KAPITI COAST DISTRICT COUNCIL

65 and 73 Ratanui Road

Development Impact Assessment

JULY 2024

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Document Title	65 & 73 Ratanui Road Development Impact Assessment
HAL Job Reference	J0667

Revision Schedule

Rev	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	12/07/2024	Draft for Client Review	KM	BDR	BDR	BDR
2	19/07/2024	FINAL incorporating client comments	KM	BDR	BDR	BDR

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1 Introduction

1.1 Objective

The objective of this study is the utilise the existing Hydraulic model of the Paraparaumu and Waikanae wastewater network to assess the impact of the proposed 65 & 73 Ratanui Road development. The existing modelled populations have been updated by HAL to provide an estimated existing (2018) population scenario.

1.2 Background

The proposed development site is located in Paraparaumu, just north of the township. The proposal seeks to develop two lots into a retirement home consisting of 260 independent units, 20 assisted living suites and 30 care facility suites.

2 Scope

The following tasks were undertaken as part of this assessment:

- Calculation of design flows for the 65 & 73 Ratanui Road development.
- Assessment of the 65 & 73 Ratanui Road development impact on the existing network for the current development scenario.

Each of these tasks is discussed in more detail in the following sections.

3 65 & 73 Ratanui Road Design Flows

3.1 Overview

The 65 & 73 Ratanui Road proposal seeks to develop two lots into a retirement home. The development seeks to connect into a new manhole on Pipe ID KWWP001467. The location of the proposed development and the discharge point Figure 1 below.

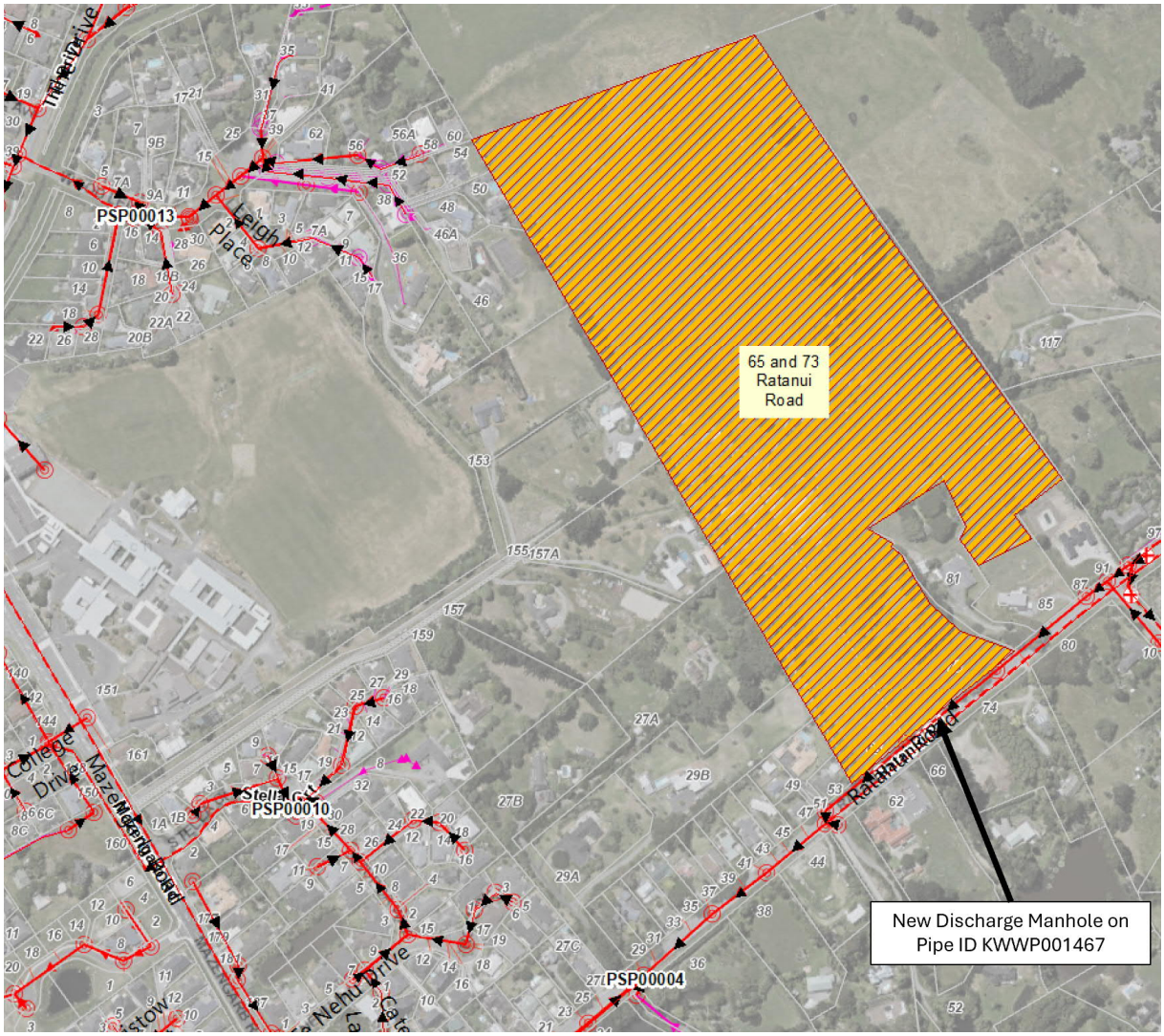

Figure 1: Proposed 65 & 73 Ratanui Road Development location

From the connection point, the network flows west via gravity before discharging to Pump Station ID: PSP0004 Ratanui PS), which then pumps to the Paraparaumu WWTP.

3.2 Development Design Flows

The PWWF for this development assessment has been calculated using the proposed 260 independent units, 20 assisted living suites, 30 care facility suites and considerations for guests and staff. Following the KCDC 'Land Development Minimum Requirements : 2022' code the design flow formulas as shown below in Table 1 can be used to calculate a proposed residential Peak Wet Weather Flow (PWWF) of 5.86l/s for the development. The calculated PWWF agrees with estimated flowrates provided to HAL by the developer's engineering consultant, Wood & Partners Consultants Ltd. (Woods). It is important to note however that this may be an under-estimation as the KCDC design code does not incorporate considerations for potential additional flows from developments such as care facilities. However, the number of care facility suites is relatively low so will only have a minor impact on the design flow.

Table 1: Gravity Option 65 & 73 Ratanui Road Design Flows

No of units	Type of units	Occupancy	Population	ADWF (l/p/day)	ADWF (l/s)	DWF Peaking Factor	PDWF (l/s)	WWF Peaking Factor	PWWF (l/s)
260	Independent Living Unit	1.3	338	250	0.98	2.5	2.45	5	4.89
20	Serviced Apartments	1	20	250	0.06	2.5	0.14	5	0.29
30	Care Facility	1	30	250	0.09	2.5	0.22	5	0.43
40	Staff	1	45	50	0.03	2.5	0.07	5	0.13
45	Guests	1	40	50	0.02	2.5	0.06	5	0.12
	Total Flow								5.86

4 65 & 73 Ratanui Road Development Impact

4.1 Pre-Development Scenario

The Paraparaumu and Waikanae wastewater model was run under the pre-development scenario, without the proposed development adopting a standard design storm with a 5-year ARI being used as the level of service for this assessment.

Figure 2 shows the network as a long section during pre-development scenario up until PSP0004. As shown in the long sections, the existing network shows some evidence of minor pipe surcharge in the downstream network prior to PSP0004, however there are no uncontrolled overflows and the risk of overflows is considered low.

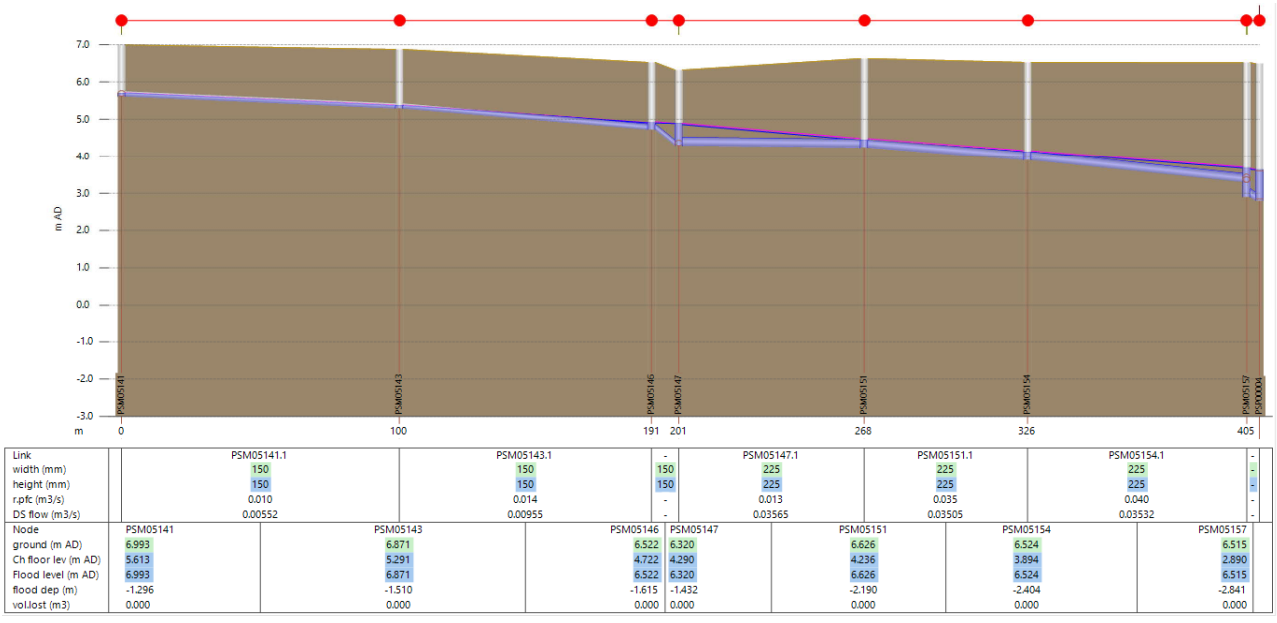

Figure 2: Pre-development flows to PSP0004 - 5-year ARI design storm, long section

4.2 Post-Development Scenario

The Paraparaumu and Waikanae wastewater model was run for the 5-year ARI design storm to assess how the local network performs in storms of this magnitude, with the additional peak wet weather flows of 5.86 l/s from the proposed 65 & 73 Ratanui Road development discharging into a new manhole along Pipe ID KWWP001467

Figure 3 shows the network as a long section on the post-development scenario. As shown in the figure, the post development scenario exacerbates the surcharging downstream of the development's connection point prior to PSP0004 that was seen in the pre-development scenario, however there are still no uncontrolled overflows, and the risk of overflows is still considered low.

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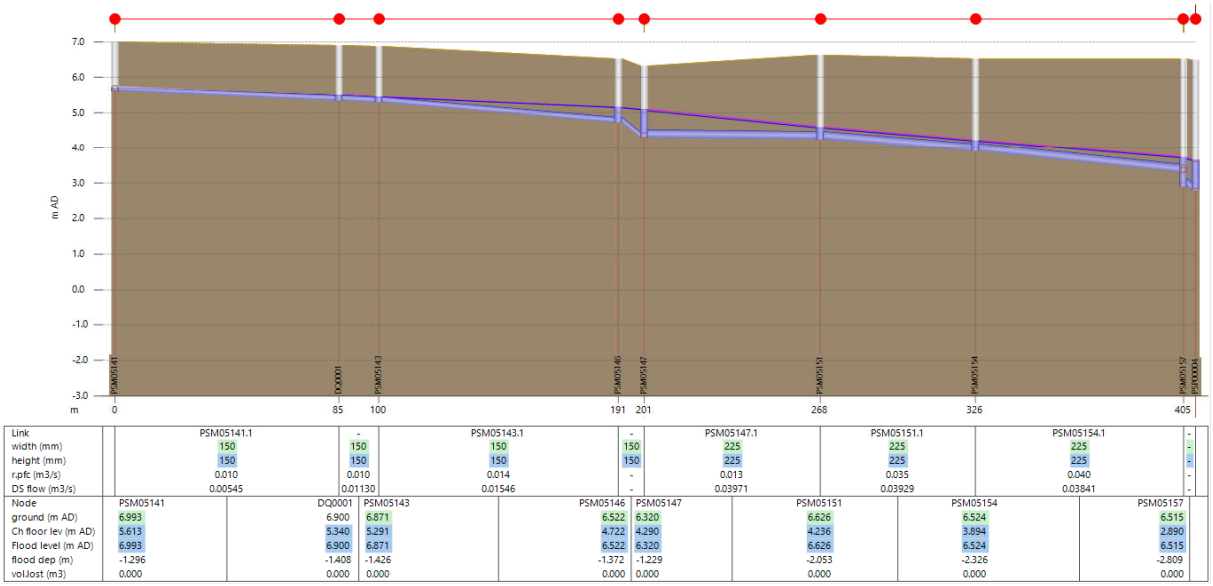

Link	PSM05141.1	-	PSM05143.1	-	PSM05147.1	PSM05151.1	PSM05154.1	-
width (mm)	150	150	150	150	225	225	225	-
height (mm)	150	150	150	150	225	225	225	-
r.pfc (m3/s)	0.010	0.010	0.014	-	0.013	0.035	0.040	-
DS flow (m3/s)	0.00545	0.01130	0.01546	-	0.03971	0.03929	0.03841	-

Node	PSM05141	DQ0001	PSM05143	PSM05146	PSM05147	PSM05151	PSM05154	PSM05157
ground (m AD)	6.993	6.900	6.871	6.522	6.320	6.626	6.524	6.515
Ch floor lev (m AD)	5.613	5.340	5.291	4.722	4.290	4.236	3.894	2.890
Flood level (m AD)	6.993	6.900	6.871	6.522	6.320	6.626	6.524	6.515
flood dep (m)	-1.296	-1.408	-1.426	-1.372	-1.229	-2.053	-2.326	-2.809
volLost (m3)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure 3: Post-development flows to PSP0004 - 5-year ARI design storm, long section

4.3 Post-Development Scenario with Upgrades

KCDC is planning to upgrade the clouded section of the line running along Ratanui Rd, seen in Figure 4, early next year which will likely alleviate the surcharging issues downstream of the development.

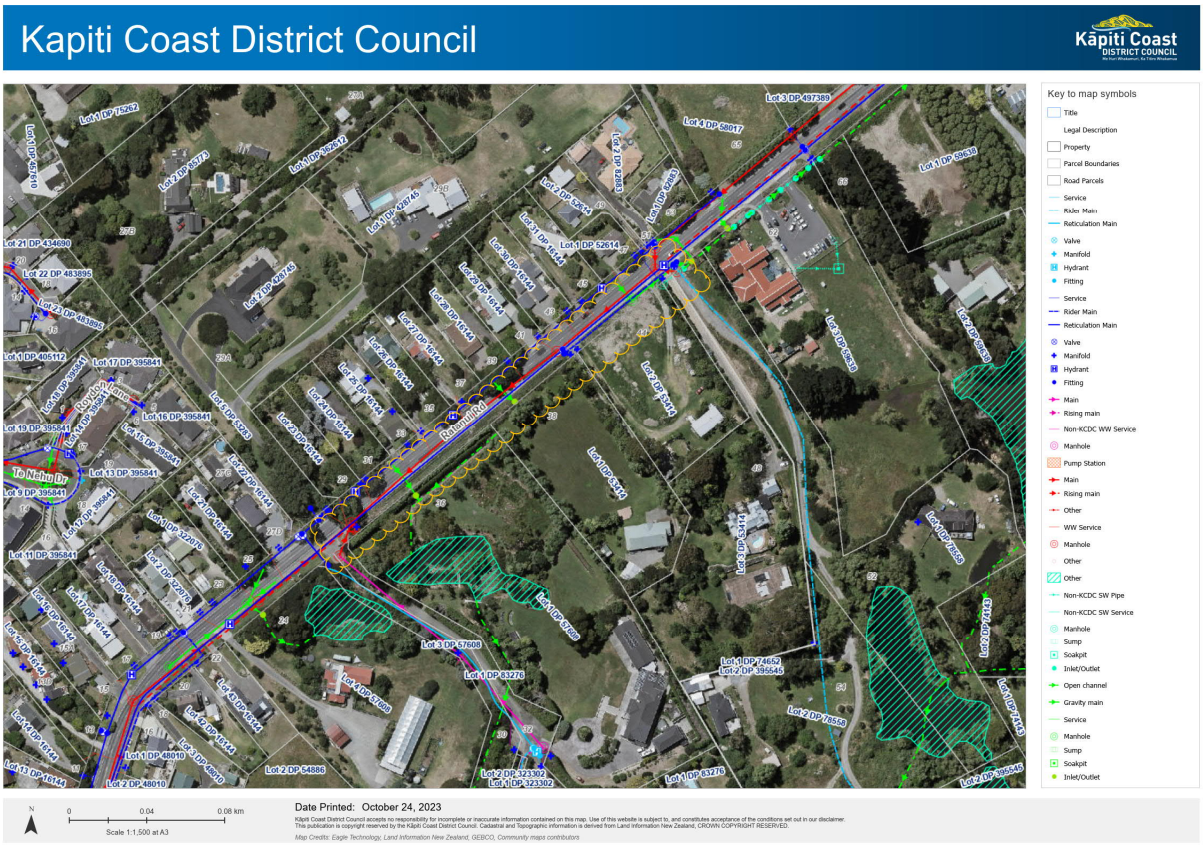

Figure 4: Upgrades of Pipe marked in clouded orange to 300mm

Therefore, the Paraparaumu and Waikanae wastewater model was run for the 5-year ARI design storm to assess how the local network performs, with the additional peak wet weather flows of 5.86 l/s from the proposed 65 & 73 Ratanui Road development discharging into a new manhole along Pipe ID KWWP001467 and the pipe upgrades planned by KCDC.

Figure 5 shows the network as a long section on the post-development scenario with the upgrades. As shown in the figure, the upgrades show some minor surcharging downstream of the development's connection point prior to PSP0004, primarily as a result of backup from PSP00004, but the surcharging in the gravity network is at a much lower level compared to the model run without upgrades.

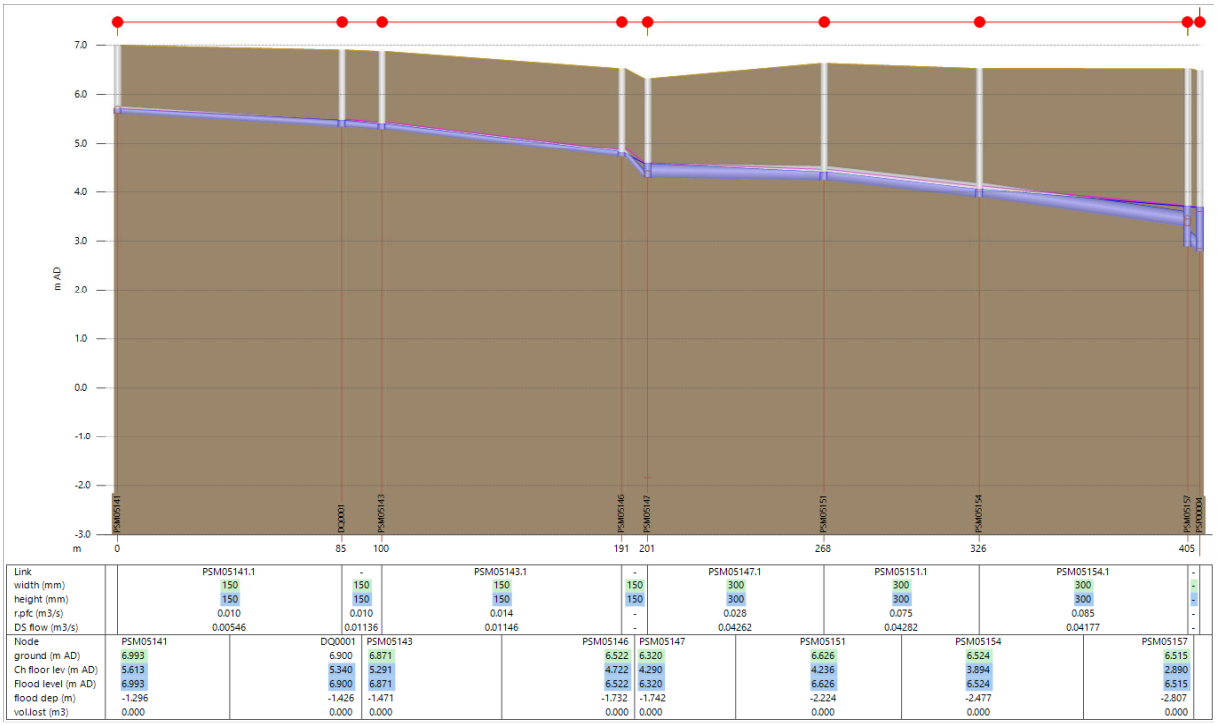

Figure 5: Post-development flows to PSP0004 with upgrades - 5-year ARI design storm, long section

5 Ratanui Pump Station (PSP0004) Assessment

From the proposed development sites, the 150mm wastewater network flows via gravity to Ratanui Pump Station (PSP0004), which has a modelled capacity of 35 l/s during normal pump rate (based on KCDC records).

As shown in Figure 4 below, the pre-development scenario simulates a peak inflow rate of approximately 37.8 l/s in the 5-year design storm. With the proposed 65 & 73 Ratanui Road development peak flows (5.86 l/s) added into the model, in the post-development scenario the peak inflow rate increases to around 40.1 l/s and in the scenario with upgrades the inflow rate increases to 42.4 l/s, as the existing constraint attenuating peak flows is no longer present. Hence, it is concluded that the inflow into PSP00004 Pump Station will exceed PS capacity, however the buffering provided by the existing storage at PSP00004 (and the upstream gravity network) is sufficient to attenuate peak flows during the period that the pump station capacity is exceeded, mitigating the risk of overflows to an acceptable level.

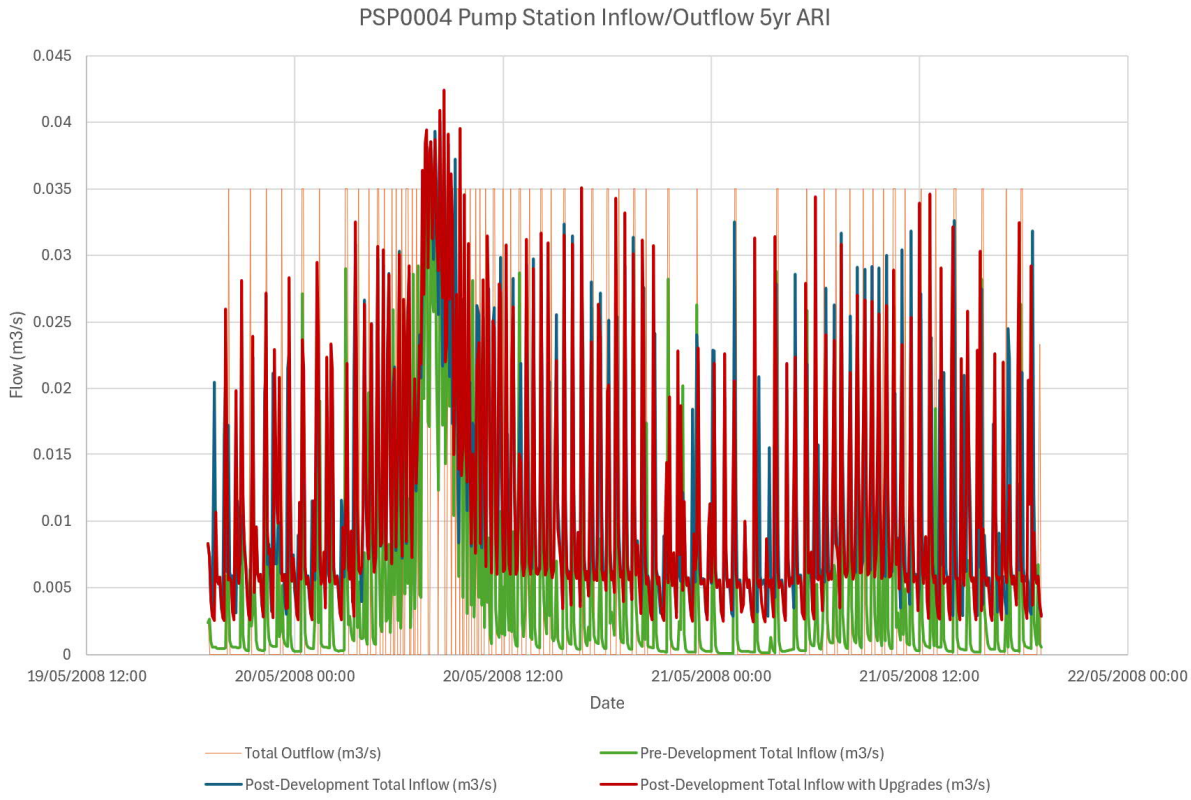

Figure 6: Existing Pre- and Post-Development PSP0004 Pump Station Flows – 5-year ARI Design Storm

6 Model Assumptions and Limitations

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

- Aurecon's report 'Paraparaumu Wastewater System – Model Build and Calibration Report, June 2009)
- Watershed's Model Update Report (2016)
- Watershed's Model Recalibration and System Performance Report (2017)

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

- The model has been verified (and recalibrated) against flows developed from KCDC pump station SCADA data, and as such has an inherent limitation to the degree of accuracy able to be achieved.
- The distribution of the modelled population is an approximation based on the population increase between the 2006 and 2018 census. No allowance has been made for additional growth since 2018 which is considered to be minor.
- Future growth other than this development has not been considered as part of this assessment
- No allowance has been made for future increased inflow/infiltration in existing areas due to deterioration of existing sewers.
- Pump station model parameters are based on information provided by KCDC operations, and its accuracy has not been validated as part of this study.
- No assessment of the development's infrastructure has been completed as part of this report.

7 Conclusion

The objective of this study was to utilise the existing hydraulic model of the Paraparaumu and Waikanae wastewater network to assess the impact of the proposed 65 & 73 Ratanui Road, retirement home facility.

The model was run under the existing population scenario, with the additional flows from the proposed development at 65 & 73 Ratanui Road with a calculated design flow of 5.86 l/s added in. The development impact was assessed against a 5-year ARI design storm to understand the performance of the downstream network, with the development assumed to connect into new manhole along pipe ID: KWWP001467.

The model was run with the additional 65 & 73 Ratanui Road development flows connected to the 150mm local network. The model simulates some evidence of minor surcharging within the local network, however there are no signs of uncontrolled overflows and the risk of overflows is considered low. The level of surcharging will be decreased with planned upgrades of the network by KCDC early next year. Therefore, as the surcharging will be minor, and there is a low risk of uncontrolled overflows, the downstream network is considered to have sufficient capacity to accommodate the increased flows from the proposed development.