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Proposed Plan Change I: Increasing housing supply and choice

Water Servicing Assessment

This document was prepared by Palmerston North City Council, Asset Planning Division.

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1 Introduction

This wastewater servicing assessment summarises the city-wide wastewater analysis carried out to inform the preparation of proposed Plan Change I: Increasing housing supply and choice (PC:I) within Palmerston North city. The intention of PC:I is to make changes to the operative District Plan to better enable medium density housing in areas which are close to existing community infrastructure/services, jobs and amenities. This will result in the creation of a Medium Density Residential Zone (MRZ). The proposed zone is shown below in Figure 1.

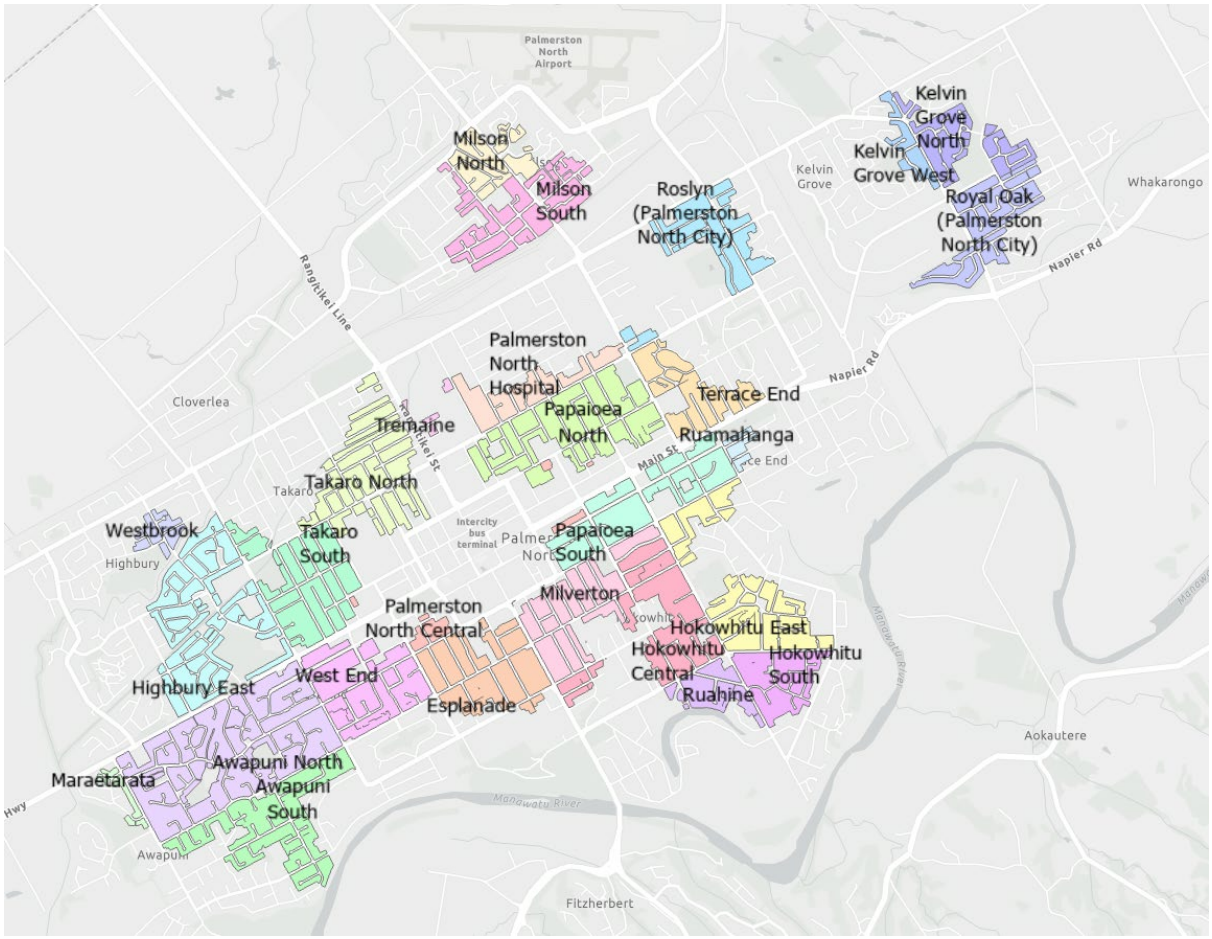


Figure 1: Preliminary Intensification Extent

A wastewater modelling approach was carried out to assess how rezoning and enabling intensification in these areas would impact the existing wastewater network, and if any upgrades would be required to the network to accommodate the proposed intensification.

For the purpose of this assessment, the proposed intensification areas have been grouped by geographical area, as shown in Figure 1 above.

2 Existing Wastewater Network

2.1 Existing Network

The existing network across the intensification area is currently under capacity for the volume of wastewater generated in Palmerston North city. It is also in poor condition, as a large number of wastewater pipes are over 70 years old. Regardless of the proposed intensification, these pipes are reaching the end of their expected lifespan and due for replacement within the next 0-30 years. Figure 2 below provides an overview of the existing wastewater network and when it was installed.

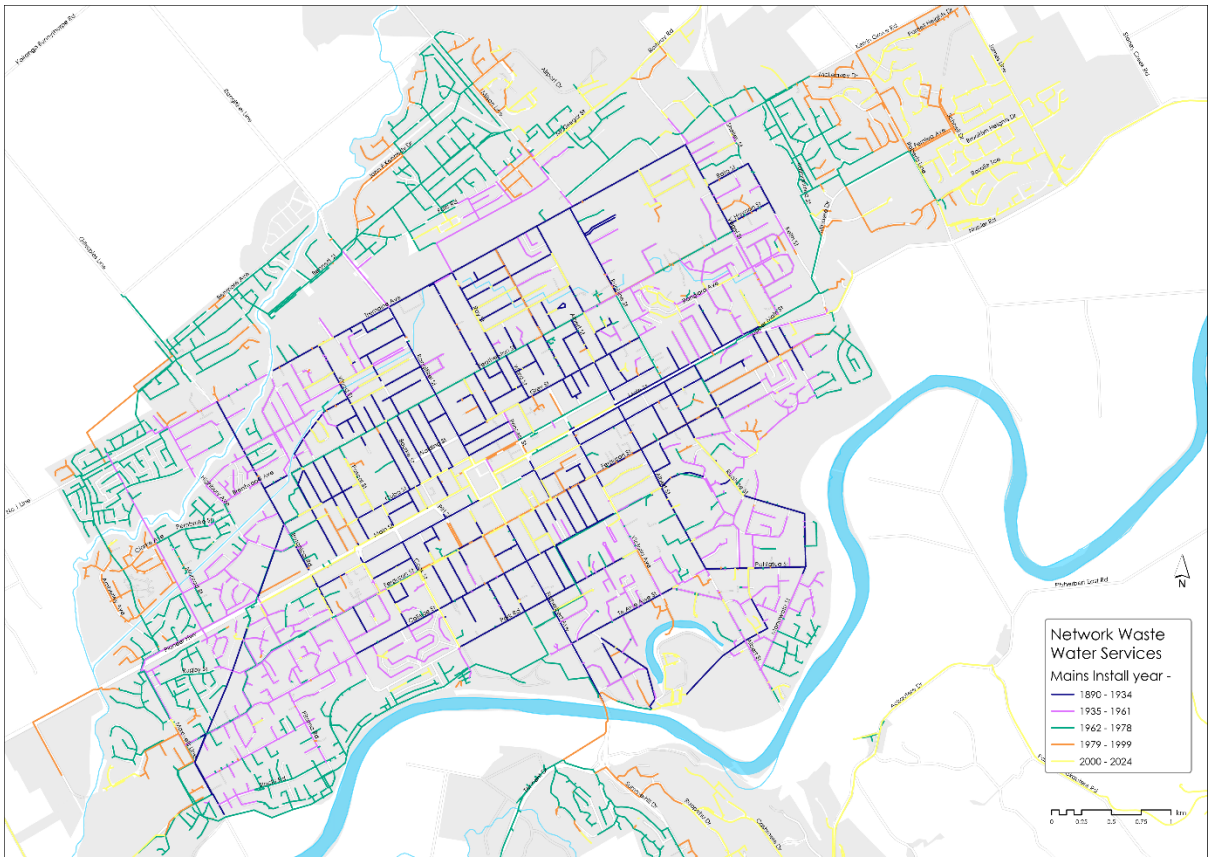


Figure 2: Overview of Existing Wastewater Network

3 Wastewater Network Assessment

3.1 Wastewater network model

In 2017, Mott MacDonald set up a wastewater model simulating several growth scenarios. One of the scenarios was for the year 2025, and the parameters from this model were used as a 'base scenario' to represent the current PNCC wastewater network. The model was run using Mike+ 2023 software by DHI.

This base scenario model was used to assess the impact of the proposed PC:I on the capacity and level of service for the wastewater network.

3.2 Assessment methodology

The following methodology was used to carry out the modelling assessment to support PC:I:

- Re-model the 2025 Mott Macdonald "Base Scenario" in PNCC's more recent wastewater model.
- Assess the current capacity of the wastewater network under the "base scenario", assessing wet weather flow (WWF) as a 1 year Annual Recurrence Interval (ARI) rainfall event with the same rainfall derived inflow and infiltration (RDI) calculation and parameters for inflow/ infiltration as were modelled in the Mott Macdonald model for 2025.
    - The 1-year ARI is a standard practice and is commonly used across wastewater network assessments to ensure no wastewater overflows occur during this storm event.
- Calculate the additional wastewater demand as a result of PC:I.
- Assess the impact of the additional demand as a result of proposed intensification for the long-term growth scenario (30-year projection).
- Compare the wastewater network issues with the predicted areas with stormwater flooding issues[1].
- Determine the network upgrades, if any, required as a result of the intensification that would be enabled by PC:I.

3.2.1 Model assumptions

The model was set up with the following assumptions, based on the three scenarios outlined below:

- Household occupancy: 2.9 persons per dwelling (in accordance with the PNCC *Engineering Standards for Land Development*)
- Wastewater loading: Dry weather flow of 250 L/ person/ day (in accordance with the PNCC *Engineering Standards for Land Development*)
- Wet weather flow: Dry weather flow with the addition of a 1 year ARI event

The wastewater load for each growth area was calculated by using both the parameters above and the number of additional dwellings proposed for each area, provided in Table 1 below.

3.2.2 Status Quo

The current wastewater demand was spatially allocated in the model based on the population distribution predictions for 2025 as modelled in the Mott MacDonald wastewater

[1] A Stormwater Servicing Assessment (October 2024) for PC:I was completed under a separate cover.

assessment carried out in 2017. The population distribution predictions can be found in Appendix A. The model is only evaluating the effects of the proposed intensification areas.

3.2.3 Modelling Intensification Options

The wastewater model used different 'scenarios' to model separate timeframes (short/medium and long term). Both scenarios were analysed to help assess how the wastewater network would perform under the intensification areas of PC:I. The following options were used to assess the impact of PC:I on the PNCC network:

- Option 1: Residential intensification across proposed MRZ as identified in the Development Capacity Assessment which accompanies the section 32 evaluation for PC:I t . Referred to as full extent intensification.

- Option 2: Residential intensification across a smaller area based on the output of the PC:I stormwater assessment. Referred to as reduced extent intensification.

4 Option 1: Full Extent Intensification Modelling Results and Comments

4.1.1 Demand Scenarios

The short/medium and long term demand scenarios were established and allocated in the model based on the proposed additional dwellings in the projected intensification areas and the timeframes from the Council's 2023 Housing and Business Needs Assessment (HBA). The projected additional dwellings for each timeframe is provided in Table 1.

Table 1: No. of additional dwellings as proposed under PC:I

Geographical area/ suburb	Additional properties		
	Short/Medium term (1-10 years)	Long term (10 -30 years)	Total
Awapuni North	34	67	101
Awapuni South	32	63	95
Esplanade	32	63	95
Highbury East	12	24	37
Hokowhitu Central	38	75	113
Hokowhitu East	59	118	177
Hokowhitu South	24	47	71
Milson North	1	1	2

Geographical area/ suburb	Additional properties		
	Short/Medium term (1-10 years)	**Long term (10 -30 years)**	**Total**
Milson South	9	19	28
Milverton	23	45	68
Palmerston North Central	2	4	6
Palmerston North Hospital	24	48	71
Papaioea North	41	82	122
Papaioea South	20	40	60
Ruahine	6	12	18
Roslyn	20	40	60
Ruamahanga	10	19	29
Takaro North	31	61	92
Takaro South	17	33	50
Terrace End	18	36	55
West End	24	48	73
Westbrook	2	5	7
Sites outside consultation area			
Huia St (Esplanade)	34	0	34
Summerhays (Papaioea South)	40	0	40
Cook St (Esplanade)	11	0	11
Total projected	**561**	**952**	**1512**

4.2 Current situation

For the "status quo" scenario, the Mott Macdonald 2025 model demonstrated that under wet weather flows (for a 1 year ARI event), most of the city is expected to have issues with wastewater pipe capacity. In the absence of intensification, overflows are expected in the following predicted growth areas:

- Milson North
- Roslyn (Palmerston North City)
- Palmerston North Hospital (overflow of >100 m^3)
- Takaro North/ South

Figure 3 below identifies the areas where overflow and capacity issues are expected under the status quo (no growth).

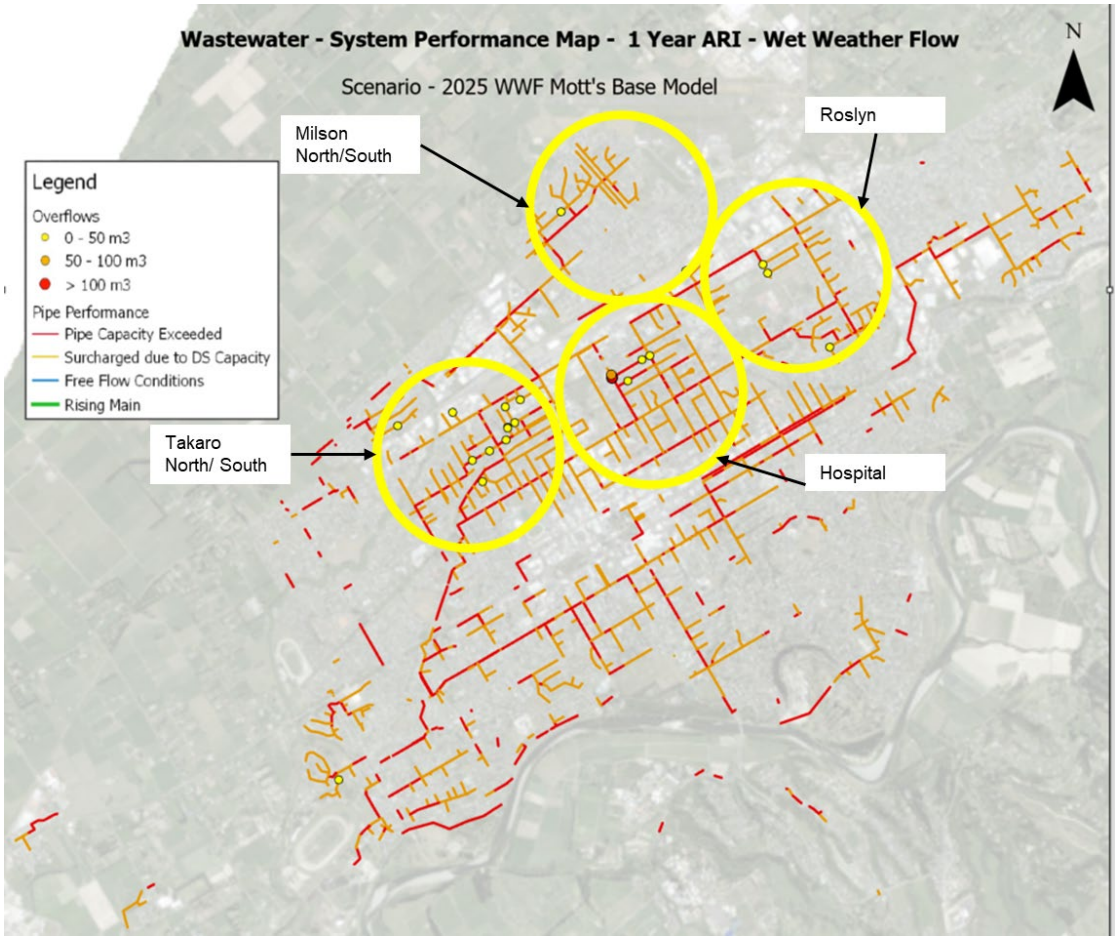


Figure 3: Existing issues based on the 2025 base scenario (Mott MacDonald base model)

4.3 Short/Medium Term (1-10 years)

In the short/medium term, surcharge (when the pipes are at full capacity) is expected in the same areas as with the current scenario, with a small number of additional areas also expected to surcharge. It is important to note that all wastewater is contained within the network. The black lines in Figure 4 below show the extent of additional capacity issues that are expected as a result of the predicted growth. These additional capacity issues are located in the predicted growth areas of Awapuni North, Hokowhitu Central, Papaioea South, and Takaro North.

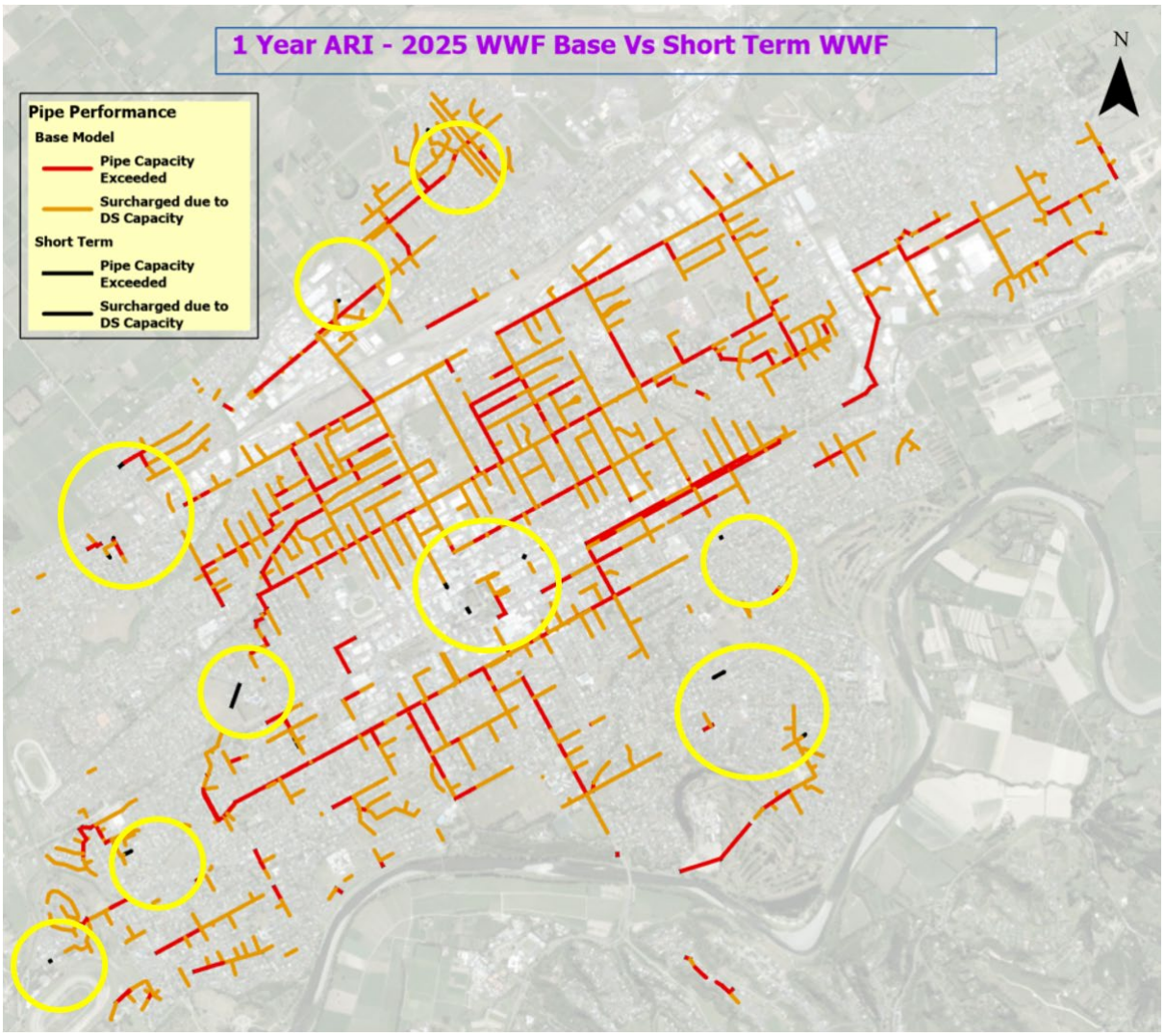


Figure 4: Short/medium term scenario – wastewater surcharge model results[2]

In comparison to the base scenario, under the short/medium term growth scenario an additional 26 pipes (0.47% of total number of pipes in network) over the region are expected to face capacity issues.

2 Additional issues are shown in black.

4.4 Long Term (10-30 years)

Over the long term, the wastewater network is expected to face additional capacity issues across the region (refer to Figure 5).

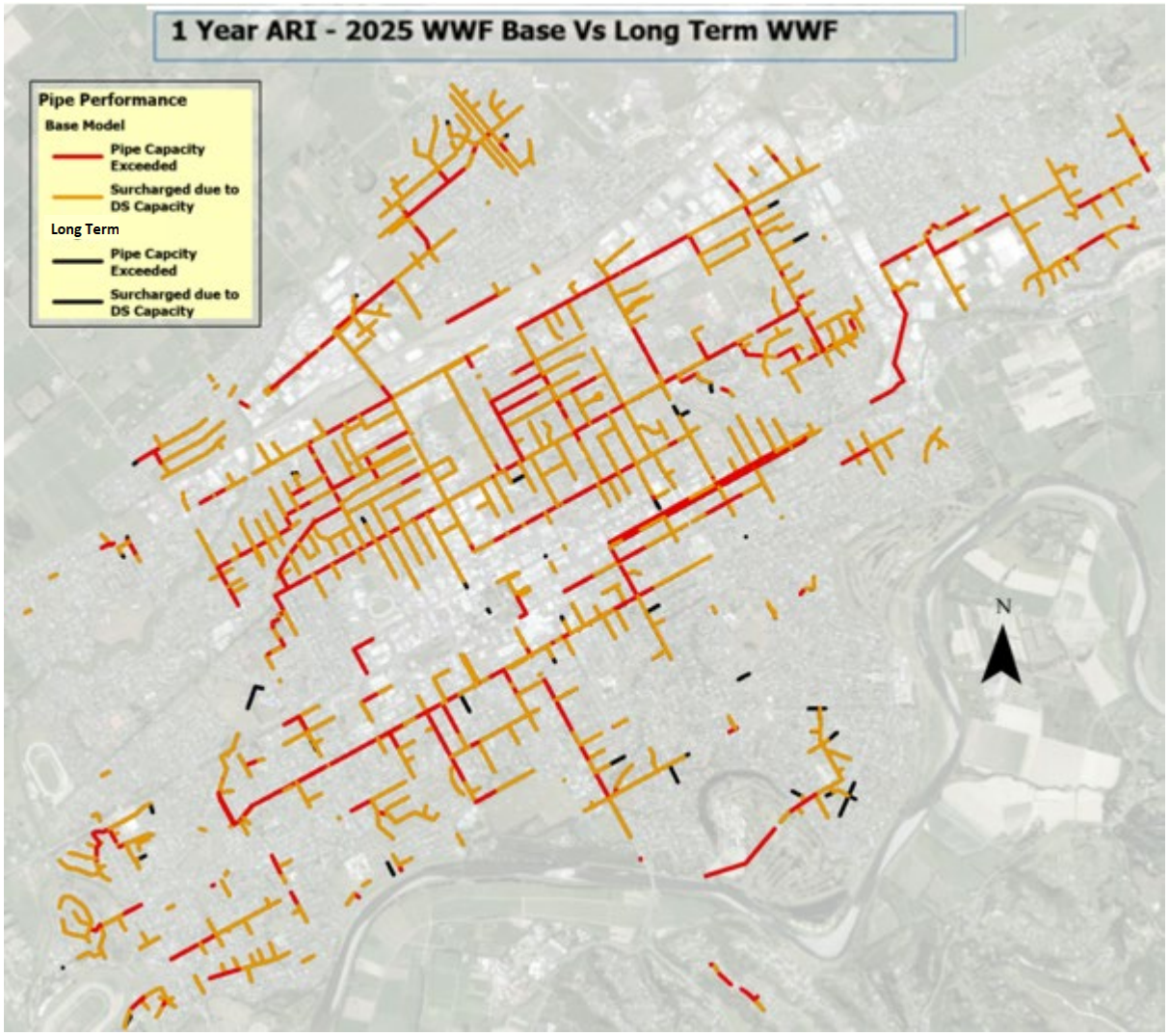


Figure 5: Long term scenario – wastewater surcharge model results[3]

In comparison to the base scenario, under the long term growth scenario an additional 12 pipes (0.2% of total number of pipes in network) over the region are expected to face capacity issues, and an additional 14 pipes (0.2%) are expected to surcharge as a result of the downstream network being undersized.

4.5 Recommended upgrades

In general, the wastewater model indicated that the PNCC wastewater network is currently under pressure, with capacity issues being experienced in the pipes throughout the network. The areas with the biggest capacity issues, leading to existing wastewater overflows, are those located in the northern end of the city:

[3] Additional issues shown in black.

- Milson North
- Roslyn (Palmerston North City)
- Palmerston North Hospital (overflow of >100 m^3)
- Takaro North/ South

With the proposed intensification enabled by PC:I, the existing capacity issues are expected to worsen and widespread upgrades to the network are necessary to allow the intensification.

Several of the "growth areas" have already been established asbeing risk of future stormwater issues resulting from intensification, as summarised in the Stormwater Servicing Assessment for PC:I (October 2024). Because of this, a number of wastewater upgrades have been investigated. These include:

- Installation of a 525mm diameter duplicate main on Ferguson Street (approx. $3.5M)
- Upgrade of approximately 160m of existing 200mm diameter pipe to 300mm diameter (approx. $450K)
- Installation of a 450mm duplicate main in Takaro Park (approx. $2.5M)
- Upgrade of a small section of existing 225mm diameter pipe to 300mm diameter on Main Street (approx. $2.0M)
- Upgrade of a small section of existing 225mm diameter pipe to 300mm diameter on Grey Street (approx. $1.9M)

It is important to note that these upgrades are not required for intensification to proceed, however the level of service cannot be maintained without the upgrades listed above.

4.5.1 Ferguson Street (West End, Esplanade and Milverton Growth areas)

The existing 750mm diameter wastewater pipe located on Ferguson Street is predicted to have capacity issues in the long term scenario on the downstream end, between Bradford Place and Keeling Street. Wastewater modelling indicates that the downstream capacity constraints will cause flows to surcharge the upstream network, impacting the predicted growth areas of West End, Esplanade and Milverton. Installing a duplicate 525mm diameter pipeline alongside the 750mm diameter pipeline would lower the hydraulic grade line and improve the network capacity in the affected areas, allowing for the future intensification. Figure 8 and Figure 9 demonstrate the model results of the 750mm pipeline, respectively before and after the installation of a duplicate main.

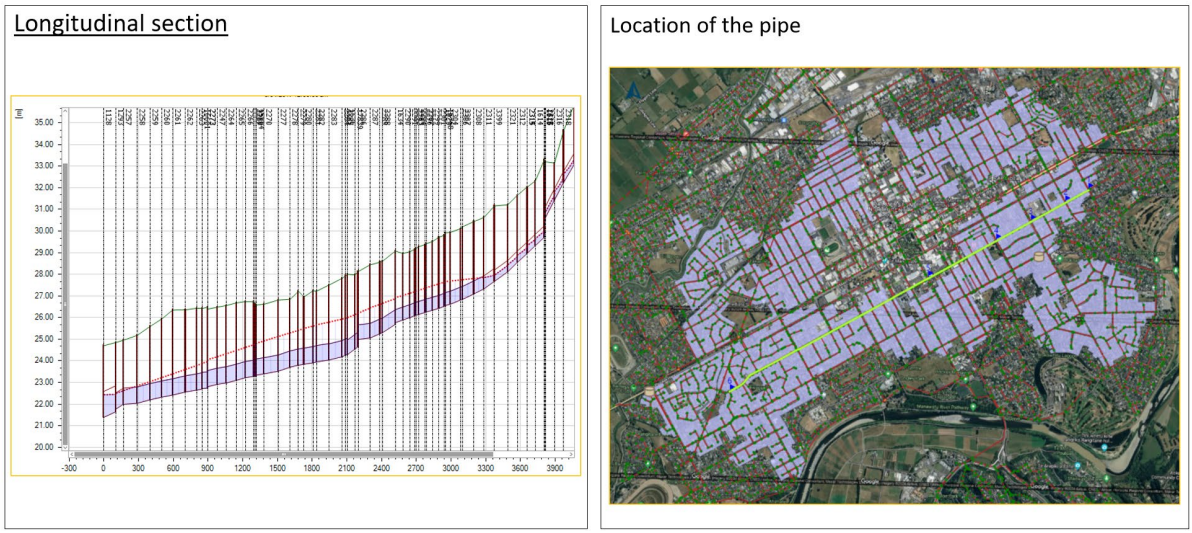


Figure 6: 750mm diameter Ferguson St wastewater main with upgrades[4]

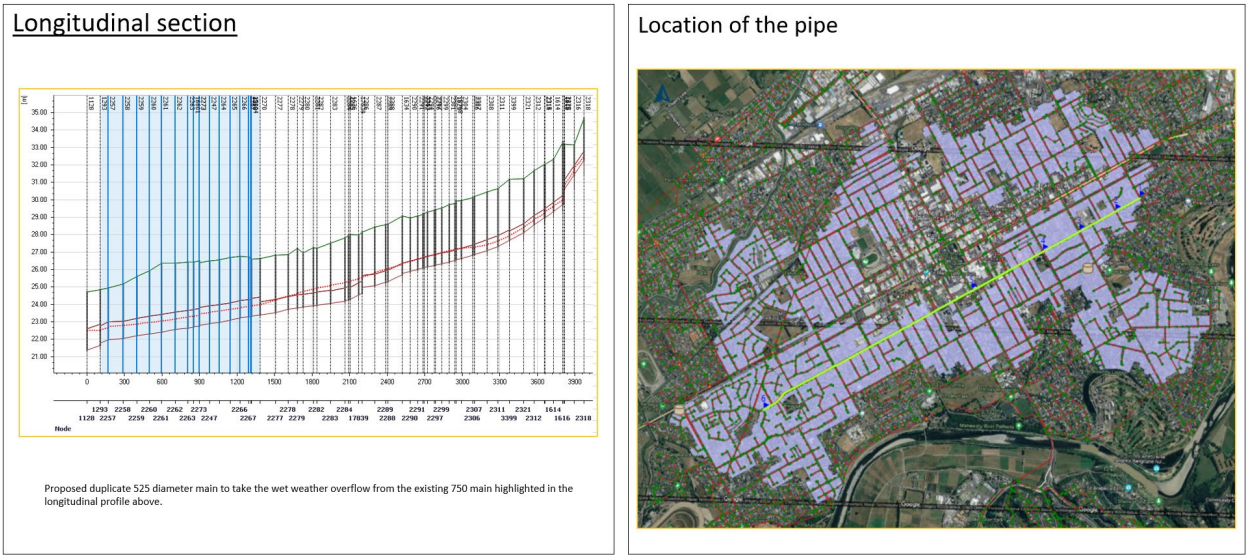


Figure 7: 750mm diameter Ferguson St wastewater main with duplicate 525mm main in highlighted area[5]

4.5.2 College Street to Savage Crescent

Similarly to the above, the downstream portion of an existing 200mm diameter wastewater main on College Street is expected to experience surcharge under the proposed long term intensification of Esplanade, Palmerston North Central, West End, Awapuni North and Awapuni South. Replacing a small section of this pipe (approximately 160m in length) with a 300mm diameter pipeline would help to alleviate the network and accommodate the intensification of these areas. Figure 10 and Figure 11 demonstrate the model results of the existing pipeline, respectively before and after the upgrade of that section.

4 Red dotted line represents the HGL.
5 Red dotted line represents the HGL.

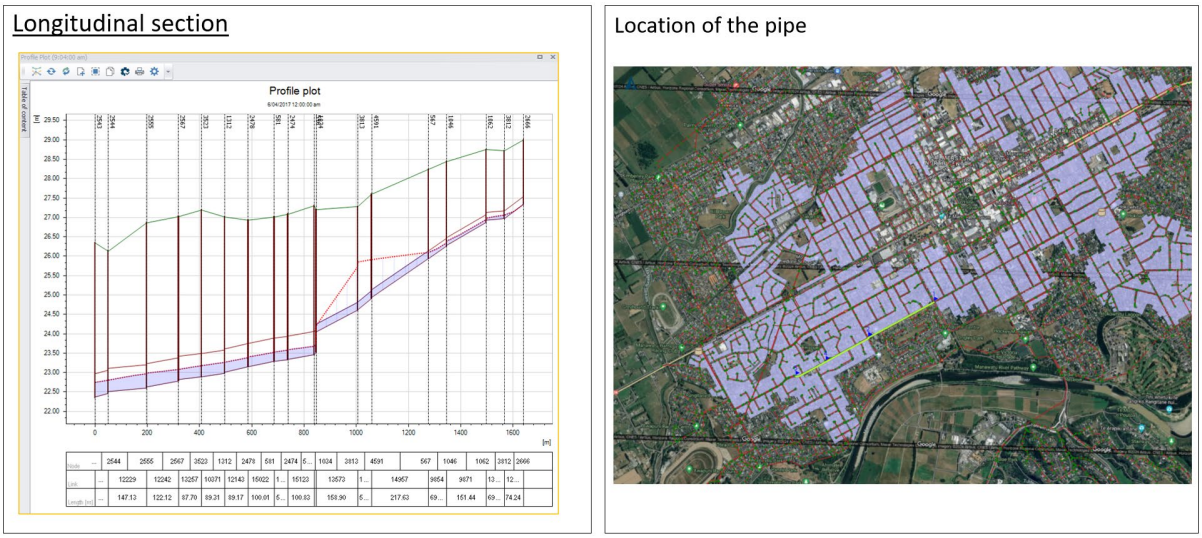


Figure 8: Existing 200mm pipeline on College street over long term with no upgrades[6]

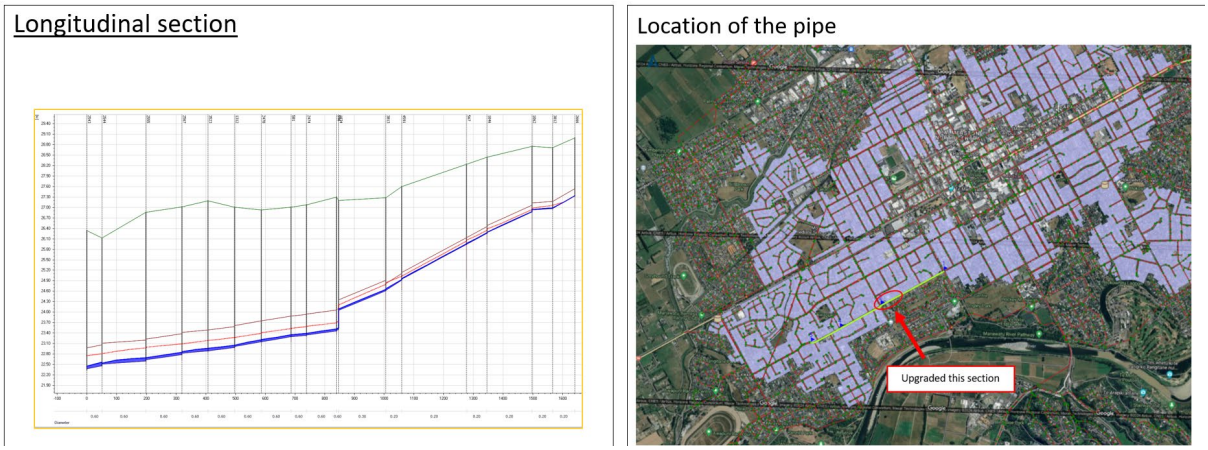


Figure 9: Existing 200mm pipeline on College street after 300mm upgrade[7]

4.5.3 North Street to Featherston Street

The modelling indicates that approximately 2.9km of wastewater pipe located on North Street and Featherston Street is expected to surcharge in the long term. The section of surcharged pipeline starts as 250mm diameter on North Street, increases as it moves downstream on Featherston Street to 600mm diameter and increases again to 750mm diameter at the downstream end at Takaro Park. Figure 12 and Figure 13 show the location of this pipeline, and the expected surcharge under the long term scenario.

6 Red dotted line represents the HGL.
7 Red dotted line represents the HGL.

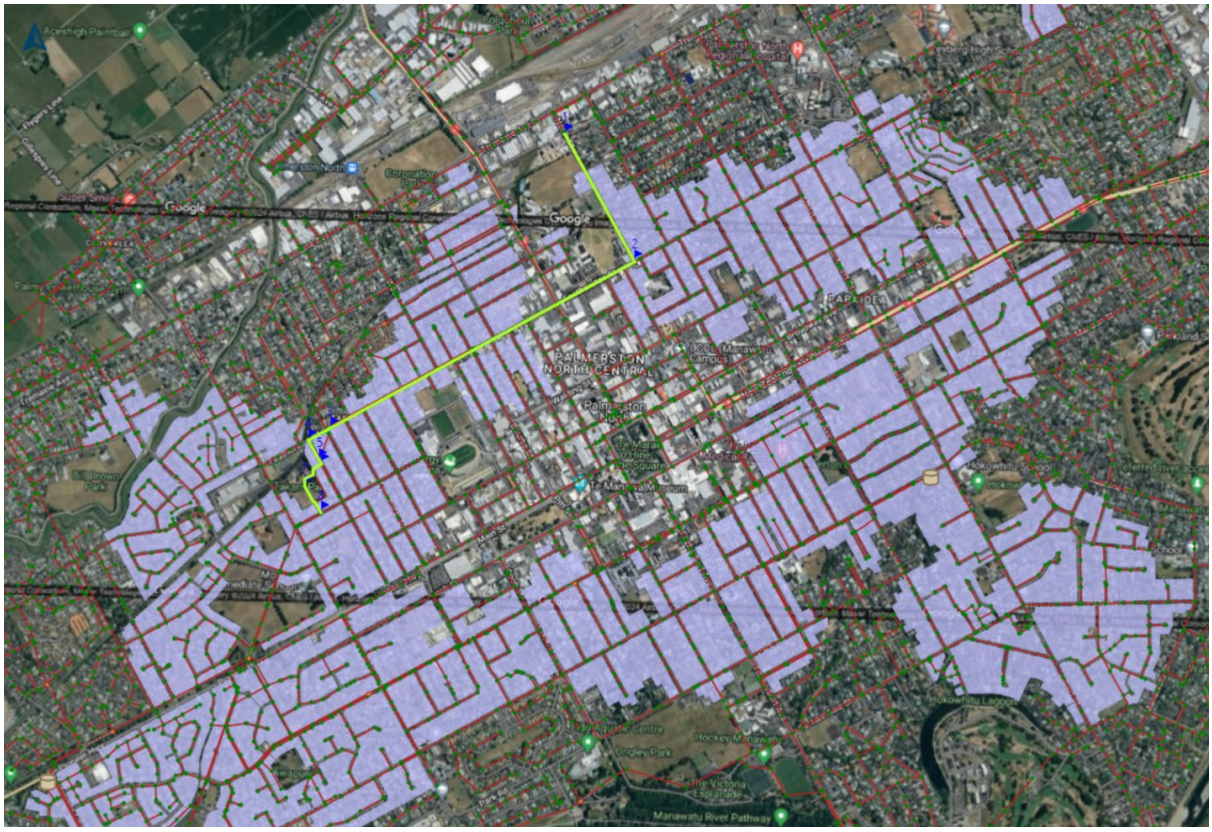


Figure 10: Location of surcharged pipeline – North St to Featherston St

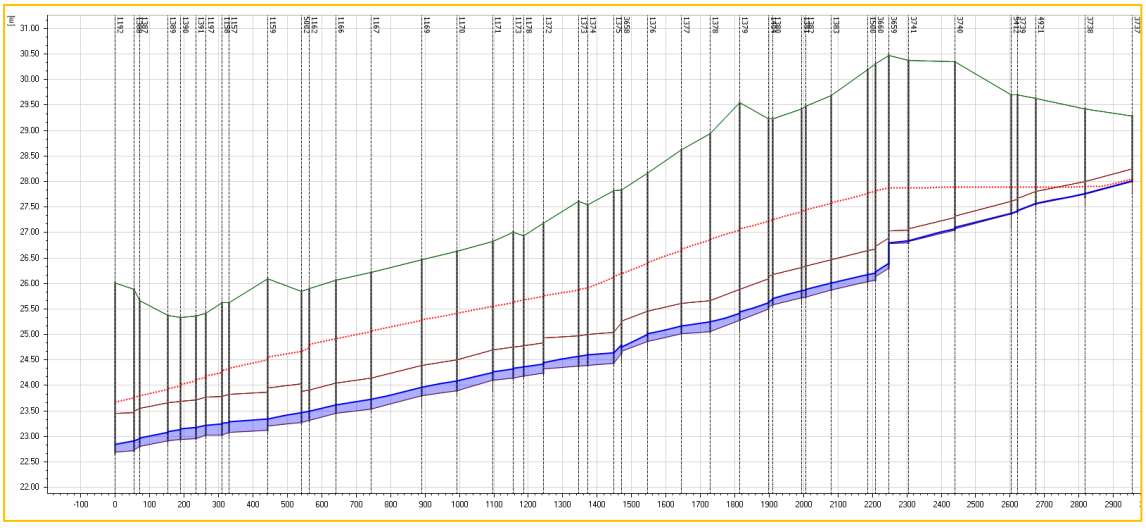


Figure 11: Long section of pipeline indicating surcharge[8]

In an attempt to resolve the issue, a 450mm diameter duplicate main was modelled alongside the existing 750mm diameter pipeline in Takaro Park, and for a section along Featherston Street. Unfortunately the addition of a duplicate main did not resolve the surcharge issues. Further investigation is required in order to address the wastewater capacity issues identified in these areas:

8 Red dotted line represents the HGL.

- Palmerston North hospital
- Papaioea North
- Tremaine
- Takaro North
- Takaro South

4.5.4 Main Street from McArthur Street to Victoria Avenue

Capacity issues in the long term were observed in the model in the existing 225mm diameter pipeline located on Main Street, between McArthur Street and Victoria Avenue. These capacity issues would limit the growth potential of Ruamahanga, Terrace End and Papaioea South. Figure 14 shows the location and expected surcharge of this pipeline.

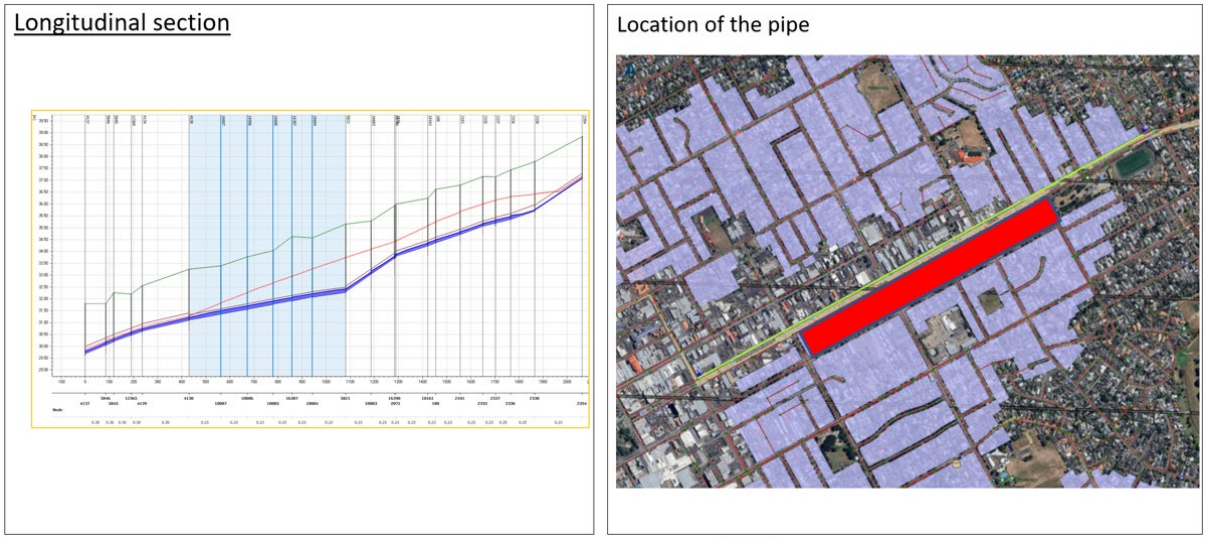


Figure 12: Surcharge observed in Main Street wastewater main[9]

An upgrade of a section of this pipeline from 225mm diameter to 300mm diameter would solve a large portion of the capacity issues, however it is still expected that the pipe would experience surcharge in the upstream end in the long term scenario. The green line and red line in Figure 15 show the hydraulic grade line for after and before the upgrades respectively.

[9] Red dotted line represents the HGL.

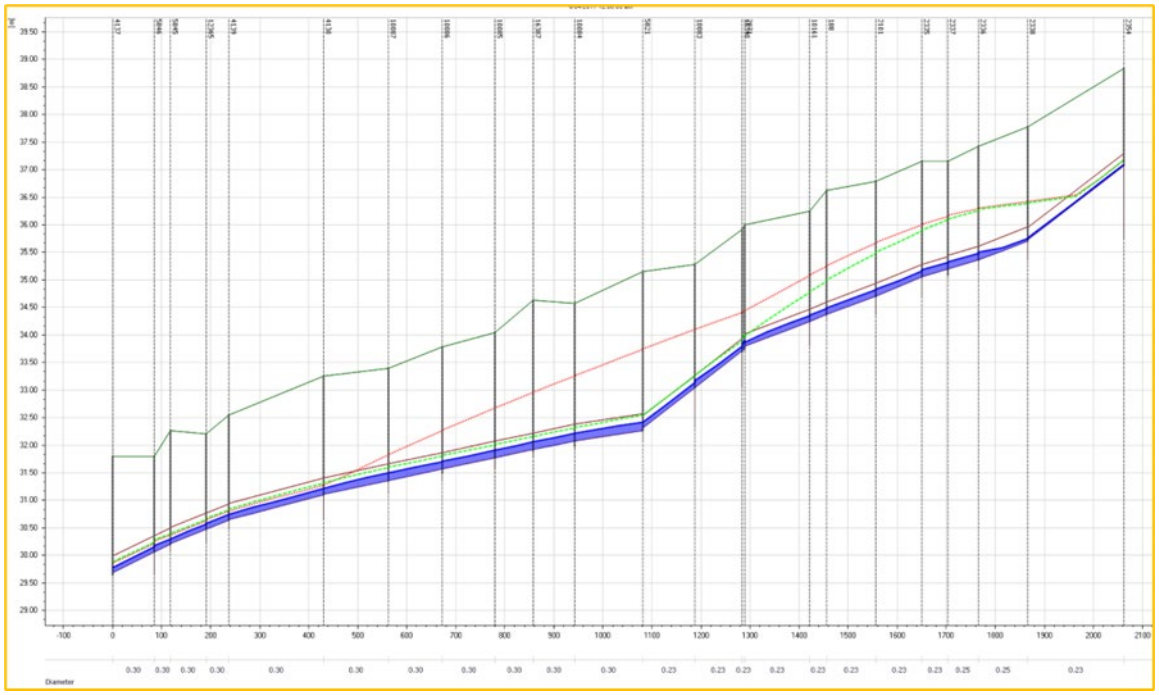


Figure 13: Long section of the main street wastewater main[10]

The surcharge of this pipe indicates insufficient existing capacity for the predicted long term growth of Ruamahanga and Papaioea South, refer to Figure 1. Further investigation and pipe upgrades would be required over the next 30-years to provide enough capacity to convey the projected flows.

4.5.5 Ruahine and Grey Street

An existing 225mm diameter pipe on Grey Street is also expected to experience capacity issues in the long term scenario. The pipe is located in the vicinity of the proposed growth area of Papaioea North. An initial upgrade of this pipeline to 300mm diameter was modelled, however the model indicated that even after an upgrade the capacity issues were expected to remain. As a result, further investigation within this area is required to address the existing capacity issues in the network before future growth is implemented for the Papaioea North area. Figure 16 shows the location and expected surcharge of this pipeline.

[10] Red line showing HGL before the proposed upgrade, green line after the upgrade.

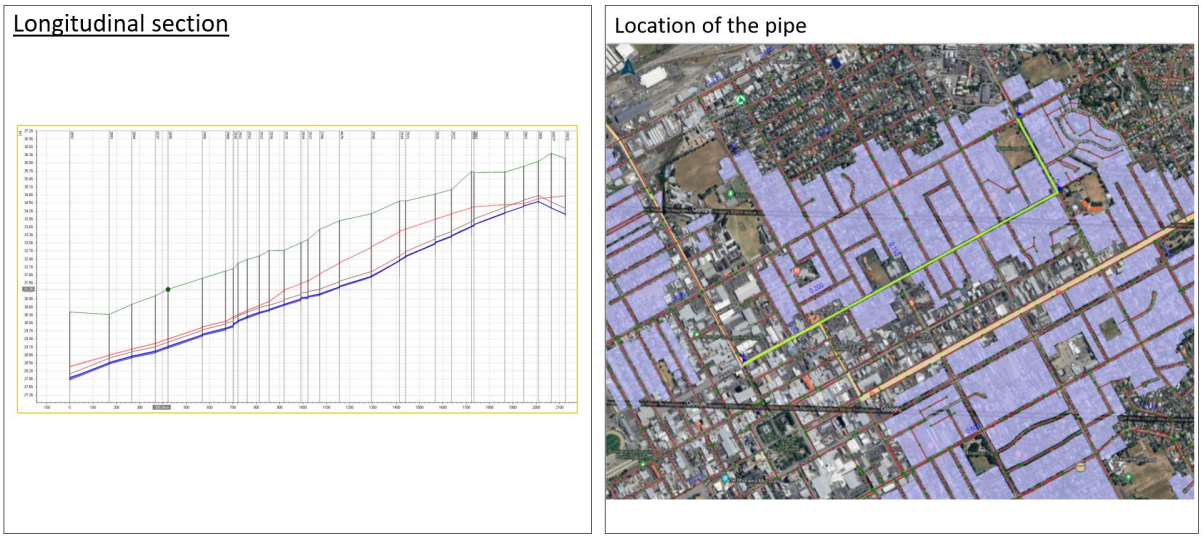


Figure 14: Model results of the Grey St wastewater main before and after upgrades.

4.5.6 Network capacity after proposed upgrades

The wider wastewater network was modelled with the upgrades outlined above in order to understand the impact of the upgrades on the wider network capacity. Figure 17 shows pipes that have had their capacity exceeded prior to any upgrades being applied (in blue) The black lines illustrate pipes that have regained capacity as a result of system upgrades.

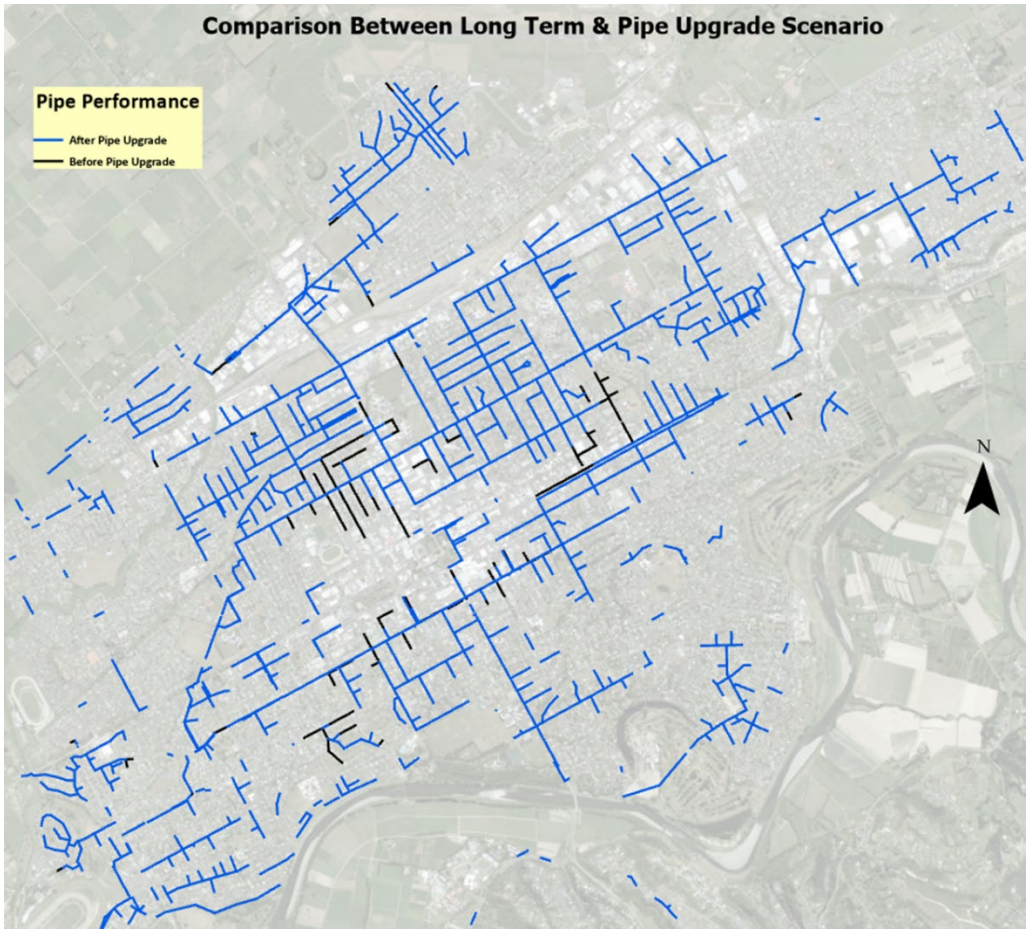


Figure 15: Wastewater modelling results – long term WWF before and after pipe upgrades

As shown above, 76 pipes have improved capacity after the proposed upgrades (1.4% of all pipes in the network).

5 Implications of stormwater modelling on wastewater assessment

The stormwater modelling carried out to support PC:I (Stormwater Servicing Assessment, 2024) has identified two areas within the proposed MRZ:

- Kelvin Grove North and West, Royal Oak except Rosalie Terrace, parts of Roslyn, Milson South, Milverton, Tremaine, Esplanade, Papaioea North, West End, Terrace End, Palmerston North Hospital and Palmerston North Central - recommend that intensification of up to 3 units per site can occur as a permitted activity without the need for stormwater system upgrades

- Stormwater Overlay - remainder of the proposed MRZ – recommend that intensification cannot occur as a permitted activity as stormwater management is required on a site-by-site basis.

Figure 18 below shows an overlay of Stormwater Overlay (in black) and the remainder of the zone with the wastewater capacity issues (no upgrades included).

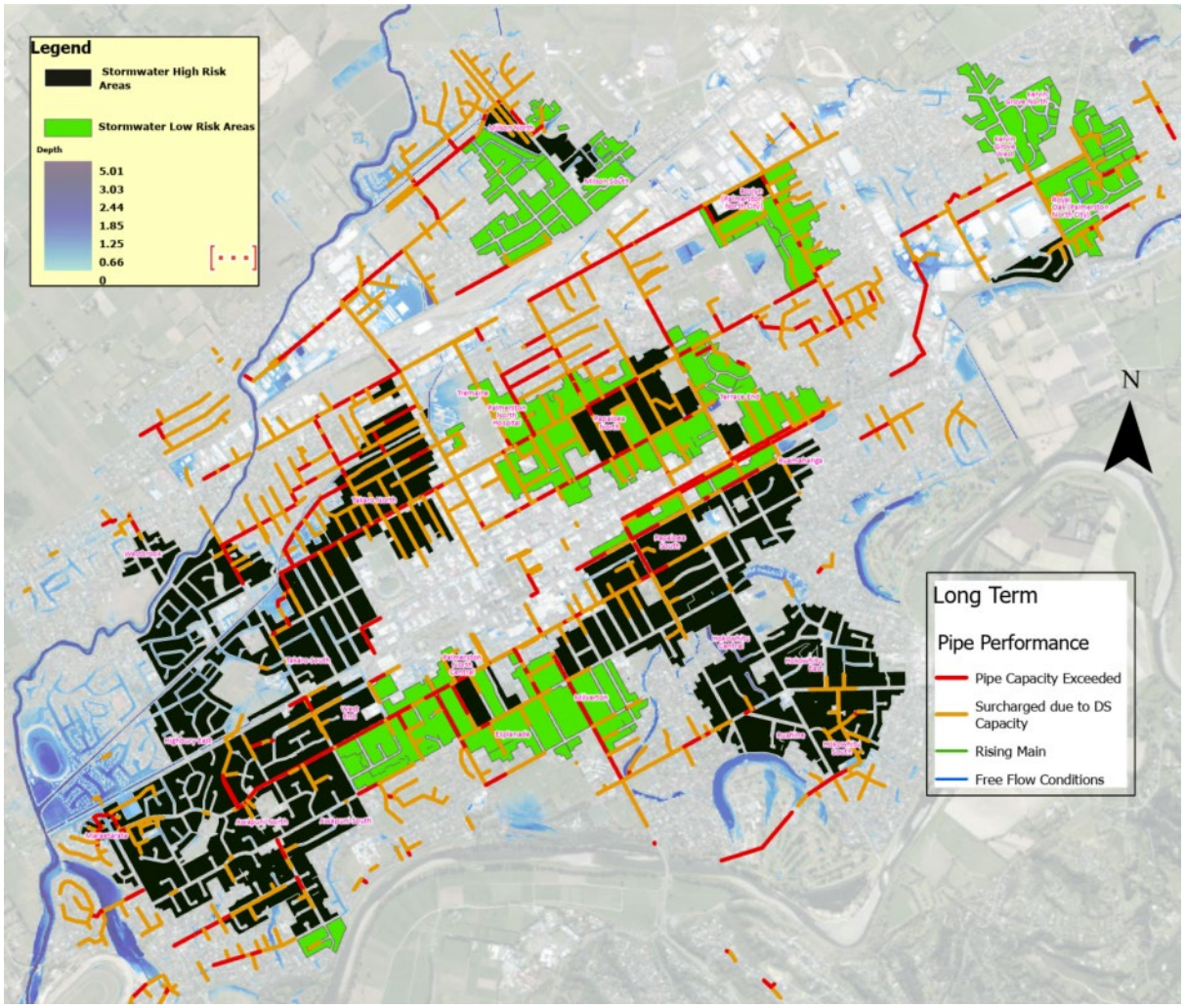


Figure 16: Wastewater capacity issues compared to stormwater areas

Figure 19 below shows the Statistics New Zealand SA2 areas[11] located outside the Stormwater Overlay.

[11] SA2 areas reflect communities that interact together socially and economically and in populated areas, they generally contain similar sized populations. Source: www.stats.govt.nz

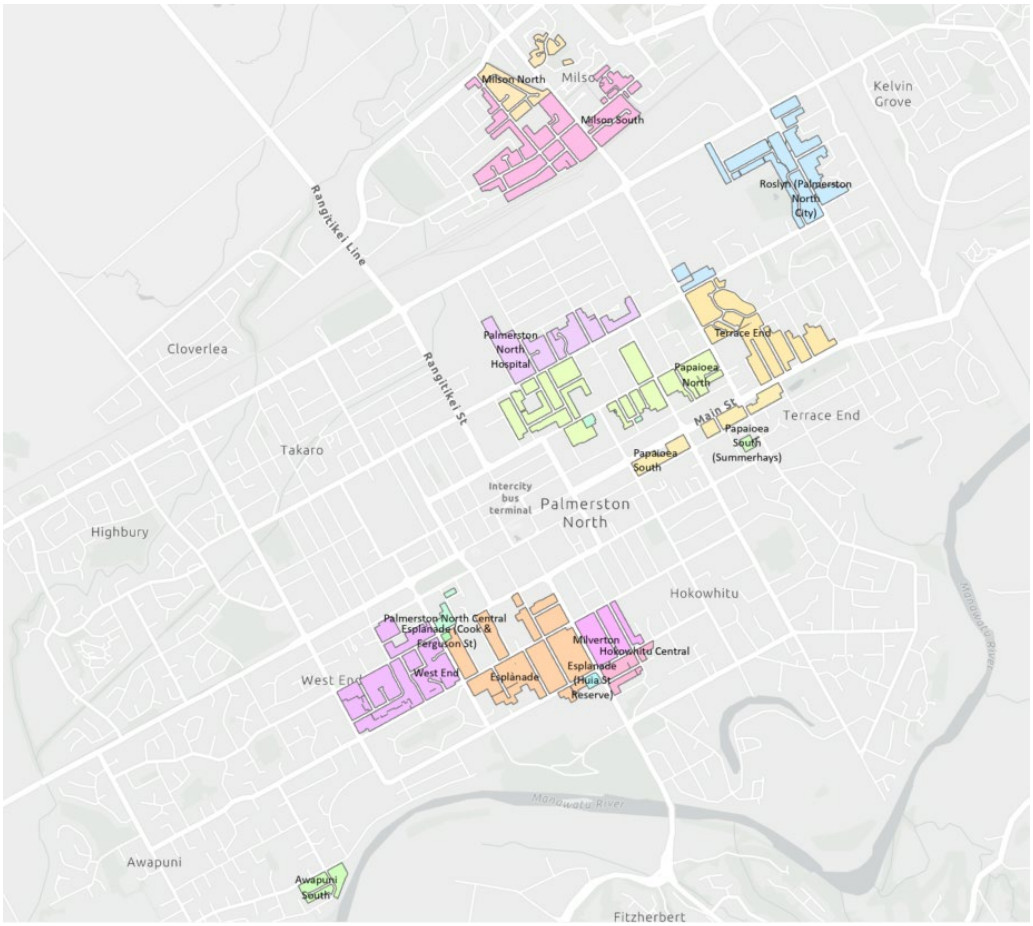


Figure 17: SA2 units outside Stormwater Overlay

An additional wastewater modelling approach was carried out to assess how a reduced zone extent based on the areas areas in Figure 19 only would impact the existing wastewater network, and if any upgrades would be required to the network to accommodate the proposed intensification.

As the proposed intensification area was significantly smaller, the long-term scenario (30-years) was modelled first to assess any potential wastewater issues as it represents the 'worst-case' scenario. Table 2 below shows the updated number of dwellings projected in the long-term scenario under the updated intensification areas.

Table 2: Additional dwellings proposed within the SA2 outside the Stormwater Overlay

Geographical area/ suburb	Additional properties – Long Term (30 years)
Awapuni South	3
Cook Street/Ferguson Street	11
Esplanade	80
Hokowhitu Central	10

Geographical area/ suburb	Additional properties – Long Term (30 years)
Huia Street	34
Milson North	2
Milson South	21
Milverton	18
Palmerston North Central	4
Palmerston North Hospital	66
Papaioea North	78
Papaioea South	17
Roslyn	45
Summerhays Street	40
Terrace End	49
West End	54
Total Projected	533

6 Option 2 – Reduced Extent Intensification Modelling Results and Comments

6.1 Status quo

6.1.1 Dry weather

For the base scenario, the Mott Macdonald 2025 model demonstrated that there were 44 pipes that exceeded capacity under dry weather flow (for a 1-year ARI event). Figure 20 below identifies the areas where wastewater pipes (in red) have exceeded capacity and where wastewater pipes (in orange) are surcharged.

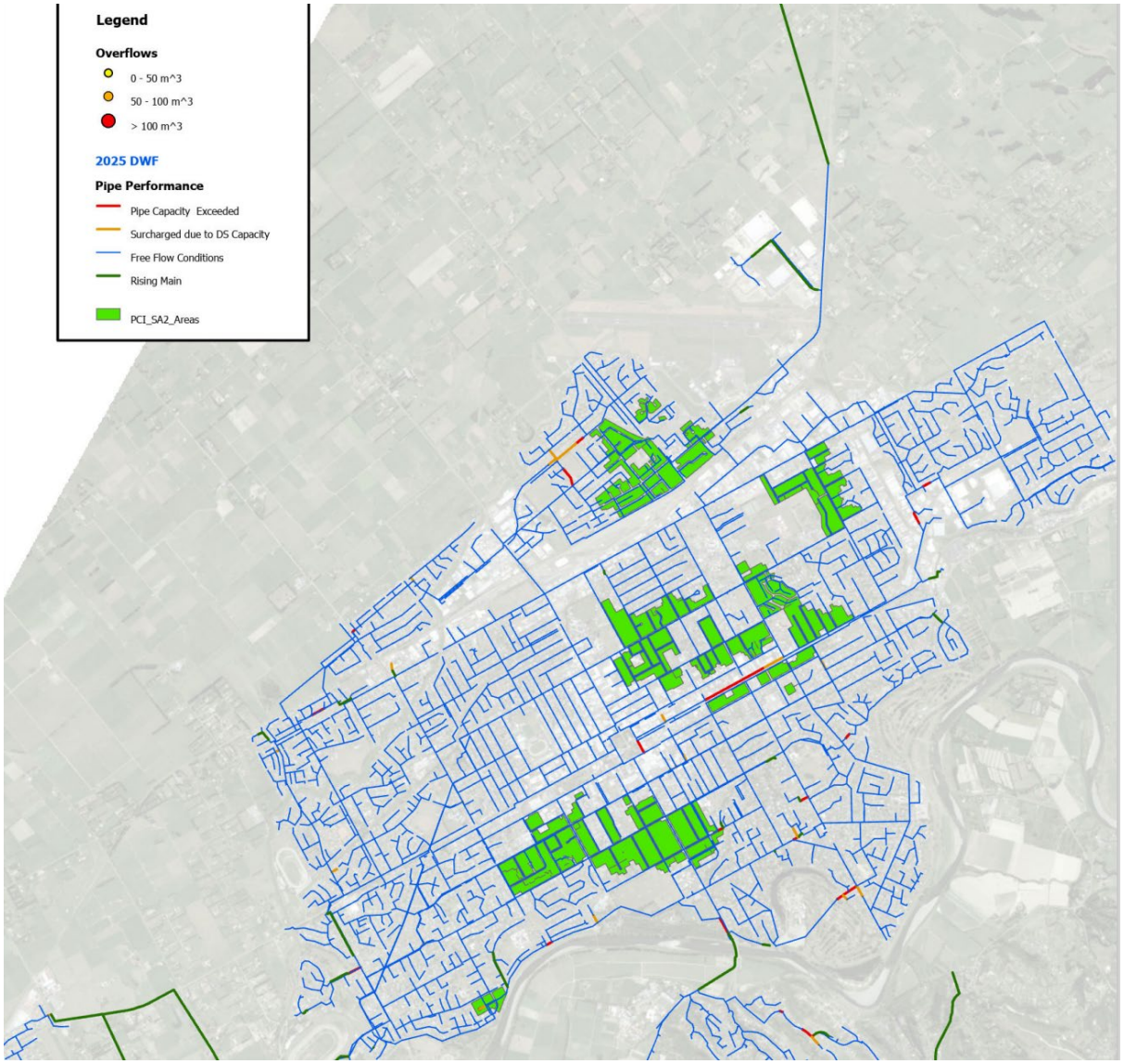


Figure 18: Existing issues based on the dry weather 2025 base scenario (Mott MacDonald base model)

The dry weather results indicate that the proposed intensification in Milson and Papaioea South are already experiencing capacity constraints.

6.1.2 Wet weather

Under wet weather conditions in the status quo most of the city is expected to have issues with wastewater pipe capacity (as previously discussed in section 4.1). In the absence of intensification, overflows are expected in the following predicted growth areas:

- Milson North
- Roslyn (Palmerston North City)
- Palmerston North Hospital

A total of 1,318 wastewater pipes (out of a total of 5,575 pipes) are surcharged and 603 wastewater pipes exceed capacity (11%). Figure 21 below identifies the areas where overflows (the yellow, orange and red dots) are expected under the status quo).

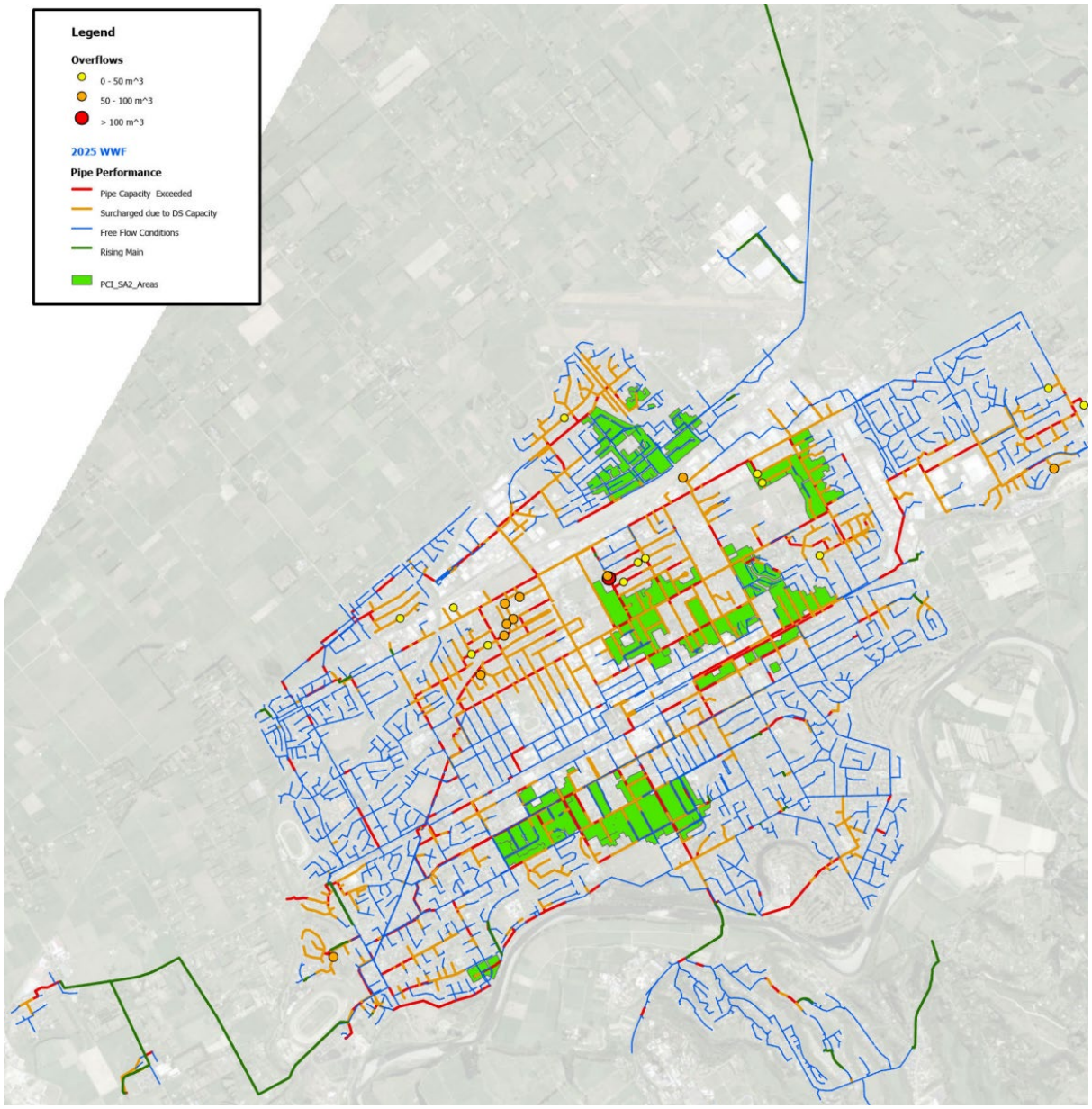


Figure 19: Existing issues based on the wet weather 2025 base scenario (Mott MacDonald base model)

6.2 Future Scenario

6.2.1 Dry weather

In the future scenario under dry weather conditions there was very little impact to the existing network capacity. A total of two additional pipes that were free flowing in the base scenario are expected to be surcharged in the future scenario, a percentage change of 0.04%. There was no increase in pipes exceeding capacity, and therefore the impact can be considered

minimal. Figure 22 below identifies the areas where wastewater pipes have exceeded capacity and where wastewater pipes are surcharged under the future scenario.

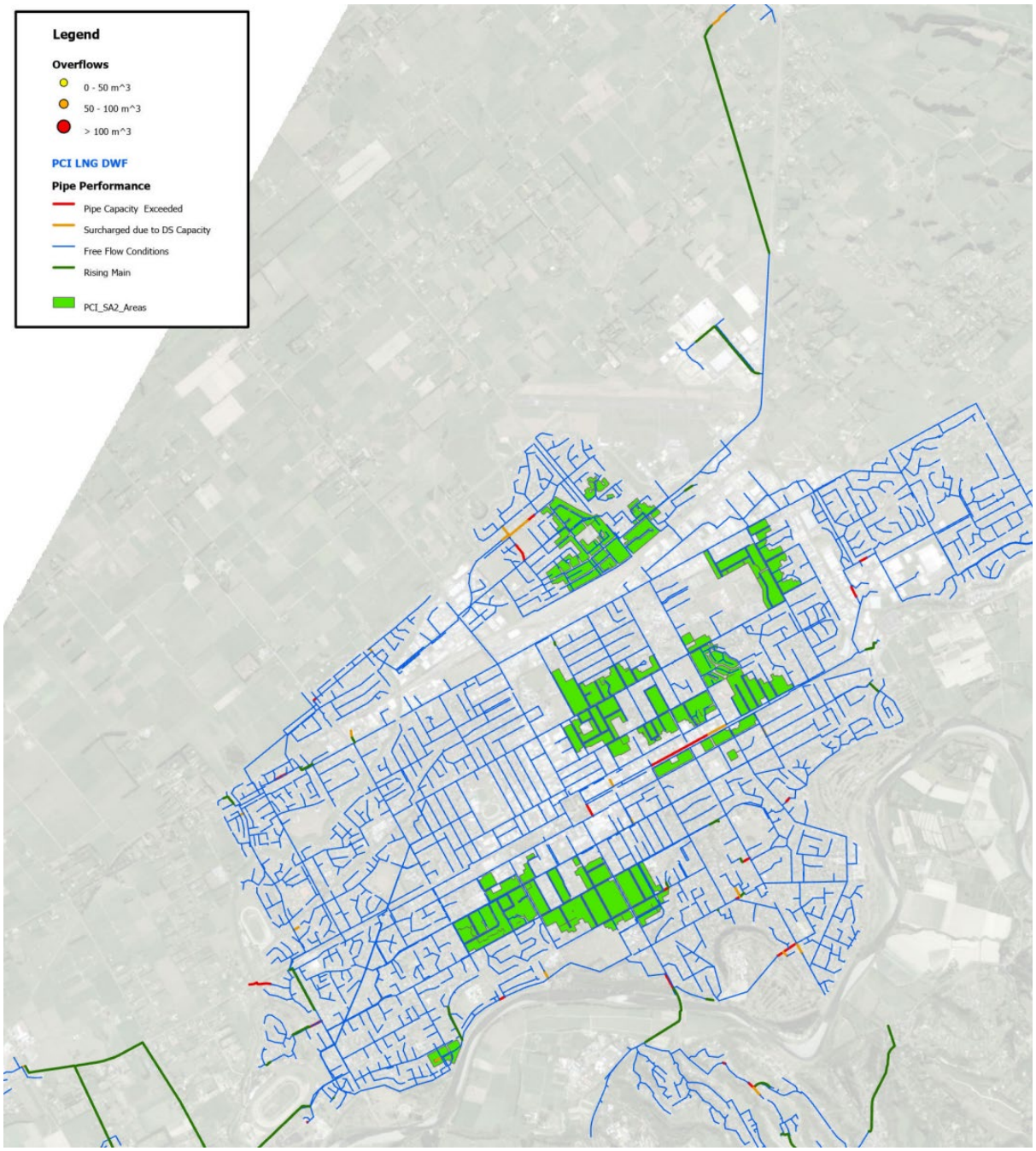


Figure 20: Network issues based on the dry weather 2055 future scenario

6.2.2 Wet weather

In the future scenario under wet weather conditions the existing network capacity was found to be under additional pressure. A total of eighteen additional pipes (0.3%) that were free flowing in the base scenario are expected to be surcharged in the future scenario, and one new manhole is expected to overflow. There was, however, no increase in pipes exceeding capacity. Figure 23 below identifies the areas where wastewater pipes have exceeded capacity and where overflow is occurring under the wet weather future scenario.

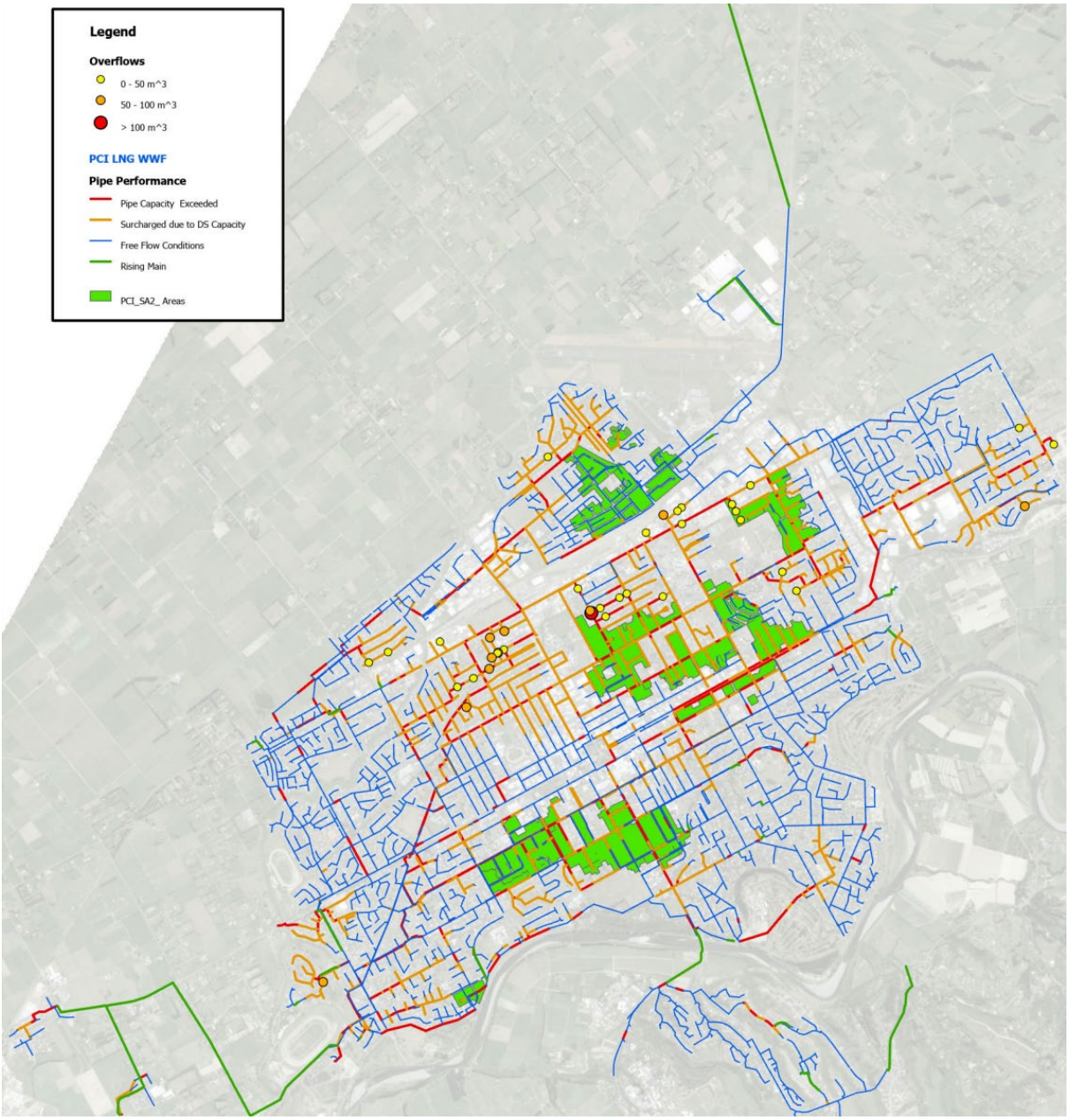


Figure 21: Future issues based on the wet weather 2055 future scenario

The locations of the additional 18 pipes predict to surcharge as a result of intensification outside of the Stormwater Overlay are illustrated below in Figure 24.

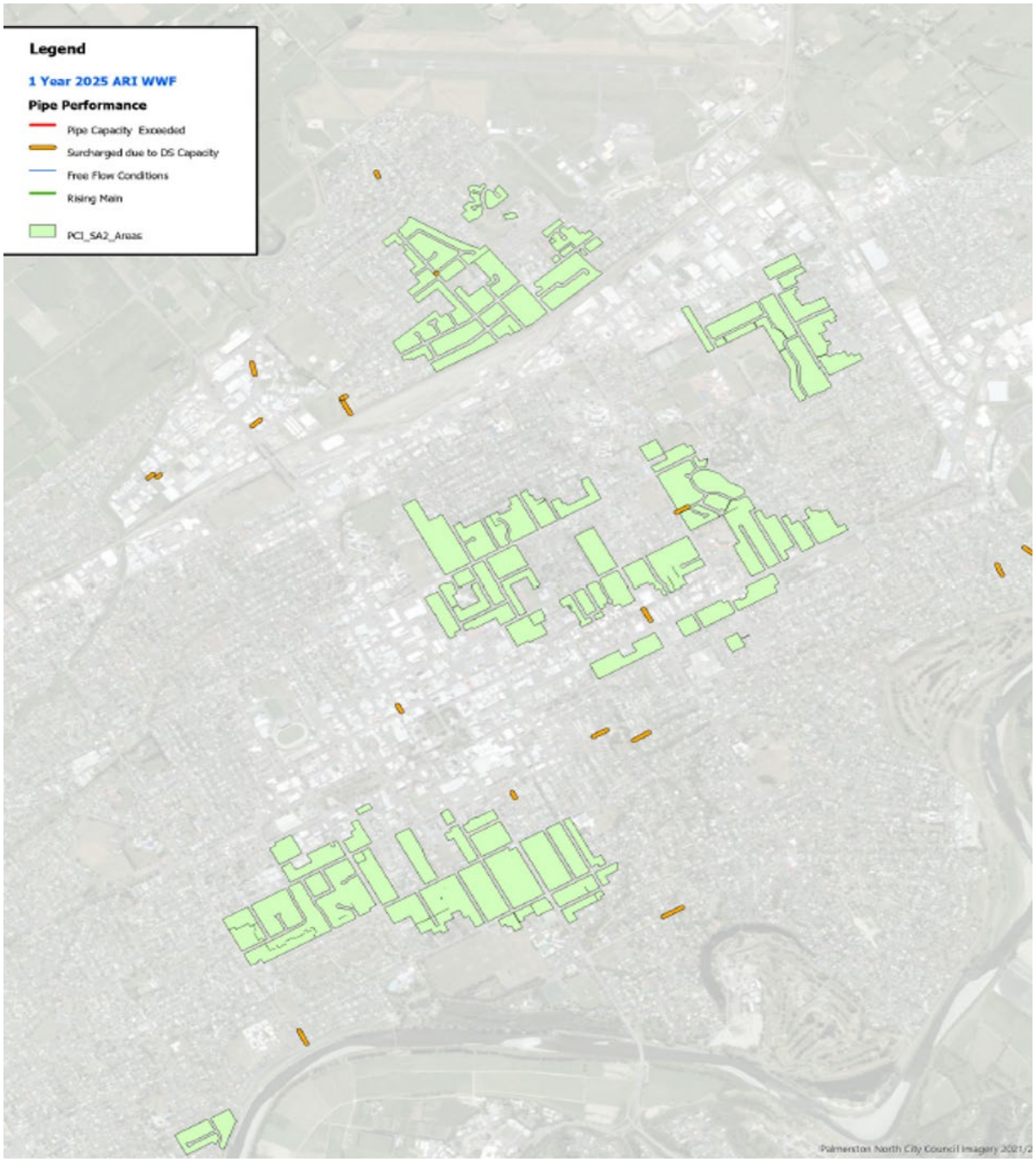


Figure 22: Future scenario – wastewater overflows compared to base model

As there was no increase in pipes exceeding capacity, the benefit of restricting medium density residential intensification to outside the Stormwater Overlay can be considered to be minimal, with the exception of the additional manhole overflow. This requires further analysis, and is further discussed in Section 6.4.

6.3 Comparison with stormwater predictions

The wastewater model for the SA2 areas outside the Stormwater Overlay was compared with the stormwater modelling that had been carried out separately. Figure 26 demonstrates that there is surcharge predicted in the wastewater pipes where there is stormwater flooding during the 1 in 5-year ARI.

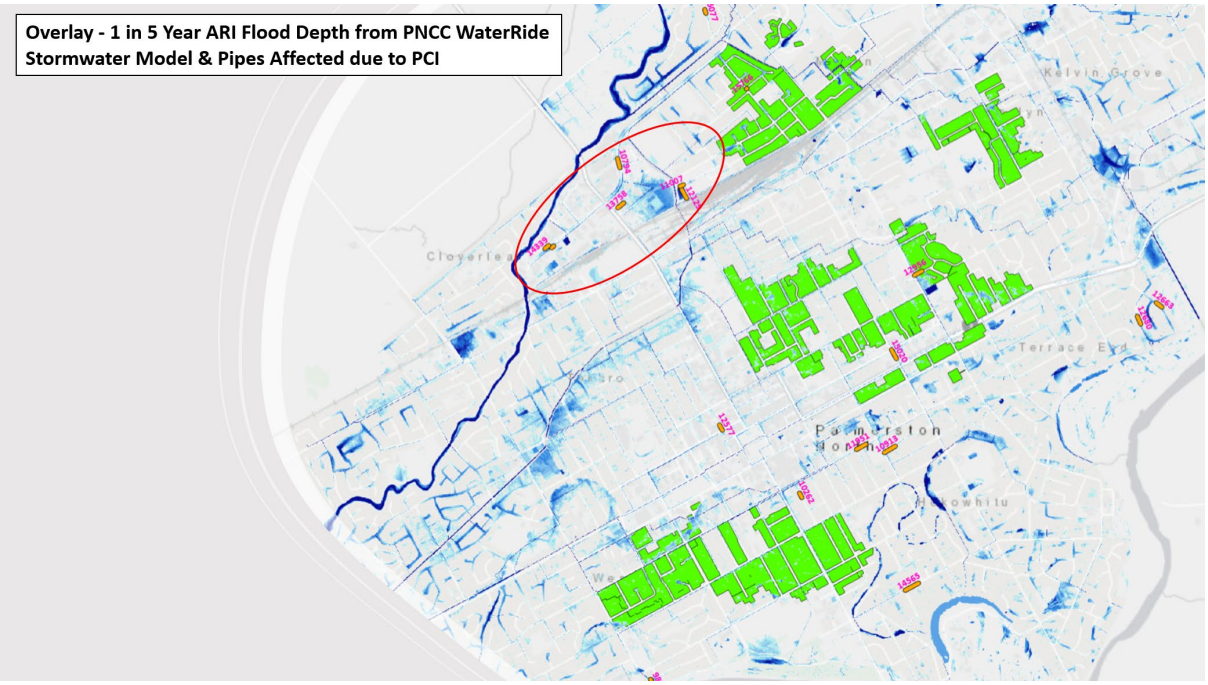


Figure 23: Wastewater capacity issues compared to stormwater flood depth areas

The additional manhole experiencing sewer overflow is not located within a high flood depth area under the 5 -year ARI (refer to Figure 27 below).

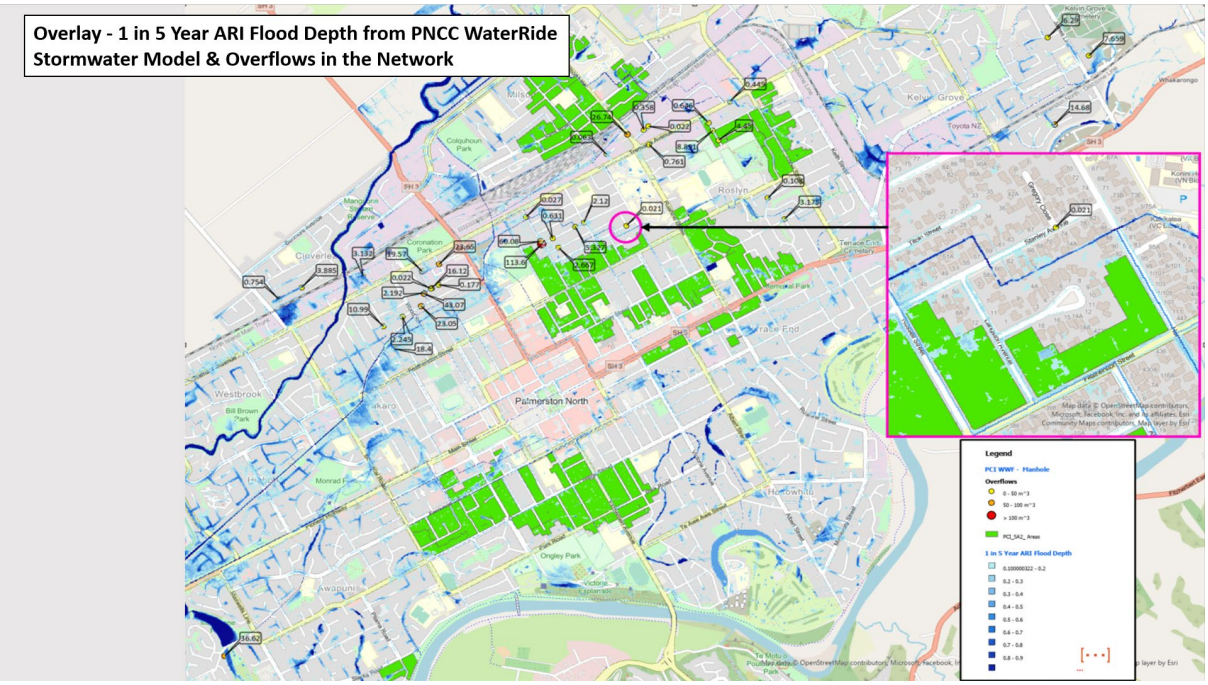


Figure 24: Manhole sewer overflow compared to stormwater flood depth areas

In conclusion, the manhole experiencing sewer overflow is not of great concern as it is not located within a flood depth area. The risk of sewer contamination with stormwater runoff is minimal.

6.4 Manhole overflow comparison

Under the base scenario (wet weather conditions) a total of 37 manholes out of 5433 manholes within the city (0.68%) experience sewer overflow during the 1-Year ARI event. Under the future scenario, one new manhole located at the intersection of Gregory Circle and Stanley Avenue (Manhole ID 3717) experiences 0.02 m^3/s of sewer overflow during the 1-Year ARI event (refer to Figure 25 below).

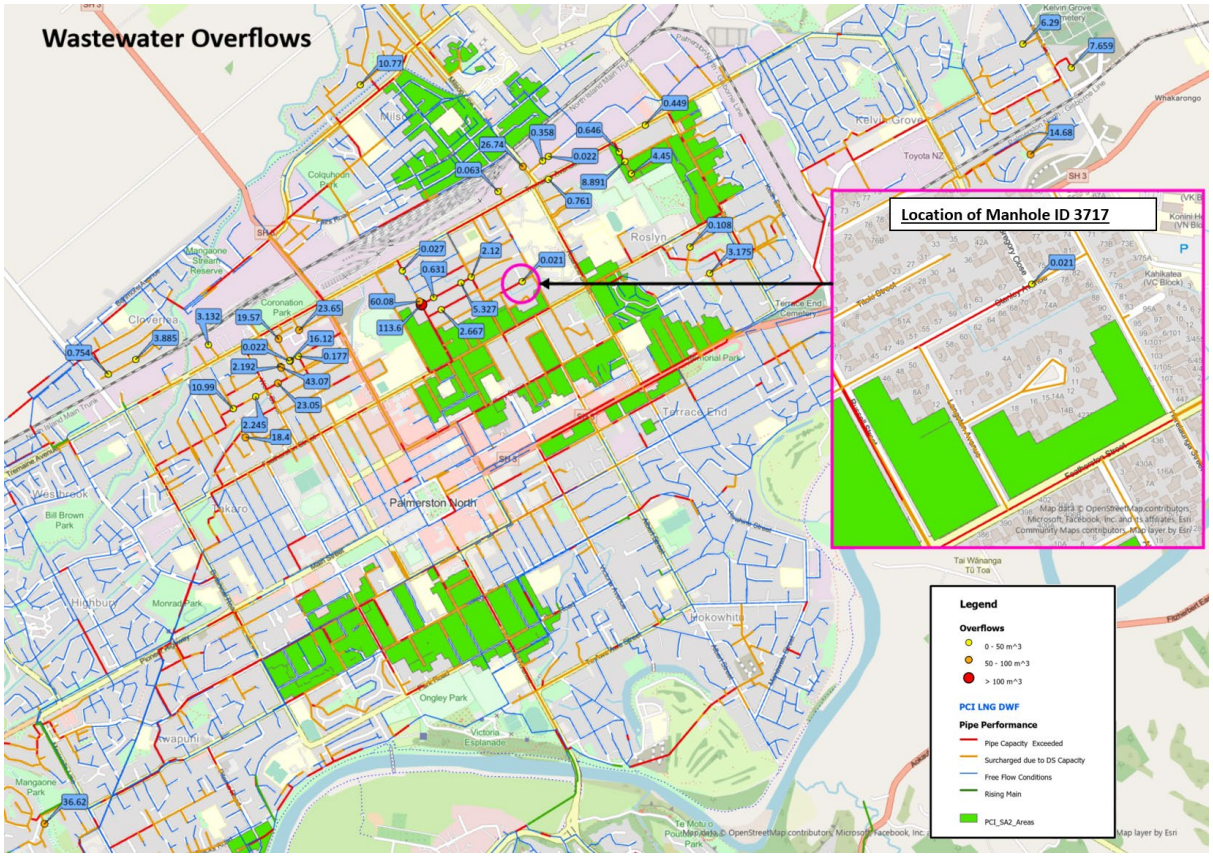


Figure 25: Location of additional manhole experiencing sewer overflow under the future scenario

The total volume of sewer overflow increased from 462.81 m^3 in the base scenario to 473.41m^3 in the future scenario, resulting in an increase of approximately 1%.

Upgrading the sewer system at Manhole ID 3717 to prevent overflow causes further problems/overflow downstream. This is because more flow would be directed downstream to already surcharged/overflowing pipes. In reality, the amount of overflow (0.02 m^3/s) is so minimal that it is unlikely the manhole lid will raise and a 'spill' would not actually occur. As a result, upgrading the wastewater pipes to prevent the additional overflow is not required.

6.5 Surcharged pipes

As mentioned in Section 6.2.2 above, an additional eighteen pipes are surcharged under the future medium density scenario. Three of the surcharged pipes are located downstream of the proposed Milson Area intensification area (refer to Figure 28 below). The pipes are surcharged due to downstream capacity issues with the Western Trunk main (blue line).

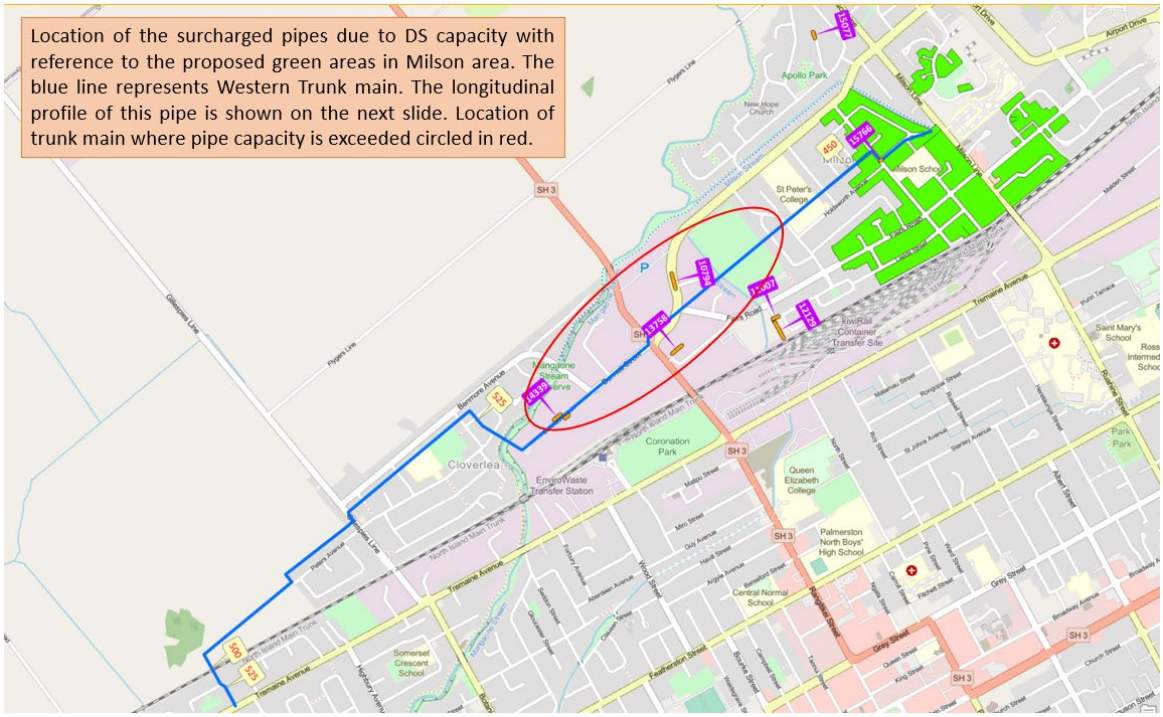


Figure 26: Location of surcharged pipes near Milson Area

The increase in surcharge in the future scenario compared to the base scenario is minimal. Figure 29 below, shows the longitudinal profile along the western trunk. The light blue line in the section indications the base scenario maximum water level, and the red line in the section indicates the maximum water level in the future scenario.

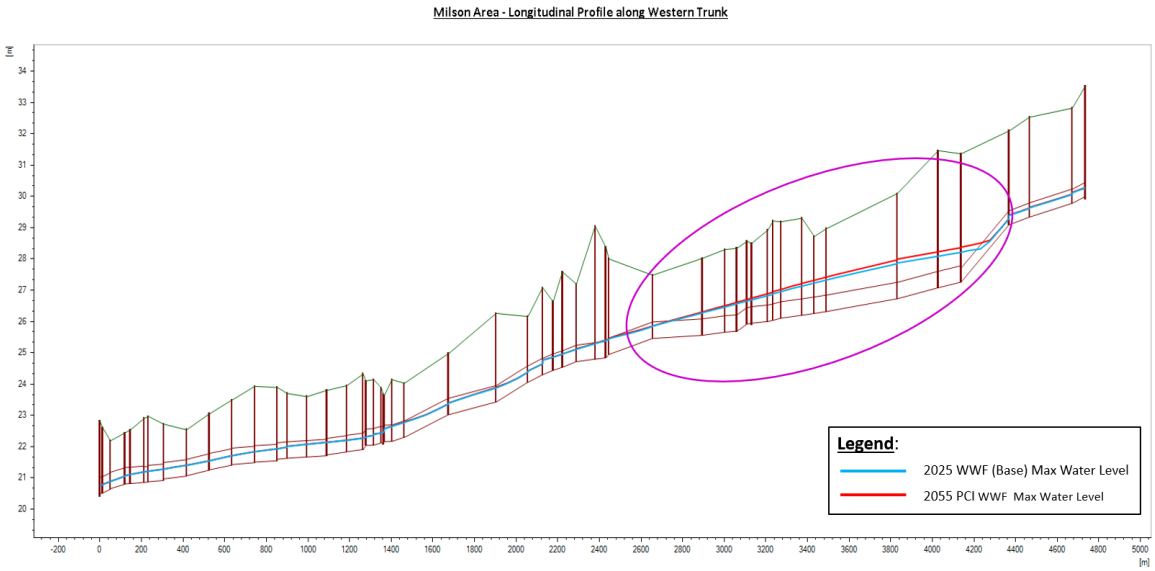


Figure 27: Western Trunk longitudinal section with HGL

The increase is very minimal and will unlikely have any impact on the overall wastewater network.

Similar to the scenario above, the remaining surcharge pipes as a result of PC:I have a very minimal increase in water level within the pipe and will unlikely have any impact on the

overall wastewater network. Therefore, upgrades to the wastewater network as a result of PC:I is not required.

7 Funding

Five wastewater programmes which contribute to improved network performance across the Palmerston North urban area are provided for in the 2024-2034 Long Term Plan adopted on 26 June 2024[12]:

- **Programme 73:** A nominal amount intended to allow for small, local works required to accommodate infill subdivisions.
- **Programme 1616:** Upgrade the College St Wastewater pump station, which includes a storage capacity upgrade and resilience improvements.
- **Programme 1712:** Upgrading pipes at key locations to mitigate manhole overflows identified in the Mott Macdonald - Palmerston North Wastewater Network Strategy Capital Works Programme Report – May 2020.
- **Programme 1821:** Re-align wastewater pipes running below streams (e.g. Summerhill gullies).
- **Programme 2229:** To fill the gap left by reduction of some of the above programme budgets, and is intended to be used in tandem with the wastewater pipe renewal budget so that pipes requiring renewal can also been given capacity, alignment or other improvements. The list of pipe renewals which also include improvements has been prepared for Year 1 and 2 and includes the following pipes which could be impacted by increased density in the proposed Intensification Areas:
    - Lyndhurst Street (Featherston St to Chelwood St)
    - Maxwells Line (Slacks Rd to Totara Rd)
    - Botanical Rd (Featherston St to Liverpool St)
    - Victoria Ave (Ferguson St to Main St)
    - Albert Street - (Stewart Cres to Churchill Ave)
    - Rangitikei St (Featherston St to Guy Ave)
    - Park Rd (Cook St to Karaka St)
    - Russel St (Featherston St to Tremaine Ave)
    - Broadway Ave (Albert St to Ruahine St)
    - Cleland St and McGiffert St (Ferguson St to Cleland St)
    - Main Street (Albert St to Margaret St)

The total cost over a 30-year span for the above programmes is approximately $73,249,500, which averages out to be approximately $2,441,650 a year. Refer to Appendix C for the cost breakdown per programme.

[12] Long-Term Plan 2024-34 | Palmerston North City Council (pncc.govt.nz)

8 Conclusions

Residential intensification increases the demand on existing wastewater infrastructure because of the increase in the number of people resident in an intensified area.

Wastewater network modelling was carried out to assess the impact of PC:I on the PNCC network under two options:

- Option 1: Residential intensification across proposed MRZ as identified in the Accessibility and Demand Assessment– predicted to deliver approximately 1,512 additional dwellings over the span of 30 years.
- Option 2: Residential intensification across a smaller area based on the output of the PC:I stormwater assessment – predicted to deliver 533 additional dwellings over the span of 30 years.

As there were no significant issues in the long term scenario in Option 2, there was no need to model the short/medium term scenario as the long term scenario represents the worst case scenario for the wastewater network.

8.1 Status quo

The model found that there are existing widespread capacity issues, with overflows expected under wet weather flow conditions in the northern parts of the city. Under dry weather conditions, two pipes that were free flowing under the base condition are expected to be surcharged due to PC:I.

8.2 Option 1– Full extent PC:I

The intensification that would be enabled under Option 1 would have a significant impact on the wastewater network. The widespread capacity issues are expected to worsen, with the number of overflows expected to increase in the Northern end of the city. Widespread upgrades to the downstream network are required to prevent surcharge during wet weather flow with the long term proposed growth. The following localised upgrades will assist in accommodating growth in the areas of West End, Milverton, Esplanade and Awapuni South:

- Installation of a 525mm diameter duplicate main on Ferguson Street (approx. $3.5M)
- Upgrade of approximately 160m of existing 200mm diameter pipe to 300mm diameter (approx. $500K)

In the following areas, localised upgrades were not able to address the capacity issues and further wastewater modelling is required to identify the extent of required upgrades in the following areas:

- Palmerston North hospital
- Papaioea North
- Papaioea South

- Tremaine
- Takaro North
- Takaro South
- Ruamahanga
- Terrace End

The LTP includes several city-wide wastewater network programmes as identified in Appendix B. The Council undertakes modelling on an on-going basis and if upgrades are required, the LTP programmes would be utilised to implement these.

8.3 Option 2 – Reduced extent PC:I

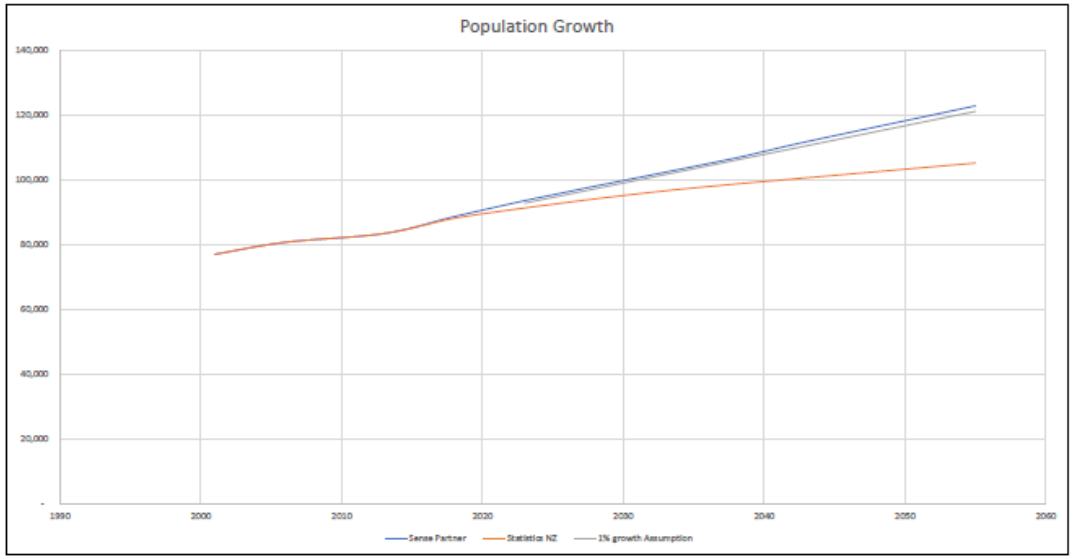
Under wet weather conditions, eighteen pipes that were free flowing under the base condition are expected to be surcharged if intensification occurred across the entire proposed MRZ (3% fall).

One additional manhole (Manhole ID 3717) is expected to experience sewer overflow. Upgrading the sewer system to prevent overflow from Manhole ID 3717 causes downstream effects. The overall increase in sewer surcharge overflow volume between the base scenario and the PC:I scenario is approximately 1% which is considered to be minimal.

The intensification that would be enabled under Option 2 has a minimal impact on the wastewater network and upgrades are not required.

Appendix A. Population Distribution Prediction

	Date	Sense Partner	Statistics NZ	Number Used	1% growth Assumption	Projection shp file	Mike Urban Model Subcatchment Population	Ashhurst	Additional Population	Total	Distribution methodology
	2001	77,100	77,100	77,100							
	2006	80,800	80,800	80,800							
	2013	83,500	83,500	83,500				2,778			
	2018	88,730	88,200	88,730			70,324.14	2990	15,415.86	85,740.00	distribute evenly across all network (Non developped)
	2023	93,650	91,400	93,650	93,167	short (3 years)					
Estimation Mott	2025	95,437	92,520	95,437	94,941				6,707.20	92,447.20	distribute across Short zones (50% greenfield - 38 % infill - 12 % rural - rural residential)
	2028	98,118	94,200	98,118	97,603						
	2033	102,444	96,700	102,444	102,040	medium (3-10 years)					
	2038	106,823	98,800	106,823	106,476						
Estimation Mott	2040	108,830	99,560	108,830	108,251				13,392.60	105,839.80	distribute across Medium zones (50% greenfield - 38 % infill - 12 % rural - rural residential)
	2043	111,840	100,700	111,840	110,913						
Estimation Mott	2055	122,910	105,260	122,910	121,560	long (10 - 30 years)			14,080.20	119,920.00	distribute across Long zones (50% greenfield - 38 % infill - 12 % rural - rural residential)



Appendix B. Wastewater Network Improvement Programme Costing

Master	Division	Programme ID	Programme Name		Programme Primary Type	2024/25 Year1 (2024/25) Capital	2024/25 Year2 (2025/26) Capital	2024/25 Year3 (2026/27) Capital	2024/25 Year4 (2027/28) Capital
54375	3 Waters	73	Urban Growth - Development Contributions - Wastewater	Wastewater	Capital Growth	104,000	150,000	150,000	200,000
54365	3 Waters	1616	City-wide - Wastewater Pump Station - Capacity Upgrade	Wastewater	Capital LOS	1,000,000	2,200,000	2,200,000	0
54375	3 Waters	1712	City-wide Wastewater reticulation wet weather overflow mitigation	Wastewater	Capital LOS	500,000	500,000	500,000	0
54375	3 Waters	2229	City-wide - Wastewater Pipe Improvement	Wastewater	Capital LOS	1,000,000	1,000,000	1,000,000	1,000,000
54365	3 Waters	2347	Wastewater Trunk Main - Infill Upgrades	Wastewater	Capital LOS	250,000	500,000	700,000	275,000
Grand Total						**2,854,000**	**4,350,000**	**4,550,000**	**1,475,000**
					Average annual	**2,441,650**			
					Total over 30 y	**73,249,500**			

2024/25 Year5 (2028/29) Capital	2024/25 Year6 (2029/30) Capital	2024/25 Year7 (2030/31) Capital	2024/25 Year8 (2031/32) Capital	2024/25 Year9 (2032/33) Capital	2024/25 Year10 (2033/34) Capital	2024/25 Year11 (2034/35) Capital	2024/25 Year12 (2035/36) Capital	2024/25 Year13 (2036/37) Capital	2024/25 Year14 (2037/38) Capital	2024/25 Year15 (2038/39) Capital	2024/25 Year16 (2039/40) Capital	2024/25 Year17 (2040/41) Capital	2024/25 Year18 (2041/42) Capital
200,000	200,000	200,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
0	0	0	0	0	0	931,500	931,500	0	0	0	0	0	0
0	0	0	0	0	0	0	1,552,500	27,000	1,242,000	207,000	1,242,000	207,000	1,138,500
1,000,000	1,000,000	500,000	500,000	500,000	500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
600,000	750,000	295,000	650,000	789,000	310,000	0	0	0	0	0	0	0	0
1,800,000	**1,950,000**	**995,000**	**1,400,000**	**1,539,000**	**1,060,000**	**2,681,500**	**4,234,000**	**1,777,000**	**2,992,000**	**1,957,000**	**2,992,000**	**1,957,000**	**2,888,500**

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