



**WASTEWATER SERVICING ASSESSMENT
FOR THE PROPOSED BAYSWATER MARITIME PRECINCT DEVELOPMENT
21 SIR PETER BLAKE PARADE, BAYSWATER
FOR BAYSWATER MARINA HOLDINGS LTD**

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Quality Assurance Statement	
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1 INTRODUCTION

Airey Consultants have carried out a review of the existing Watercare Wastewater Reticulation and Wastewater Pumping Station (Watercare GIS ID 961776) located at 21 Sir Peter Blake Parade, Bayswater to assess the impact of the additional flows from the proposed unit title development on the existing infrastructure.

Existing public wastewater reticulation and pumping station are located on and adjacent to the applicant site which serves the existing Marina including public facilities and minor industry.

The proposed development has been assessed at 94 Terrace Houses, 27 Apartments and commercial areas which will be connected to the existing public wastewater infrastructure.

2 DESIGN PARAMETERS

Wastewater Flows

The overall proposed development has been designed using Watercare's Standards for the Water and Wastewater Code of Practice for Land Development and Subdivision - Chapter 5. An assessment of the development has been carried out as shown below.

Wastewater Design Parameters

Parameter	Value	Units	Peaking Factor
Terrace Housing	180	L/person/day	6.7
Apartments (3 storeys with commercial below)	180	L/person/day	5.0
Live on Board (use of public facilities)	100	L/person/day	6.7
Dry Commercial (@50m ² per person)	65	L/person/day	1.0
Wet Commercial	15	L/m ² /day	1.0
Industrial (light water usage)	4.5	L/m ² /day	1.0
Old Yacht Club (community @ 10l/seat/day)	10	L/seat/day	6.7
Boat Pump Out	150	L/boat/day	1.0
Ferry (toilet usage)	6	L/person/day	1.0

From the design parameters the wastewater loads have been determined as:

Wastewater Flows

Area	Residential ADWF (l/s)	Residential PWWF (l/s)	Commercial Peak Flow (l/s)	Total Peak Flow (l/s)
Bayswater Marina	0.76	5.07	0.37	5.43

3 WASTEWATER RETICULATION

Existing Wastewater

There is existing public and private wastewater gravity reticulation serving the site. The gravity reticulation flows to a Watercare wastewater pumping station adjacent to the Marina site, which pumps up Sir Peter Blake Parade to Beresford Street before gravitating to a trunk main in Lansdowne Street.

The existing wastewater infrastructure present on the site consists of:

- A public gravity pipeline running north along the eastern boundary of the site
- A public pump station located northeast of the site (within the neighbouring property owned by Auckland Council)
- A private pump station located in the southern part of the site serving the ferry terminal and the southern ablutions block
- Private gravity pipeline running from the northern ablutions block to the public gravity pipeline
- Private rising mains running from the southern pump station to the private gravity pipeline

Proposed Wastewater

The majority of the existing private wastewater within the site will be decommissioned and removed, including the private pump station. The existing public gravity line running along the eastern boundary of the site will be retained. The existing public pump station is proposed to be replaced with a new pump station.

It is proposed to construct a private gravity wastewater system to serve the development and connect to the existing public wastewater network at 2 locations. CCTV investigation of the public wastewater reticulation has been carried out to ascertain the condition of the pipes. The results show the pipes to be in acceptable condition and able to serve the development. It is noted there are minor dips and that the pump station operating levels cause back-up in the incoming gravity pipes. See CCTV log sheets attached in Appendix 5.

Preliminary design of a private wastewater system within the development site shows a private gravity system is able to be constructed to serve all the units of the development and connect to the existing public wastewater network – see plans attached in Appendix 1.

4 WASTEWATER PUMP STATION

Existing Wastewater Pump Station

There is an existing Watercare public wastewater pumping station located adjacent to the applicant site which serves the Marina Development including existing public facilities and light industry.

Pump Station Assessment

The existing pumps are not capable of managing the proposed flows from the development. Airey Consultants have carried out a review of the as-built plans for the site to assess options available to provide a solution to increase the pumping capacity to manage the flows from the proposed development and existing facilities which remain. The options to provide a suitable solution to connect the Bayswater Marina Development include:

1. Upgrade the existing wetwell and provide additional storage to meet Watercare's requirements.
2. Construct a new pumping station and storage to meet Watercare's requirements.

The existing pumps are at the top end of their range to manage the proposed flows from the development. Calculations show the pumping capacity of the pump station is required to be upgraded from 4.8l/s to 5.4l/s A

larger pump provides a better efficiency and the ability to cater for additional future flows should an expanded catchment or future construction feed to this pump station. This means the pumps will be upgraded from 4.4kW to 8.5kW.

Option 1 – Upgrade the existing WW Pump Station.

Preliminary calculations have been completed which show an increase in pump size is practical with the following works required:-

- Retain the existing wetwell and valve chamber.
- Install new pumps. To meet the required flows from the total development, it is proposed to increase the pumping capacity of the pump station by upgrading the pumps from 4.4kW to 8.5kW. The new pumps will fit in the existing wetwell with new bases and lower vertical pipework.
- Retain existing 80mm \varnothing pipework and valving.
- Install a new switchboard to meet the current Watercare standards and the increased motor size.
- Construct and install a separate additional storage tank.

Option 2 – Construct a New WW Pump Station.

Install a single FRP pump station that has a wetwell with integrated valve chamber as supplied by Pump & Valve or similar. The depth would be approximately 5.0m below ground level with the following works required:-.

- Construct a new package pump station with integrated valve chamber adjacent to the existing pump station. This type of pump station can be pre-assembled and installed in a single operation by the contractor.
- Retain the existing wetwell as a receiving manhole which will include additional storage.
- Install a new switchboard to meet the current Watercare requirements and the increased motor size.
- Utilize the existing pump station wetwell as a receiving manhole for the new pump station which will include a portion of the additional storage.
- Construct and install a separate additional storage tank.

Conclusion.

Airey Consultants have assessed the options based on the investigation and as-built plans available. Please see options assessment attached as Appendix 2.

Our assessment concludes that **Option 2** is the preferred option to serve the development based on the following:-

- Option 1 - Installing new pumps and pipework and retrofitting the existing wetwell to conform to the current Watercare standards is able to be achieved however the current operating levels of the pump station cause wastewater to back up in the existing gravity reticulation. A review of the available as-built drawings and minimum pump volume calculations indicate the capacity of the operating levels in the wetwell is limited and may compromise pump starts and limit the ability to change operating levels and volumes should changes be required in the future.
- Option 2 will provide a new pump station which is designed to meet Watercare Standards.
- Option 2 will re-use the existing wetwell as a receiving manhole, which is then able to be used as emergency storage and reduce the volume of an additional emergency storage tank required.

Proposed Wastewater Pump Station

It is proposed to install a single Fibre Reinforced Plastic (FRP) pump station that has a wetwell with integrated valve chamber. The depth would be approximately 5.0m below ground level. The lid of the pump chamber will be sitting just slightly above ground level to prevent stormwater entering the wetwell.

This type of pump station can be pre-assembled and installed in a single operation by the contractor.

The wetwell and valve chamber is proposed to be manufactured from fibre reinforced plastic (FRP) utilising the British Standard BS4994:1987 "specification for the design and construction of vessels and storage tanks in reinforced plastics". The wetwell is designed to have a 2.0m internal diameter with an internal depth of 5.0m, combined with an integral valve chamber at the top of the wetwell. The opening to the wetwell and valve chambers shall include lids to Watercare standards to allow access for maintenance operations.

Integral wetwell/valve chambers provide:-

- reduced overall footprint.
- the pump station can be completely fitted out with all pipework before delivery to site. Included in this chamber shall be an inlet stub with a 150mm ϕ stainless steel knife gate valve mounted in the inlet stub. The inlet stub will be fibre glassed into the wetwell wall for easy connection on site utilizing an approved standard pipe joiner.
- The single integrated wetwell/valve chamber fitted will minimise the construction personnel entering the excavation for the structure to reduce the safety risk.

The interior of both these chambers shall be pigmented white by using white resin for the first two layers. This is to be white for excellent light reflection properties which gives better visibility for maintenance purposes. The wetwell shall incorporate circumferential stiffening ribs for below ground installation for nominated depth and lifting holes to facilitate installation. The pump station shall be installed with a concrete bedding ring ballast in accordance with the supplier's recommendation, to resist hydrostatic pressure of at least 5.0m of ground water. The asset life of these chambers shall be 100 years as required by the Watercare standards.

5 ELECTRICAL SUPPLY

The pump station currently has a dedicated transformer adjacent to the station to supply power to the site. The capacity of the transformer will be reviewed at Engineering Plan Application stage of development to confirm it has sufficient capacity for the proposed increase in pump size.

A new electrical cabinet will be designed and constructed to comply with Watercare's Standard Pump Station Electrical Drawings set DW18. A connection to the existing transformer from the new electrical cabinet will be made at during change over to the new pump station.

6 PUMP SIZING

The existing pumps installed in the pumping station are Flygt MP 3102 HT pumps in a duty/standby mode. One pump has a capacity of 5.1l/s at total head of 22.6m.

Calculations based on the wastewater flows have been used to evaluate the pumping station system design, utilizing the existing rising main. The flow calculations for the proposed development are:-

- Total PWWF = 5.4 l/s
- Static Head = 15.4 m
- Total Head = 23.7 m
- RM Velocity = 1.1m/s

We have completed a preliminary pump selection based on the preliminary calculated pump station flows.

Two pumps will be installed in the wetwell chamber. The pumps will operate in an alternating Duty/Standby mode. The design capacity of the station (5.4 l/s) is to be met by one single pump. A second standby pump will be installed to take over should the duty pump fail to pump the required flow due to blockage or breakage.

Two Xylem (Flygt) NP3127 SH3 249 submersible pumps rated at 8.5kW are proposed and will be installed in the wetwell. See duty chart attached in Appendix 3.

7 STORAGE

It is proposed to provide approximately 25.6m³ of storage to meet Watercare's standards of 8 hours Average Dry Weather Flow. The proposed location for the additional storage will be located adjacent to and connect to the proposed receiving manhole (the existing wetwell) as shown on the drawings attached. The volume of the storage has been designed to meet Watercare's standards of 8 hours Average Dry Weather flow.

Option 2 – Construct a New WW Pump Station.

The storage will be located in the following structures:-

- | | |
|--|--------------------------------|
| • Wetwell (above HW Alarm) = | 7.5m ³ |
| • Existing pump station converted to receiving manhole = | 9.6m ³ |
| • Proposed storage tank (2.0m \varnothing x 3.0m long) = | 8.5m ³ |
| | <u>TOTAL 25.6m³</u> |

An additional storage tank is proposed to be manufactured from fibre reinforced plastic (FRP) utilising the British Standard BS4994:1987 "specification for the design and construction of vessels and storage tanks in reinforced plastics".

8 RISING MAIN

The Watercare GIS show the existing rising main is constructed of both 150mm \varnothing and 100mm \varnothing pipes and has a total length of 484m.

A review of the as-built plans shows the rising main is constructed of 75mm \varnothing uPVC Class D pipe. The total length for design purposes is as taken from Councils GeoMaps and is 484m. We have based our assessment on the rising main being a 75mm \varnothing uPVC pipe as this provides the most conservative approach to the design.

Preliminary calculations attached show the rising main is able to take the additional flow. The existing working head is estimated as 23.2m with the proposed working head of 31.8m.

Watercare standards require:-

- a minimum flow velocity in the rising main to be between 0.9m/s and 1.5m/s.
- a maximum flow velocity in the rising main of 2m/s to allow for future expansion that may require the maximum velocity to be increased over time.

The velocities in the rising main are 1.09m/s for the 75mm \varnothing pipe. This allows for additional velocity capacity in the rising main should flows increase over time.

It is proposed to use the existing rising main to service the development. A condition assessment will be carried out at detail design stage of the development to confirm the pipe size and condition.

9 RECEIVING WASTEWATER PIPE

Calculations have been carried out using Watercare's GIS maps and standards to ascertain the capacity of the receiving gravity sewer (as attached). The 150mm \varnothing gravity sewer from the receiving manhole to the 375mm \varnothing trunk main at the bottom of Lansdowne Street is capable of serving the additional and proposed flow at the critical pipe which has a gradient of 0.77% - see calculations attached in Appendix 4.

10 OVERFLOW

The existing overflow point from the public wastewater network will be retained and will therefore fall within the existing Wastewater Network Discharge Consent. It is proposed that the new pump station will continue to utilise the existing wastewater discharge consent for wastewater overflows and the conditions of this consent will be varied as required to suit the new, larger, pump capacity.

11 SUMMARY

The construction of a new Bayswater Wastewater Pump Station (**Option 2**) is able to meet the demands of the existing and proposed wastewater flows from the development with the inclusion of additional peak flow storage to meet Watercare's standards.

The existing wastewater rising main is suitably sized to take the additional flows in accordance with Watercare's design parameters (subject to condition assessment). The capacity of downstream reticulation has been calculated and confirmed that it is able to take the flows from the proposed development.

It is considered that this preliminary assessment adequately caters for the forecast flows and is able to be constructed in accordance with Watercare requirements.