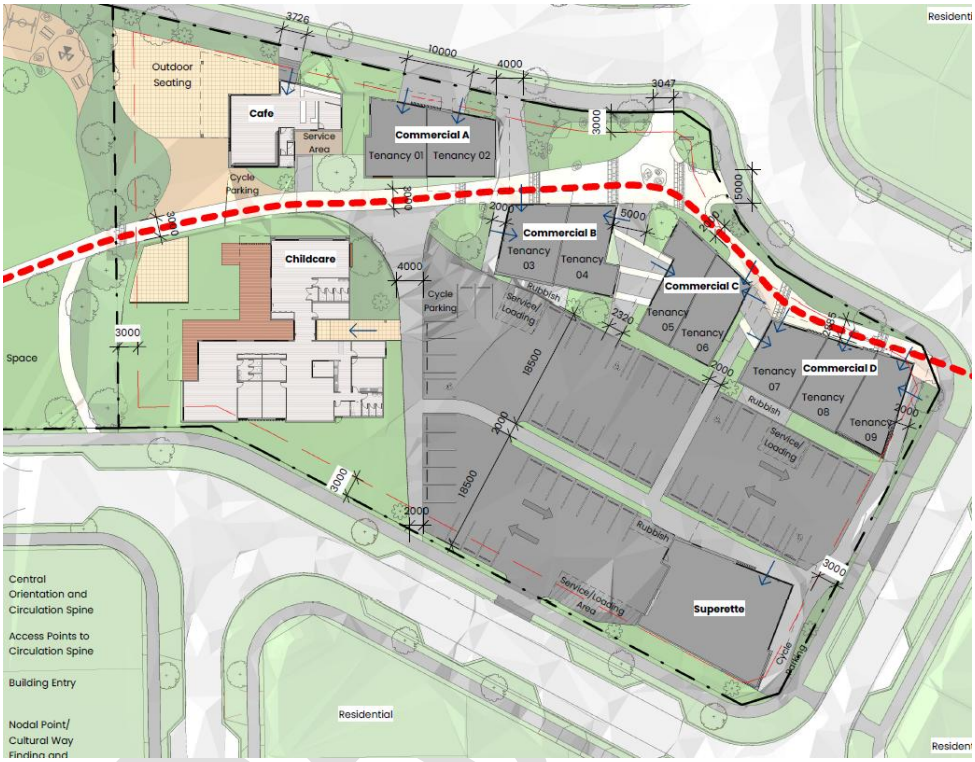
Activity	Proposed GFA / size	MPDP Parking Provision Rate	MPDP Requirement
Childcare	500 m2 100 students Assume staff ratio (1:10)	1 per four children, 2 per 3 staff	32
Café/Restaurant	150 m2	1 per 10m2	15
Dairy/Convenience	300 m2	1 per 40m2	8
Shops/Retail	920 m2	1 per 40m2	23
Total			**78**

In addition, the NZ Building Code / NZS 4121:2001 document, requires that at least two mobility spaces are provided for the first 50 parking spaces, with an additional mobility space to be provided for each additional 50 spaces (or part of).

8.2.2 Proposed Parking Provision

The commercial node is proposed to be supported by a central parking area, accessed from Road 10 and Road 14. This parking area will contain 51 parking spaces, with three loading spaces (two for van deliveries and one for an 8m truck) and four accessible spaces.

Figure 8-2: Proposed commercial parking layout



8.2.3 Parking Shortfall Assessment

The proposed parking provision results in a parking shortfall of 27 spaces. As per 9.1.4(iii) in the MPDP an assessment of this parking shortfall follows.

The parking area is proposed to be a large, shared parking area, which with the variety of adjacent uses, and complementary peak parking demands, this results in an opportunity for a more efficient parking provision. An assessment of the parking demands based on typical peak time of day demands is summarised below in Table 8-2.

Table 8-2: Peak Parking Demands Based on Shared Utilisation

		Peak Parking Demand based on Joint Demands							
Activity	**MPDP**	**AM Peak**		**Midday**		**Saturday**		**Evening**	
		Demand	**Spaces**	**Demand**	**Spaces**	**Demand**	**Spaces**	**Demand**	**Spaces**
Childcare	32	100%	32	25%	8	0%	0	60%	19
Café/ Restaurant	15	25%	4	80%	12	100%	15	75%	11

Dairy/ Convenience	8	75%	6	100%	8	100%	7.5	25%	2
Shops/Retail	23	25%	6	80%	18	100%	22.5	75%	17
Total Demand			**48**		**45**		**45**		**49**

As seen, overall estimated parking demands are highest in the evening peak, with estimated parking demands at 49 parking spaces.

In addition to this parking provision, on street parking is provided on Road 7, which can assist in the event of isolated parking demands in excess of the provision of 51 parking spaces.

8.2.4 Parking Dimensions

All parking spaces are proposed to be 2.6m wide by 4.9m long with a minimum of 7.7m manoeuvring aisle width.

MPDC Development Manual 2010 requires that 90-degree parking spaces for short term parking have a stall width of 2.6m, a stall depth of 4.9 (including kerb overhang) and a manoeuvring depth of 7.7m. As such all parking spaces comply with this requirement.

Mobility spaces have a total width of 3.6m, made up of a 2.5m space with 1.1m mobility strip. These dimensions meet the requirements of NZS 4404, and the MPDC Development Manual requirements.

8.3 On Street Parking

In addition to the on-site parking, on street parking will be available on all of the road network. The provision on each road is dependant on the location of vehicle crossings and the provision of rain gardens.

8.4 Retirement Village

8.4.1 District Plan Parking Requirements

The parking requirements for the commercial parking area are shown below in Table 8-3.

Table 8-3: Retirement Village District Plan Parking requirements

Activity	Proposed no./ size	MPDP Parking Provision Rate	MPDP Requirement
Villas	218	2 / dwelling	436
Aged care hospital	71 beds 18 employees No ambulance spaces	Visitor parking - 1 space / ten beds, plus 1 space / two employees, plus 1 space / ambulance	7 36 1
Aged Care Total			**44 spaces**

In addition, the NZ Building Code / NZS 4121:2001 document, requires that for the hospital component at least two mobility spaces are provided for the first 50 parking spaces, with an additional mobility space to be provided for each additional 50 spaces (or part of).

8.4.2 Proposed Parking Provision

All villas will be provided with a minimum of two parking spaces, typically with additional provision for visitor parking on site in front of garages.

The aged care hospital is proposed to be supported by some 41 parking spaces accessed from private Road 9.. This parking area will contain 39 spaces for staff and visitors, 1 ambulance spaces and 2 mobility spaces.

A parking provision of 41 parking spaces is a slight shortfall against the parking requirements of the MPDC.

In addition to the parking spaces above, parking spaces for larger vehicles such as campers has also been provided and can be access from Road 6 within the Village. This parking areas can also be utilised as overflow parking in exceptional circumstances.

Additional visitor parking is also available throughout the site (20 spaces) and located outside the facilities building (29 spaces).

The Aged Care parking shortfall is considered acceptable given:

- The Village is intended to operate as an integrated development and there is availability of additional parking on throughout the site and
- Aged care parking demands are expected to be slightly less than that required by the MPDC. Parking demands are expected to be region on 1 parking space per three beds for staff – 24 staff spaces, and 1 space per four beds for visitors – 18 visitor spaces.
- Staff shower and changing facilities are provided within the Aged Care facility to also encourage walking and cycling to work.
- A pick up/drop off area and the loading space adjacent to the building can both be utilised by ambulances in the event of an emergency.

8.4.3 Parking Dimensions

As mentioned above, parking dimensions are required to have a stall width of 2.6m, a stall depth of 4.9 (including kerb overhang) and a manoeuvring depth of 7.7m.

The proposed parking spaces within the Aged Care parking area are 2.7m wide, with a stall depth of 5m, and a manoeuvring depth of 8.0m. These comply with the MPDC requirements.

The proposed parking spaces at the facilities building are 2.7m wide, with a stall depth of 5.0m, and a manoeuvring depth of 8.0m. These comply with the MPDC requirements.

The other visitor parking spaces located throughout the site are 3.0m, with a stall depth of 5.0m, and a manoeuvring depth of 12m. These comply with the MPDC requirements.

8.5 Loading

8.5.1 Residential

There are no specific loading requirements in the MPDCDM. On street rubbish and recycling collection is proposed through the residential development. Vehicle tracking of an 11.5m truck has been undertaken to demonstrate circulation through the residential development. This tracking is provided in Appendix B.

8.5.2 Commercial

The commercial area is proposed to be supported by three loading bays, all located onsite within the shared parking area. No reverse movements on to the road network are required. Tracking of these areas has been completed and is provided in Appendix B.

Figure 8-3: Loading areas in commercial area

8.5.3 Retirement Village

The retirement village has been designed to accommodate an 11.5m truck to enable public rubbish collections to be facilitated. Rubbish collection points will be provided for residents at the end of the shared driveways, and rubbish collection trucks will not be required to travel on these parts of the internal network. As such a route that does not require reverse movements can be provided.

Servicing for the Aged Care is via dedicated loading space.

Vehicle tracking has been provided in Appendix B.

9 Integration with Policy and other Frameworks

9.1 Government Policy Statement on Transport (GPS 2024)

The Government Policy Statement on Transport (GPS 2024) sets four strategic priorities for Transport. These priorities include:

- Economic Growth and Productivity
- Increased Maintenance and Resilience
- Safety
- Value for Money

The Government's main priority is to boost economic growth through efficient land transport investment, enabling faster, safer movement and better access to housing land. The proposal provides increased housing options for Matamata, enabling growth while leveraging from the existing roading network. Assessment of the road network, demonstrates that the increased housing supply can be provided, with negligible impact on the efficiency of the surrounding road network. As such, it is considered that the proposed development is well aligned with the GPS for transport.

9.2 Waikato Regional Land Transport Plan (RLTP 2024 - 2054)

The strategic objectives of the 2024 Waikato RLTP are summarised in below. As shown, the proposed development is well aligned with these objectives.

Figure 9-1: Waikato RLTP Objectives

Objective	How the proposal meets the Objectives
Climate change–an environmentally sustainable, energy efficient and low-carbon transport system that delivers emissions reductions and enhances communities long-term resilience to the effects of climate change.	The proposal includes a solar farm to generate clean, renewable energy and reduce reliance on carbon-based sources. A walkable layout encourages short trips by active modes, supported by a local retail centre that reduces the need for vehicle travel.
Resilience– an efficient and resilient land transport system that ensures communities have route security and access to essential services.	The development features a connected street network with multiple access points, providing alternative routes and improving network resilience. It also allows for future connections to adjacent developments, supporting long-term growth and accessibility.
Growth and economic development– an integrated transport system that supports compact urban form and planned future growth; AND an efficient and resilient strategic corridor network that advances regional economic and social wellbeing	Located next to the existing urban area, the development provides direct links to Matamata town centre and regional transport corridors. It includes a mix of housing types, including a large retirement and aged care facility, supporting diverse housing needs and long-term social wellbeing.
Accessibility and transport options an integrated transport system that provides transport options for differing community access and mobility needs	A comprehensive network of footpaths, shared paths, and recreational trails supports walking and cycling, ensuring accessible transport choices for residents of all ages and abilities
Safety– a safe, accessible transport system in the Waikato region where no one is killed or seriously injured.	The development has been designed to prioritise safety and provides facilities for pedestrians and a shared path on the Spine Road, reducing the risk of serious injuries

9.3 Matamata-Piako District Plan objectives, policies and rules.

The following table provides an assessment of the proposal against the Transportation Objectives of the Matamata Piako District Plan: Part 3.8 Transportation. As shown, the proposed development is consistent with the objectives of Part 3.8.

Table 4: Assessment of Development Proposal against MPDC Transport Objectives

Objective	
O1: The strategic importance of significant transport infrastructure is recognised	The proposed development recognises the importance of strategic transport connections, with all access points designed to connect via existing intersections or new upgraded intersections that preserve through-movement along key corridors.
O2: A safe, efficient, integrated, and environmentally sustainable transport network that ensures our social, economic, and cultural wellbeing.	The development layout prioritises efficiency and connectivity, offering multiple access points and supporting logical extensions to the wider network over time. Active transport modes are encouraged through the provision of footpaths, shared paths, and a recreational trail, reducing car dependency and supporting environmental sustainability. The inclusion of a solar farm contributes to low-carbon energy use within the development, aligning with broader climate goals.
O3: The avoidance, remediation or mitigation of the adverse effects of transportation.	Assessments completed within this ITA has identified that the existing infrastructure can accommodate the expected traffic generation without adverse effects.
O4: To ensure that those activities that place demands on the roading network contribute fairly to any works considered necessary to meet those demands.	The development proposal includes new intersections where the roading network interfaces with Station Road. From the intersection with the Spine Road through to the existing urban area, an urban footpath will be provided.
O5: To protect residential amenity from the effects of excessive traffic generation.	Appropriate vehicle crossings and sufficient parking supply has been proposed for all parts of the development.
O6: To maximise safety and convenience for pedestrians and vehicular traffic on all sites.	The roading network has been developed to provide an efficient layout with high levels of connectivity. There are safe options for pedestrians to connect to the existing urban area, or to utilise the commercial centre.
O7: Provision for parking and loading is adequate to ensure the safety and efficiency of the road network, without stifling development or leading to inefficient use of land.	Assessment of parking and loading demands in this ITA has confirmed that an appropriate level of parking has been provided in an efficient manner that enables optimised land development.
O8: To encourage the provision of alternative transportation networks where it is clearly demonstrated that the provision of such networks	Footpaths and a shared path, and a recreational path through greenway have been provided to encourage local trips by active modes. A footpath

will positively benefit and enhance the environment and community which they serve.	will be provided on Station Road to connect with the existing footpath facilities.

9.4 Structure Plan Requirements

An assessment of the Structure Plan requirements has been provided in Section 5.3.2

10 Construction Traffic

The development site is currently rural residential, and while detailed earth works calculations have not yet been undertaken, the site is expected to be generally balanced in terms of cut and fill.

As is typical with a development of this scale, it is recommended that should consent be approved, a Construction Traffic Management Plan (CTMP) should be required as a condition of consent. A draft CTMP has been completed below and should be developed further and updated for each stage of works.

Based on experience of constructing similar projects and bearing in mind capacity within the existing road network, with the appropriate Construction Traffic Management Plan in place and the below measures implemented, it is considered that construction activities can be managed to ensure any generated traffic effects are appropriately mitigated.

10.1 Draft CTMP

10.1.1 Site Access

Site Access for all stages of work will be confirmed via a CTMP. This will confirm:

- Details of site access/egress over the entire construction period and any limitations on truck movements.
- All egress points should be positioned to achieve appropriate sight distances.

Specific details related to the below activities shall also be provided.

Retirement Village

Site Access to the Retirement Village in Stage 1 is expected to be via Station Road in the same location as the long-term development access. For subsequent stages, heavy vehicle access to the site will be to the west of the property boundary, via the balance lot to maintain safety for residents.

No sight line impediments have been identified, however temporary vehicle access will need to be sought and approved by MPDC.

Residential Development
Site access to the Residential Development for the initial stage will be via Peakedale Road. A supplementary haulage route will be provided at the location of the proposed Spine Road intersection which has suitable sight distance provisions.

Solar Farm Development

Site access to the Northern Solar Farm will be via Station Road. Vehicles will require sufficient turning space so that all egress movements from the site are in a forward-facing direction.

Site access to the Southern Solar Farm will be via either the balance lot to the north of the development, or via the existing new road network. This is dependent on staging. Confirmation of this access location will be confirmed in the final CTMP.

10.1.2 Site Parking

The development proposal is significant with a significant land area available. All workers and subcontractor parking shall be provided for on site.

10.1.3 Truck Routes

Truck routes will use Strategic Corridors including SH27 as much as practicable. Connections to these routes will be via the shortest route.

10.1.4 Construction hours

Construction hours are expected to generally be in the region of 7am – 7pm Monday to Saturday.

Due to the proximity of the site to several schools, non-movement hours to and from the site between 8am and 9am, and 3pm to 3.30pm are recommended.

Future consideration of the proposed day care operating hours and potential truck movement timings may be necessary depending on implementation staging.

11 Infrastructure Assessment and Implementation Plan

The proposed development is largely offline from the surrounding road network; however, several infrastructure improvements are proposed as part of the development and are summarised below.

Table 5: Implementation Plan

Proposed Upgrade	Responsibility	Final Owner	Trigger
New roading network to serve residential development	Developer	Matamata Piako District Council	Staged delivery coordinated with residential development
New Roading network to serve retirement village	Developer	Retirement Village Operator	As development occurs
New intersection with Station Road and Proposed Residential area	Developer	Matamata Piako District Council	Final development stage
Upgraded southern side of Station Road between existing urban edge and Spine Road intersection, including footpath	Developer	Matamata Piako District Council	Intersection of Spine Road and Station Road
New intersection to access Retirement Village on Station Road	Developer	Matamata Piako District Council	As development occurs
Rural Footpath to be provided on Station Road from new access with Retirement Village to proposed intersection on Station Road with new Spine Road on southern side of the corridor.	Developer	Matamata Piako District Council	Intersection of the retirement village access with Station Road.

12 Consultation

Consultation has been undertaken with MPDC and NZTA during the preparation of this application.

This included providing MPDC providing feedback on the referral memo prepared to support this Fast Track application. This feedback included commentary on the requirement for a Broad ITA in accordance with the MPDC District Plan. This commentary has been incorporated into this report.

Consultation with NZTA confirmed that no concerns were raised with the proposed development

13 Conclusions

The proposal seeks to provide a multiuse development with four key precincts providing for a range activities including residential dwellings, a retirement village, small commercial hub and two areas of solar farms.

Included in this development are the following activities:

- 518 residential dwellings,
- A 0.75ha area of commercial activities,
- A retirement village of approximately 218 units and 71 care beds; and
- Approximately 27 ha of solar farm activities in two areas.

This assessment has considered the transport effects of the development and following this assessment finds:

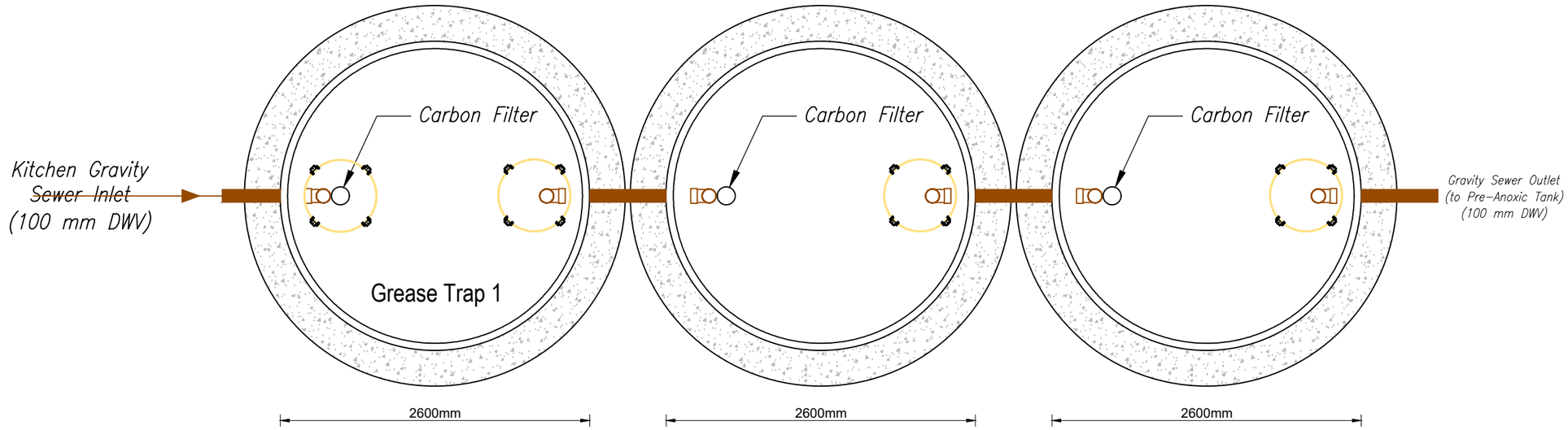
- The site is reasonably well located from a walking and cycling perspective, and within 25mins walk is the town centre and local schooling options;
- No traffic safety issues have been identified near the proposed development. Given the local residential nature of the surrounding roads, the proposed development is considered unlikely to exacerbate the road safety in any way both during construction and once the development is completed;
- The key intersection anticipated to be used by residents to access the wider area and road network is Jellicoe and Firth Street until such time that a new intersection is provided on Station Road. Intersection modelling shows that this intersection will be able to accommodate the additional trips generated by the proposed residential development;
- The internal road layout and cross-sections largely comply with MPDC DM standards and are considered be appropriate. Where there are deviations from these standards, it is considered that these do not result in operational or safety effects on the road network;
- All Vehicle tracking shown in Attachment B is considered acceptable;
- All proposed intersections have been reviewed in relation to the relevant sight distance requirements are appropriate to ensure a safe and efficient roading environment. The intersection of Road 1 and Road 7 and Road 1 and Road 10 do not meet the required standards. It is recommended that street furniture and vegetation be avoided at these intersections, and that traffic calming be investigated at detailed design.
- The driveway locations are considered appropriate and meet sight distance requirements with the exception of Lot 123. It is recommended that the vehicle crossing for this lot be moved in order to achieve the compliant sight distance.
- All waste is expected to be accommodated on-street via public collection;
- The effects relating to construction are temporary and the site is well positioned for safe and efficient access for construction vehicles;
- A CTMP as described in Section 10 should be a condition of consent.
- Crossing sight distance requirements for proposed pram crossings are checked through engineering approval stage.
- K-values of the proposed roads are rechecked at EPA stage to comply with the above Austroads requirements.
- Vehicle tracking is checked again at the EPA stage to ensure compliance.

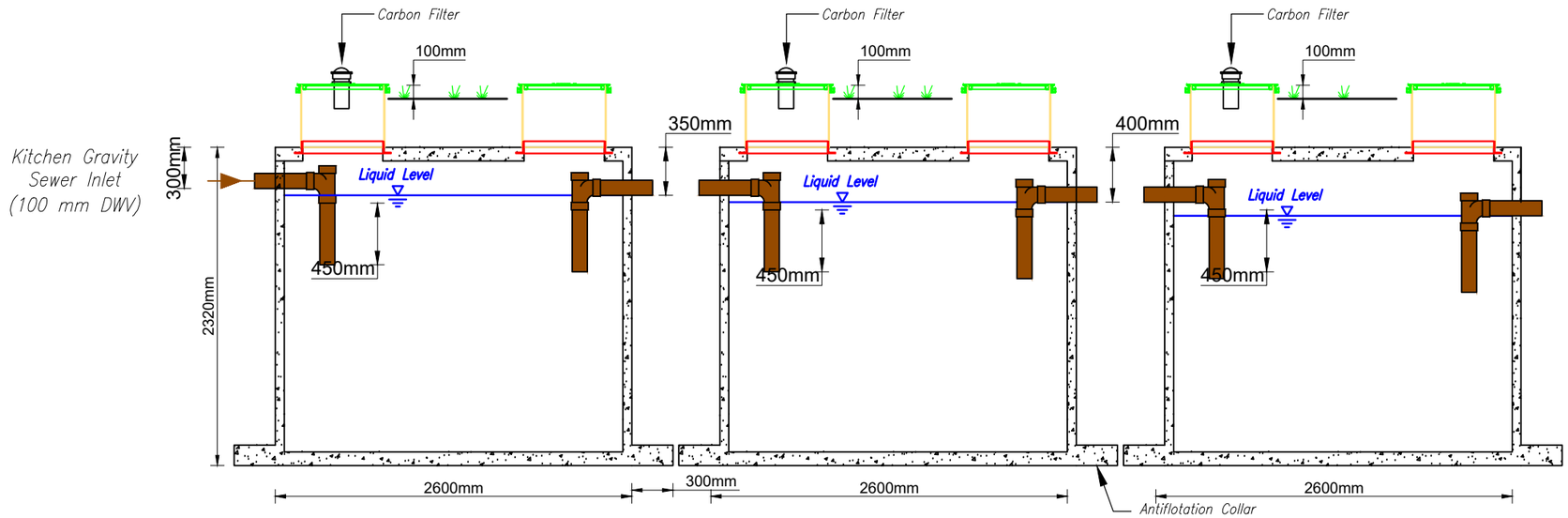
Overall, there is no reason to preclude acceptance of the proposal as currently intended, subject to the recommendations made above. Accordingly, it is concluded that there are no traffic engineering or transportation planning reasons that would preclude the development of the subject site as proposed.

Appendix A: Trip Distribution

Appendix B: Vehicle Tracking

APPENDIX D – INNOFLOW WWTP CONCEPT DESIGN





Grease Trap 1
10,000L

Grease Trap 2
10,000L

Grease Trap 3
10,000L

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- Mixing Pipe
- Sodium Lauryl Sulphate

0 1 2 3 4 5

SCALE BAR 1:20

REV.	DESCRIPTION	DATE
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DATE: 20th Nov 2024

SCALE: 1 : 20 (A1)

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CLIENT

PROJECT: Ashbourn Retirement Village

DRAWING No.

TITLE: Grease Traps Detail

REVISION

General Notes:

Tank Volumes: Total Volume: 4630 L ±
Operating Volume: 5686 L ± @ 1448 mm
Unit volume at typical Operating Depth : 31 L./ 10 mm.±

Loads: Top = 500 psf minimum
Lateral Load = 62.4 pcf, EFP
Concentrated Wheel Load = 2500 lb.
The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.
Soil Bearing = 1000 psf (re-evaluate support base if soil bearing is less or unequal)

Method of calcuations:
1. Tanks shall be analyzed using strength design methods and finite element analysis for buried structures.
2. Calculations shall address the following:
   - strength
   - buckling
   - deflection of 0.5 - 1% of the tank diameter, based on service load (including long-term deflection lag)
   - buoyancy
3. Performance testing shall include vacuum testing followed by a hydrostatic test.

Material: Resin: polydicyclopentadiene

The properties listed here along with the minimum thickness as shown in the details are considered design minimums that must be maintained during the manufacturing of the tanks. The primary strength properties are listed below:

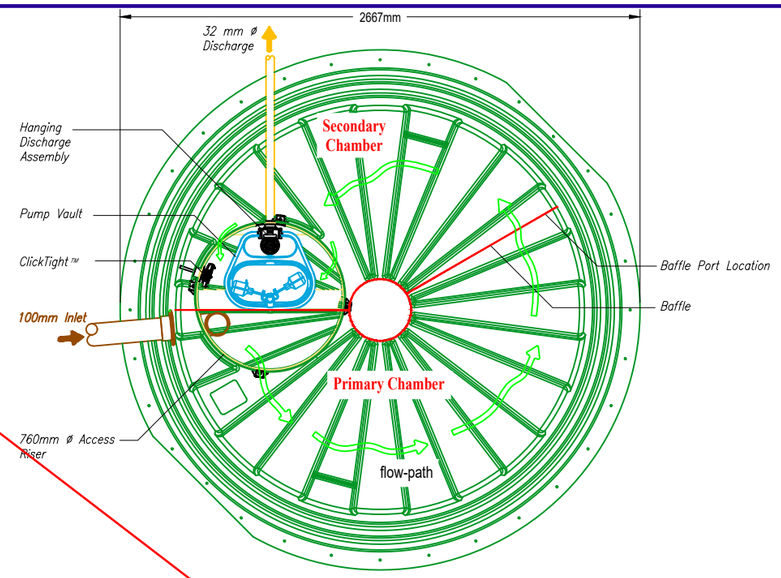
Property	DCPD	Property	DCPD
Flexural modulus E_f	274,000 psi	Compressive strength F_c	9,200 psi
Tensile strength F_t	6,700 psi	Shear In-Plane F_c	7,180 psi
Flexural strength F_b	10,500 psi	Flexural Rigidity	585 psi

Poisson ratio = 0.400 (Any permanent metal part shall be 300 series stainless steel.)

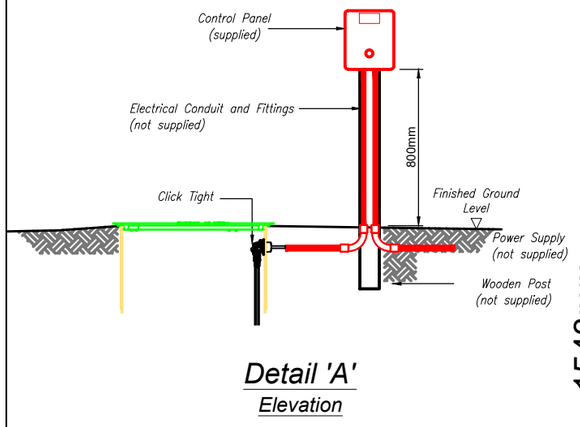
Installation: See detail below

Test: Tanks shall be tested and certified watertight per manufacturers recommendations and or any prevailing rules or guidelines, whichever is more restrictive.

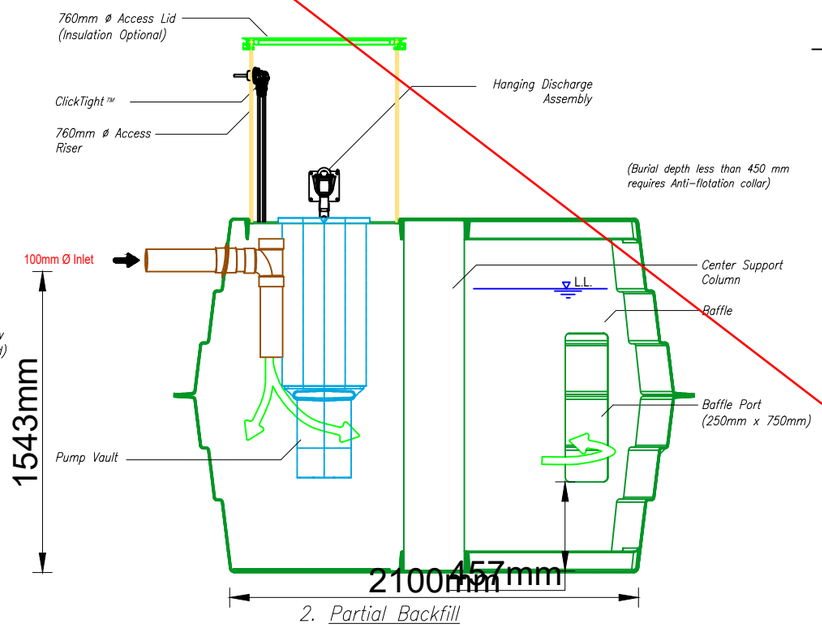
Tank Markings: Place marking on the upper most surface over the outlet.
Nominal Liquid capacity: 5,675 L. ±
Max burial depth: 1524 mm.
Max traffic (wheel): 1,100 Kg.

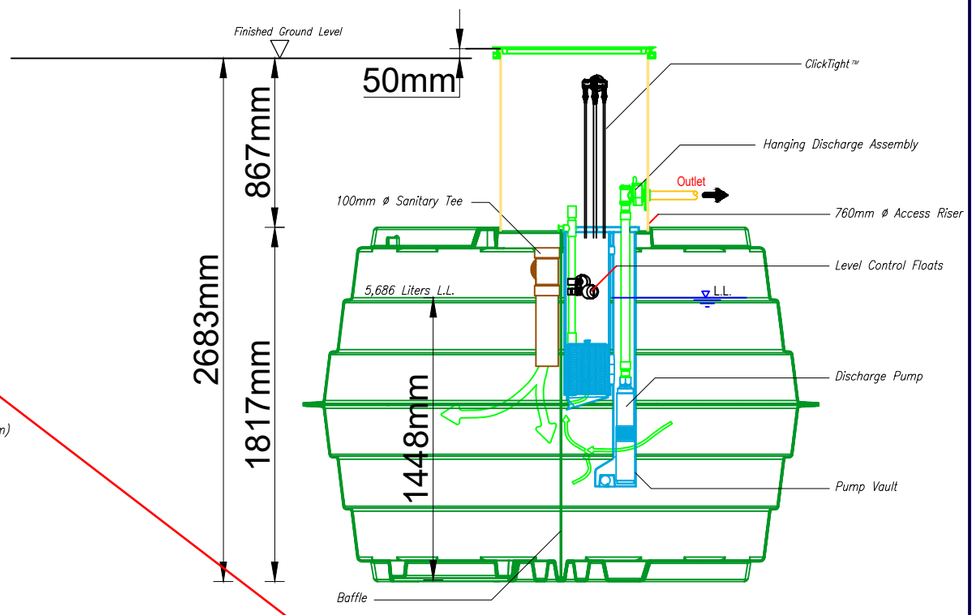


Top Detail



Detail 'A'
Elevation





NOTES

In all cases, the recommendations described in the Orenco Systems Inc. installation instructions shall take precedent (Document Number NIM–LOS–1 Rev.1.0 02/20)

1. Bedding

At least 100mm thick of compacted sand, pea gravel or other granular material less than 10mm in diameter overlying a firm, compacted and uniform base.

Do not set the tank directly on boulders or rock edges. If sand bedding is used, lightly moisten the sand to compact it, but do not saturate it, or the underlying soil may become unstable.

2. Partial Backfill

Backfill material should have a uniform gradation and be free of stones larger than 25mm diameter. 10mm or smaller crushed rock or pea gravel is required. Do not use sand. If use flowable concrete material instead of granular material, the layering and compacting steps are not necessary.

Place a 400mm layer of backfill, using a mechanical compactor, thoroughly compact the fill, especially in the haunch zone, to minimize settlement and to provide support for the tank walls.

3. Final Backfill and Grading

Complete the remaining backfill and compaction above the midseam flange to the finish grade in maximum 600mm layers. Place the backfill material gently if you poured a concrete collar that day.

Flowable concrete material may be used above the midseam for the backfill, as can native soil if it does not contain rocks.

Make sure the risers extend a minimum of 75mm above the original grade to allow for settling and to ensure drainage away from risers.

Backfill and compact around the inlet and outlet fittings by hand.

4, Determine whether an Antibuoyancy Collar is needed

The requirement for an antibuoyancy collar shall be at the sole discretion of the installation contractor. If groundwater is present or if there is any other condition that is likely to cause the tank to become buoyant, you may need to pour a reinforced concrete concrete collar around the tank as supplemental ballast. If backfill material used is cohesive (cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay). supplemental ballast may not be necessary. If the backfill material used is noncohesive (soils including gravel, sand, or silt with little or no clay content) no supplemental ballast is necessary as long as the minimum depth of bury is 800 mm or greater. For tanks set more shallowly, you'll need to add a concrete collar.

REV.	DESCRIPTION	DATE
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DATE 20th Nov 2024
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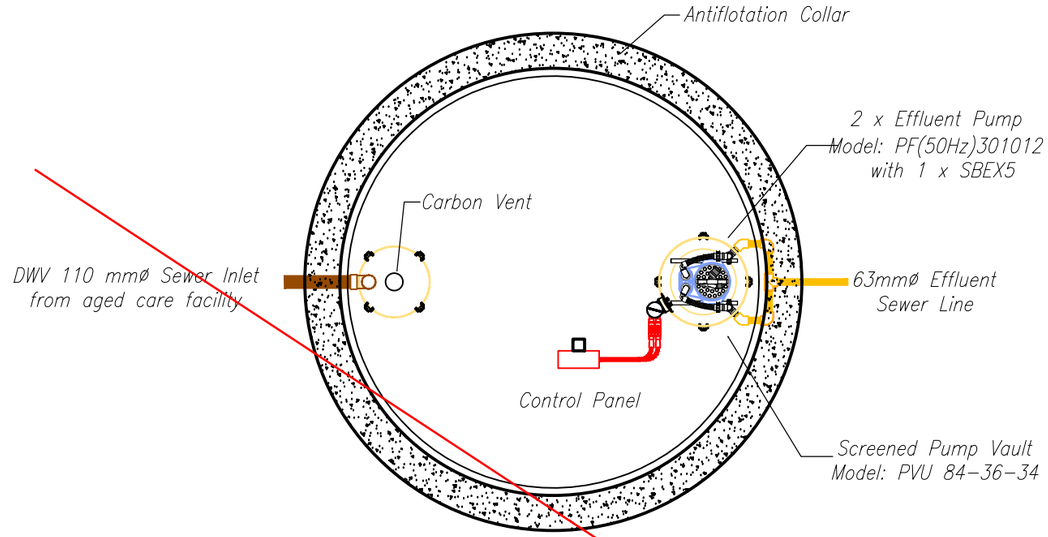
CLIENT

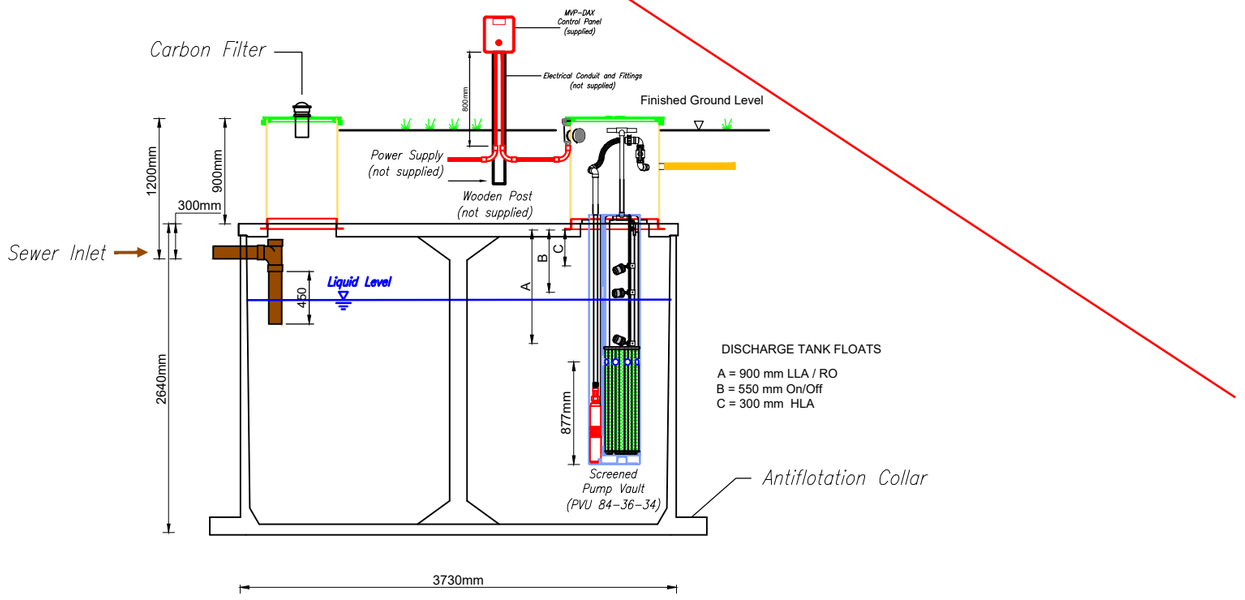
PROJECT Ashbourn Retirement Village

DRAWING No.

TITLE 6,000L Prelos STEP Detail

REVISION





STEP Tanks (1 of 3 Tanks)
25,000 L

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- Mixing Pipe
- Sodium Lauryl Sulphate

0 1 2 3 4 5 10

SCALE BAR 1:50

REV.	DESCRIPTION	DATE
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DATE 20th Nov 2024

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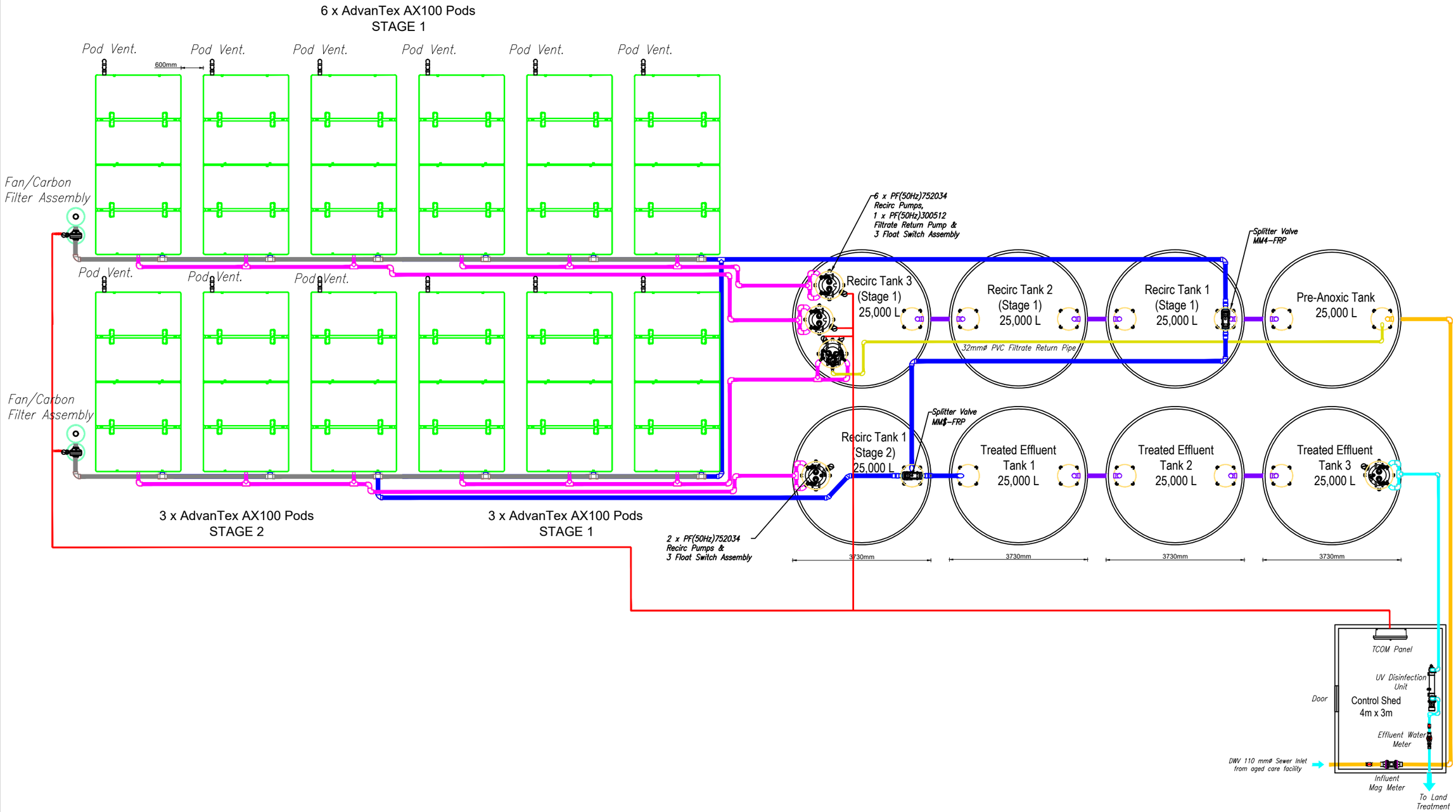
CLIENT

PROJECT Ashbourn Retirement Village

DRAWING No.

TITLE 25,000L STEP Tank Details

REVISION



LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- Mixing Pipe
- Sodium Lauryl Sulphate

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CLIENT

PROJECT Ashbourn Retirement Village

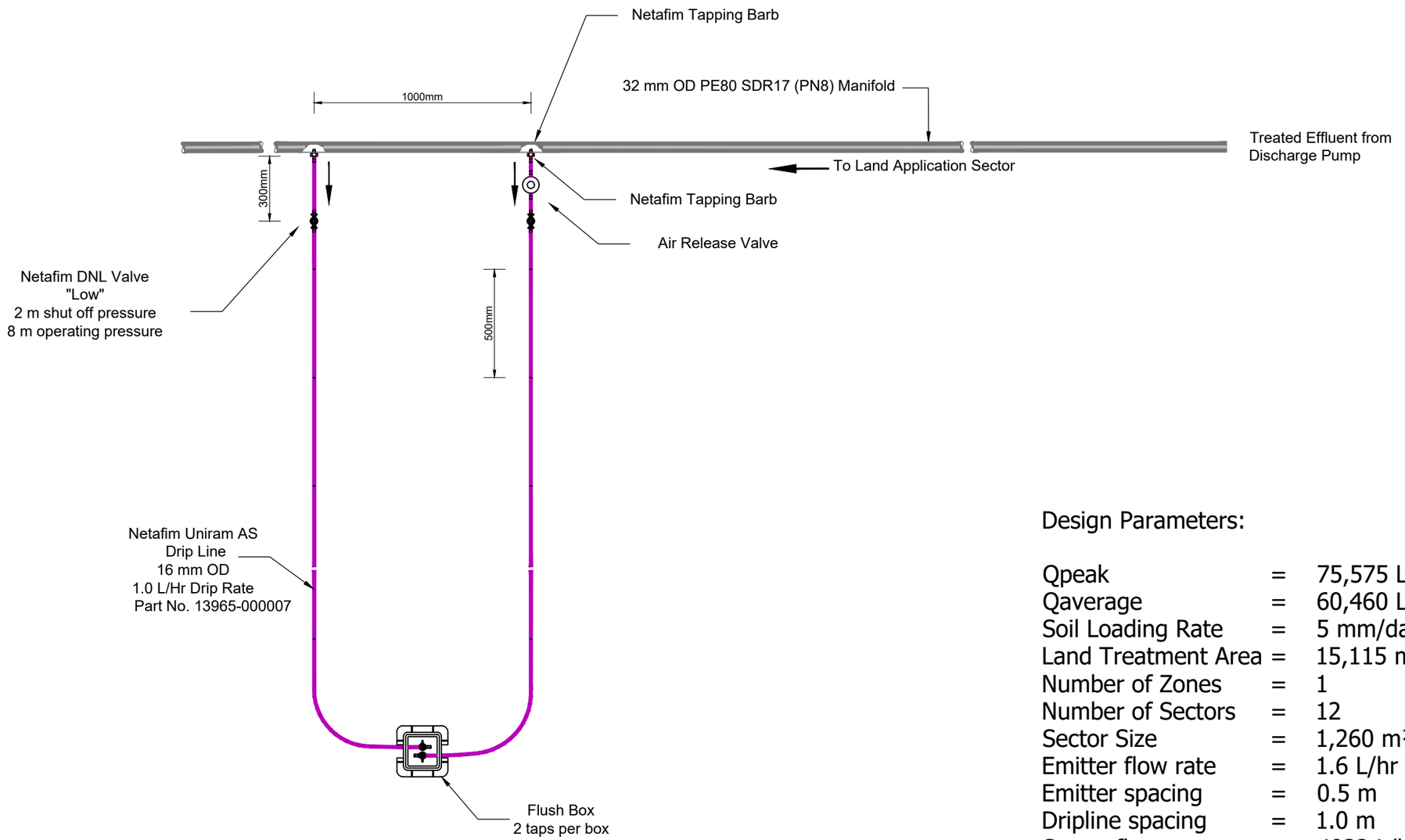
DRAWING No.

TITLE AdvanTex Wastewater Treatment Plant Plan

REVISION

Legend:

DNL - Durable Non-Leakage Valve
AS - Anti Syphon Valve
XR - Xtra-Root Protection
CV - Anti Drain & Non Leakage Mechanism



Design Parameters:

Qpeak	=	75,575 LPD
Qaverage	=	60,460 LPD
Soil Loading Rate	=	5 mm/day
Land Treatment Area	=	15,115 m²
Number of Zones	=	1
Number of Sectors	=	12
Sector Size	=	1,260 m²
Emitter flow rate	=	1.6 L/hr
Emitter spacing	=	0.5 m
Dripline spacing	=	1.0 m
Sector flow rate	=	4032 L/hr
Pump Duty	=	2.24 L/sec @ 25 m TDH

REV.	DESCRIPTION	DATE
-	-	-

DATE: 20th Nov 2024
SCALE: N.T.S

APPROVED		
CHECKED		
DESIGNED		

STATUS: Concept

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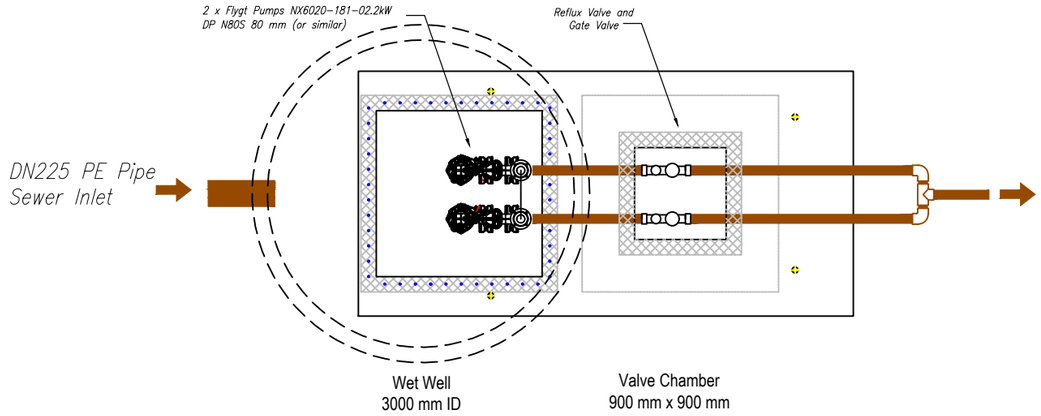
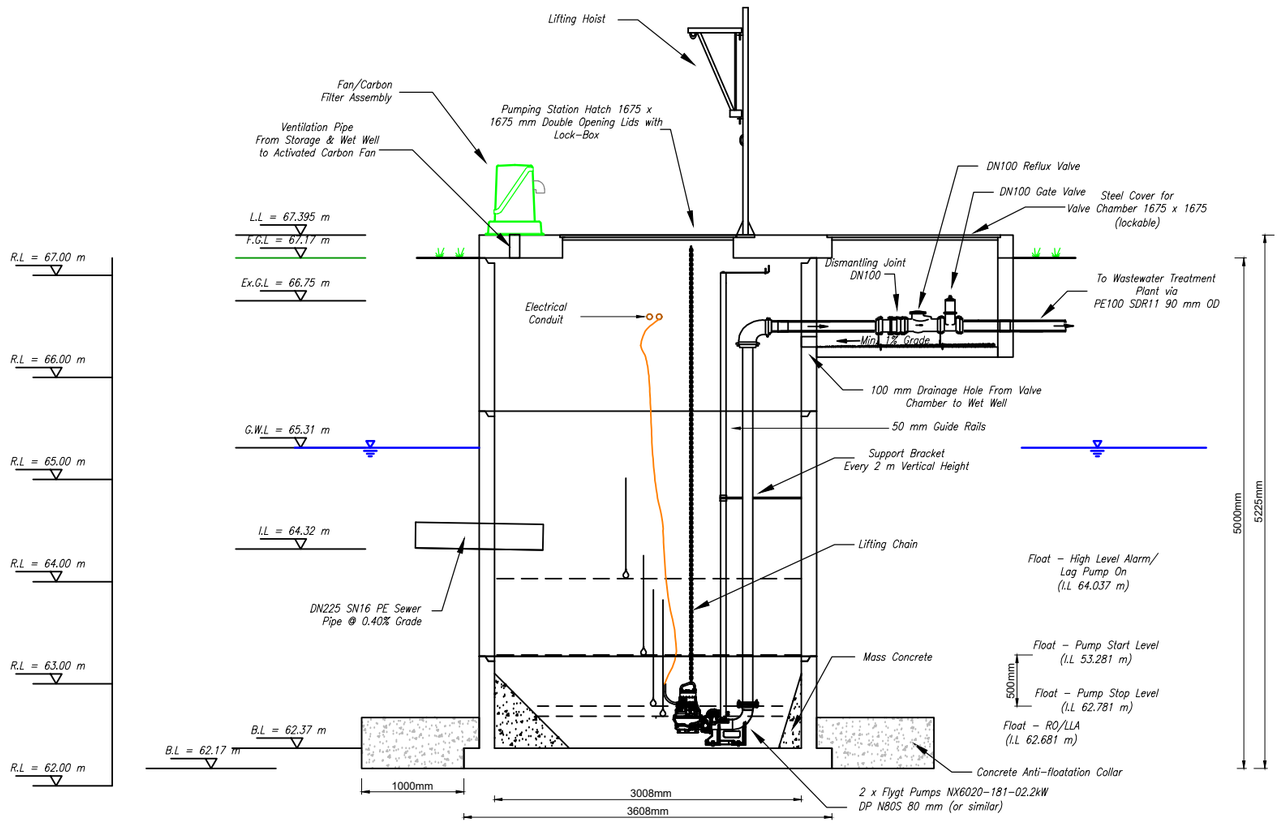
CLIENT

PROJECT: Ashbourn Retirement Village
DRAWING No.

TITLE: Land Treatment Area Detail
REVISION

NOT FOR CONSTRUCTION





Pump Station Wet Well & Valve Chamber Details

0 1 2 3 4 5

SCALE BAR 1:30

REV.	DESCRIPTION	DATE
–	–	–

DATE 6th June 2025

SCALE 1 : 30 (A1)

APPROVED		
CHECKED		
DESIGNED		

STATUS Design

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CLIENT Maven

PROJECT ASHBOURNE RETIREMENT VILLAGE

DRAWING No. 7760-9

TITLE Pump Station Typical Detail

REVISION -