



Memorandum

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| To | Tim Carter, Bruce Van Duyn |
| Copy | Sue Harrison, Murray England |
| From | Charlotte Mills |
| Office | Christchurch |
| Date | 3 December 2020 |
| File/Ref | 3-C2210.00 |
| Subject | Iport 27 ha Extension Wastewater Capacity Assessment |

1 Summary

WSP was engaged by Rolleston Industrial Developments Ltd. to complete a wastewater network capacity assessment for the Iport 27 ha Extension in Rolleston.

Our assessment has found that connection of the development to the gravity network is not predicted to cause any adverse effects and that George Holmes pump station has sufficient capacity for the predicted increased flows.

Therefore, in our professional opinion, the wastewater network has capacity to receive the re-zoning of this land for the plan change application.

2 Assumptions

2.1 General

- The existing 2019 wastewater model was used, which was modelled in InfoWorks ICM v6.0.9 (WSP model reference: *chpc044:40000/SDC Wastewater Models*). This is the most up-to-date version of the model, used for the Resilience Master Planning project completed for SDC in 2019. During the Resilience Study bulk population updates were applied so the model matched SDC's 2019 population estimates, and the new Prebbleton pump station was added to the model, which diverts Prebbleton flows away from Lincoln directly to the Selwyn Road Pump Station (PS). An overview of the system is presented in Figure 1.



Figure 1 Wastewater System Overview

- To conservatively represent flow conditions the highest observed rate of groundwater ingress to the wastewater collection system, in the period from 2012-2016, was assumed. This high groundwater was observed in June 2014, affecting the communities of Prebbleton, Lincoln and Springston and was applied in the model as a constant baseflow.
- As per all wastewater system performance assessments undertaken for SDC, the model has been run with 1 in 5-year ARI 12-hour design event to replicate wet weather flow (WWF). The 12-hour design event was assessed, as this was previously determined to be the critical storm duration for the ESSS system. To truly understand the impact of rainfall, a variety of rainfall events would need to be considered. However, there are many

variables to consider, including but not limited to, the annual exceedance probability (AEP), intensity, duration and timing of the event (in relation to flows in the wastewater system). Comprehensive modelling of a variety of design rainfall events has not been conducted as part of this query.

2.2 Scenario Specific

Flow records from the George Holmes PS for the period 1 January 2019 – 31 December 2019 were assessed and the following was determined:

- Average dry weather flow per hectare = 0.06 L/s/ha;
- Peak flow peaking factor of 2.4;
- No wet weather response was observed.

These parameters were then used to calculate flows for the Iport Extension which are presented in Table 2-1.

Table 2-1: Calculated Flows for the Plan Change Block

| Plan Change Block | Area (ha) | Calculated ADWF (L/s) | Calculated PWWF (L/s) |
|-------------------|-----------|-----------------------|-----------------------|
| Iport Extension | 27 | 1.6 | 3.9 |

Apart from the updates discussed above (Section 2.1), the model asset data has not had an extensive update since the model was first built in 2016, as such it did not include infrastructure for recent development within Izone and Iport industrial areas. The infrastructure highlighted in red Figure 2 below has been added to the model for this assessment and flows in these areas have been updated based on the George Holmes PS records outlined above.



Figure 2 Wastewater model updates (added pipework shown in red)

3 Wastewater Servicing Options

There are two nominated connection points for the development to SDC's gravity sewer. The flows from the site may be split once the site develops but for the purposes of this assessment each connection point has been considered separately to take the full flow:

1. Connection point 1 - manhole Asset ID 670856. The flows are then conveyed through the gravity network to George Holmes Road PS which pumps directly to the Pines WWTP in a common rising main it shares with Burnham School Road PS.
2. Connection point 2 - manhole Asset ID 658222. The flows are then conveyed through the gravity network to George Holmes Road PS which pumps directly to the Pines WWTP in a common rising main it shares with Burnham School Road PS.



Figure 3 Development connection point options

4 Modelling Methodology

The following methodology was undertaken:

- 1 A new scenario was created in the existing 2019 model, with updated pipe network and flows from the Izone and Iport areas. This was used as the Base scenario.
- 2 Another two new scenarios were created, for the different connection points, and a new sub-catchment representing the extension area was included in both.
- 3 The wet weather scenario was run the with the development PWWF applied as a constant flow. No dry weather scenario was run, as there is very little wet weather response in the Rolleston catchment there is no difference between the peak dry and peak wet weather results.
- 4 Simulations were run to assess the impact of the development on the existing network during wet weather.

5 Modelling Results

The predicted impact of the two connection options is presented for the development below.

5.1 Connection Point 1

No issues are predicted in the gravity network downstream of the connection point (manhole Asset ID 670856), refer to Figure 4.

5.2 Connection Point 2

No issues are predicted in the gravity network downstream of the connection point (manhole Asset ID 658222), refer to Figure 5.

5.3 George Holmes Pump Station

The duty pump flow rate at George Holmes pump station is modelled as 63 l/s, the peak inflow rate with the development is predicted to be 52 l/s so the pump station has sufficient capacity for the development flow.

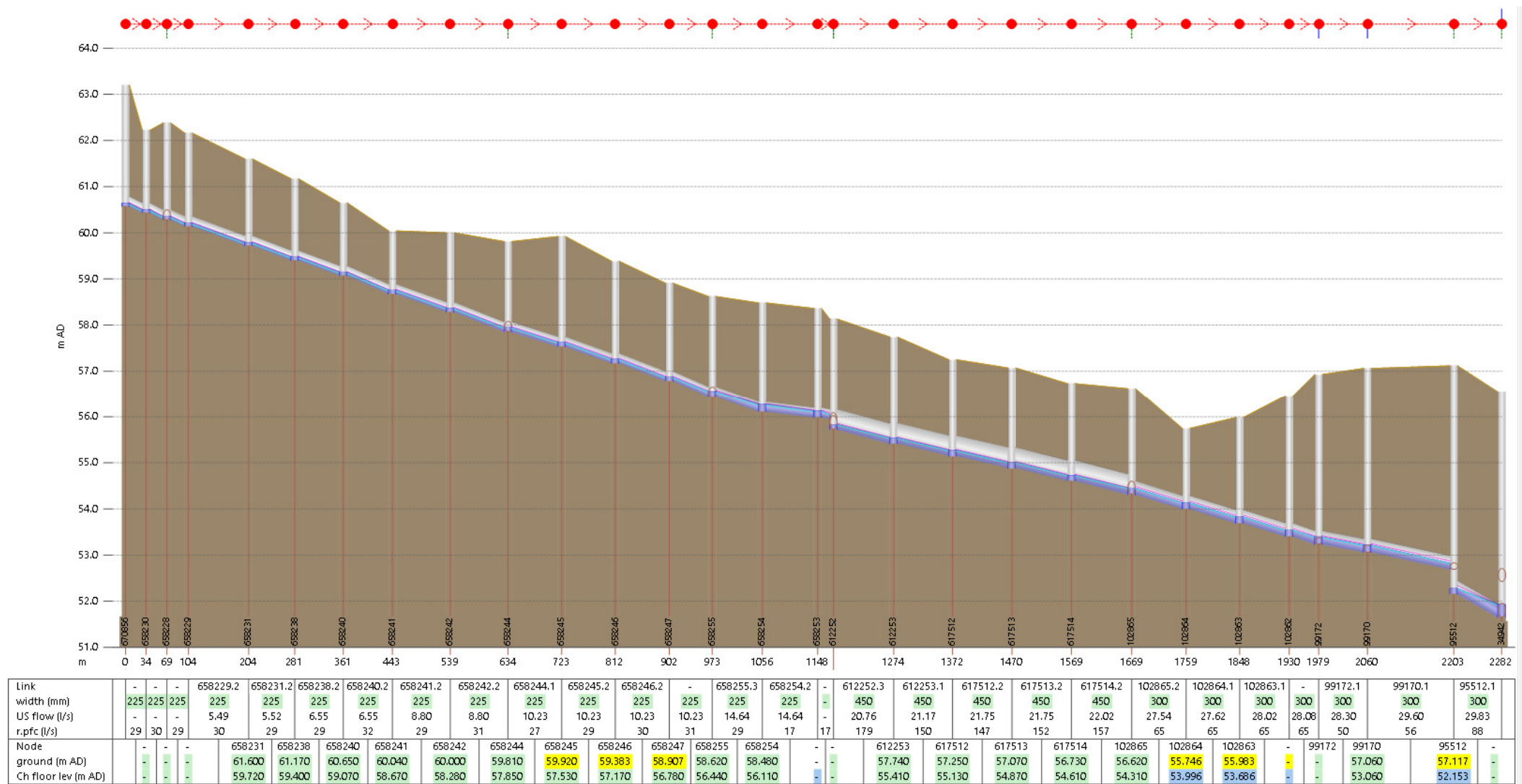


Figure 4: Long section at peak flow from manhole Asset ID 670856 to George Holmes PS. Predicted levels in the current system without the Iport 27 ha Extension is shown by the light blue line.

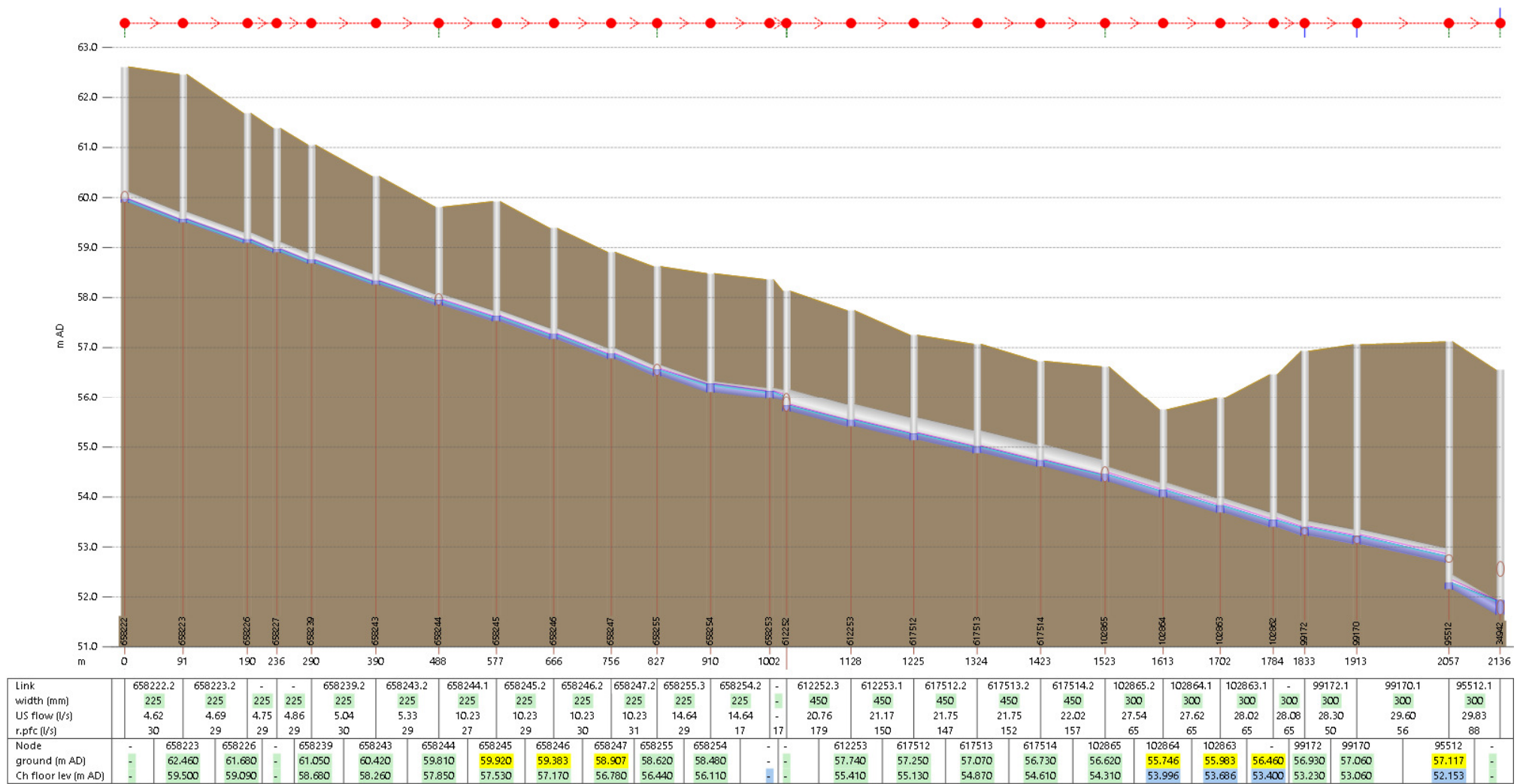


Figure 5: Long section at peak flow from manhole Asset ID 658222 to George Holmes PS. Predicted levels in the current system without the lport 27 ha Extension is shown by the light blue line.

6 Conclusions

The addition of the proposed wastewater flows from the Iport 27 ha Extension is not predicted to cause any capacity issues in the gravity pipe network during peak wet weather flow. The George Holmes pump station is predicted to have sufficient capacity to cater for the additional flow from the development.

7 Limitations

- This assessment has not considered whether the Pines WWTP has capacity to accept flow from the developments.
- Flows for the Izone and Iport areas have been based on flow records for 2019 provided by SDC.

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