Appendix 9: Water Management Report – Spencer Holmes

S200380

24/01/2023

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Benmore Crescent: Waste Management Site

Three Waters Servicing Report

General

The Waste Management (WM) site comprises a canopy area for waste sorting; a retail space; an office block; a Refuse Transfer Station; a Building & Construction waste sorting building; a Material Recycling Facility and a workshop.
The main business activity is the handling of solid waste. No liquid waste, with the exception of domestic standard waste, will be accepted or disposed of from the site.
Each building will have normal sanitary facilities which will discharge to a gravity wastewater system.
Potable water and fire supplies are enhanced by a tank farm that is trickle fed so as not to overload the Manor Park reservoir (see services report by Vecta).
WM have committed to the beneficial reuse of rainwater collected from roofs to minimise water demand and stormwater discharges.
A gravity stormwater network services the site, discharging to Dry Creek. First flush stormwater treatment is achieved by using a specialist high performance gross pollutant trap from Stormwater360.

Wastewater

Wastewater servicing is proposed for the Waste Management (WM) site by a 225mm diameter gravity uPVC SN16 pipeline. We propose to connect to the existing 850mm Hutt City Council trunkmain at manhole HCC_WW001616 and extend the gravity service to the WM site. The pipeline will extend over Dry Creek by means of a bespoke gravity pipeline bridge crossing. The invert of the pipeline is designed to be above the predicted Q100 flood level with freeboard allowed.

The pipeline extends generally eastwards and northwards with side branches to pick up all of the WM buildings. A 225mm branch main extends northwards for future development on an adjacent site to the north.

The minimum nominal gradient for the pipeline is 1 in 145 which meets the Wellington Water minimum grade for 225mm wastewater pipelines.

Truck and Bin Washing

Automatic truck washing facilities are proposed as well as a waste bin washing area. Wastewater will be recycled and reused as much as possible in the truck and bin wash areas to minimise water use and wastewater volume. Water that cannot be reused will either be stored for disposal at a

liquid waste treatment facility or controlled by a trade waste consent and discharged back into the gravity wastewater network. To be confirmed at detailed design.

Stormwater Gravity network

The site has been designed so that the contours generally fall towards a low spot near Dry Creek located to the southwest within the WM site.

It is proposed to control stormwater from the site via a gravity piped network. Pipe sizes range from 750mm RCRRJ to 450mm RCRRJ. The gravity pipeline extends eastwards and northwards with side branches to service each building. The stormwater discharge is controlled into Dry Creek by a wingwall and rip rap protection with the point of discharge downstream of the bespoke wastewater gravity pipeline bridge crossing. Stormwater intakes and sumps are positioned around the WM site to collect surface stormwater. The nominal minimum level of service for the gravity network is a 10% AEP storm. Events larger than a Q10 will flow towards the low spot and discharge into Dry Creek.

Beneficial Rainwater Reuse

To minimise potable water use, each building will have a rainwater collection system for beneficial reuse and water conservation. Roof downpipes will be directed to surface water tanks and pump boosted to each building for toilet flushing and outdoor tap use only. Advice has been obtained from Pump & Valve in the design of the pump boosted system and the reused water will have its own internal plumbing reticulation network, completely separate to the potable network for public health security. Each downpipe to have Leaf Guards and first flush diverters to assist with water quality. A top up valve (Rojo Partfill valve) connected to the potable network will boost supply to the rainwater collection tanks if they should run low.

A more substantial rainwater tank farm is proposed for the high use truck and bin wash areas. Rainwater collected from the workshop and covered wash areas will be pump boosted to supply the truck wash and water blasters in the bin wash area.

Stormwater Treatment

Specialist advice has been obtained from Stormwater 360 for the design and specification of a stormwater treatment device for the gravity discharge into Dry Creek. A specialist high performance gross pollutant trap Vortechs VX9000 unit (or similar) is proposed. It is designed to cope with first flush treatment at 10mm/hr across the site as per the Wellington Sensitive Design for Stormwater: Treatment Device Design Guideline.

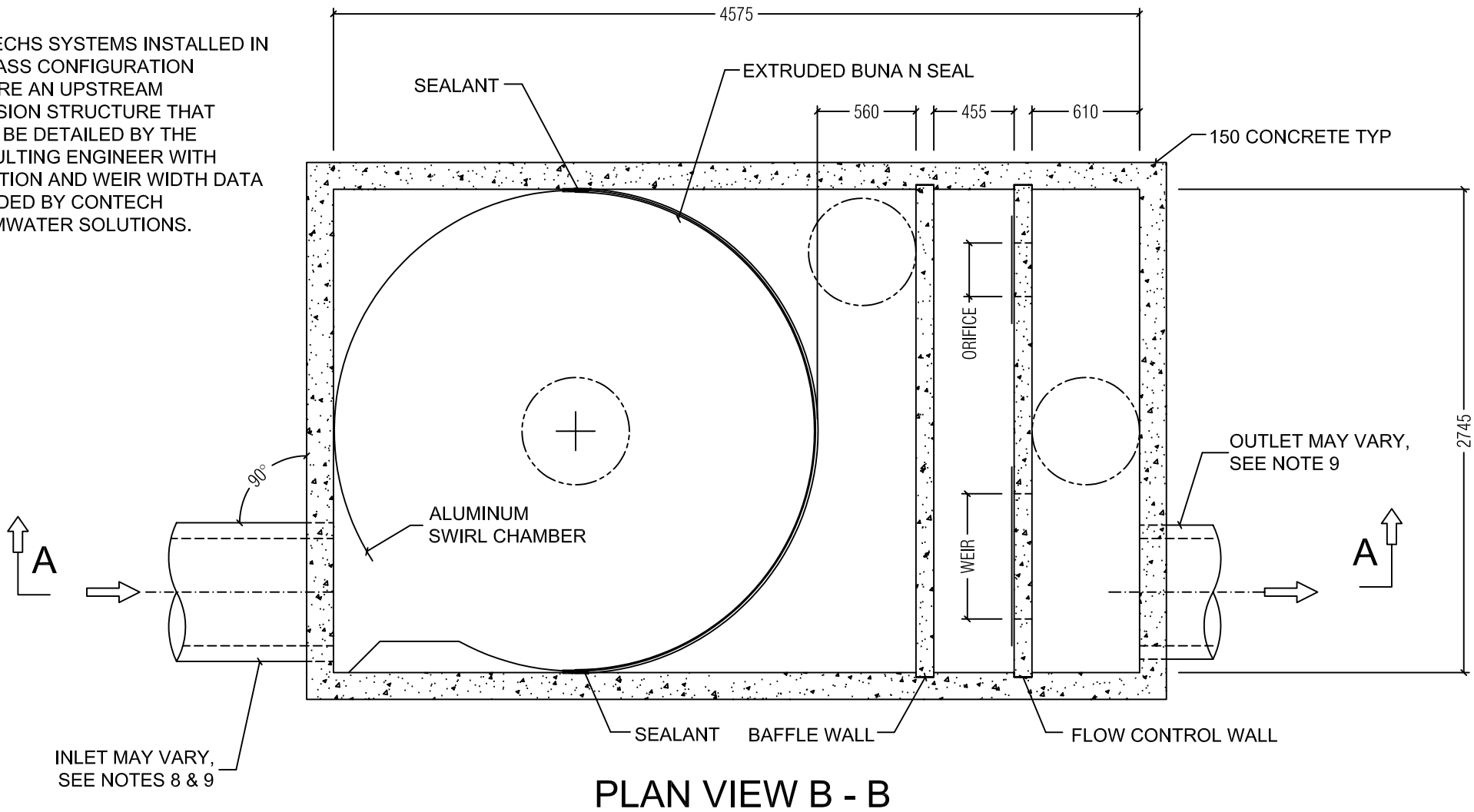
Potable Water and Fire Supply

A substantial tank farm is proposed for the WM site to balance water demand across the site. It will be trickle fed so as not to overload the Manor Park Reservoir. Specialist advice has been obtained from Deeco in the design of the trickle feed system so that peak flows into the tank farm do not exceed 114 l/minute. A pumping station, designed by Pump & Valve, is proposed to provide sufficient pressure to meet potable and fire supply demands. All the main buildings will be sprinklered so that the fire supply classification of FW2 is met. Hydrants have been placed to meet minimum spacing requirements.

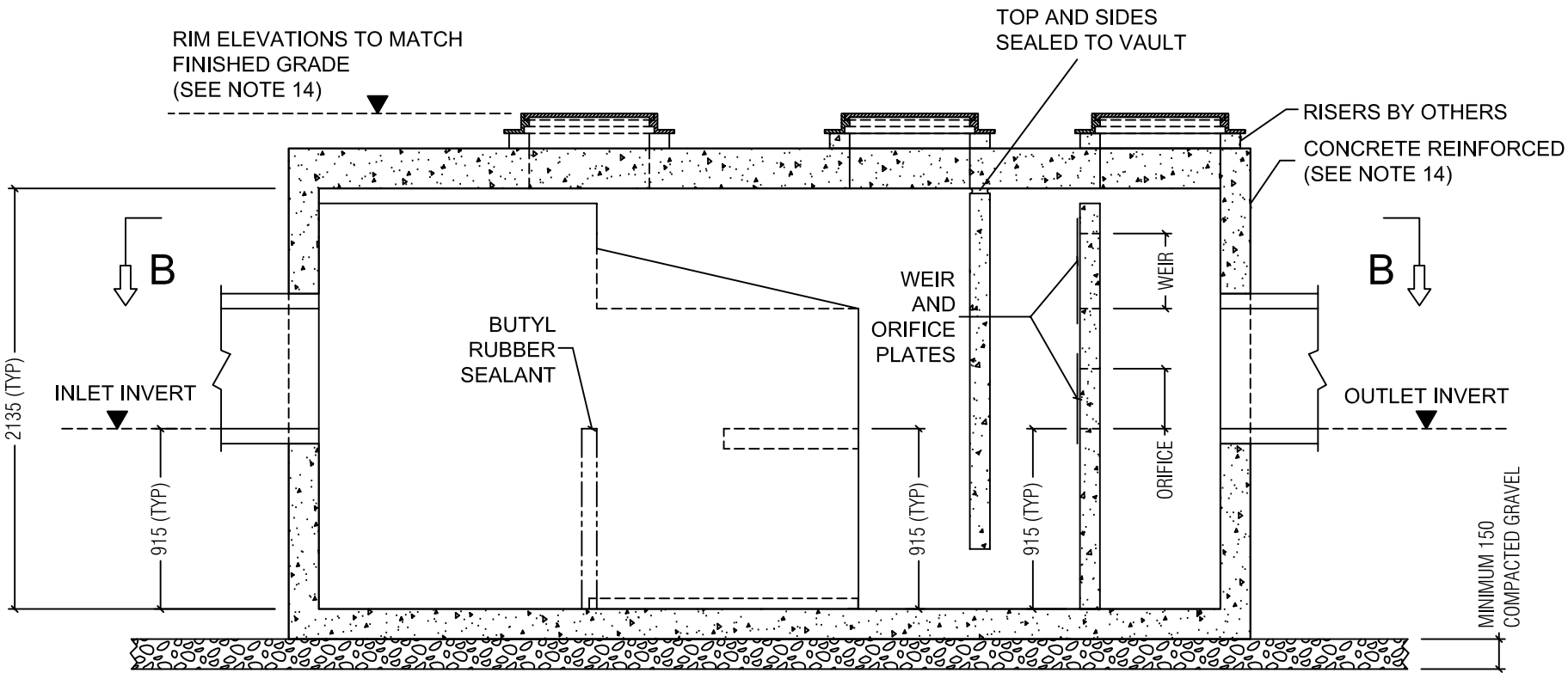
Water supply servicing across the site is provided by a 200mm PE100 SDR11 water main. Separate potable water and fire sprinkler connections have been allowed for each building.

John Eyles
Civil Engineer
Spencer Holmes Limited

NOTE:
VORTECHS SYSTEMS INSTALLED IN A BYPASS CONFIGURATION REQUIRE AN UPSTREAM DIVERSION STRUCTURE THAT SHALL BE DETAILED BY THE CONSULTING ENGINEER WITH ELEVATION AND WEIR WIDTH DATA PROVIDED BY CONTECH STORMWATER SOLUTIONS.



PLAN VIEW B - B



SECTION A - A

NOTES:
1. STORMWATER TREATMENT SYSTEM (SWTS) SHALL HAVE:
   PEAK TREATMENT CAPACITY: 396L/S
   SEDIMENT STORAGE: 3.67M3
   SEDIMENT CHAMBER DIA: 2743MM
2. SWTS SHALL BE CONTAINED IN ONE RECTANGULAR STRUCTURE
3. SWTS REMOVAL EFFICIENCY SHALL BE DOCUMENTED BASED ON PARTICLE SIZE
4. SWTS SHALL RETAIN FLOATABLES AND TRAPPED SEDIMENT UP TO AND INCLUDING PEAK TREATMENT CAPACITY
5. SWTS INVERTS IN AND OUT ARE TYPICALLY AT THE SAME ELEVATION
6. SWTS SHALL NOT BE COMPROMISED BY EFFECTS OF DOWNSTREAM TAILWATER
7. SWTS SHALL HAVE NO INTERNAL COMPONENTS THAT OBSTRUCT MAINTENANCE ACCESS
8. INLET PIPE MUST BE PERPENDICULAR TO THE STRUCTURE
9. PIPE ORIENTATION MAY VARY; SEE SITE PLAN FOR SIZE AND LOCATION
10. PURCHASER SHALL NOT BE RESPONSIBLE FOR ASSEMBLY OF UNIT
11. MANHOLE FRAMES AND PERFORATED COVERS SUPPLIED WITH SYSTEM, NOT INSTALLED
12. PURCHASER TO PREPARE EXCAVATION AND PROVIDE CRANE FOR OFF-LOADING AND SETTING AT TIME OF DELIVERY
13. VORTECHS SYSTEMS BY STORMWATER360:
    AUCKLAND (09) 476 5586 BRISBANE (07) 3272 1872 SYDNEY (02) 9525 5833
14. VORTECHS SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH RELEVANT AUSTRALIAN ANS NEW ZEALAND STANDARDS FOR 0-2m FILL AND T44 (HNHO-72) LIVE LOADINGS ONLY. FOR OTHER LOADING CONDITIONS PLEASE CONTACT STORMWATER360.

PROPRIETARY INFORMATION - NOT TO BE USED FOR CONSTRUCTION PURPOSES

This CADD file is for the purpose of specifying stormwater treatment equipment to be furnished by STORMWATER360 and may only be transferred to other documents exactly as provided by STORMWATER360. Title block information, **excluding** the STORMWATER360 logo and the Vortechs Stormwater Treatment System designation and patent number, may be deleted if necessary. Revisions to any part of this CADD file without prior coordination with STORMWATER360 shall be considered unauthorized use of proprietary information.

www.stormwater360.com.au www.stormwater360.co.nz

Stormwater360

STORMWATER360

STORMWATER TREATMENT SYSTEM
VORTECHS MODEL 9000 METRIC
STANDARD DETAIL

DRAWING 1 A

DATE: 18.11.07	SCALE: N.T.S.	FILE NAME: STD9KM	DRN: R.P.	CHK: M.W.

BENMORE CRESCENT, MANOR PARK

THREE WATERS SERVICING REPORT

Project Number: 210026

PROVIDED FOR

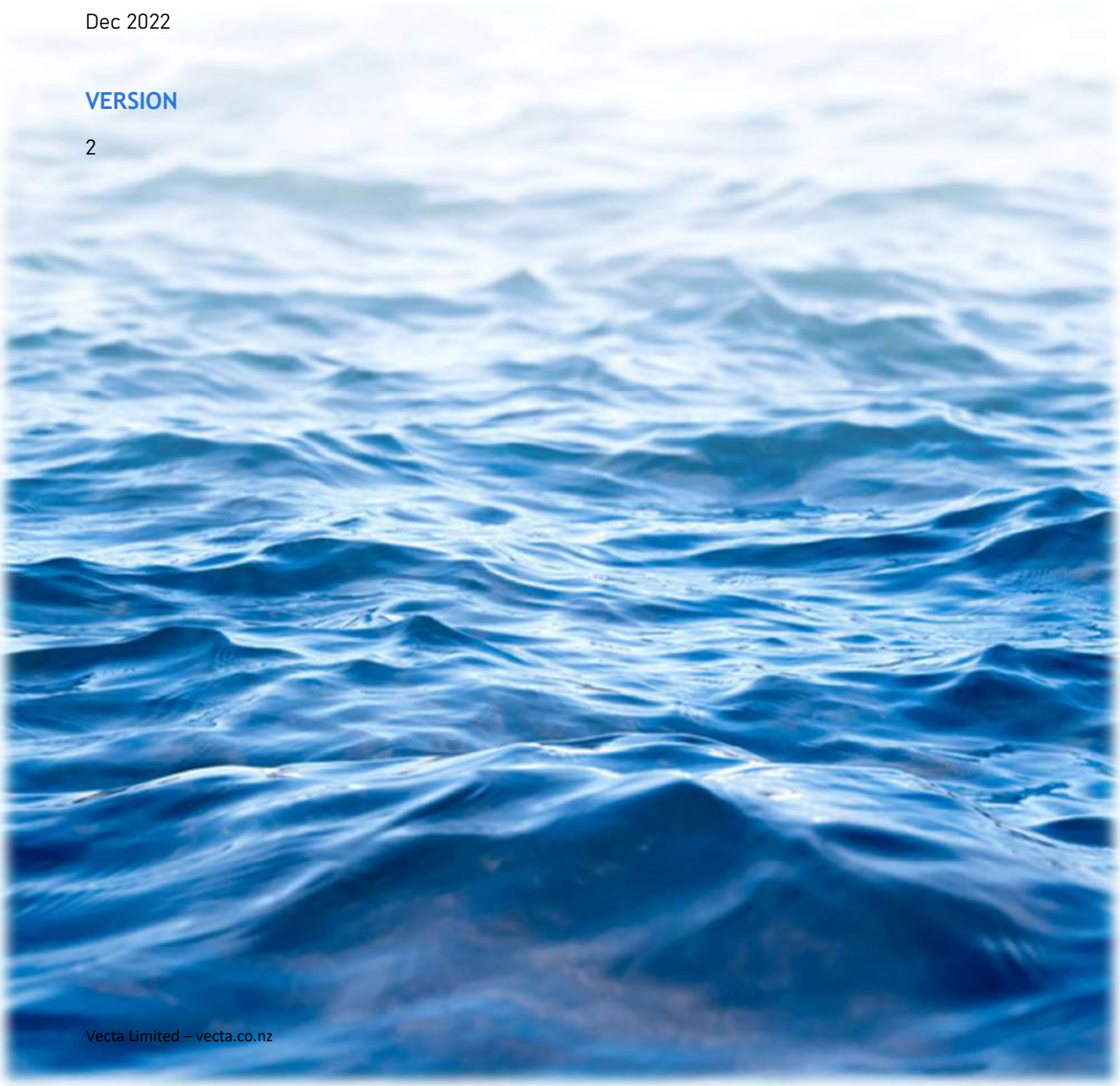
Rosco Industrial Limited

DATED

Dec 2022

VERSION

2



DOCUMENT CONTROL

Project Number: 210026

Version	Date	Purpose	Author	Reviewer
1	28 Nov 2022	For consent application	RJ	TN
2	22 Dec 2022	With amendments	RJ	TN

Version	General Extent of Revision
2	Incorporating amendments proposed by client

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Consideration of protection of the building owner's property, beyond what is achieved by compliance with the minimum requirements of the relevant legislation, is not included within this Report unless this has been specifically requested.

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ME (civil) CPEng IntPE(NZ)

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ME., CPEng., IntPE(NZ).

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1 Introduction

1.1 Objective

The objective of this report is to outline how the proposed development at 30 Benmore Crescent, Manor Park, Lower Hutt, will be suitably serviced for water supply, wastewater, and stormwater. The intention is for the site to cater to primarily rural ancillary land uses and for some commercial land uses. The location of the site is shown in Figure 1.

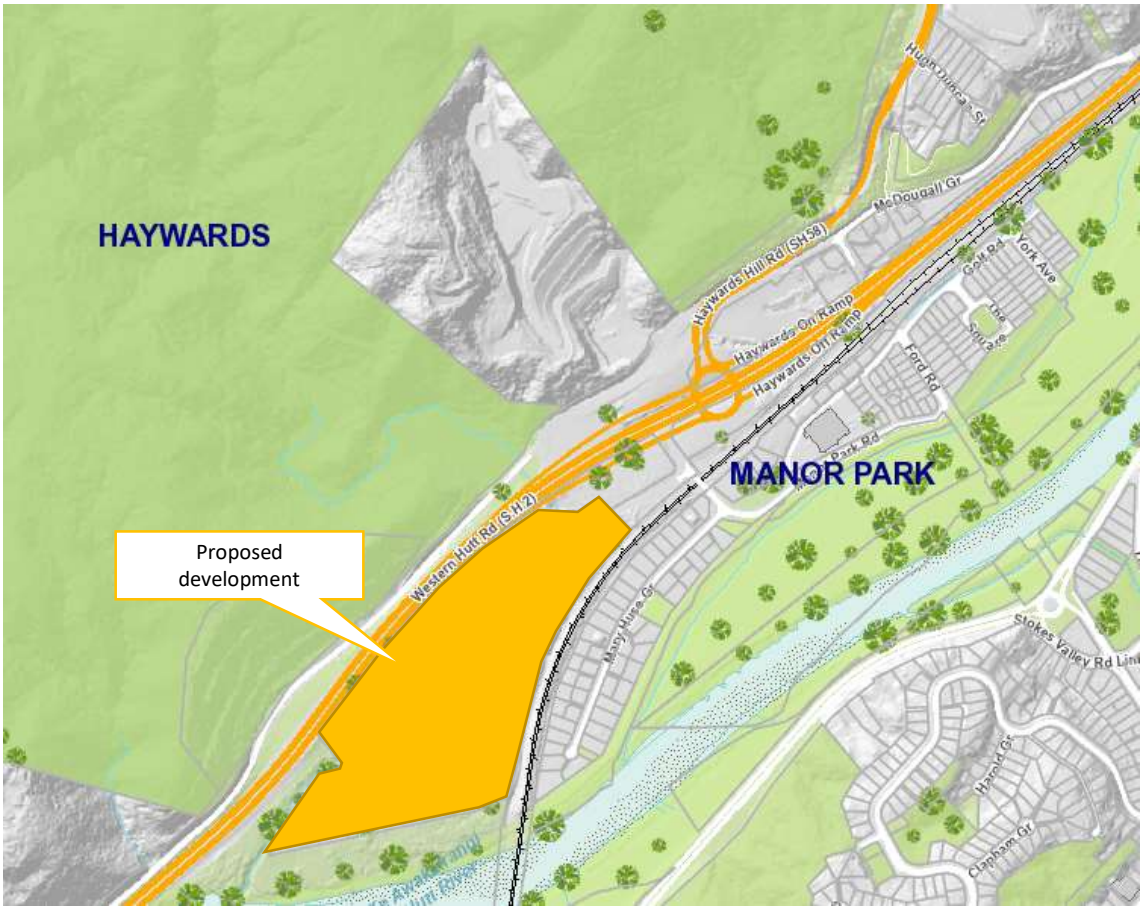


Figure 1 - Location of proposed development.

1.2 Scope

The scope of this report covers:

1. Water supply: determining if suitable pressure and flow is achievable to the site for both potable, and firefighting purposes. This includes concept level engineering.
2. Wastewater: confirming the potential yield and possible connection points for disposal. Concept level engineering.
3. Stormwater: confirming potential increases in stormwater and any potential mitigation to achieve the water quality and quantity objectives.

Viability of the above services will be measured against the performance requirements outlined in Wellington Water Limited's Regional Standards for Water Services Dec 2021 (RSWS), section 11.2.2.1 of the operative Hutt City Council District Plan (HCCDP) and the Greater Wellington Regional Council (GWRC) proposed Natural Resources Plan.

The concepts presented here will be detailed further during detailed design for the development and land use resource consent stage of the project and associated engineering approval. The concepts may evolve during these later stages as more information comes available, but the achieved performance should remain the same or improve.

1.3 Assumptions and Limitations

The report has the following assumptions and limitations:

1. Viability of the services relies on information that is available and was received at the time of writing.
2. Water supply pressure monitoring was over a short period of time and may not represent network performance if there were valves closed or on-going maintenance works at the time of recording.
3. The projected yields and demands of the site are based on the RSWS/District Plan requirements. Actual yields and demands once developed may be higher or lower depending on future commercial activity adopted.

2 Water Supply

The existing water supply network is shown in Figure 2.

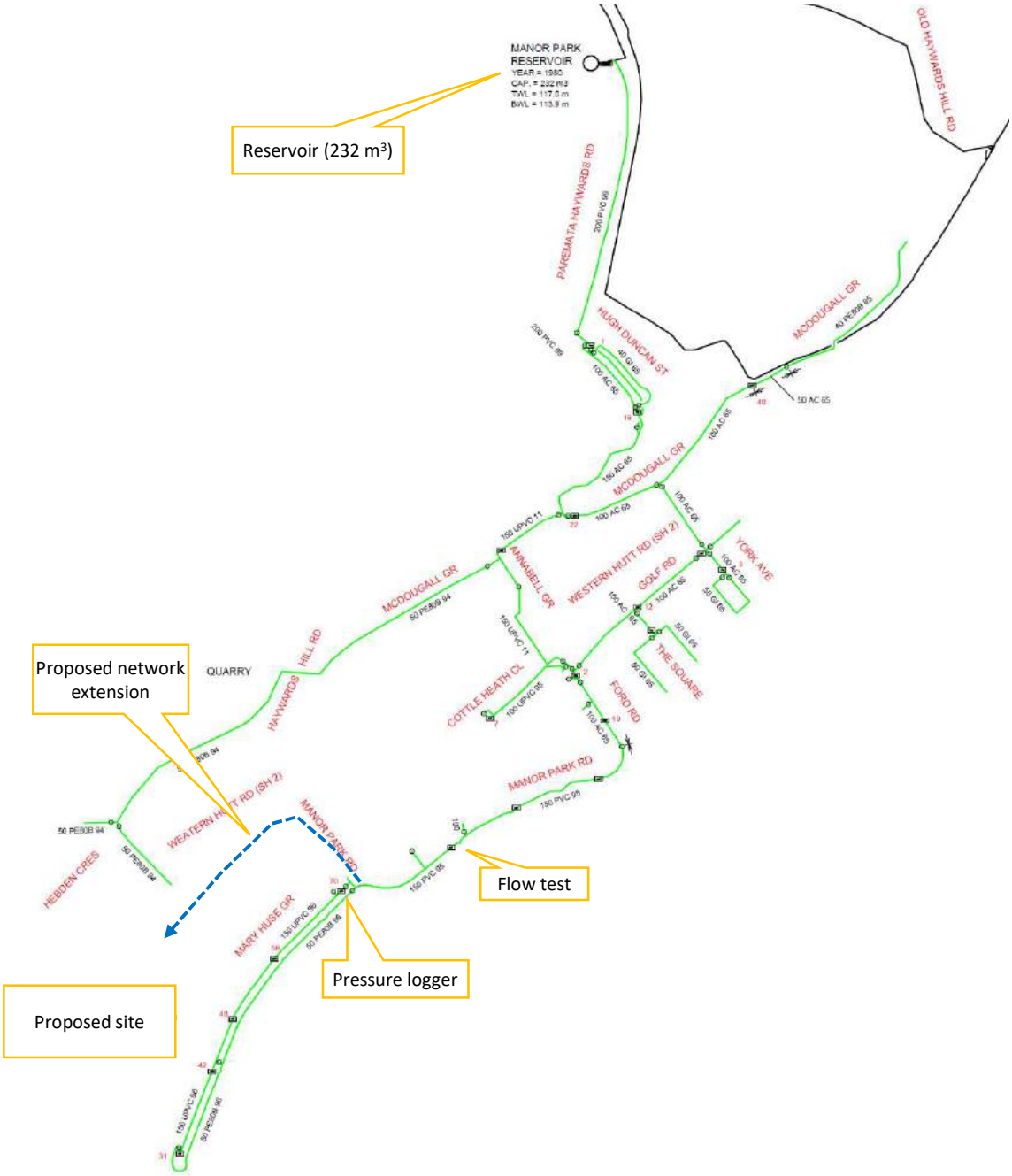


Figure 2 - Water supply network for Manor Park (from WWL)

2.1 Performance requirements

The RSWS requires the development to achieve:

- Minimum peak period pressures of 25 m (RSWS) or 30 m (HCCDP)
- Maximum pressure of 90 m (RSWS and HCCDP)

- Firefighting flow and pressure compliance with SNZ PAS 4509 *Code of practice for firefighting water supplies. (RSWS and HCCDP)*
- Reservoir storage must meet requirements of the Regional Standards for Water Services.

In addition to this, the development shall have a less than minor impact on the existing storage, and pressures within the existing network.

2.1.1 Consultation

Wellington Water Limited were contacted for pre-development advice on the development. Their response is shown in Appendix A.

The main concerns with respect to the water supply is:

a) Flow testing to confirm flows and pressures are compliant
b) The existing Manor Pak reservoir is currently undersized by a significant volume, and the proposed development will exacerbate this.

2.2 Field Test

A pressure logger was deployed for 7 days and a flow test carried out to determine the performance characteristics of the existing network. The location of the logger and flow test is shown in Figure 2, and the results are shown in Appendix B and illustrated below in Figure 3.

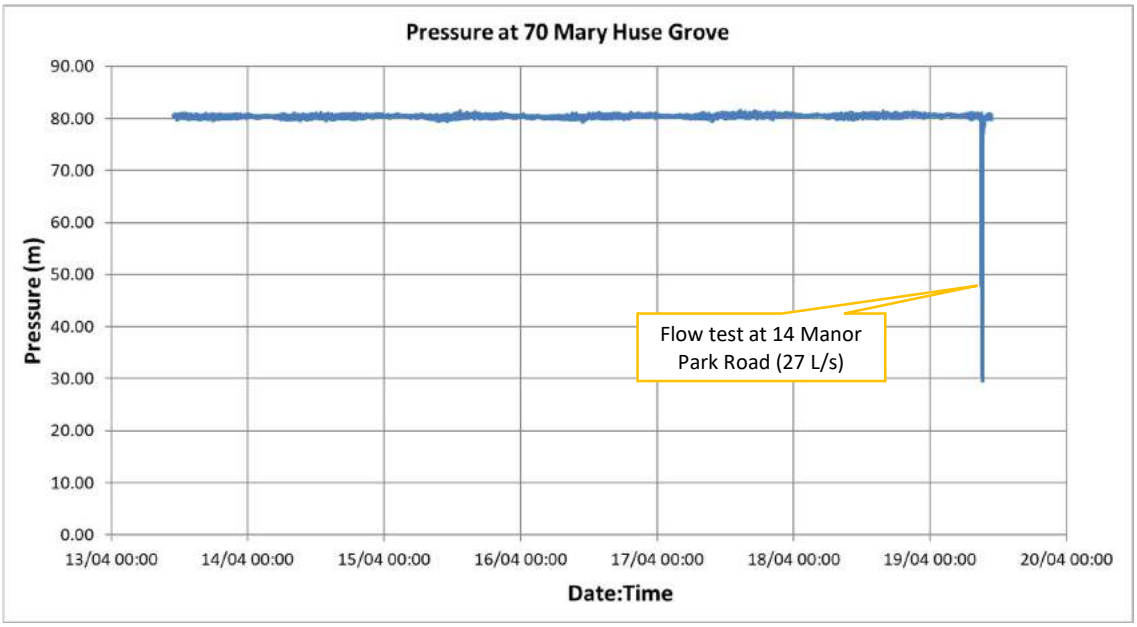


Figure 3 - Pressure trace from logging at 70 Mary Huse Grove

The flow test will allow an extrapolation of the network performance to include the additional demand and firefighting flows. The logger elevation was approximately 30 m above MSL.

The losses are higher than expected and may represent some maintenance issues within the network such as a closed, or partially closed valve. However, this would be considered conservative so we have continued with the results as presented.

The analysis suggests the existing representative peak demand from the zone is approximately 5.8 L/s.

2.3 Design parameters

2.3.1 Peak demand

The proposed site is approximately 10.04 hectares. As the development will not be for residential use, non-residential activity has been assumed for future uses as would seem appropriate for the current zoning. The RSWS states in 6.3.1.1:

> (d) Where an area has predominantly industrial demand, and the demand is unknown, the designer may use the ADWF calculated in **Section 5.3.1.4 High density / industrial / commercial design flows** multiplied by a factor of 8, as the design demand for the water supply analysis.

And 5.3.1.4 states:

> (c) Where specific activities are *not* known, the following factors from **Table 5-2** may be used:

Table 5-2 – Industrial and commercial design flows

Council		ADWF (L/ha/s)	PDWF (L/ha/s)	PWWF (L/ha/s)
HCC	Industrial/commercial	0.52	1.56	1.56

As the final and future uses for the site are unknown, the peak flow can be calculated as:

Peak demand = Area x 0.52 x 8 L/s

Peak demand = 10.04 x 0.52 x 8 L/s

Peak demand = 42 L/s

The affinity analysis (Section 2.2) suggests the existing network is unable to deliver this peak flow, so it is proposed that a trickle feed system is accommodated until such time as upgrades are enacted. The trickle feed will also reduce peak demands on the reservoir storage, therefore buffering demand.

2.3.2 Reservoir storage

Table 6.2 from the RSWS is shown Figure 4. The proposed development is a non-residential development with unknown future activities and no residential population. As such, Method 2 would be the most appropriate using the ADWF calculated in 2.3.1.

The ADWF is 10.04 ha x 0.52 L/s/ha x 86400 seconds x 2 days = 902 m^3.

The existing reservoir is only 232 m^3 so additional storage will be required at the reservoir to accommodate the additional volume.

Table 6-2 – Mandated levels of service for storage volumes

Method	Storage (L/person)	Scenario
1	700	Where actual consumption is not known such as new developments
2	2 x Average Day Demand	Used when demand statistics are available from Wellington Water. The designer to target the greater of the volume determined by each method. Consult with Wellington Water to determine critical users and their consumption.
3	Maximum Day Demand + 20% + SNZ PAS 4509 firefighting requirements	
4	(20 L/person/day for 23 days + critical users allowance) x 1.43	

Figure 4 - Reservoir storage calculations from RSWS

2.3.3 Firefighting flow

Any future structures can require significant volumes of firefighting water to meet the firefighting water supplies code of practice. The minimum level of firefighting is FW2 (25 L/s) with sprinklers or additional private storage for any activities or structures that exceed the limitations on FW2. The affinity analysis in section 2.2 suggests the existing network cannot supply more than FW2 so a higher level is not proposed at this stage.

Table 2 – Method for determining firefighting water supply

	Reticulated water supply			Non-reticulated water supply	
Fire water classification	Required water flow within a distance of 135 m	Additional water flow within a distance of 270 m	Maximum number of fire hydrants to provide flow	Minimum water storage within a distance of 90 m (see Note 8)	
				Time (firefighting) (min)	Volume (m^3)
FW1	450 L/min (7.5 L/s) (See Note 3)	–	1	15	7
FW2	750 L/min (12.5 L/s)	750 L/min (12.5 L/s)	2	30	45
FW3	1500 L/min (25 L/s)	1500 L/min (25 L/s)	3	60	180

Figure 5 - From SNZ PAS4509

2.4 Concept design

There are several network restrictions that have guided the water supply concept. This is the small size of the existing reservoir and the limited capacity of the existing network. Due to the restrictions, an interim solution is proposed, and this is shown in Figure 6.

The interim solution was discussed with Hutt City Council and Wellington Water Limited representatives. The advantages and disadvantages of the interim solution were considered, and the proposal accepted as a short-term solution until the reservoir is constructed. This approval is documented in Appendix D.

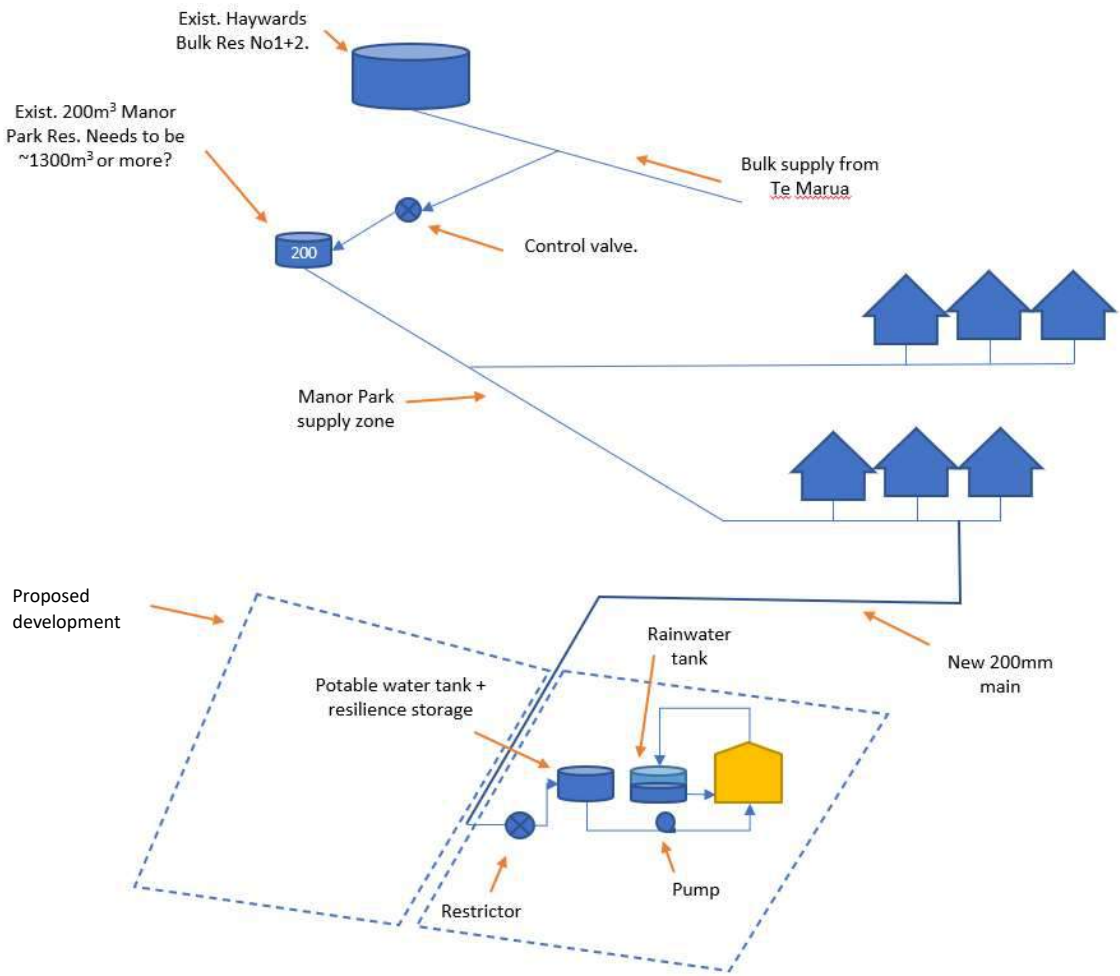


Figure 6 - Proposed INTERIM solution for water supply to the development

The interim solution has:

- Interim restrictors on each connection to reduce peak demand
- Potable storage tanks and pumps (48 hours average demand) to augment reservoir storage

These measures would be removed when the existing reservoir is upgraded and the network is gradually improved.

The reservoir upgrade would be part funded by a Developer Contribution to pay for the developers 903 m^3 component of the upgrade. Any volume over the existing 232 m^3 plus 903 m^3 volume would be funded by Hutt City Council through a separate mechanism. HCC/WWL are currently suggesting a combined volume of 1300 m^3 may be required for the new reservoir, but this will need to be confirmed.

The ultimate solution is shown in Figure 7.

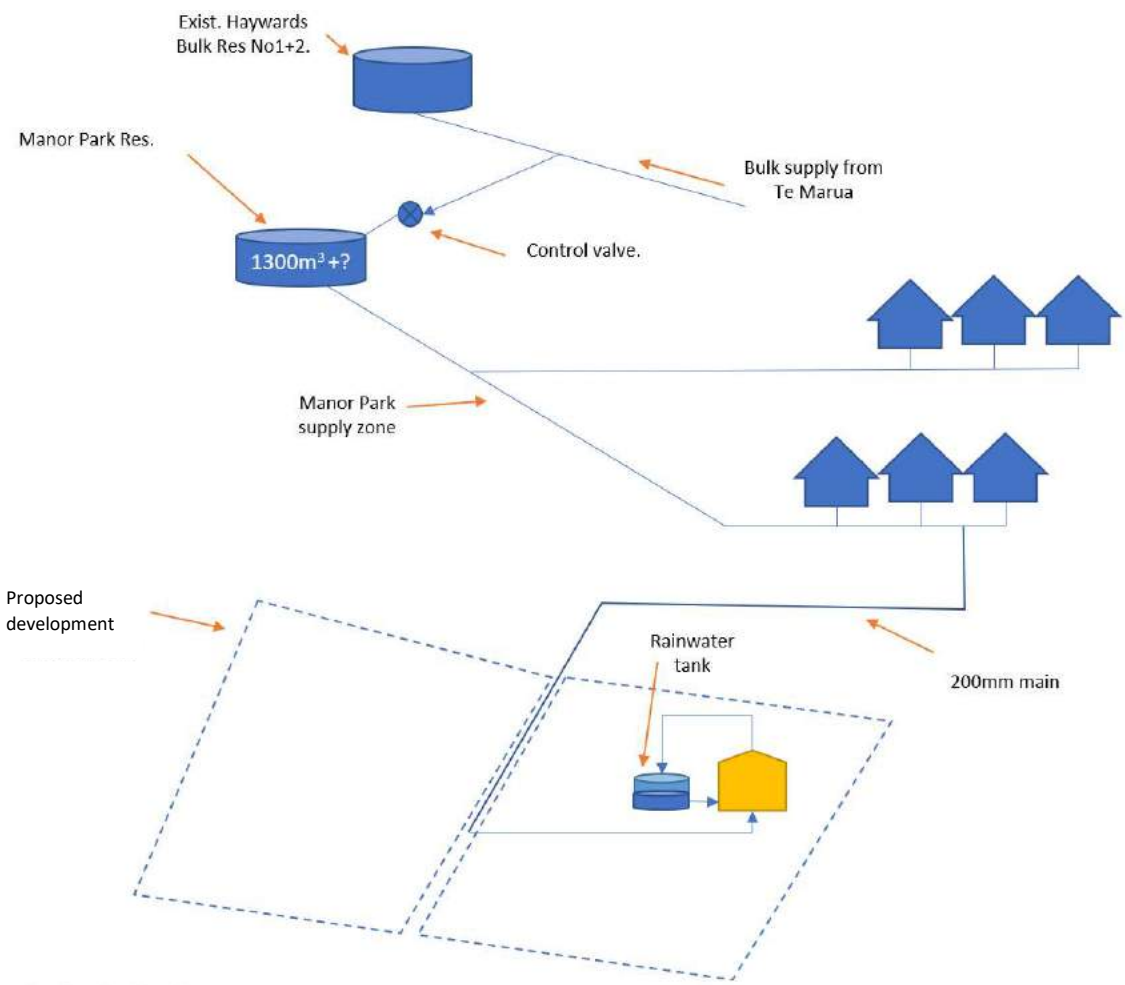


Figure 7 - Proposed ULTIMATE solution for water supply to the development. Final size of the reservoir is to be confirmed after full zone analysis.

2.4.1 Principle main (public asset)

The site will be supplied from the existing 150 mm main on Manor Park Road. A 200 mm main is proposed to deliver potable supply and firefighting water (FW2) with a potential alignment shown in Figure 9. A 200 mm main is recommended due to the long length and potentially high future demands.

The interim firefighting flow is around 29 L/s (25 L/s + 2/3rds peak), and the ultimate firefighting flow is 53 L/s. A 200 mm main can provide both those flows along the proposed 820 m long principle main without significant loss. At 29 l/s, the existing network pressure drops to 25.6 m which means there is only 15.6 m of friction losses permitted along the pipeline to comply with RSWS. As shown in Figure 8, the proposed main results in 3.7 and 11.8 m of losses suggesting the pipeline is suitable for short and long term scenarios.

	Dia (m)	flow (m3/s)	Length (n	V	Vh	Re	e (mm)	f (swam-j)	hf (m)	K	Total hf
Proposed 200mm main @ 29 L/s	0.2	0.029	820	0.92	0.0434	184620	0.15	0.0203	3.61	1.5	3.7
Proposed 200mm main @ 53 L/s	0.2	0.053	820	1.69	0.1451	337408	0.15	0.0195	11.61	1.5	11.8

Figure 8 - Headloss equations for principal main.

In the interim scenario, there is a 125 m long section of 150 mm main between the flow test point and the connection point that the logger and affinity test would not allow for. The firefighting pressure at the terminal hydrant (assuming a flat site) can be calculated as:

The starting pressure
less head loss between flow test and connection point;
less headloss along 200 mm pipe

= 25.6 – 3.7 – 2.6
= 19.3 m which is much greater than the minimum of 10 m.

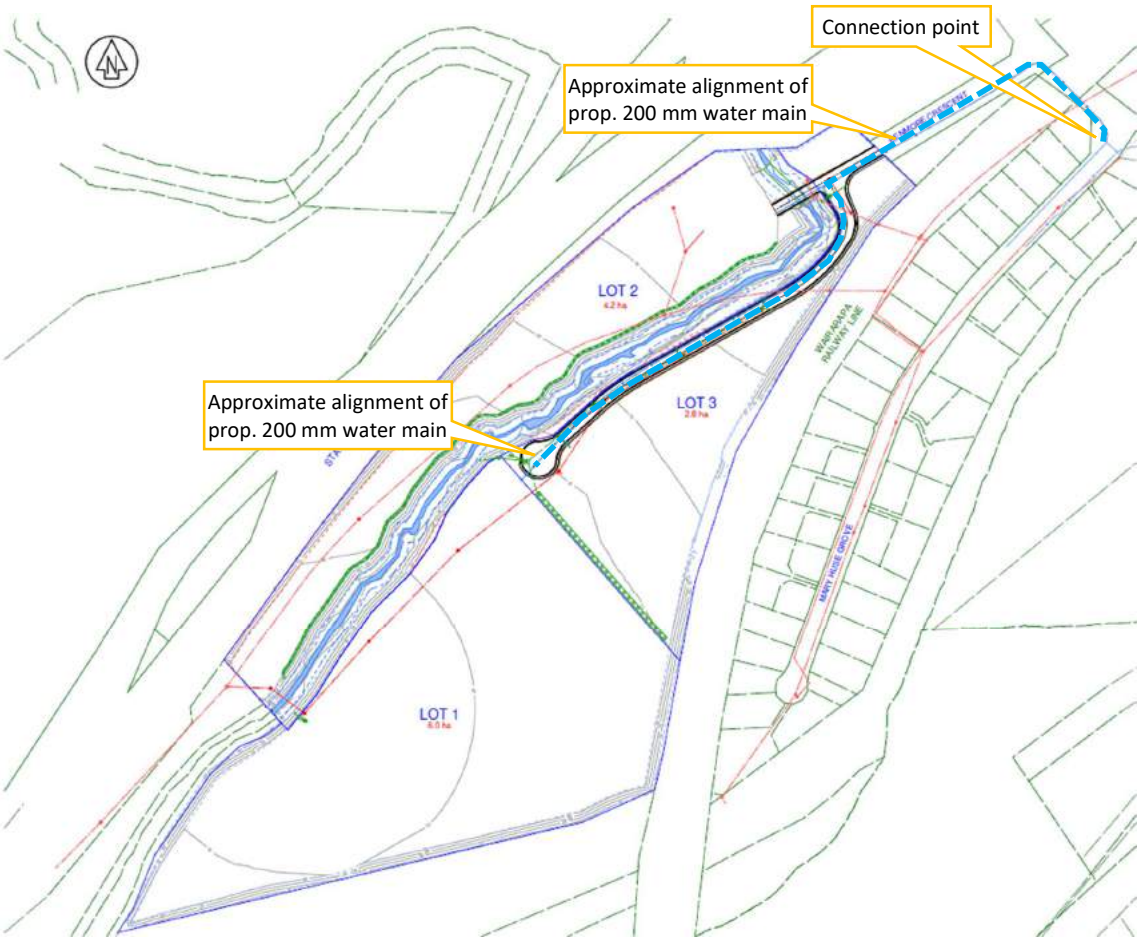


Figure 9 - Potential alignment of 200 mm water main providing potable and firefighting water supply

The long-term scenario (53 L/s) would require network upgrades as there are some 100 mm diameter sections which would require attention. Calculations suggest the main losses for the ultimate scenario are encountered along the last 500 m of main along Ford Road (100 mm pipe) and, to a lesser degree, Manor Park Road (150 mm). These are not required while the restrictors are in place, but will be required as part of the reservoir upgrade solution. The minimum upgrade to achieve the 25 m minimum pressure at the proposed development is to upgrade 120metres of 100 mm pipe to 200 mm pipe as shown in Figure 10.

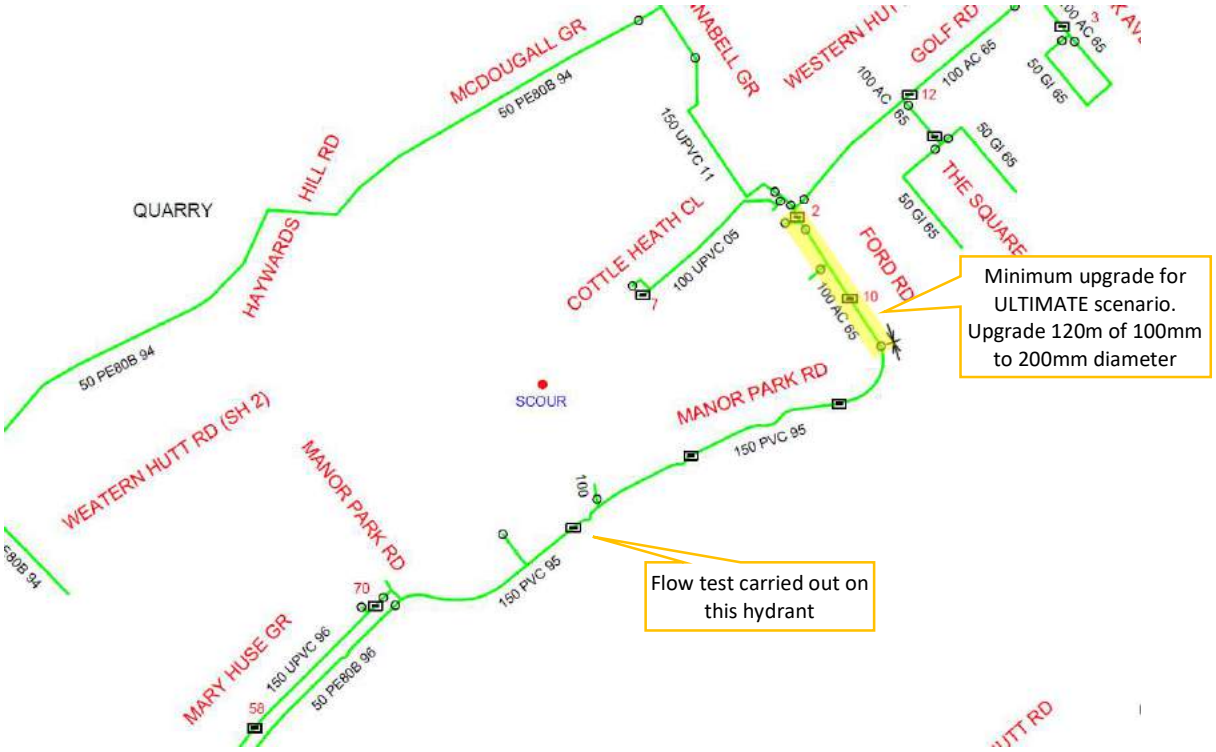


Figure 10 - Potential mains requiring upgrade for ULTIMATE solution.

2.4.2 Customer connection restrictors (public asset)

The interim solution requires all tenancies within the scheme to be supplied with water through a restrictor to limit the demand to the property. The restrictor will be sized based on the activity/tenancy area, but the demand from the entire scheme should not exceed 5.2 L/s which is the average day demand. This:

1. Reduces demand on the network pipes therefore reducing pressure fluctuations; and
2. Reduces demand on the existing reservoir to minimise impact on the reservoir level.

The restrictors are proposed to be temporary until the reservoir has been upgraded and the network capacity improved.

The connection will be metered as required by the Water Supply by-law.

2.4.3 On-site potable storage (private asset)

To help buffer the demand on the existing reservoir, the restrictors will supply on-site potable storage tanks. These will be sized to accommodate 48 hours of the proposed tenancy activities average demand. The tank will supply the future activity through a pump which will provide the pressure for the activity.

2.4.4 Rainwater re-use tank (private asset)

Rainwater harvesting tanks are proposed primarily to reduce site run-off, but they can help reduce demand on the network and reservoir. The tank will supply toilet flushing, external taps and irrigation. The size of the tank will depend on the commercial activity proposed. An example of a

1000 m^2 roof servicing a non-potable demand of 4000 L/day is given in Appendix D. This uses 10 years of rainfall data from the Maybey Road rainfall gauge (2010-2020) and suggests reductions in consumption up to 40% are possible for this example.

Current guidelines (RSWS) do not provide a target reduction in consumption, and the size of the tank will be determined by space, available roof area and activity. We are currently working on the basis of a tank that captures 2 mm runoff ie: a 1000 m^2 roof would attract a 2000 L tank. This would be ample for a warehouse type scenario, but potentially undersized for a large multistorey office building or high irrigation need.

Where rainwater harvesting systems are proposed, they are to be a permanent, privately owned installation.

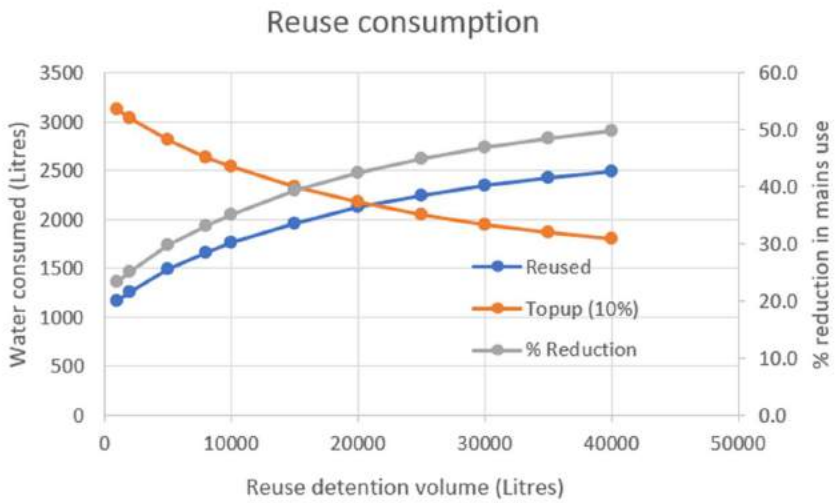


Figure 11 - Example consumption reduction for 1000 m^2 roof supplying 4000 L/d demand

2.5 Summary for Water Supply

The water supply requirements of both the Regional Standards for Water Services, and Chapter 11 of the Hutt City Council District Plan can be met through an interim and then an ultimate staged implementation. Therefore, it is feasible for rural ancillary and some commercial land uses to establish onsite.

Table 1 - Summary of compliance for Water Supply

	RSWS / HCCDP requirement	Interim stage	Ultimate stage
Peak demand	0.52 x 8 L/ha	5.3 L/s[1]	42 L/s[2]
Max pressure	90 m	81	81
Min pressure	25 / 30m	75	39[3]
Firefighting flow + 2/3peak	25 + 28	25 + 4	25 + 28
Firefighting pressure (min)	10	19.3	17[4]
Reservoir storage m^3	Exist + 903	Exist[5]	Exist[6] + 903

Notes:
1: Peak reduced in interim stage through restrictors on customer connections
2: Unrestricted potential peak demand after reservoir and network upgrades
3: Based on ultimate hypothetical development flow, but current, existing network flows (not future)
4: Includes Ford St upgrade and ultimate development flow and existing zone's current estimated peak.
5: Private activity specific storage will be required on site
6: Existing storage to be increased for the existing zone also with extra 903 for proposed development.

To achieve the compliance outlined in Table 1:

1. Flow restrictors on the customer connections to limit flow to 5.3 L/s in total for the whole development (Interim); and
2. Potable water supply tanks and pumps on each tenancy to provide 48 hours potable storage on each tenancy (Interim); and
3. Potentially rainwater harvesting tanks to reduce demand (some sites may opt for soakage); and
4. A 200 mm principal main running the length of the development from Manor Park Road; and
5. An additional 903 m^3 augmentation of the existing Manor Park reservoir storage, through a developer's contribution for a larger replacement reservoir, is to be added to the council's long-term plan. The value of the developer's contribution is dependent on the final volume and timing of the eventual upgrade.
6. A 120 m long section of 100 mm main along Ford Road will need to be upgraded to 200 mm diameter main before restrictors can be removed. This could be carried out as part of, or prior to, the reservoir upgrade.

Once the new reservoir has been built, the private storage can be removed, or retained at the development owner's discretion. The restrictors can be removed after subsequent network upgrade has been carried out.

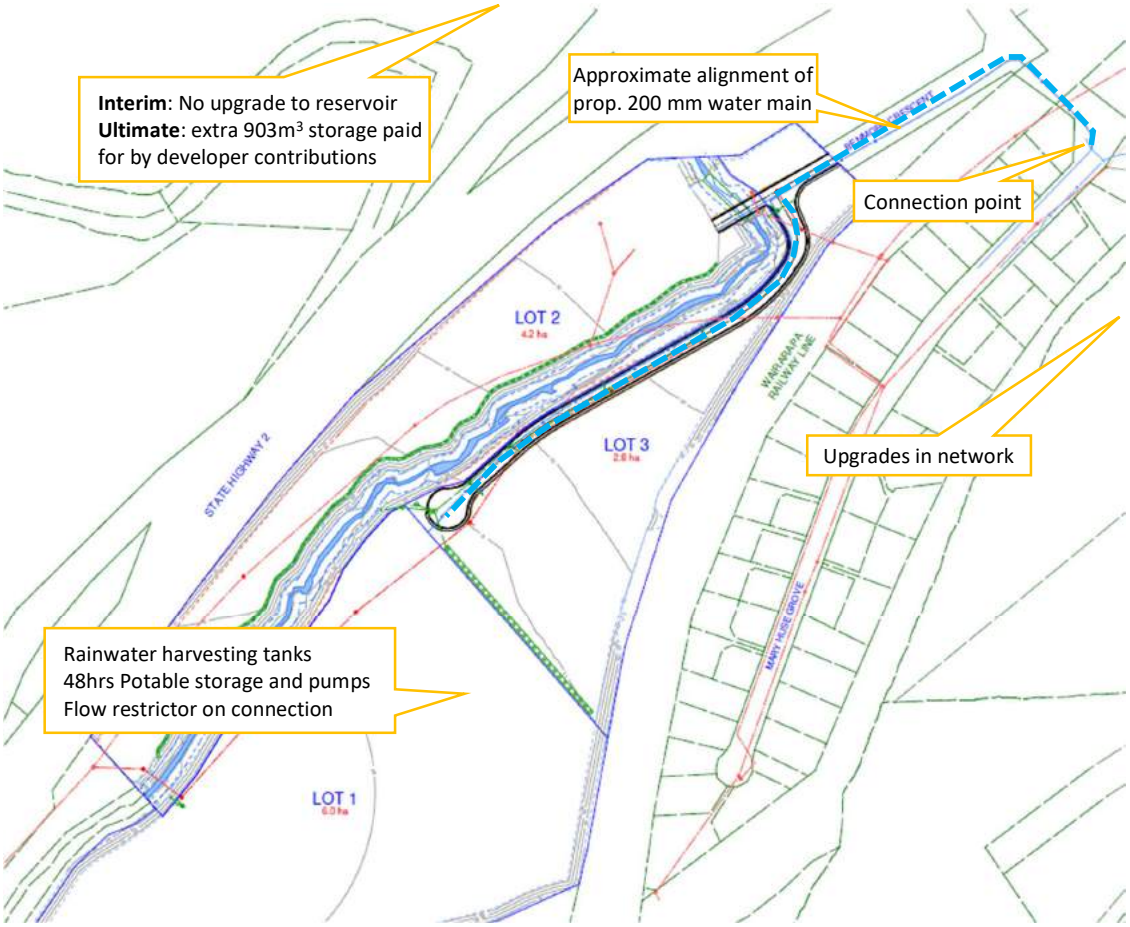


Figure 12 – Summary of water supply components

3 Wastewater

3.1 Performance requirements

The RSWS and HCCDP suggests the wastewater yield from the site for non-residential use will be as below.

Council		ADWF (L/ha/s)	PDWF (L/ha/s)	PWWF (L/ha/s)
HCC	Industrial/commercial	0.52	1.56	1.56

Figure 13 - commercial wastewater yield rates. From RSWS Table 5.2

As there is approximately 10.04 hectares of useable area, the total expected wastewater yield is:

ADWF = 5.24 L/s

PDWF = 15.7 L/s

PWWF = 15.7 L/s

3.1.1 Consultation

Wellington Water Limited's preference is to use an existing connection to the trunk main (see Appendix A) and avoid new connections. However, the proposed connection is at the high point of the site so a pumping station and rising main would be required. Due to the cost and maintenance of a pump station, storage and rising main, a gravity system has been proposed. This requires a connection to an existing manhole on the trunk sewer (HCC_W001616 - IL 25.91).

3.2 Existing network

The existing wastewater network is shown in Figure 14.

There is no existing local wastewater network within the site apart from a short length of 150 mm AC pipe (laid in 1972) that services 10d Benmore Crescent.

The trunk sewer (825 mm concrete pipe) passes through the site, but it is not permitted to connect customer connections directly to the trunk sewer.

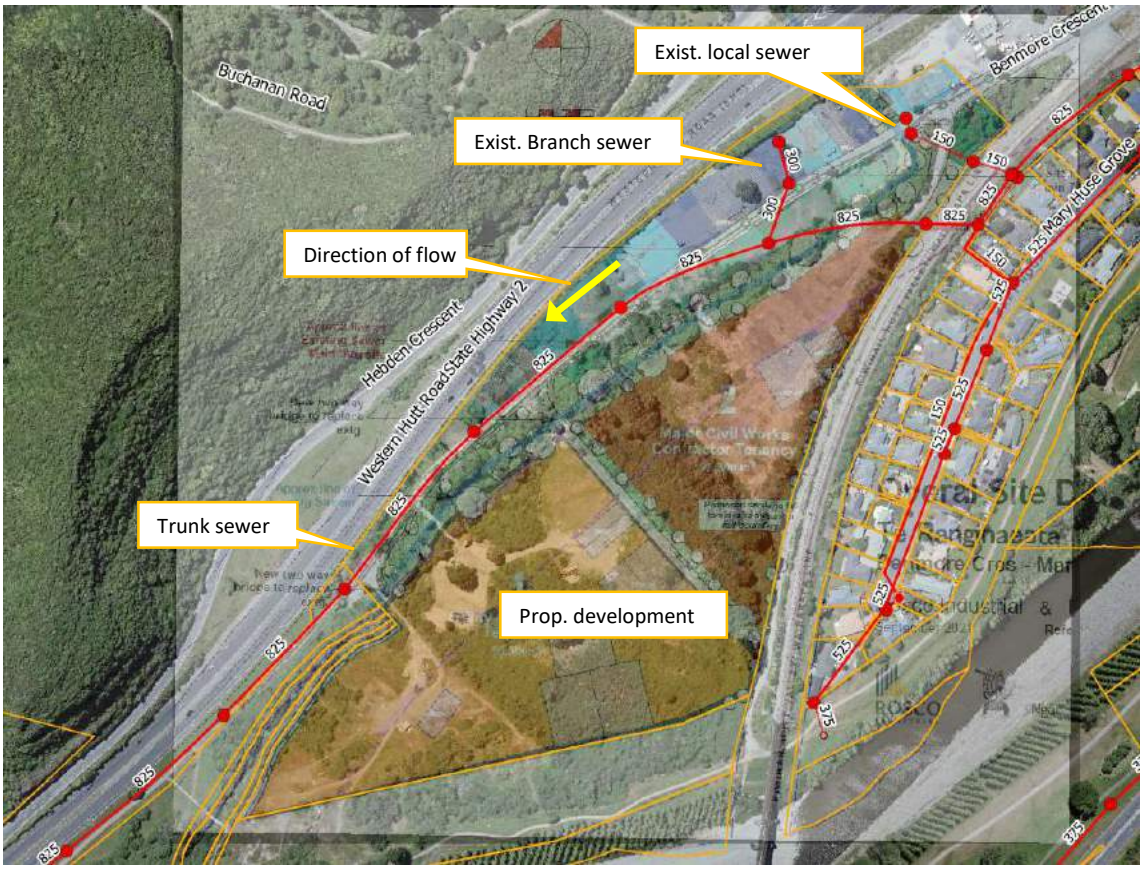


Figure 14 - Existing Wastewater Network

3.3 Concept design

It is proposed to adopt a traditional gravity network falling to a low point within the site. Unfortunately, this is well downstream of the existing trunk sewer branch, so a new connection to the trunk sewer will be required. A pump station back to the existing connection was considered but has been dismissed due to the distance, pump station storage requirements and associated maintenance costs. A gravity connection will have greater long term maintenance benefits than a municipal owned pumped system.

A watercourse bisects the site and wastewater would need to cross this stream at two points to service areas on the eastern side of the stream. The height of this crossing would need to be considered carefully to ensure it is above the flood level, or at least designed against flood flows.

If, during detailed design, the pipe crossings are too low for the culverts or are exposed to flood waters, there is the potential to have the eastern side serviced by on-site private pressure sewers that discharge to the trunk main at the northern end of the site. The private pumping stations would also have storage in-line with the site activity and the Regional Standard for Water Services.

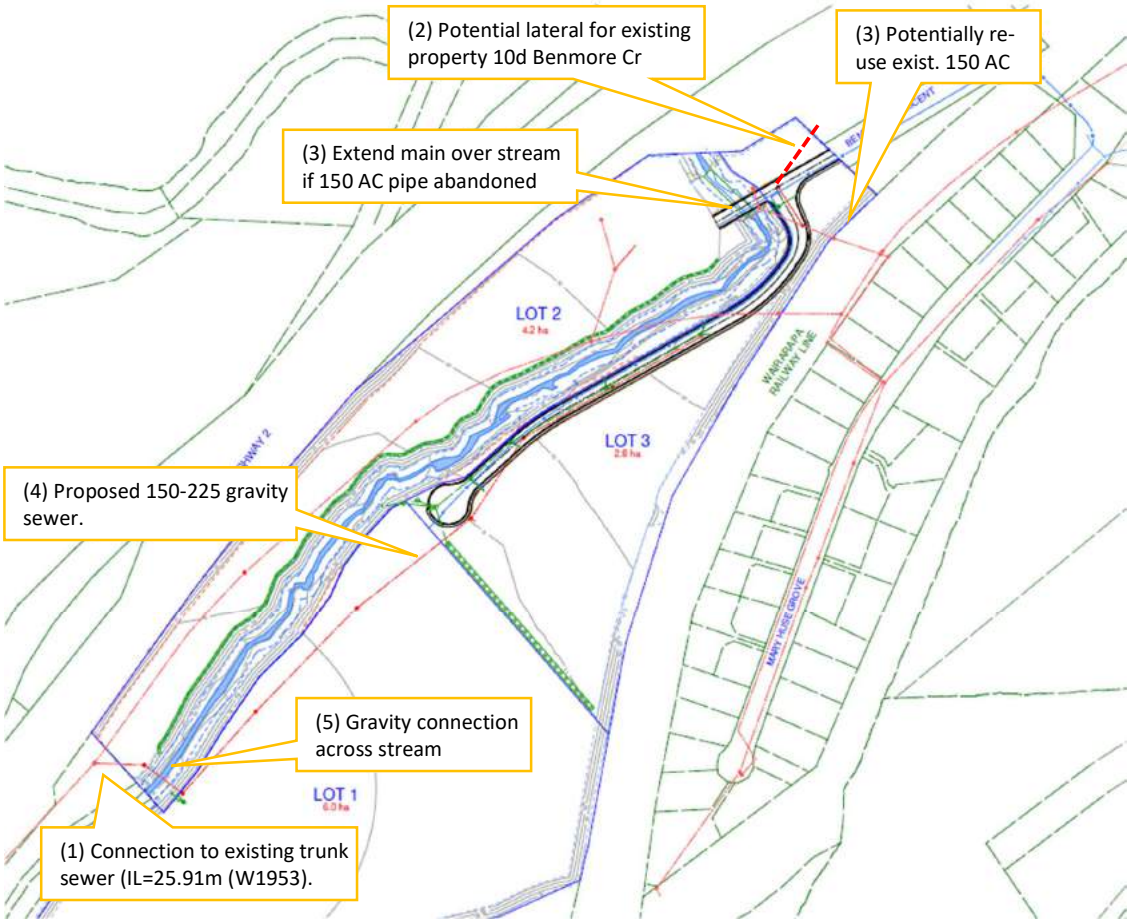


Figure 15 - Proposed wastewater network infrastructure

Considerations:

1. Trunk Sewer Invert for HCC_WW001616 = 25.91m (WLG1953 from GIS). Approx. 2 m cover
2. The property at 10d Benmore Crescent will need to be accommodated within the new network.
3. The existing 150 AC pipe (laid in 1972) servicing 10d Benmore Crescent could be used to service the areas at the north eastern corner of the development. If this pipe is too small, a pipeline could be laid across the stream to the proposed main within the access way.
4. The proposed main pipeline will be laid in the access road and will be either a 150 mm or 225 mm diameter pending available grades and detail design. The ground profile generally slopes down in a south-west direction at a 1:80 (v:h) grade. The PWWF would be just contained with a 150 mm pipe (at 80% depth) but does not include contributions from outside the development, so a combination of 150 mm and 225 mm pipe is likely.
5. Gravity is preferred.

3.4 Summary for Wastewater

The wastewater requirements of both the Regional Standards for Water Services, and Chapter 11 of the Hutt City Council District Plan can be met through a traditional gravity sewer system. Therefore, it is feasible for rural ancillary and some commercial land uses to establish onsite.

Table 2 - Summary of compliance for wastewater network

	RSWS / HCCDP requirement	Vel > 0.75 m/s[1]	<=80% capacity
ADWF	0.52 x 10.04 ha	N/A	Yes
PDWF	1.56 x 10.04 ha	Yes	Yes
PWWF	1.56 x 10.04 ha	Yes	Yes

Notes:
1: based on 150mm pipeline

A central gravity pipeline will run the length of the site and discharge to the trunk sewer at the south-western end of the site. A new connection to the trunk sewer will be required.

10d Benmore Crescent will need to remain connected to either the existing 150 mm sewer main, or transferred to the proposed wastewater network.

All other activities will be able to connect to the main sewer pipeline using traditional gravity connections.

4 Stormwater

4.1 Performance requirements

The Hutt City Council District Plan (HCC DP) does not have any specific clauses outside conveyance of ARI events which are duplicated in the RSWS.

The RSWS outlines the minimum level of protection for stormwater assets. The primary level of service for the development is 10% AEP for local roads and commercial areas.

The activity ***does not*** comply with Greater Wellington's Proposed Natural Resources Plan (PNRP) Rule R49:

> Rule R49: Stormwater from new subdivision and development – permitted activity
>
> The discharge of **stormwater** into water, or onto or into land where it may enter a **surface water body** or coastal water, including through an existing local authority or state highway **stormwater network,** from:
>
> (a) a new urban subdivision or new urban development associated with **earthworks** up to a total area of 3,000m² per **property** per 12 month period, or
>
> (b) a new or redeveloped state highway associated with **earthworks** up to a total area of 3,000 m², or

Meaning the proposed activity is a restricted discretionary activity as per Rule R50 below:

> Rule R50: Stormwater from new subdivision and development – restricted discretionary activity
>
> The discharge of **stormwater** from a new urban subdivision or new urban development, or new or redeveloped state highway into water, or onto or into land where it may enter a **surface water body** or coastal water, including through an existing local authority or state highway **stormwater network,** that is not permitted by Rule R49 is a restricted discretionary activity.
>
> *Matters for discretion*
>
> 1. Measures to **minimise** the adverse effects of **stormwater** discharges in accordance with Policy P83, including the extent to which **water sensitive urban design** measures are employed
>
> 2. Measures to manage runoff volumes and peak flows in accordance with Policy P84
>
> 3. Requirements of any relevant local authority **stormwater network** discharge consent, including those set out in any relevant **stormwater management strategy** developed in accordance with Schedule N (stormwater strategy)

The related policies are outlined below:

Policy P83: Minimising adverse effects of stormwater discharges

The adverse effects of **stormwater** discharges shall be **minimised**~~ to the smallest amount reasonably practicable~~, including by:

(a) using **good management practice**, and

(b) taking a **source control** and treatment train approach to new activities and land uses, and

(c) implementing **water sensitive urban design** in new subdivision and development, and

(d) progressively improving existing **stormwater, wastewater**, road and other public infrastructure, including during routine maintenance and **upgrade**~~.~~, and

(e) managing localised adverse effects, including by addressing particular attributes appropriate to the receiving environment.

Policy P84: Managing land use impacts on stormwater

Land use, subdivision and development, including **stormwater** discharges, shall be managed so that runoff volumes and peak flows:

(a) avoid or **minimise** scour and erosion of stream beds, banks and coastal margins, and

(b) do not increase risk to human health or safety, or increase the risk of inundation, erosion or damage to **property** or infrastructure,

including by retaining, as far as practicable, pre-development hydrological conditions in new subdivision and development.

4.1.1 Consultation

Wellington Water did not have anything specific (see Appendix A) related to stormwater, notwithstanding building no closer than 5 m to the stream and that overland flow needs to be considered. Overland flow is being considered in a separate, flood specific report, and will also be considered in detail during resource consent.

4.2 Overall proposed concept

The general stormwater concept proposed for the development is outlined in Figure 16. This is based on the currently proposed scheme and may change during detailed design.

The objective of the concept is to:

- Mitigate adverse impacts from changes in frequent flow hydrology,
- Reduce pollutant loads from the proposed development into the receiving environment,
- Reduce temperature impacts on downstream receiving environments.

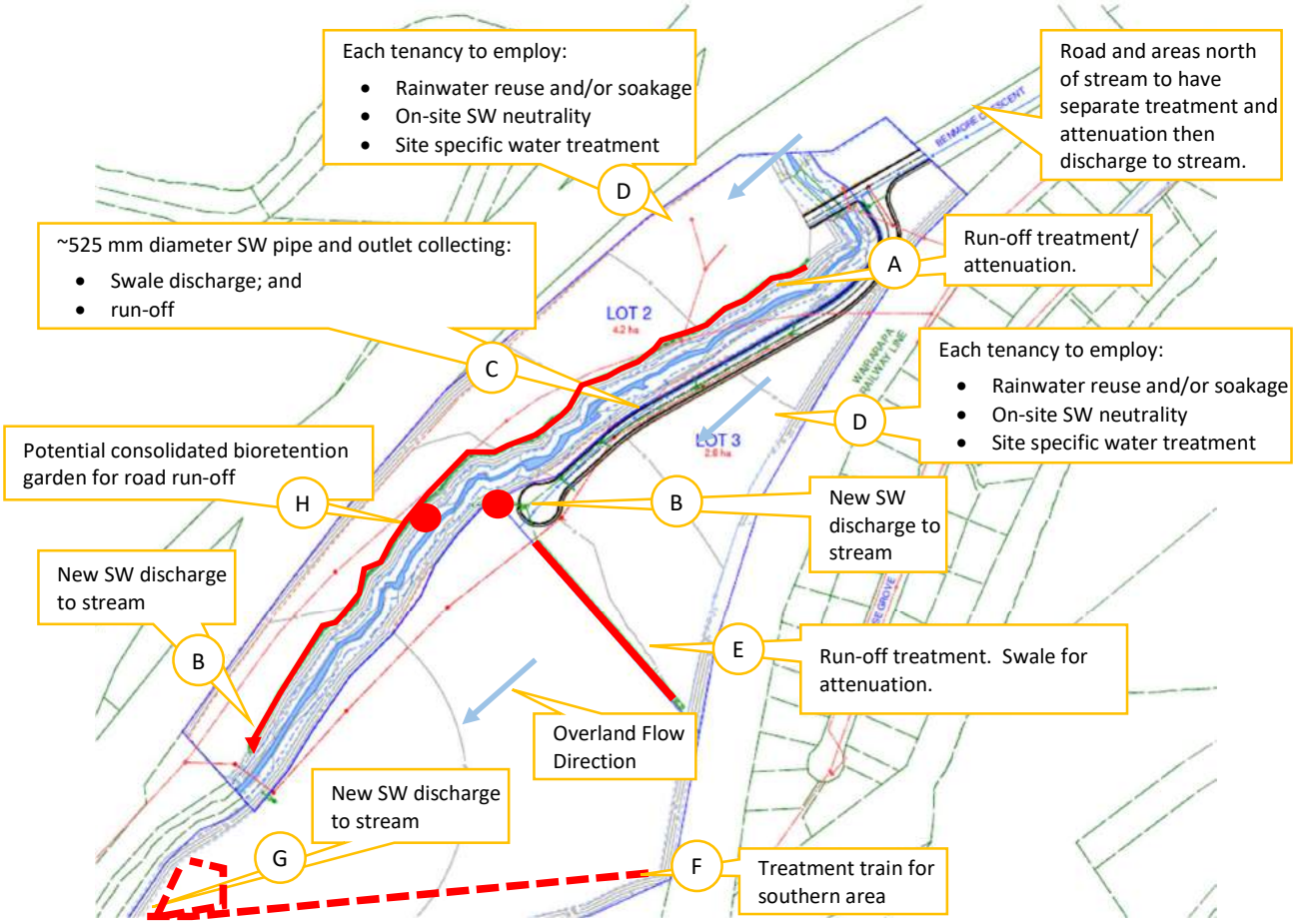


Figure 16 - Outline stormwater management quality (Based on currently proposed scheme)

The general concept components proposed to achieve these objectives are:

1. Stormwater re-use is provided for each tenancy using on-site retention tanks (D). These are to be designed on a per area and case-by-case basis.
2. Water quality treatment for each tenancy will be through a bespoke, on-site, WSUD design (D). This is likely to comprise proprietary pollutant traps supported by rainwater harvesting.
3. Water quality treatment of other road surfaces will be through other devices as either part of the swale, or off-line to the swales. The devices will be for water quality only and are expected to be around 2% of the paved area in size (E and A).
4. Discharges from the bioretention devices, swales and on-site WSUD devices will be collected by a 525 mm diameter drain (C). This drain can accommodate the 1% AEP event. It is provided at depth as many filtration devices have sub-soil discharges.
5. Collected discharges will discharge to the stream outlets (B and G). These will require erosion and scour protection.
6. The southern tenancy will require on-site stormwater detention and treatment (F) and then discharge direct to the stream (G) through a constructed outlet with erosion and scour protection.

4.3 Rainwater harvesting / run-off volume management

Rainwater harvesting is proposed to both reduce demand on the potable water supply network, but primarily to reduce stormwater run-off volumes. Harvesting potential is heavily dependent on the

roof area available from the on-site activity and a specific target reduction has not been set. The limiting factor will be the amount of non-potable demand from the commercial activity, as the run-off reduction is only long term if there is long-term non-potable use.

A bespoke design will be required for each tenancy and activity incorporating either one or both of the volume management options.

4.4 Stormwater disposal

Discharges from the treatment and attenuation devices will be discharged to the stream via constructed outlets. These will require rip-rap scour and erosion protection. These outlets will need to be designed to discharge the design 1% AEP flows without scour or erosion, and also withstand 1% AEP transverse flows from the stream when the stream is in flood.

4.5 Stormwater quality

To meet the requirements of policy P83, it is proposed that:

1. Water sensitive design devices to treat run-off from paved surfaces on each activity, and
2. Vegetated swales to treat run-off from impermeable surfaces.

4.5.1 Swales

The swales beside the roads provide more of an attenuation function than treatment due to the requirement of them to convey low-frequency high-flow events as well as higher frequency events. They will provide some pre-treatment and sediment removal of the water quality flow prior to that flow being collected by any devices at the end of the swale.

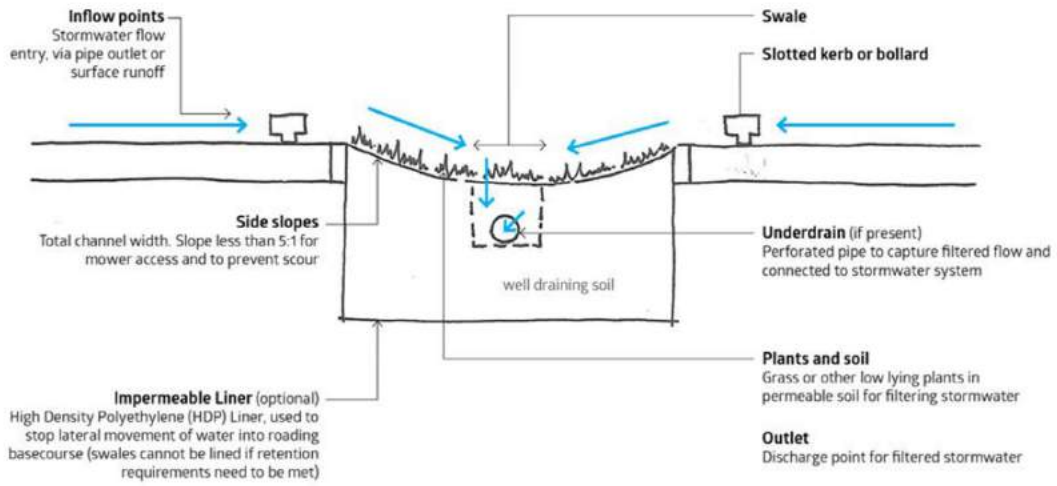


Figure 17 - Typical swale cross-section (from Auckland Regional Council 2011)

4.5.2 Treatment Devices

The devices on Benmore Crescent could be either multiple smaller devices along the long road, or a single large device at the southern end. A single device would be the preference as it consolidates maintenance into a single device, and the longer uninterrupted swale will better attenuate flows than a series of shorter swales.

Each tenancy will require a treatment device or devices to collect treat and discharge the water quality volume from the tenancy. The design and quantity of these will be dependent on the site layout, coverage and activity employed on each tenancy.

The treated discharge from each tenancy will be to either the central pipeline through the site, or directly to the stream, or to the local stormwater network.

Any discharges to the stream will require erosion protection to prevent damage to the sides of the stream. This is likely to be rip-rap protection and potentially energy dissipators depending on the slope and flow. As the swales and pipes are artificial and will normally be dry, fish passage is not a consideration on any of the discharges.

4.6 Summary for Stormwater

The proposed activity is a restricted discretionary activity under the proposed Natural Resources Plan administered by Greater Wellington. To achieve the objectives of the proposed Natural Resources Plan, specifically Rule R50, any implementation must:

a) Minimise the adverse effects of stormwater discharges in accordance with Policy P83, including the extent to which water sensitive urban design measures are employed
b) Manage run-off volumes and peak flows in accordance with Policy P84: minimising scour and erosion and not increasing risks to human health or safety or inundation damage to property or infrastructure.

The following stormwater management components are proposed:

1. Each tenancy will collect and treat the run-off on each activity using on-site with WSD devices;
2. Each tenancy will employ rainwater harvesting and/or soakage to reduce run-off volumes;
3. Each tenancy's treated discharge will discharge to the proposed stormwater pipe or, where this is not possible, directly to the stream.
4. The swales will be sized to accommodate the 10% and 1% AEP events from the carriageway.
5. Public/common access roads will use gross pollutant traps (Vortech units or similar) to treat runoff. Flows beyond the water quality volume will be by-passed to the stormwater network.
6. All attenuated and treated flows from areas and carriageways will be collected and conveyed to outfalls through a swale and pipe network. The network will need to be sized to accommodate the 1% AEP flows from tenancies and roads. Some direct, uncontrolled run-off to the stream is likely from adjacent stream banks and undeveloped areas, but these will be minor and either the same or improved over existing in terms of quality and quantity.
7. Discharge points to the stream will need to be designed to protect the receiving environment from scour and erosion for flows up to 1% AEP. The discharge points will in turn, need to be protected against high lateral flows from the streams flood flows.

Hutt City Council District Plans requirement in Chapter 11 requires the primary network (pipes and channels) to convey a 10% AEP event. Item 7 complies with this as well as carrying the secondary flow of 1% thereby satisfying the primary and secondary conveyance requirements.

WSD devices employed by the development will need to be assessed against the requirements of Wellington Water Limited's *Water Sensitive Design for Stormwater: Treatment Device Design Guideline (December 2019)* and the internally referenced documents to demonstrate compliance with the objectives of policies P83 and P84 and therefore the requirements of the proposed Natural Resources Plan.

Overall, it is feasible to acceptably manage stormwater onsite for industrial and commercial land uses that may establish onsite if the land is re-zoned to the General Business Activity Area in the District Plan.

Effects of overland flows and flooding from the stream is under a separate report by others.

Appendix A. Wellington Water Correspondence

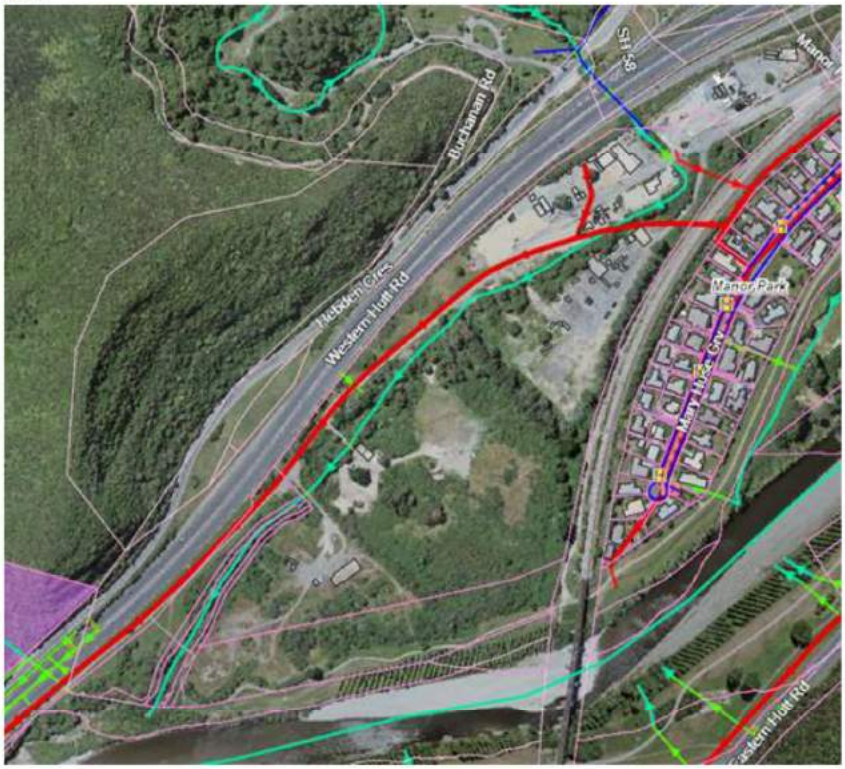
Rob Jack

From:	Land Development <Land.Development@wellingtonwater.co.nz>
Sent:	Wednesday, 27 October 2021 4:59 PM
To:	Rob Jack
Cc:	Resource Consents (ResourceConsents@huttcity.govt.nz); Subdivision
Subject:	RE: Te Rangihaeta Business Park, Manor Park, Lower Hutt- wwl - 27 Oct 2021

Hi Rob

Please find the 3 waters comments below:

GIS:



Proposal:

Water Supply:

In terms of connection, the proposed location (off the existing 150mm pipe on the manor Park Road) seems Ok. Our model shows that water pressure is expected to be around 85m around the identified location. It is recommended that the they do pressure logging and hydrant flow test and provide hydraulic calculations to support their scheme is compliant with the RSWS and the NZ fire code.

Please note that the Manor park reservoir servicing this zone is a small reservoir (~200 m^3) and is currently under capacity. Current short fall in storage is estimated to be double the size of reservoir so in reality there is no room to service additional large demand such as this proposed commercial/industrial park. Additional storage / new reservoir would be required to service this development.

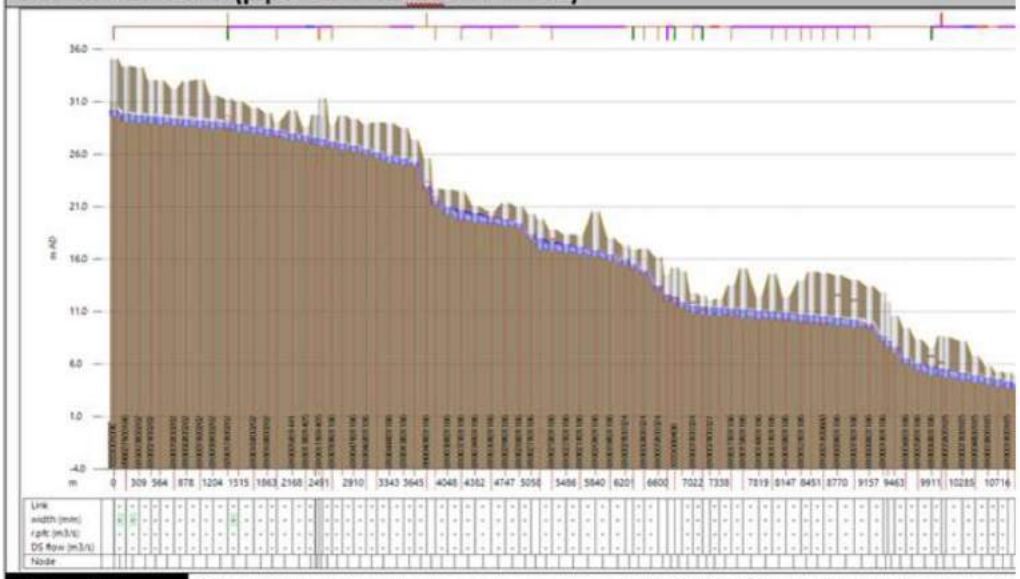
Please discuss with Wellington Water once a scheme plan and a domestic/fire water demand is estimated.

Stormwater:

- Please note that Wellington Water currently does not have a hydraulic model for this area and as such we are unable to provide any information on flooding for this area. We recommend that a catchment analysis be carried out to determine minimum floor levels and overland flow paths – this is to ensure the proposed development will be constructed above possible flood levels and outside of any secondary flow path. It is also advised to consult with HCC subdivision team and or GWRC to confirm if they have any information on flooding.
- There is a stream along the site, we do not recommend building close than 5m to the stream. Please discuss with Regional Council on any other requirements.
- Based on the total development area, stormwater treatment will be required (as part of GW requirement).

Wastewater:

- We recommend a peak flow assessment for this development. Significant overflow to Hutt River may trigger mitigation requirements. Please find the modelling info below.

TRUNK NETWORK (pipes 300mm dia and above)	
	
Current Capacity	The trunk network downstream manhole 810046R01186 discharges via Trunk Sewer to pump station PS434 at the Ava Rail Bridge. There are ma sections that are already over their design capacity during a 1-year LTS event. Furthermore, there are engineered overflows at manhole 81001 and the inlet to pump station PS434 that discharge into the Hutt River. it is not clear from the model results as to whether they operate and th frequency. Further development of this property will exacerbate this.

- Discharging to trunk main directly is not recommended. Option B is preferred if feasible. For Option A, instead of a private connection to the trunk, a small section of 300mm main section is recommended as a transition(please check if there are concerns on sewer back up/overflow). A private manhole is also required before discharging to the public main (public manhole) by gravity.
- There is a trunk wastewater main on site, please obtain as built info from Wade: Wade Gosper <Wade.Gosper@wellingtonwater.co.nz>
  Please refer to Regional Standard for building close to mains. Discussion and approval from Wellington Water is required if building close to main is proposed.

Thanks
Sarah

Sarah Zhou Senior Engineer - Land Development
Wellington Water
Tel +64 4 912 4531 Mob 021 309 998
Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt
www.wellingtonwater.co.nz
Wellington Water is owned by the Hutt, Porirua, Upper Hutt and Wellington city councils and Greater Wellington Regional Council.
We manage their drinking water, wastewater and stormwater services.

From: Rob Jack <rob.jack@3wl.co.nz>
Sent: Monday, October 11, 2021 11:36 AM
To: Land Development <Land.Development@wellingtonwater.co.nz>
Subject: Te Rangihaeta Business Park, Manor Park, Lower Hutt

Hello

We are helping Richard Burrell (client/landowner) with a development which is proposed as a commercial/industrial park (see yellow outline below).

A plan change application is currently being compiled as the land is currently zoned Rural (with various designations). As part of this, an assessment around the water and wastewater servicing is required.

Are you able to provide an indication of where connections might be permitted to this site for water and wastewater should the plan change (to commercial) be successful? We are currently assuming:

- 150mm firefighting connection onto the 150mm main on Manor Park Road (see light blue below), pending pressure tests etc
- Wastewater draining to a pump station which then discharges into a manhole on the 825mm Trunk Sewer (point A) or onto the 300mm branch line (point B)

Is Wellington Water able to comment on these two services in terms of:

- What would be allowed (in principal until further detail is provided by the proposal)
- What definitely would not (just so we know).

Cheers!
Rob Jack
0272 854 566

Appendix B. Water Supply Flow Test Results

ADR Arthur D. Riley & Co. Ltd. | fieldsmart technology

ADRwater

20 April 2022

Vecta Limited
7 Lydney Place
Porirua 5022
Attention: Rob Jack

Dear Rob

14 Manor Park Road Lower Hutt Water Main Testing

I have completed my testing. There were no incidents or issues. Everything went smoothly.

I did my pressure testing using the hydrant in the berm outside 70 Mary Huse Grove. Pressure data was collected at 30-second intervals from 13 to 19 April 2022 inclusive. Meters Head is the measurement unit. 10.215 Meters = 100 KPA. Static pressure in this area averages about 81-82 MH.

I used the hydrant in the berm outside 14 Manor Park Road for the flow testing. I opened the hydrant fully to get its best flow rate. The maximum flow rate was about 27 LPS. This remained steady during the testing.

There was only about a 62 % drop in pressure during the flow testing between 9.07 and 9.17 AM on 19 April. I have highlighted this in the spreadsheet provided with this report. Although the flow rate is probably adequate the large drop in pressure may be more concerning, depending on the demands of the new development at this site.

This should give you all the data you need.

Yours faithfully

Chris Parkinson
Manager Leak Detection
ADR
Wellington
04916 6211
021 305 637

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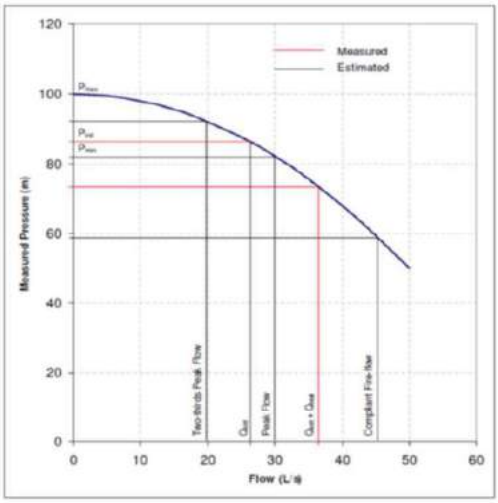
Appendix C. Affinity Analysis

Design Flow & Design Pressure Loss Estimate Based on Network Hydrant Testing

Tested Hydrant Number: 14 Mary Huse Grove
Main Size: 150mm
Main Material: PVC



81.3	PmaxA	Max pressure at Logger A (during low flow in metres)
79.5	PminA	Min pressure at Logger A (during high flow in metres)
80.4	PinitA	Initial Logger A Pressure just before flow test (metres)
30	PtestA	Logger A pressure during flow test (metres)
1.8	Hfpeak	total headloss during peak demand (Pmax-Pmin)
0.0	Hflow	total headloss during low demand (Assumed to be 0 metres)
0.9	Hfinit	total headloss just before test flow (Pmax-Pinit)
51.3	Hftest	Total headloss during test flow (Pmax-Ptest metres)
27	Qtest	test flow (L/s)
0.0	H	variable (Hfinit/Hftest)
4.1	Qinit	network flow immediately before test

Then using the relationship

$$\frac{Hf_{init}}{Hf_{test}} = \left(\frac{Q_{init}}{Q_{init} + Q_{test}}\right)^2$$

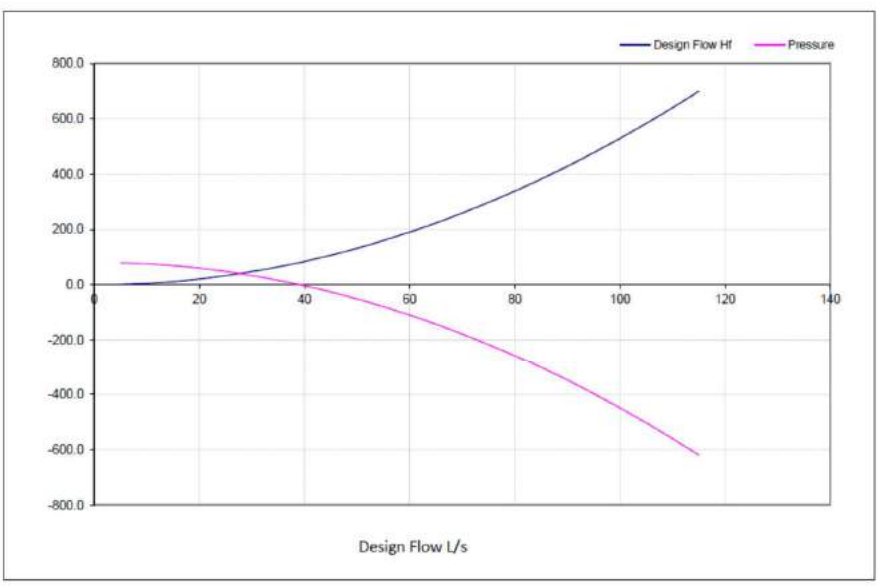
5.8	Qpeak	peak demand flow	where Qpeak = (Qinit+Qtest)/(sqrt(Hftest/Hfpeak))
25	Firefighting flow	plus	
5.3	Additional peak flow from development/growth		
32.4	Design flow		
55.7	Design Pressure Loss	25.6	Design pressure

0.0529634 Kv where Kv = Hfpeak/((Qpeak)^2)

$$Q_{init} = \frac{-2HQ_{test} - \sqrt{(2HQ_{test})^2 - 4(H-1)(HQ_{test}^2)}}{2(H-1)} \quad \text{where } H = \left(\frac{Hf_{init}}{Hf_{test}}\right)$$

Appendix 1

Design	Design Flow Hf	Pressure
5	1.3	80.0
10	5.3	76.0
15	11.9	69.4
19.4	19.9	61.4
25	33.1	48.2
30	47.7	33.6
35	64.9	16.4
40	84.7	-3.4
45	107.3	-26.0
50	132.4	-51.1
55	160.2	-78.9
60	190.7	-109.4
65	223.8	-142.5
70	259.5	-178.2
75	297.9	-216.6
80	339.0	-257.7
85	382.7	-301.4
90	429.0	-347.7
95	478.0	-396.7
100	529.6	-448.3
105	583.9	-502.6
110	640.9	-559.6
115	700.4	-619.1



Appendix D. Interim Water Supply Solution Acceptance Email

Rob Jack

From: Stephen Davis <Stephen.Davis@huttcity.govt.nz>
Sent: Tuesday, 24 May 2022 11:41 am
To: Alex Gifford; mohammed.hassan@wellingtonwater.co.nz; Rob Jack
Cc: Iman.Aghamohammadi@wellingtonwater.co.nz; Bruce Hodgins; Kate Pascall
Subject: RE: [EXTERNAL] RE: Manor Park - HCC & WWL meeting notes

Hi Alex,

After discussing with Wellington Water we are okay with your proposed interim solution but it will be just a short term solution. The existing reservoir has seismic issues and will still need to be fully replaced sooner rather than later, with a new approx. 1.3 ML reservoir (figure including your project's needs).

We're looking at an amendment to the LTP to cover the replacement, and we'll be looking for development contributions to cover your project's share. We don't have any more definite costs for this at this stage.

Cheers,
Steve

Stephen Davis
Intermediate Policy Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: 04 570 6761 M: W: www.huttcity.govt.nz

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From: Alex Gifford <AGifford@tonkintaylor.co.nz>
Sent: Tuesday, 24 May 2022 8:39 AM
To: Stephen Davis <Stephen.Davis@huttcity.govt.nz>; mohammed.hassan@wellingtonwater.co.nz; Parvati Rotherham <Parvati.Rotherham@huttcity.govt.nz>; Kate Pascall <Kate.Pascall@huttcity.govt.nz>; Rob Jack

<rob.jack@vecta.co.nz>
Cc: Iman.Aghamohammadi@wellingtonwater.co.nz; Bruce Hodgins <bruce.hodgins@huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: Manor Park - HCC & WWL meeting notes

Morning Stephen

Can you please provide an update on the discussions between HCC and WWL.

Rob and I are available to answer questions as they come up.

Cheers,
Alex

Alex Gifford | Senior Planner
BRP(hons), MNZPI
Tonkin + Taylor - ***Exceptional thinking together***
Level 4, 2 Hunter Street, Wellington 6011 | PO Box 2083, Wellington, New Zealand
T +6448064996 www.tonkintaylor.co.nz T+T profile

Tonkin+Taylor
To send me large files you can use my **file drop**

From: Stephen Davis <Stephen.Davis@huttcity.govt.nz>
Sent: Thursday, 12 May 2022 9:27 AM
To: Alex Gifford <AGifford@tonkintaylor.co.nz>; mohammed.hassan@wellingtonwater.co.nz; Parvati Rotherham <Parvati.Rotherham@huttcity.govt.nz>; Kate Pascall <Kate.Pascall@huttcity.govt.nz>; Rob Jack <rob.jack@vecta.co.nz>
Cc: Iman.Aghamohammadi@wellingtonwater.co.nz; Bruce Hodgins <bruce.hodgins@huttcity.govt.nz>
Subject: RE: [EXTERNAL] RE: Manor Park - HCC & WWL meeting notes

Hi Alex,

We're still working through this with Wellington Water but we're hoping to have an answer for you soon.

Cheers,
Steve

Stephen Davis
Intermediate Policy Planner

Hutt City Council, 30 Laings Road, Lower Hutt 5040
P: 04 570 6761 M: W: www.huttcity.govt.nz

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From: Alex Gifford <AGifford@tonkintaylor.co.nz>
Sent: Wednesday, 11 May 2022 4:46 PM
To: mohammed.hassan@wellingtonwater.co.nz; Stephen Davis <Stephen.Davis@huttcity.govt.nz>; john.duggan@wellingtonwater.co.nz; Parvati Rotherham <Parvati.Rotherham@huttcity.govt.nz>; Kate Pascall <Kate.Pascall@huttcity.govt.nz>; Rob Jack <rob.jack@vecta.co.nz>
Cc: Iman.Aghamohammadi@wellingtonwater.co.nz; Bruce Hodgins <bruce.hodgins@huttcity.govt.nz>
Subject: [EXTERNAL] RE: Manor Park - HCC & WWL meeting notes

Hi all

Has HCC and WWL has a chance to meet and discuss the interim potable water solution proposed by Vecta?

In terms of development being staged onsite (e.g. 5, 10, 15 years), this is unlikely. Once the site is able to be developed, this will progress in line with demand for the sites.

Cheers,
Alex

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From: Alex Gifford
Sent: Friday, 29 April 2022 8:38 AM
To: mohammed.hassan@wellingtonwater.co.nz; Stephen Davis <Stephen.Davis@huttcity.govt.nz>; john.duggan@wellingtonwater.co.nz; Parvati Rotherham <Parvati.Rotherham@huttcity.govt.nz>; kate.pascall@huttcity.govt.nz; Rob Jack <rob.jack@vecta.co.nz>
Cc: Iman.Aghamohammadi@wellingtonwater.co.nz; bruce.hodgins@huttcity.govt.nz; Richard Burrell <richard@building-solutions.co.nz>
Subject: Manor Park - HCC & WWL meeting notes

Hi all

Thanks for your time earlier in the week to discuss the Manor Park site and potable water supply options. A summary of the call and next steps are outlined below.

If you would like to amend/add to these notes please let me know and I will update and recirculate.

Summary

- A private plan change (PPC) is being prepared to rezone the Manor Park site from General Rural Activity Area to General Business Activity Area. The intention for the site is to develop an industrial business park. The land is owned by Ngāti Toa Rangatira and the development will attract businesses to the Hutt District;
- As part of the preparation of the PPC, Vecta (previously 3WL) is investigating the feasibility of the development in terms of three waters servicing. Wastewater and stormwater are no issue, although Wellington Water has raised a lack of potable water supply as the existing potable supply network is over-subscribed for existing development within the water supply zone. The need for a new reservoir has been raised by WWL;
- Identifying a location, funding and building a new reservoir prior to development occurring onsite will result in significant programme delays;
- Vecta are proposing an interim solution to enable development onsite. Refer to the email attached for the full details. In summary, this includes onsite storage as an interim solution while a new reservoir is built to address the existing shortfall and additional needs of the proposed Manor Park development;
- Vecta and T+T are seeking direction from WWL and HCC on:
    - Whether an interim solution is acceptable while a new reservoir is built long term;
    - If developer contributions to a new reservoir are required, and an indication of what these may be;
- T+T would like to reach an agreement on a potable water supply system to the site prior to lodging the PPC in late July.

Next steps

- T+T to provide an indicative programme for development so WWL and HCC understand the expected rate of uptake onsite and therefore demand;
- Vecta to confirm storage requirements and provide flow testing results (attached);
- WWL to check if the 5.8 L/S trickle draw down from the existing potable water network will create any demand issues; and
- HCC and WWL to meet next week to discuss the Vecta proposal and to provide advice back to Vecta and T+T.

Cheers,
Alex

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Appendix E. Water re-use example

From:
Greater Wellington Regional Council
Rainwater Tank Analysis for Upper Hutt
Jan 2011 (Harrison Grierson)

Climate change mult.	20	%		Average annual run-off	1127906
Average Daily demand	5000	4000 = non-office		Average annual rainfall	1044.4 mm (over study period)
Roof area	1000	m2		Annual annual water supply demand	1825000 L/household
Runoff coeff	0.9			Reduction in demand due to reuse	49.8%
Reuse volume	40000	Litres		Reduction in runoff due to reuse	81%
Mains top-up threshold	4000	Litres		Average Annual reused	909390
				Average Daily reuse	2491

Mains topup/annum 657142
Ave topup/d 1800

Table 2: Rainwater Tank Usage (RTU) rates for each season

Season	Toilet Flushing (% of DD)	Outdoor Usage (% of DD)	Total RTU (% of DD)
Spring / Summer	17.5%	17%	34.5%
Autumn / Winter	18.5%	6%	24.5%

Table 3: Monthly Demand Variations (MDV)

Month	Daily Demand Variation (% of DD)	Monthly Rainwater Tank Usage (% of DD)	Daily Demand (L/person/day)
January	107%	34.5%	88.60
February	111%	34.5%	91.91
March	109%	34.5%	91.74
April	98%	24.5%	97.52
May	96%	24.5%	96.45
June	92%	24.5%	93.06
July	95%	24.5%	95.86
August	95%	24.5%	95.06
September	95%	24.5%	79.66
October	94%	24.5%	79.40
November	102%	24.5%	94.46
December	102%	24.5%	93.63

Day	Daily Rain	Stored	Daily dema	Used - Sea	Used - non	Used	Remaining	Run-off	Runoff2Tan	Balance	Topup	End of day	Mains use
1/01/2011	0	40000	5070	187	4182	4369	35631	0	0	35631	0	35631	701
2/01/2011	0	35630.85	5070	187	4182	4369	31262	0	0	31262	0	31262	701
3/01/2011	0	31261.7	5070	187	4182	4369	26893	0	0	26893	0	26893	701
4/01/2011	0	26892.55	5070	187	4182	4369	22523	0	0	22523	0	22523	701
5/01/2011	0	22523.4	5070	187	4182	4369	18154	0	0	18154	0	18154	701
6/01/2011	0	18154.25	5070	187	4182	4369	13785	0	0	13785	0	13785	701
7/01/2011	0	13785.1	5070	187	4182	4369	9416	0	0	9416	0	9416	701
8/01/2011	0.5	9415.95	5070	187	4182	4369	5047	540	540	5587	0	5587	701
9/01/2011	0	5586.8	5070	187	4182	4369	1218	0	0	1218	2782	4000	3483
10/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
11/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
12/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
13/01/2011	1	4000	5070	187	4182	4369	-369	1080	1080	711	3289	4000	3990
14/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
15/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
16/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
17/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
18/01/2011	0	4000	5070	187	4182	4369	-369	0	0	-369	4369	4000	5070
19/01/2011	16.5	4000	5070	187	4182	4369	-369	17820	17820	17451	0	17451	701
20/01/2011	1	17450.85	5070	187	4182	4369	13082	1080	1080	14162	0	14162	701
21/01/2011	0	14161.7	5070	187	4182	4369	9793	0	0	9793	0	9793	701
22/01/2011	0	9792.55	5070	187	4182	4369	5423	0	0	5423	0	5423	701
23/01/2011	0	5423.4	5070	187	4182	4369	1054	0	0	1054	2946	4000	3647
24/01/2011	42.5	4000	5070	187	4182	4369	-369	45900	40369	40000	0	40000	701
25/01/2011	9	40000	5070	187	4182	4369	35631	9720	4369	40000	0	40000	701
26/01/2011	0	40000	5070	187	4182	4369	35631	0	0	35631	0	35631	701
27/01/2011	0	35630.85	5070	187	4182	4369	31262	0	0	31262	0	31262	701
28/01/2011	0	31261.7	5070	187	4182	4369	26893	0	0	26893	0	26893	701
29/01/2011	0	26892.55	5070	187	4182	4369	22523	0	0	22523	0	22523	701
30/01/2011	4	22523.4	5070	187	4182	4369	18154	4320	4320	22474	0	22474	701
31/01/2011	0	22474.25	5070	187	4182	4369	18105	0	0	18105	0	18105	701
1/02/2011	0	18105.1	5110	194	4189	4383	13722	0	0	13722	0	13722	727
2/02/2011	0	13722.15	5110	194	4189	4383	9339	0	0	9339	0	9339	727
3/02/2011	0.5	9339.2	5110	194	4189	4383	4956	540	540	5496	0	5496	727
4/02/2011	0	5496.25	5110	194	4189	4383	1113	0	0	1113	2887	4000	3614
5/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
6/02/2011	0.5	4000	5110	194	4189	4383	-383	540	540	157	3843	4000	4570
7/02/2011	0.5	4000	5110	194	4189	4383	-383	540	540	157	3843	4000	4570
8/02/2011	11	4000	5110	194	4189	4383	-383	11880	11880	11497	0	11497	727
9/02/2011	0	11497.05	5110	194	4189	4383	7114	0	0	7114	0	7114	727
10/02/2011	0	7114.1	5110	194	4189	4383	2731	0	0	2731	1269	4000	1996
11/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
12/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
13/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
14/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
15/02/2011	3	4000	5110	194	4189	4383	-383	3240	3240	2857	1143	4000	1870
16/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
17/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110
18/02/2011	0	4000	5110	194	4189	4383	-383	0	0	-383	4383	4000	5110

Seasonal 1 (Toilets)

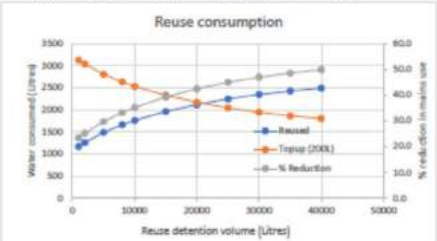
Month	Name	Coeff
1	Jan	0.175
2	Feb	0.175
3	Mar	0.165
4	April	0.165
5	May	0.165
6	Jun	0.165
7	Jul	0.165
8	Aug	0.165
9	Sep	0.175
10	Oct	0.175
11	Nov	0.175
12	Dec	0.175

Seasonal 2 (Outdoors)

Month	Name	Coeff
1	Jan	0.17
2	Feb	0.17
3	Mar	0.06
4	April	0.06
5	May	0.06
6	Jun	0.06
7	Jul	0.06
8	Aug	0.06
9	Sep	0.17
10	Oct	0.17
11	Nov	0.17
12	Dec	0.17

Daily demand variation

Month	Name	Coeff
1	Jan	1.07
2	Feb	1.11
3	Mar	1.05
4	April	0.98
5	May	0.96
6	Jun	0.95
7	Jul	0.95
8	Aug	0.95
9	Sep	0.95
10	Oct	0.96
11	Nov	1.02
12	Dec	1.01

40000 2491 1800

Volume	Reused	Topup (20	Reductior	Total runc	% runoff reduction
1000	1167	3127	23.3	1127906	0%
2000	1257	3037	25.1	1127906	0%
5000	1484	2809	29.7	1127906	0%
8000	1659	2633	33.2	1127906	0%
10000	1757	2535	35.1	1127906	0%
15000	1963	2329	39.3	1127906	0%
20000	2120	2172	42.4	1127906	0%
25000	2248	2044	45.0	1127906	0%
30000	2348	1944	47.0	1127906	0%
35000	2427	1864	48.5	1127906	0%
40000	2491	1800	49.8	1127906	0%