Project Number: 2-WLASS.IJ

Plan Change 26

Water and Wastewater Infrastructure Assessment

18 April 2023

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Document History and Status

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Revision Details

Revision	Details
1	Draft
2	Final
3	Final V2 – PC26 scenario corrected

Contents

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Disclaimers and Limitations

This report ('Report') has been prepared by WSP exclusively for Waipā District Council ('Client') in relation to the assessment of water and wastewater infrastructure against the requirements of Draft Plan Change 26 (Enable Housing Supply Amendment Act) ('Purpose') and in accordance with the Waikato LASS panel instruction for Service dated 07 March 2023 (PO071930).

The findings in this Report are based on and are subject to the assumptions specified in the Report and those associated with the water and wastewater model builds for the purpose of Master Planning in Cambridge, Te Awamutu, and Kihikihi. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

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1 Introduction

As a result of the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (the Amendment Act), Waipā District Council (Council) is required to amend the operative Waipā District Plan (District Plan) to include new medium density residential standards. The proposed medium density residential standards apply to all relevant residential zones within the urban environments of Cambridge, Kihikihi and Te Awamutu.

The geographic layout of Cambridge, Te Awamutu and Kihikihi network areas are shown in Figure 1-1 including the growth cells in relation to each area.

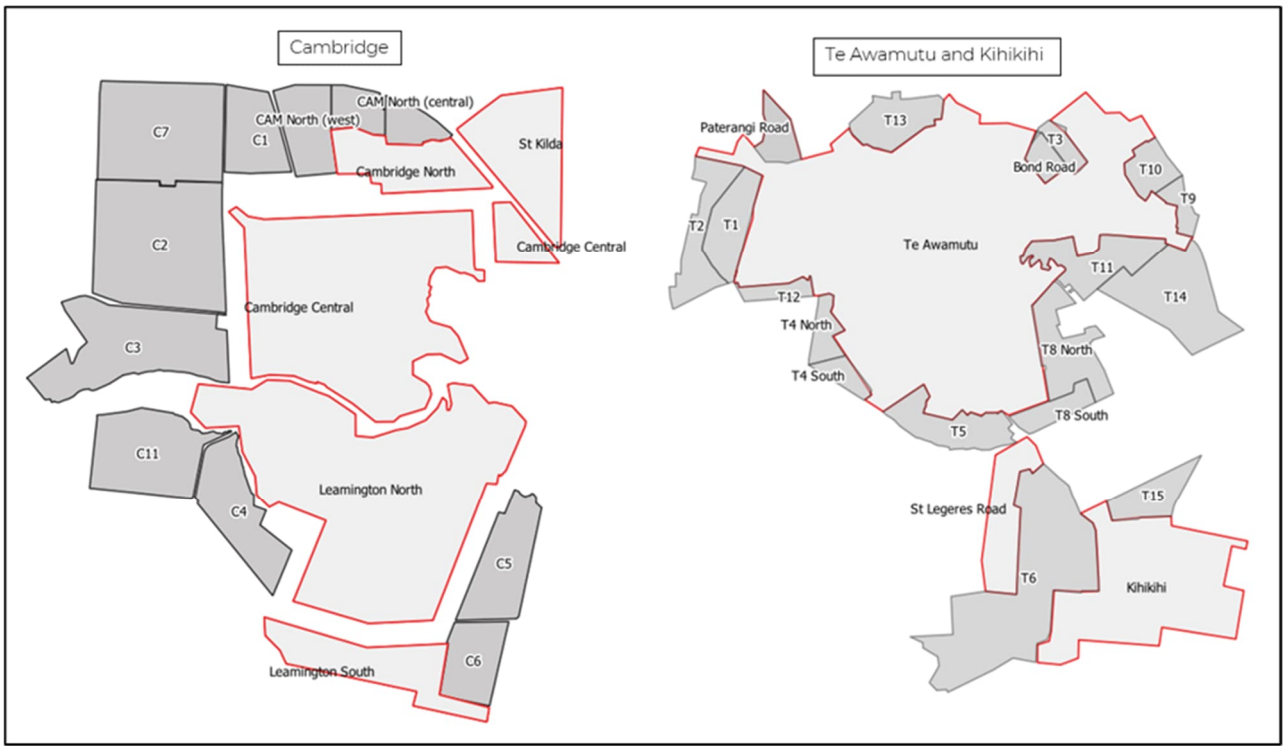


Figure 1-1: Layout of Cambridge, Te Awamutu and Kihikihi networks

Water and wastewater modelling assessments were carried out to investigate the impact of increasing housing intensification on the current 2050 water supply networks for Cambridge, Te Awamutu and Kihikihi. The findings are summarised in this report.

The assessment and outcomes presented in this report are based on master planning and associated modelling was undertaken for Waipā District Council 2050 Growth Plan[1]. The water and wastewater models were developed by WSP Ltd and cover the urban centres of Cambridge, Te Awamutu, and Kihikihi. The population data used to update the model were provided by m.e Consulting (Market Economics Ltd).

[1] Waipa District Council, Three Waters Master Plan 2020, May 2020

2 Scope and Modelling Scenarios

The scope of this modelling assessment is to identify the impact of proposed higher housing intensifications on the current (2050) Waipā DC water supply network.

The following tasks have been undertaken as part of this assessment:

- Review the 2050 growth plan model and assess the population per population data provided by the population consultant as mentioned above.
- Update the model with the proposed plan change 26 (PC26) including qualifying matters equivalent to two dwellings per lot for Cambridge, Te Awamutu and Kihikihi.
- Update the model with proposed medium density residential standards (MDRS) without qualifying matters equivalent to three dwellings per lot for Cambridge, Te Awamutu and Kihikihi.
- Produce maps indicating system performance for the infrastructure capacity assessment.

The following modelling scenarios have been assessed for both water and wastewater.

- **Scenario 1 – Existing 2050 growth network (Baseline)**

  2050 Growth Model (current Operative District Plan population scenario) – current master planning is based on this. Referred to as the 'Base Model'.

- **Scenario 2 - Plan Change 26 Network (PC26)**

  Including qualifying matters (equivalent 2 dwellings per lot). Referred to as the 'PC26 Model'.

- **Scenario 3 - Medium Density Residential Standards (MDRS)**

  Excluding qualifying matters (equivalent 3 dwellings per lot). Referred to as the 'MDRS Model'.

The modelling outputs are explained in this report. System performance maps are attached in Appendix A.

3 Assumptions

3.1 General Assumptions (Water and Wastewater)

- WSP used population data and parcel layouts provided by m.e Consulting (Market Economics Ltd) for PC26 and MDRS growth plan scenarios.
- The Waipā DC 2050 Growth Model was used as a baseline for comparison with the two higher densities scenarios. This model includes all growth cell demands across Cambridge, Te Awamutu and Kihikihi townships.
- All planned infrastructure upgrades from previous master planning project have been included in the model. No additional infrastructure is included to cater for higher densities so that the baseline comparison is based on the same network.

3.2 Wastewater Model Assumptions

- Population density per dwelling is considered 2.7 as per the Regional Infrastructure Technical Specification V1 (RITS) 2018 for all scenarios.
- Domestic Average Daily Flow (ADF) considered 200 litres per person per day as per the Regional Infrastructure Technical Specification V1 (RITS) 2018 for all scenarios.

4 Acceptance Criteria

4.1 Water Supply Acceptance Criteria

The following criteria were used for the hydraulic assessment:

- **Level of Service (LoS) – Minimum pressure**: 200 kPa (20 m) pressure at every connection point as per RITS and Council guidelines.
- **LoS – Total Unit Headloss**: Total Unit Headloss (m/km) of the proposed pipe and the existing supply pipe was also investigated as per NZS 4404:2010.
    - 5 m/km for DN ≤ 150 mm diameter.
    - 3 m/km for DN ≥ 200 mm diameter.

    As the headloss of a supply pipe increases, the efficiency of the network to meet the demands decreases. An inefficient network is more at risk of unforeseen pressure issues.

- **Fire flow:** New Zealand Fire Service Code of Practice; SNZ PAS 4509:2008 and subsequent amendments, to the satisfaction of the New Zealand Fire Service. Table 4-1 lists the minimum fire flow requirements (for a single hydrant).

Table 4-1: Fire Flow Requirements as per Fire Fighting Water Supply Code of Practice

Code	Description	Requirements	
		Minimum Fire Flow (L/s)	Minimum Residual Pressure at Required Fire Flow (m)
FW2	Residential	12.5	10

Limitations in the hydraulic modelling software only allow the fire flow analysis for one hydrant at a time. Therefore, WSP has adopted a methodology used for Wellington Water for a similar exercise, this is explained below.

For residential fire flows (FW2), the flow from a single hydrant is used to assess the likely flow from two hydrants. If the average flow is greater than or equal to 25 L/s, the flow from one hydrant meets the FW2 requirements. The use of this approach also creates a buffer to cater for any uncertainty in the models.

Therefore, WSP used the values listed in Table 4-2 to test the fire hydrants.

Table 4-2: Fire Flow Requirements used by WSP in this Assessment

Fire Flow Classification	Minimum Required Flow (L/s)	Minimum Residual Pressure (m)
FW2	25	10

4.2 Wastewater Acceptance Criteria

The following criteria were used for the hydraulic assessment:

- For peak wet weather flow in the wastewater network (Pipes):
    - **Surcharge > 2 (Slope Hydraulic Gradient Line < Slope of Pipe) -** Water level at the upstream and / or downstream end of the pipe is greater than the soffit level, and the flow is greater than the pipe's full capacity. No Capacity in pipe for more flow.

- **Surcharge > 1 (Slope of Hydraulic Gradient line > Slope of the pipe) -** Water level at the upstream and / or downstream end of the pipe is above the soffit level, and the flow is less than or equal to the pipe's full capacity. Minimum Capacity in pipe for more flow.
- **0.7 <= Depth / Diameter (d/D) ratio < 1 -** Pipe is not surcharged. The water level is below the soffit level at both ends of the pipe. Surcharge State is calculated as the ratio of water depth to pipe height. Capacity in pipe for more flow.

- For peak wet weather flows in the wastewater network (at Manholes):
  - **Flood Volume > 0 m^3** - Potential overflow location

The above criteria are used on maps indicating the performance analysis of the wastewater network for the growth plan with respect to Baseline, PC26 and MDRS growth.

5 Methodology

5.1 Methodology for Water Supply Modelling

- **For Base Model:**
  - The 2050 Growth Model was used (as a baseline) to obtain LoS and fire flow results.
- **For PC26 and MDRS:**
  - The population data provided by m.e Consulting were imported to the model as customer points.
  - Assigned the specific consumption and demand category to each customer point based on their location (area code).
  - The existing customer points in the model were deleted to avoid demand double-ups.
  - The imported customer points were allocated to the nearest pipes.
  - Ran the models to obtain LoS and fire flow results.
- **Summary of the dwelling data:**
  - Table 5-1 summarises the number of dwellings in each area in each different scenario.
  - The total number of dwellings for Scenario 1 was taken from the Base model.
  - The total number of dwellings for PC26 and MDRS were taken from the population data provided by m.e Consulting.

Table 5-1: Summary of the number of dwellings in each scenario

Network	Existing 2050 Growth – Baseline Model	PC26 – Plan Change 26	MDRS (Medium Density Resident Standards)
Cambridge	15,670	~~19,790~~28,173	39,761
Te Awamutu and Kihikihi	13,093	~~15,653~~24,901	35,585

5.2 Methodology for Wastewater Modelling

The existing population in the 2050 growth model was unchanged and used as the baseline model on which the development of PC26 and MDRS is based. Growth cells were included In the PC26 and MDRS based on the parcels with dwellings growth given by m.e Consulting (Market Economics Ltd), the same can be seen in the maps provided in the Appendix.

No other changes were made to the model, the growth plan wastewater profile was used for all the scenarios.

The following sections give a brief idea about the total population modelled as per the dwellings data and three scenarios were assessed for a 5-year 2-hour design storm event, to understand the performance of the system.

5.2.1 Dwellings in each catchment

This section outlines the current densities used in planning and the proposed densities that will apply under the plan change processes.

Table 5-2 gives the total number of dwellings for ~~2022~~2050 growth plan, PC26 and MDRS for all three catchments for assessment.

Table 5-2: Total number of dwellings for the following catchments

Catchments	Existing 2050 Growth – Baseline Model	PC26 – Plan Change 26	MDRS (Medium Density Resident Standards)
Cambridge	15,670	~~19,790~~28,173	39,761
Te Awamutu and Kihikihi	13,093	~~15,653~~24,901	35,585

5.2.2 Population

Applying population density per dwelling equal to 2.7 based on Regional Infrastructure Technical Specification V1 (RITS) 2018, Table 5-3 gives detail of the total population in the catchment based on existing 2050 growth, PC26 and MDRS growth.

Table 5-3: Total population for the following catchments

Catchments	Existing 2050 Growth – Baseline Model	PC26 – Plan Change 26	MDRS (Medium Density Resident Standards)
Cambridge	42,309	~~53,433~~76,067	107,355
Te Awamutu and Kihikihi	35,351	~~42,263~~67,233	96,080

Table 5-4 shows the population modelled as per the following scenario based on the dwellings per lot based on data provided by m.e Consulting (Market Economics Ltd).

1 Existing 2050 Growth Model – Baseline Model
2 Plan Change 26 (PC26) – 2 dwellings per lot
3 Medium Density Resident Standards (MDRS) – 3 dwellings per lot

Table 5-4: Total Population modelled in each scenario for the following catchments

Catchments	Existing 2050 Growth – Baseline Model	PC26 – Plan Change 26	MDRS (Medium Density Resident Standards)
Cambridge	47,502	~~53,490~~77,269	107,506
Te Awamutu and Kihikihi	30,129	~~42,285~~67,311	96,967

6 Modelling Results – Water Supply

6.1 Cambridge LoS and Fire Flow results

6.1.1 LoS Results

The minimum pressure and maximum headloss results in Cambridge were taken for each scenario and are summarised below. Please refer to Appendix A for system performance maps for each scenario.

6.1.1.1 Existing 2050 growth Network (Baseline)

The minimum pressure across the area is generally above 20 m, except some parts of Cambridge North. Maximum headloss of the water supply pipes are less than 1.5 m/km for most parts of the network.

6.1.1.2 Plan Change 26 (PC 26) Network

The minimum pressure is below 20 m in most parts of Cambridge. Only some areas around Watkins reservoir and Dominion Ave/ Duke St still maintain a minimum pressure above 20 m. This is a significant decrease in the minimum pressure compared to Scenario 1. The maximum headloss of the supply pipes across the area ranges between 1.5 – 10 m/km which is an increase compared to Scenario 1.

6.1.1.3 Medium Density Resident Standards (MDRS) network

The minimum pressure results are like Scenario 2, where it is below 20 m for most parts of Cambridge except for a smaller area near Watkins reservoir. The maximum headloss of the water supply pipes has increased and ranges between 5 m/km and 20 m/km in most parts of Cambridge. There are some areas in North Cambridge and Leamington where the maximum headloss of the pipes exceeds 20 m/km.

In summary, the network performance (for minimum pressure and maximum headloss) decreases with the increasing population density. The current Cambridge water supply network is not capable of meeting the additional demands created by Scenario 2 and Scenario 3.

6.1.2 Fire Flow Results

The hydrants within the Cambridge area were tested for FW2 criteria. A summary of the fire flow results is shown in Table 6-1.

Table 6-1: Summary of fire flow results for Cambridge

Scenario	Total Hydrants	Hydrants Passed	Hydrants Failed	% Passed (%)
Base Model	894	688	206	77
PC26	894	~~681~~678	~~213~~216	76
MDRS	894	665	229	74

As shown in the table, the number of hydrants not meeting FW2 criteria remains generally the same across all three scenarios, with a slight increase in the number of hydrants failing as the population density increases.

6.2 Te Awamutu/Kihikihi LoS and Fire Flow results

6.2.1 LoS Results

The minimum pressure and maximum headloss results in Te Awamutu and Kihikihi were taken for each scenario and are summarised below. Please refer to Appendix A for system performance maps for each scenario.

6.2.1.1 Existing Model – 2050 Growth (Baseline) Network

The minimum pressure across the whole Te Awamutu and Kihikihi areas is generally above 20 m. Maximum headloss of the water supply pipes is less than 1.5 m/km for most parts of the network except for a few areas (i.e., Te Awamutu CBD) where the headloss ranges between 1.5 m/km and 10 m/km.

6.2.1.2 Plan Change 26 (PC 26) Network

The minimum pressure in ~~some areas including the lower~~ Te Awamutu ~~area and Cambridge Rd area~~ is generally below 20 m, except for the area near Pakura St (between Alexandra St and Frontier Rd), and the area around Factory Rd.

The minimum pressure of the whole Kihikihi area is below 20 m, as Taylors Hill reservoirs not being able to supply enough water to Kihikihi via the new pipeline.

~~Some of the areas (Te Rahu Road) maintain pressure between 10 m and 20 m. The minimum pressure in the rest of Te Awamutu is generally above 20 m.~~

The maximum headloss in the network has generally increased across the township compared to Scenario 1. Most of the Te Awamutu CBD area, lower Te Awamutu area and Cambridge Rd area are experiencing a higher headloss between 5 and 20 m/km.

6.2.1.3 Medium Density Resident Standards (MDRS) network

The minimum pressure across the Te Awamutu and Kihikihi networks are below 20 m. The maximum headloss across the networks is generally over 20 m/km.

In summary, the network performance (for minimum pressure and maximum headloss) decreases with the increasing population density. The current Te Awamutu water supply network is not capable of meeting the additional demands created by PC 26 and MDRS, with MDRS creating the most significant impacts.

6.2.2 Fire Flow Results

The hydrants within Te Awamutu and Kihikihi areas were tested for FW2 criteria. A summary of the fire flow results is shown in Table 6-2.

Table 6-2: Summary of fire flow results for ~~Cambridge~~Te Awamutu

Scenario	Total hydrants	Hydrants Passed	Hydrants Failed	% Passed (%)
Base Model	859	774	85	90
PC26	859	~~760~~753	~~99~~106	88
MDRS	859	722	137	84

The number of hydrants not meeting FW2 criteria slightly increases with the increasing population density in each scenario.

7 Modelling Results – Wastewater

7.1 Cambridge

7.1.1 Existing 2050 growth Network (Baseline)

Much of the existing network is predicted to operate under a surcharge condition in wet weather. The trunk network downstream to the treatment plant is also predicted to surcharge.

Three potential overflows are identified in the model results: two within the local network in the Leamington area, and one in the north of Cambridge.

Parts of the Leamington network may be able to accommodate some infill and intensification on a local level.

The central network is planned to receive a lot of future flows from adjacent growth areas. This means that existing issues will not only be compounded by internal infill but also by other areas.

However, wider redevelopment across the area is anticipated to cause issues requiring strategic upgrades due to surcharge conditions and several overflows in the trunk sewer to the treatment plant.

7.1.2 Plan Change 26 (PC 26) Network

Densification for the PC26 currently planned densities i.e., 2 dwellings per lot, will contribute to issues that are likely to require additional strategic upgrades through the Cambridge wastewater networks.

~~Eight~~13Thirteen potential overflows are identified in the model results: ~~four~~11 within the local network in the Leamington area, ~~one~~two in the north of Cambridge and three in Cambridge central.

The PC26 network is predicted to operate under a surcharge condition in wet weather, worse than the existing network, the trunk network downstream to the treatment plant is also predicted to have a surcharge.

The central network is a lot of flows from adjacent growth areas with the PC26 densification. This means that existing issues will not only be compounded by internal infill but also by other areas.

7.1.3 Medium Density Resident Standards (MDRS) network

Densification for MDRS's currently planned densities i.e., 3 dwellings per lot will contribute to issues through the Cambridge wastewater networks.

30 potential overflows are identified in the model results. Refer to Appendix A for more detail on the location of this overflow.

The MDRS network is predicted to operate under a worse surcharge condition in wet weather, and the trunk network downstream to the treatment plant is also predicted to have a surcharge. Refer to Appendix A for more detail on the surcharge areas in the network.

7.2 Te Awamutu and Kihikihi

7.2.1 Existing Model – 2050 Growth Network (Baseline)

Most of the upper local networks in Te Awamutu are predicted to have spare capacity with most areas having a pipe utilisation of less than 50 % in peak wet weather. However, surcharging is predicted in much of the trunk network where upper network flows combine, and strategic sewers onto the treatment plant.

Six potential overflows are identified in the model results within the Te Awamutu network.

Parts of the network may be able to accommodate some infill and intensification on a local level. However, wider redevelopment within Te Awamutu is anticipated to cause issues requiring strategic upgrades due to surcharge conditions and predicted overflows in the main trunk sewer network.

Most of the upper local networks in Kihikihi are predicted to have spare capacity with most areas having a pipe utilisation of less than 50 % in peak wet weather. However, surcharging is predicted in some pipelines.

The key issue for Kihikihi is capacity in the transfer of sewer to Te Awamutu and on through the Te Awamutu network. Most of the strategic network downstream of Kihikihi is predicted to operate under surcharge conditions, with some overflow predicted, in 2050.

Parts of the network may be able to accommodate some infill and intensification on a local level. However, wider redevelopment within Kihikihi is anticipated to cause issues requiring strategic upgrades due to surcharge conditions and predicted overflows in the main sewer trunk network downstream through the transfer sewer and within Te Awamutu.

7.2.2 Plan Change 26 (PC 26) Network

Densification for PC26's currently planned densities i.e., 2 dwellings per lot, will contribute to issues that are likely to require additional strategic upgrades through the Te Awamutu wastewater networks. All will discharge through the central Te Awamutu trunk waste network and onto the treatment plant.

~~Eleven~~A total of 22 potential overflows are identified in the model results: ~~Nine~~14 within the local network in the Te Awamutu, and ~~two~~eight in the Kihikihi catchment.

The trunk sewer network receives a lot of flows from adjacent growth areas with the PC26 densification~~,~~ and from the Kihikihi catchment. This means that existing issues will not only be compounded by internal infill but also by other areas.

7.2.3 Medium Density Resident Standards (MDRS) network

Densification for MDRS's currently planned densities i.e., 3 dwellings per lot will contribute to issues through the Te Awamutu wastewater networks.

A total of 39 potential overflows are identified in the model results: 25 in the Te Awamutu catchment. Eleven potential overflows on the main trunk sewer to Te Awamutu WWTW.

Refer to Appendix A for more detail on the location of the predicted overflows.

The MDRS network is predicted to operate under a worse surcharge condition in wet weather, and the trunk network downstream to the treatment plant is also predicted to have a surcharge and potential overflows.

Refer to Appendix A for more detail on the surcharge areas in the network.

8 Conclusions

WSP has carried out water and wastewater modelling assessments to identify the overall impact of increasing housing intensifications on the current Waipā DC 2050 base model.

The following scenarios were assessed:

- **Scenario 1 – Existing 2050 growth Model (Baseline) Network**
  2050 Growth Model (current Operative District Plan population scenario)
- **Scenario 2 – Plan Change 26 (PC26) Network**
  Including qualifying matters (equivalent 2 dwellings per lot)
- **Scenario 3 – Medium Density Residential Standards (MDRS) Network**
  Excluding qualifying matters (equivalent 3 dwellings per lot)

Water supply modelling results for system performance (minimum pressure, maximum headloss and fire flow) trended as follows:

- Minimum pressure of the network decreases (below 20 m and in some cases 10 m) as the population density increases.
- Maximum headloss of the water supply pipes increases as the population density increases.
- The number of hydrants failing for FW2 criteria slightly increases as the population density increases.

The wastewater modelling results for system performance (Potential overflows, network hydraulic incapacity) trended as follows.

- The number of potential overflows increase as the population density increases.
- Pipe surcharge increases as the population density increases, thus there is less hydraulic capacity.
- Issues with surcharge/pipe incapacity and potential overflows on the main trunk sewer increases as the population density increases.

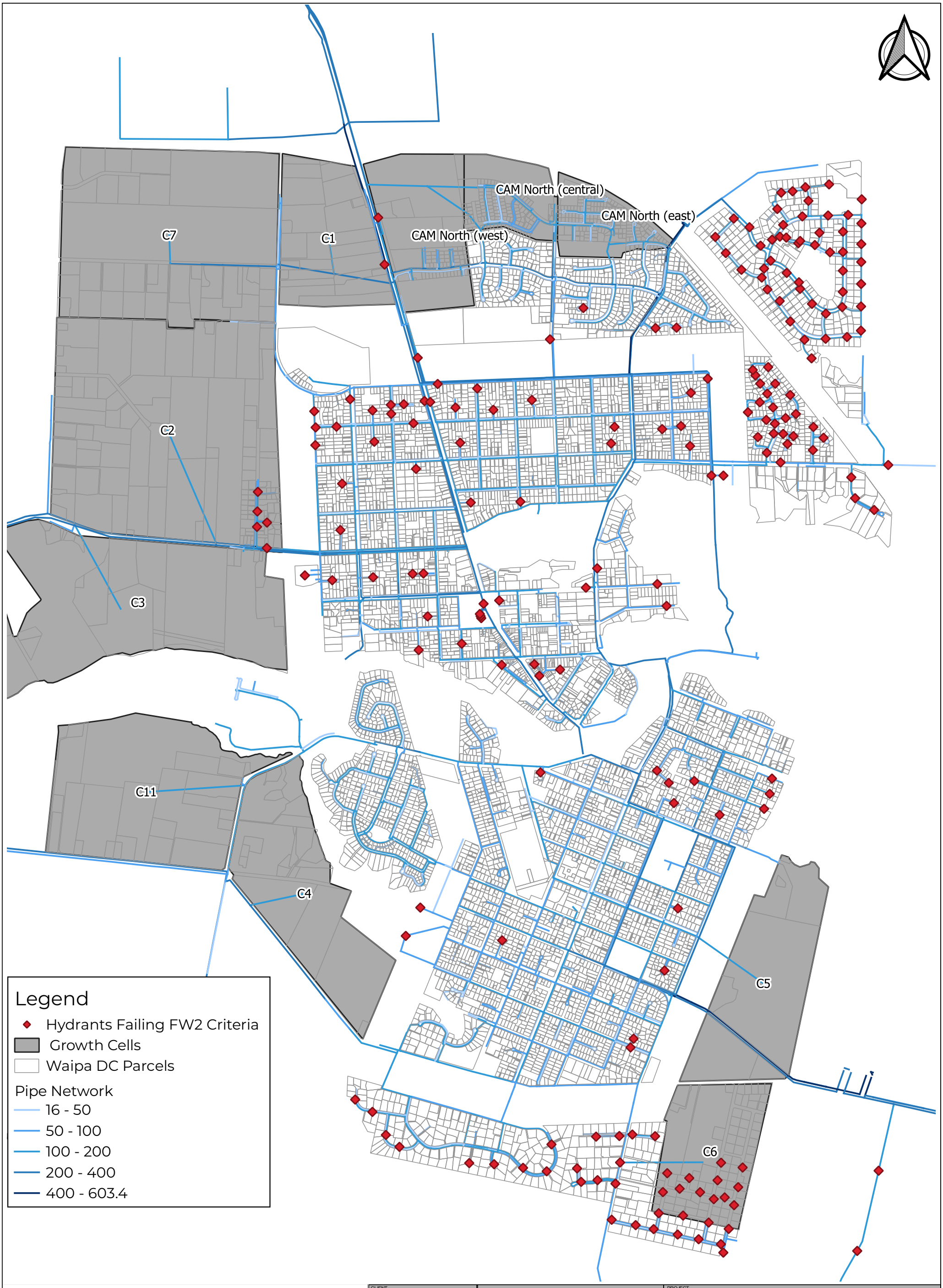
In conclusion, the assessment showed that water and wastewater networks will have significant issues unless additional infrastructure is planned and implemented.

While PC26 has adverse effects on the existing 2050 network, MDRS is the worst-case scenario. Therefore, it is appropriate to have an infrastructure overlay as proposed, to control all development above 2 dwellings per lot.

The widespread nature of the predicted issues means that adverse effects could occur away from a particular development. Therefore, no areas can be confidently removed from the overlay and targeted assessment remains the preferred tool for development above the proposed acceptable level.

Appendix A

Water and Wastewater System Performance Maps



CLIENT: Waipa District Council

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DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:20,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Hydrants Failing for FW2 Criteria scenario 1
(2050 Baseline)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

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CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

- Hydrants Failing FW2 Criteria
- Growth Cells
- Waipa DC Parcels

Pipe Network

- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

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New Zealand

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1 of 1	1:20,000

PROJECT
Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET
2050 System Performance Maps
Cambridge - Hydrants Failing for FW2 Criteria scenario 2
(Plan Change 26)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	18/04/2023	R1

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CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

- Hydrants Failing FW2 Criteria
- Growth Cells
- Waipa DC Parcels

Pipe Network

- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

CLIENT

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New Zealand

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PROJECT
Waipa District Council
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SHEET
2050 System Performance Maps
Cambridge - Hydrants Failing for FW2 Criteria scenario 3
(Medium Density Residential Standards - MDRS)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	10/03/2023	R0

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CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

Min Pressure Results
- Below 10m
- Between 10m and 20m
- Between 20m and 30m
- Above 30m
- Growth Cells
- Waipa DC Parcels

Pipe Network
- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

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SCALE: 1:20,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Minimum Pressure Results for scenario 1 (2050 Baseline)

PROJECT NUMBER: 2-WLASS.IJ
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REVISION: R0

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CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

Min Pressure Results
- Below 10m
- Between 10m and 20m
- Between 20m and 30m
- Above 30m
- Growth Cells
- Waipa DC Parcels

Pipe Network
- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

CLIENT: Waipa DISTRICT COUNCIL

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan
SHEET NUMBER	SCALE
1 of 1	1:20,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Minimum Pressure Results for scenario 2 (Plan Change 26)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	18/04/2023	R1

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-04-17 15:01:31 by Galabadage, Pramodi (pga191)

CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

Min Pressure Results
- Below 10m
- Between 10m and 20m
- Between 20m and 30m
- Above 30m
- Growth Cells
- Waipa DC Parcels

Pipe Network
- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:20,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Minimum Pressure Results for scenario 3
(Medium Density Residential Standards - MDRS)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-09 11:18:29 by Galabadage, Pramodi (pga191)

CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

Maximum Unit Pipe Headloss

- Less than 1.5 m/km
- Between 1.5 and 5 m/km
- Between 5 and 10 m/km
- Between 10 and 20 m/km
- Above 20 m/km
- Growth Cells
- Waipa DC Parcels

CLIENT: Waipa District Council

WSP
Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:20,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Maximum Headloss Results for scenario 1 (2050 Baseline)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2WV2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-06 16:32:31 by Galabadage, Pramodi (pga191)

CAM North (central)
CAM North (east)
CAM North (west)
C7
C1
C2
C3
C11
C4
C5
C6

Legend

Maximum Unit Pipe Headloss

- Less than 1.5 m/km
- Between 1.5 and 5 m/km
- Between 5 and 10 m/km
- Between 10 and 20 m/km
- Above 20 m/km
- Growth Cells
- Waipa DC Parcels

CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:20,000

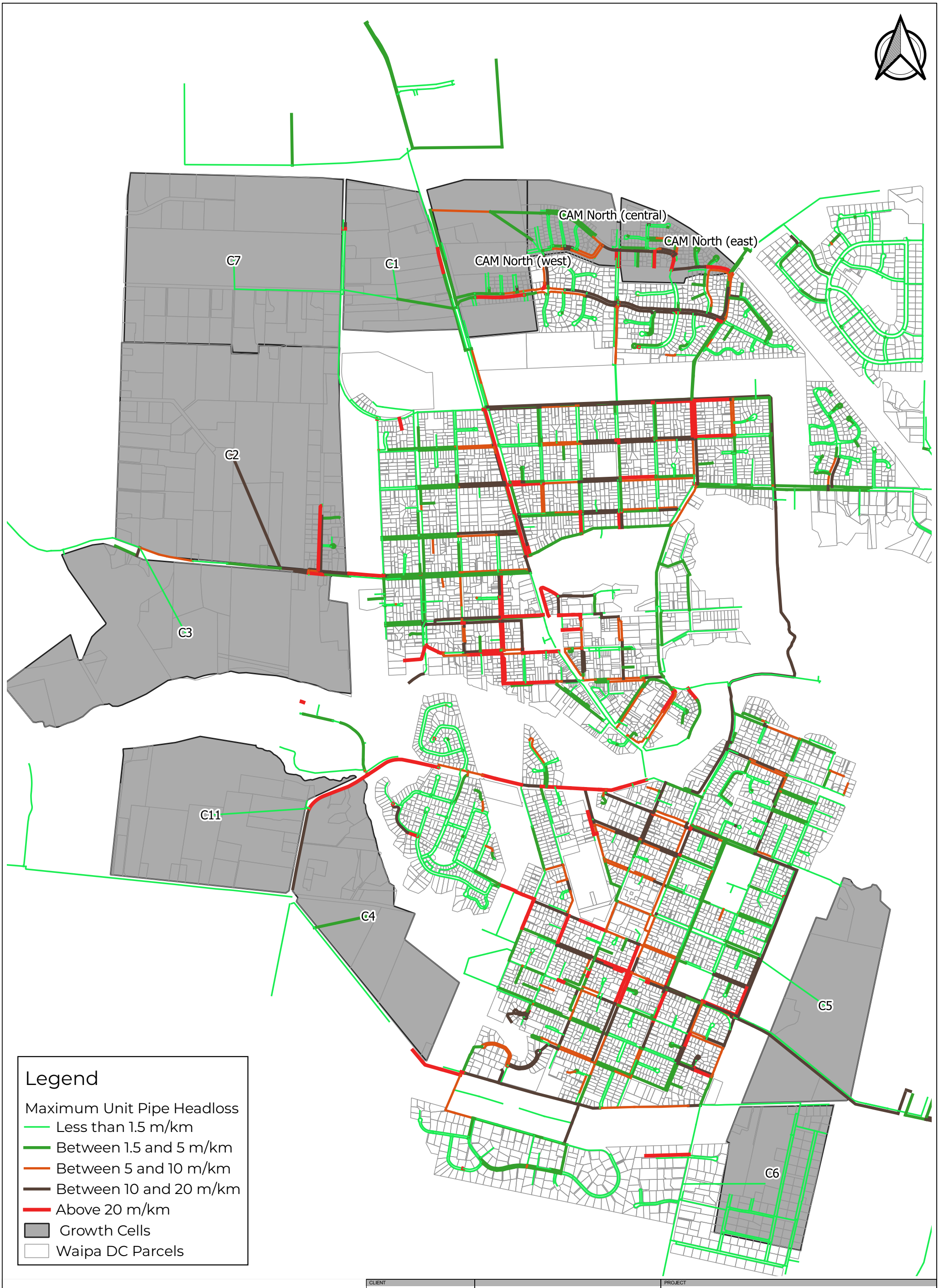
PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Maximum Headloss Results for scenario 2 (Plan Change 26)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 18/04/2023
REVISION: R1

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-04-17 15:04:55 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

WSP — Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:20,000

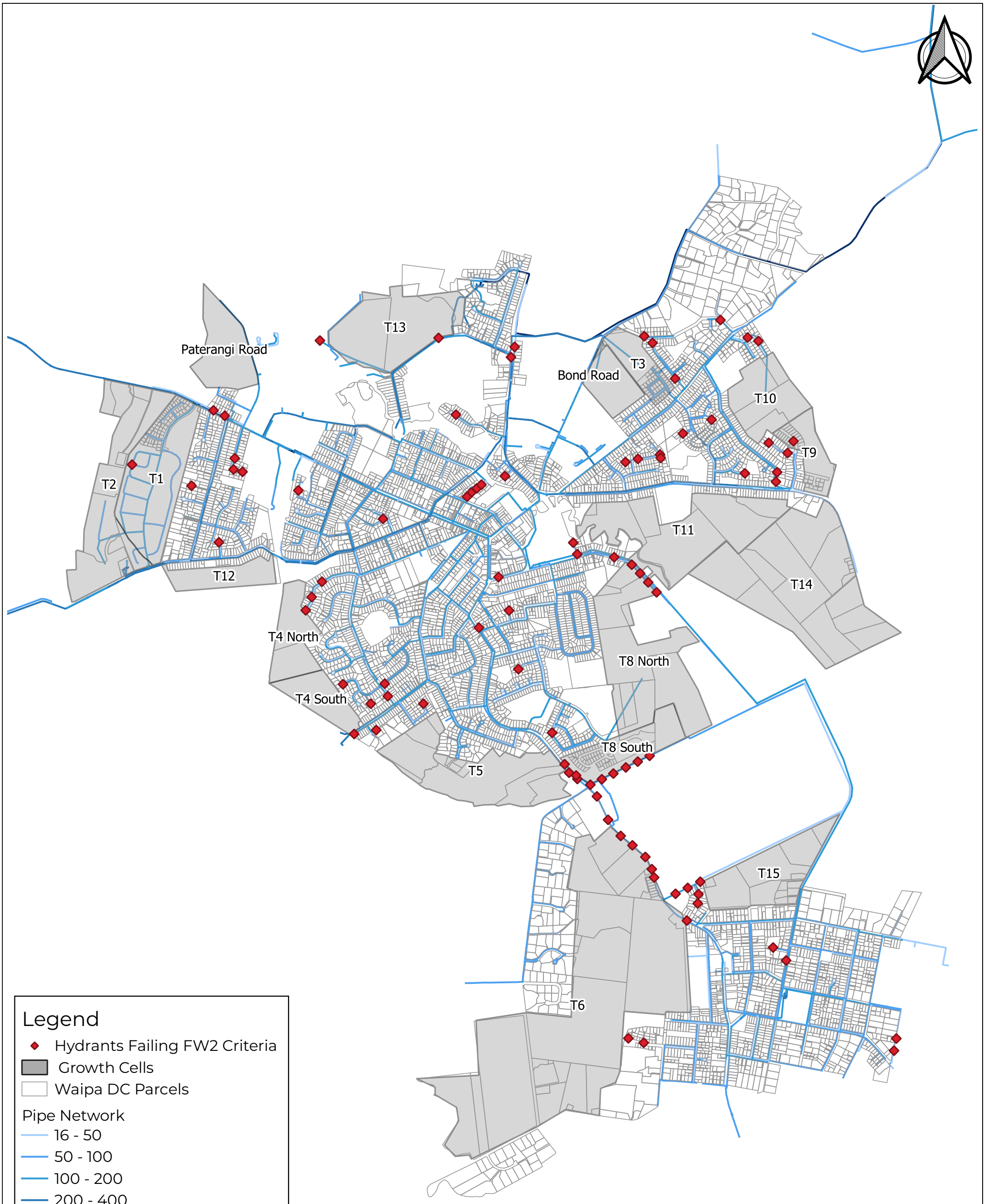
PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Cambridge - Maximum Headloss Results for scenario 3
(Medium Density Residential Standards - MDRS)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2WV2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-07 15:06:34 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:25,000

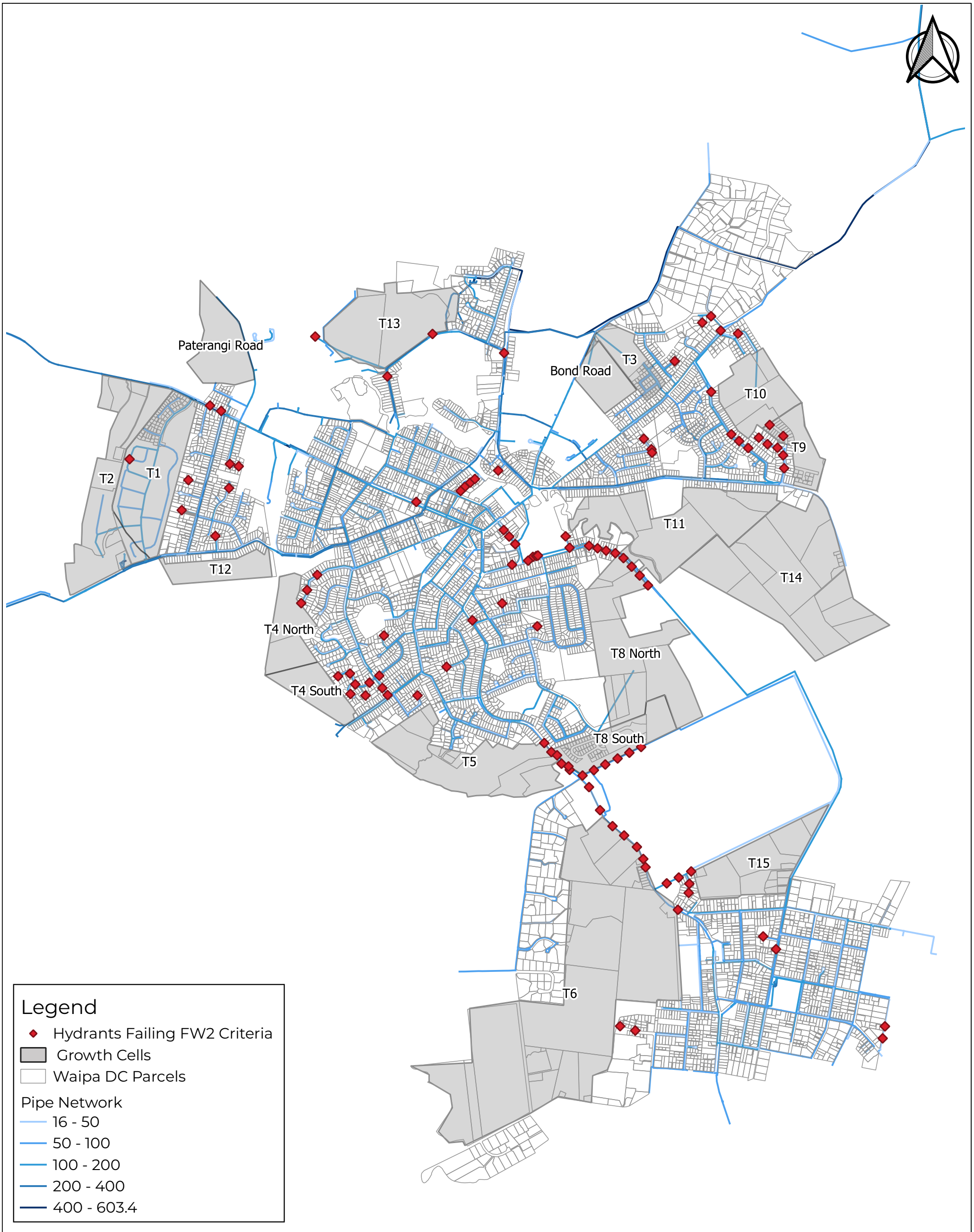
PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Hydrants Failing for FW2 Criteria scenario 1 (2050 Baseline)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-08 10:41:44 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

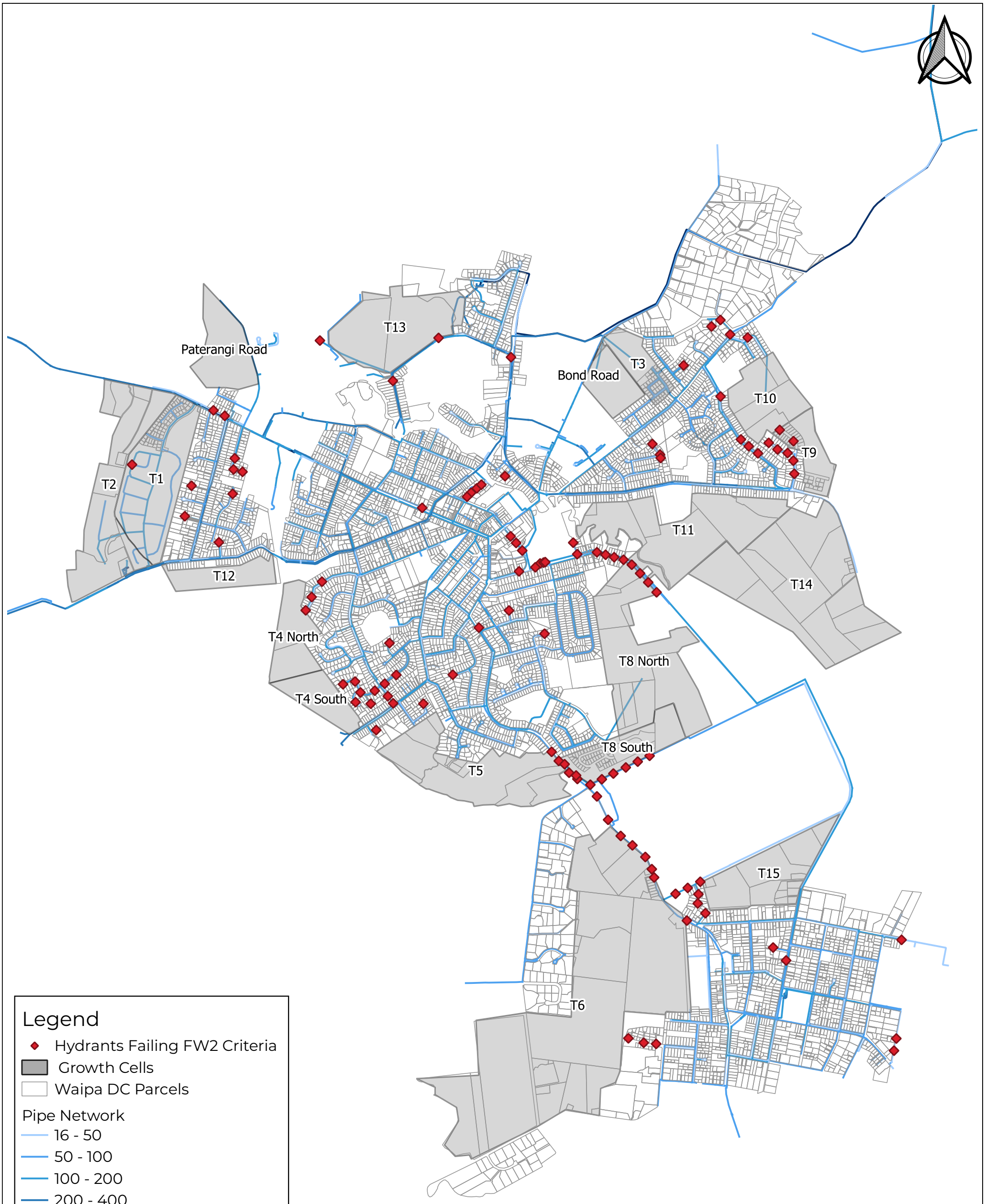
PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Hydrants Failing for FW2 Criteria scenario 3 (Plan Change 26)

DRAWN	APPROVED			
P. Galabadage	J. Viyakesparan			
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:25,000	2-WLASS.IJ	18/04/2023	R1

File Ref: U:\Projects\NZ\2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-04-17 14:29:40 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Hydrants Failing for FW2 Criteria scenario 3 (Medium Density Residentia Standards - MDRS)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

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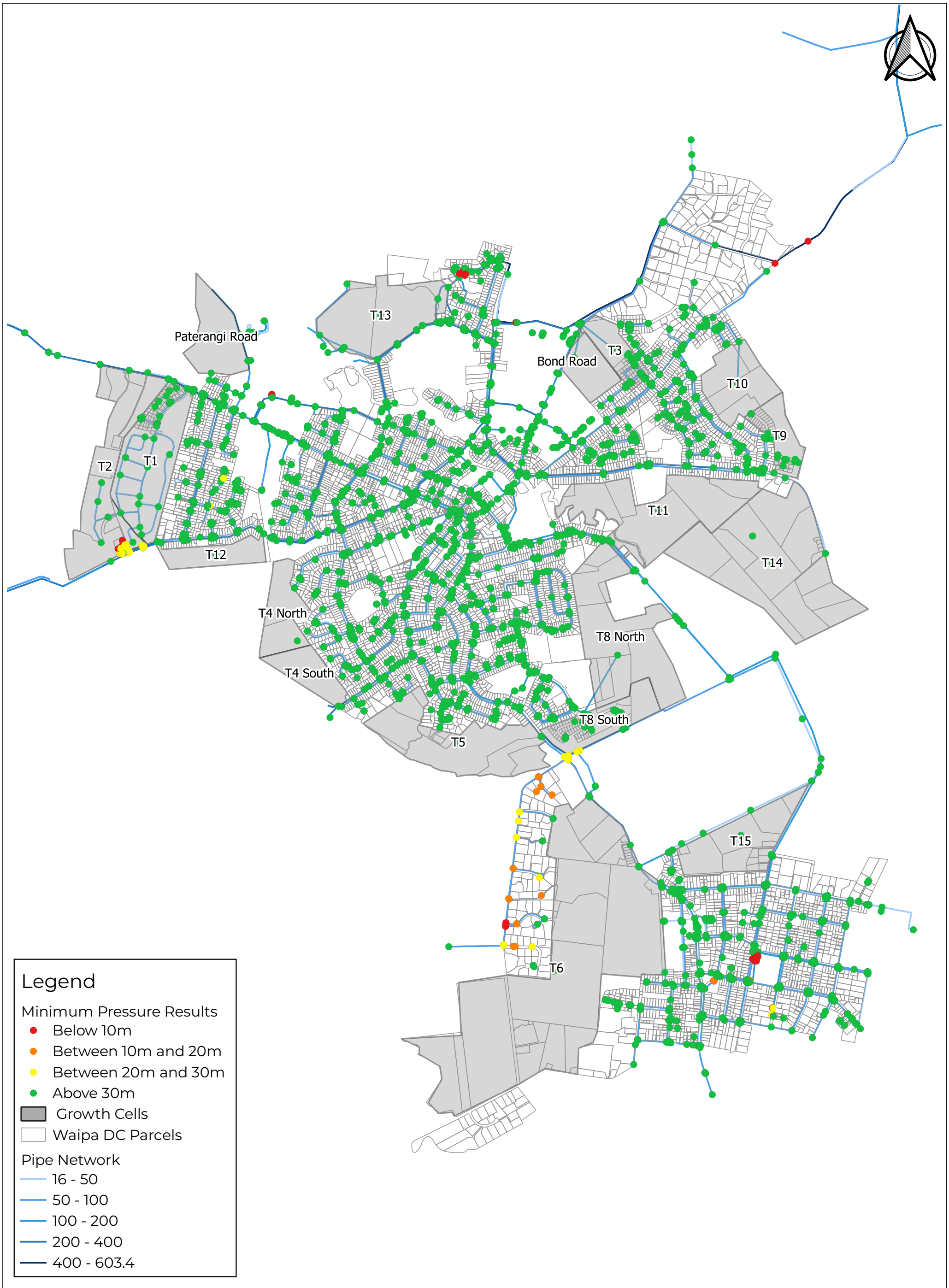

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New Zealand

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan
SHEET NUMBER	SCALE
1 of 1	1:25,000

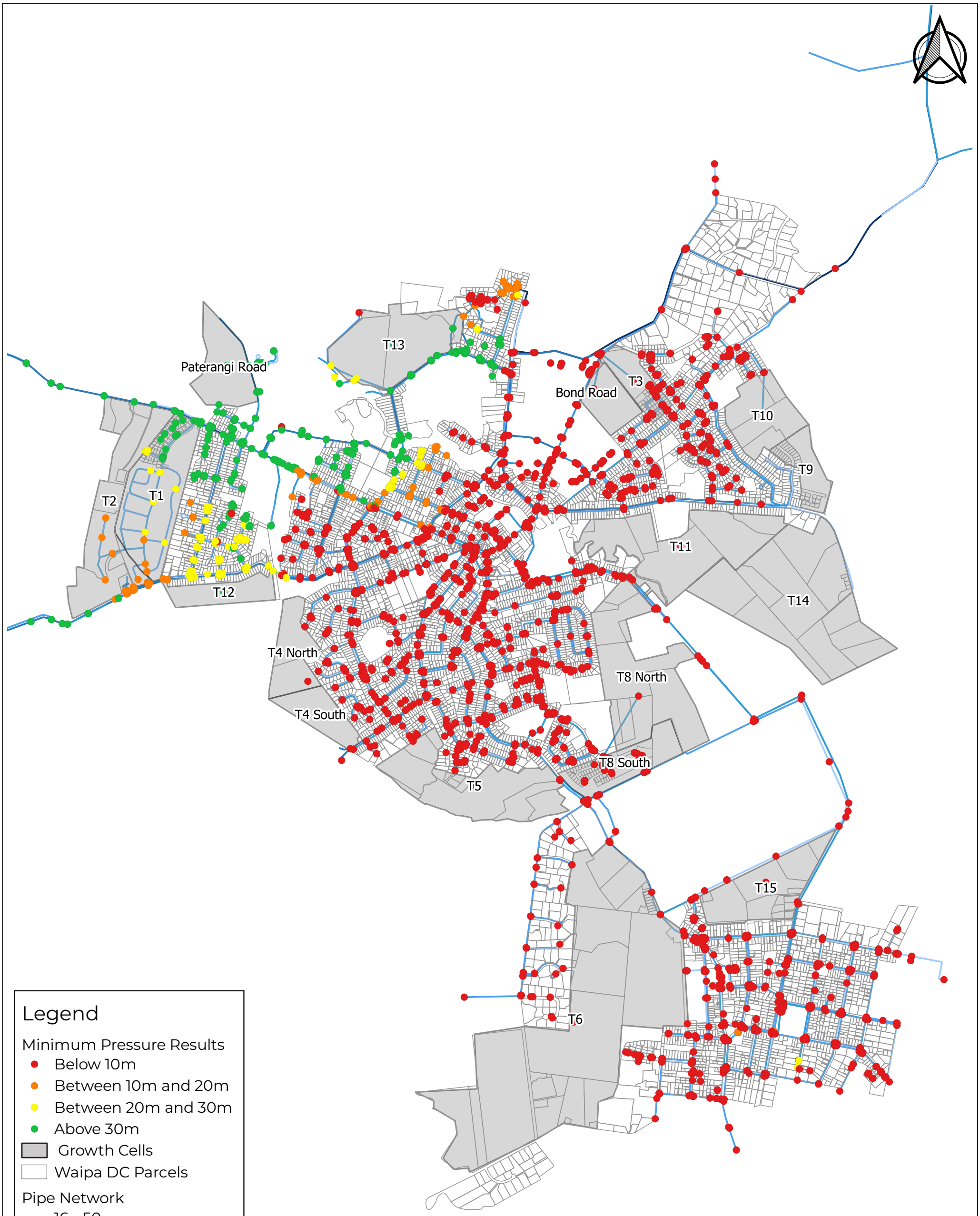
PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Minimum Pressure Results for scenario 1 (2050 Baseline)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	10/03/2023	R0

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-09 11:29:18 by Galabadage, Pramodi (pga191)



Legend

Minimum Pressure Results
- Below 10m
- Between 10m and 20m
- Between 20m and 30m
- Above 30m
- Growth Cells
- Waipa DC Parcels

Pipe Network
- 16 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- 400 - 603.4

CLIENT: Waipa District Council

WSP
Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan
SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

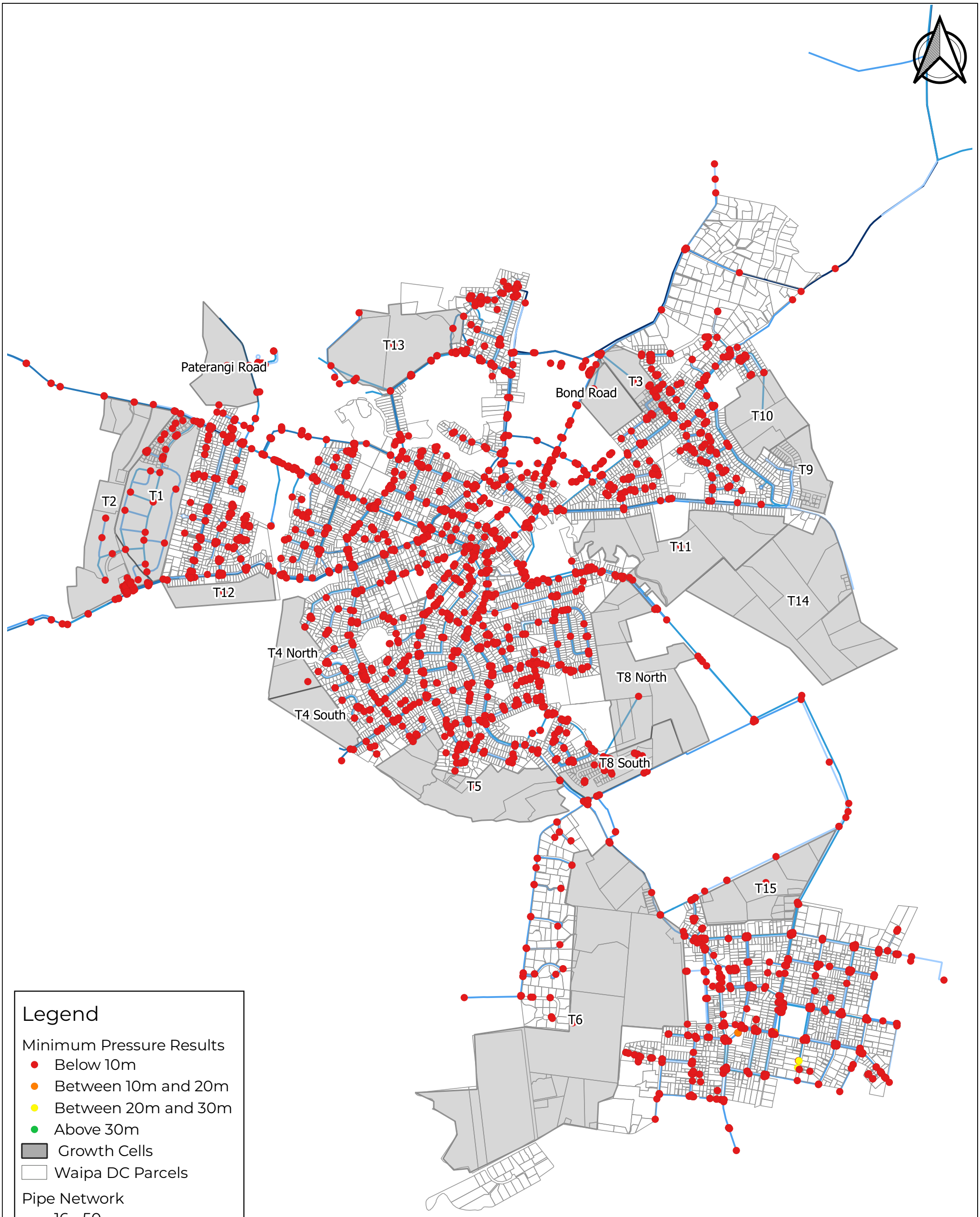
SHEET: 2050 System Performance Maps
Te Awamutu - Minimum Pressure Results for scenario 2 (Plan Change 26)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.HP	18/04/2023	R1

File Ref: U:\Projects\NZ\2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-04-17 14:22:49 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

Hamilton Office
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Hamilton 3204
New Zealand

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan
SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Minimum Pressure Results for scenario 3 (Medium Density Residential Standards - MDRS)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	10/03/2023	R0

File Ref: U:\Projects\NZ\2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

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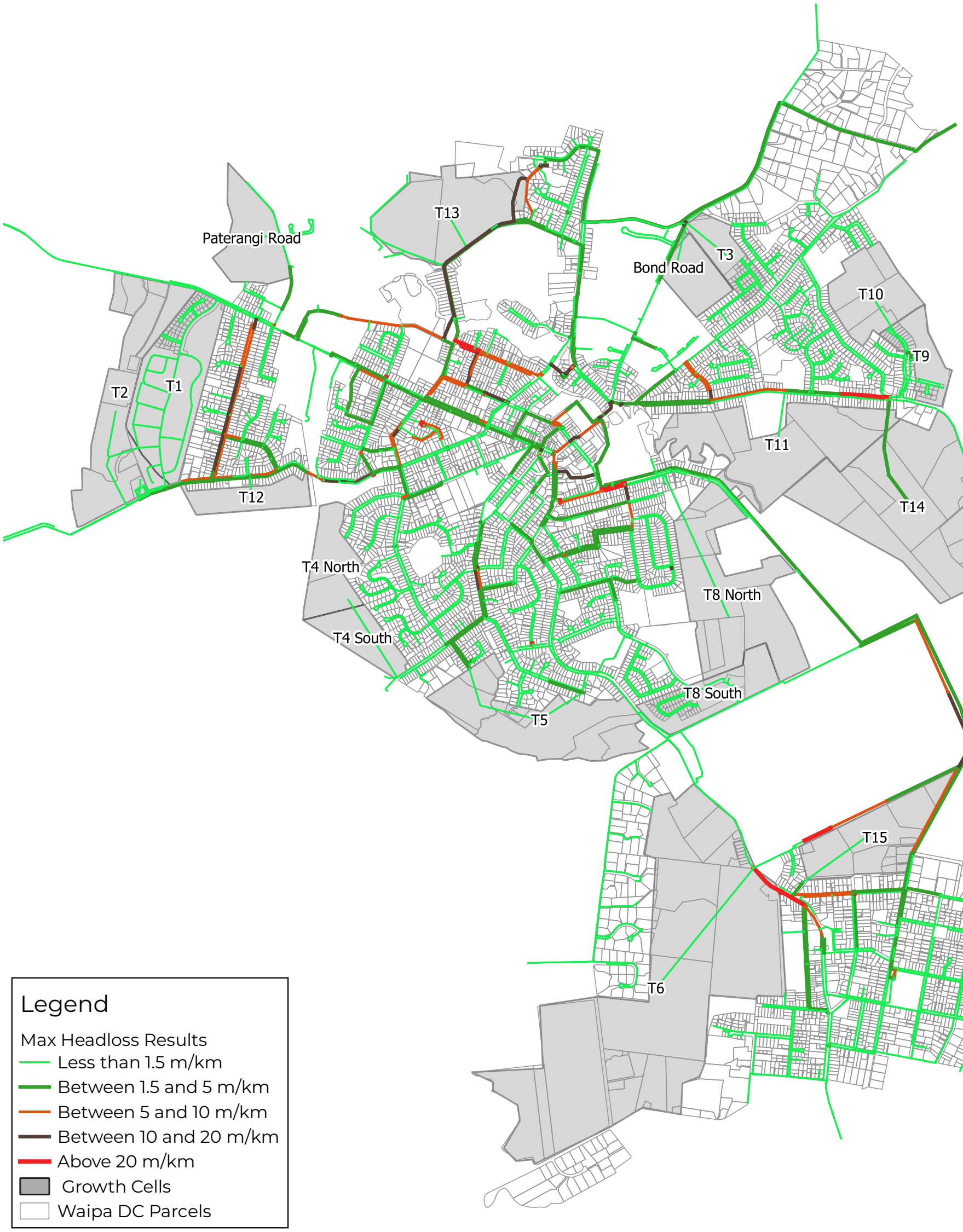


Legend

Max Headloss Results

- Less than 1.5 m/km
- Between 1.5 and 5 m/km
- Between 5 and 10 m/km
- Between 10 and 20 m/km
- Above 20 m/km
- Growth Cells
- Waipa DC Parcels

CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

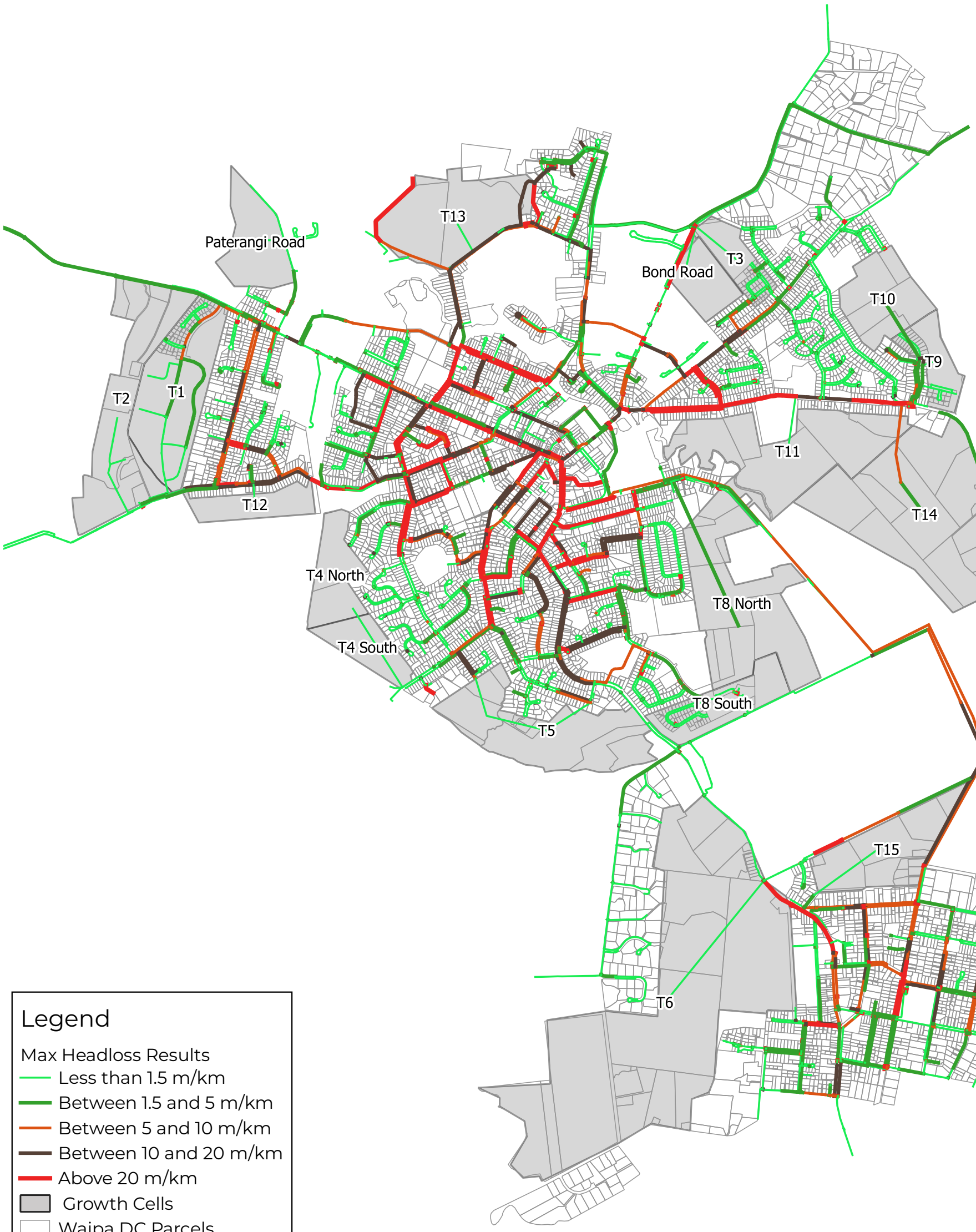
SHEET: 2050 System Performance Maps
Te Awamutu - Maximum Headloss Results for scenario 1 (2050 Baseline)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 10/03/2023
REVISION: R0

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-03-06 15:07:51 by Galabadage, Pramodi (pga191)



CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN: P. Galabadage
APPROVED: J. Viyakesparan
SHEET NUMBER: 1 of 1
SCALE: 1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

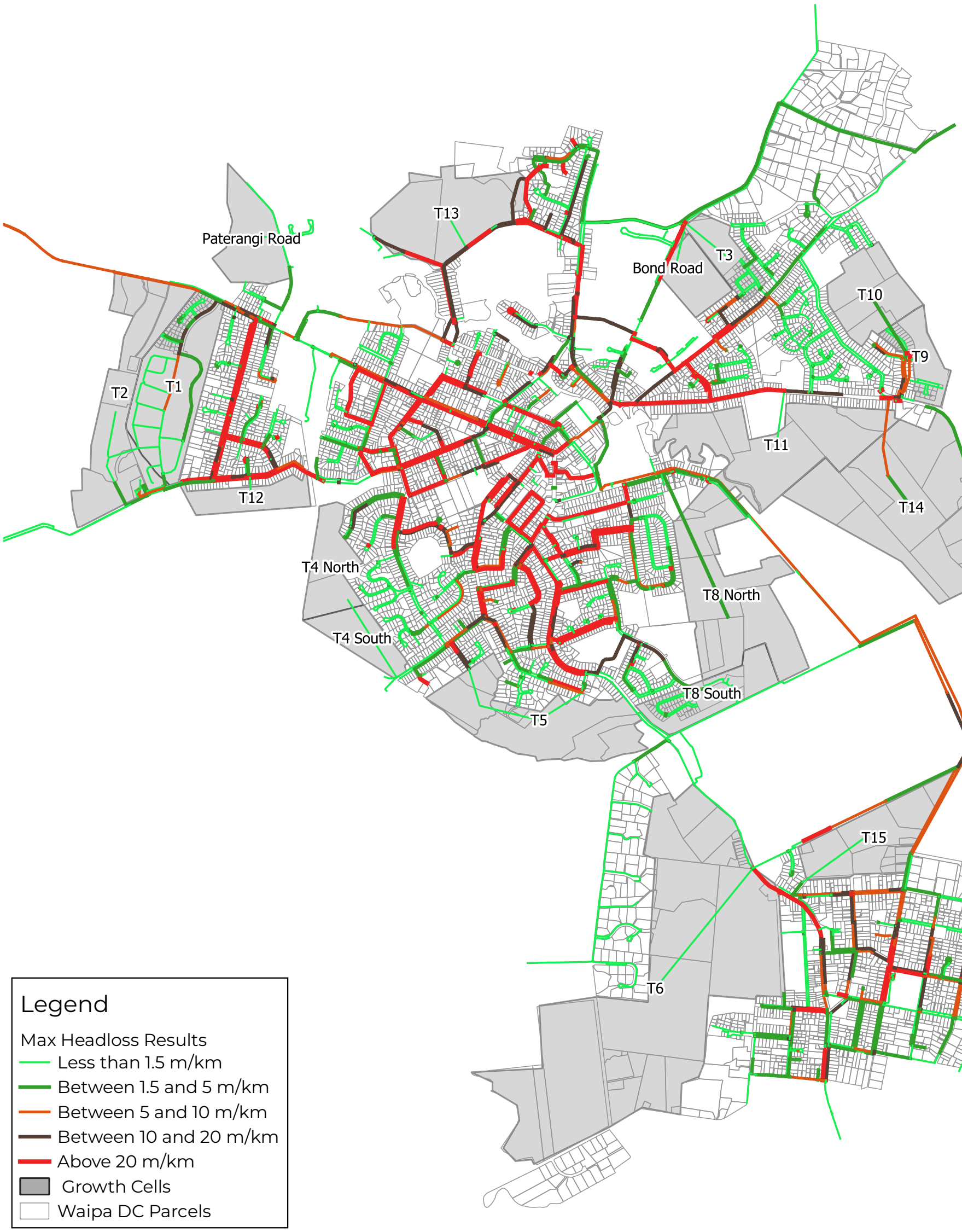
SHEET: 2050 System Performance Maps
Te Awamutu - Maximum Headloss Results for scenario 2 (Plan Change 26)

PROJECT NUMBER: 2-WLASS.IJ
REVISION DATE: 18/04/2023
REVISION: R1

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-04-17 14:25:15 by Galabadage, Pramodi (pga191)



Legend

Max Headloss Results

- Less than 1.5 m/km
- Between 1.5 and 5 m/km
- Between 5 and 10 m/km
- Between 10 and 20 m/km
- Above 20 m/km
- Growth Cells
- Waipa DC Parcels

CLIENT: Waipa District Council

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan

SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT: Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET: 2050 System Performance Maps
Te Awamutu - Maximum Headloss Results for scenario 3 (Medium Density Residential Standards - MDRS)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	10/03/2023	R0

File Ref: U:\Projects\NZ\2\W2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\03_GIS\Water Supply Modelling Outputs\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420] Plot Date: 2023-03-06 16:03:43 by Galabadage, Pramodi (pga191)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

Waipa DISTRICT COUNCIL

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
S.Sawant	C. Hardy

SHEET NUMBER	SCALE
1 of 1	1:20,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Cambridge Peak Wet Weather Flow Capacity
2050 Growth Plan Baseline

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	07/03/2023	R0

File Ref: U:\Projects\NZ\2WV2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-03-15 13:42:25 by Sawant, Sphurti (NZSS30860)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

Waipa DISTRICT COUNCIL

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
S.Sawant	C. Hardy

SHEET NUMBER	SCALE
1 of 1	1:20,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Cambridge Peak Wet Weather Flow Capacity
2050 Growth Plan Change 26 (PC26)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	17/04/2023	R1

File Ref: U:\Projects\NZ\2WV2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-04-17 14:08:47 by Sawant, Sphurti (NZSS30860)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

Waipa DISTRICT COUNCIL

Hamilton Office
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DRAWN	APPROVED
S.Sawant	C. Hardy
SHEET NUMBER	SCALE
1 of 1	1:20,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Cambridge Peak Wet Weather Flow Capacity
Medium Density Residential Standards (MDRS)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	07/03/2023	R0

File Ref: U:\Projects\NZ2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-03-15 13:43:24 by Sawant, Sphurti (NZSS30860)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

Waipa DISTRICT COUNCIL

Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
S. Sawant	C. Hardy
SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Te Awamutu Peak Wet Weather Flow Capacity
2050 Growth Plan Baseline

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	08/03/2023	R0

File Ref: U:\Projects\NZ\2\W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-03-08 11:17:16 by Sawant, Sphurti (NZSS30860)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

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DRAWN	APPROVED
S. Sawant	C. Hardy
SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Te Awamutu Peak Wet Weather Flow Capacity
2050 Growth Plan Change 26 (PC26)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	17/04/2023	R1

File Ref: U:\Projects\NZ2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

Plot Date: 2023-04-17 14:29:18 by Sawant, Sphurti (NZSS30860)

Legend

PWWF Themes

- d/D < 0.5
- 0.5 ≤ d/D < 0.7
- 0.7 =≤ d/D < 1
- Surcharged (Slope HGL < Slope Pipe)
- Surcharged (Slope HGL > Slope Pipe)
- Spilling Manholes
- Growth Cells

CLIENT

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Hamilton Office
Level 2, 160 Ward Street
Hamilton 3204
New Zealand

DRAWN	APPROVED
S. Sawant	C. Hardy
SHEET NUMBER	SCALE
1 of 1	1:25,000

PROJECT

Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET

2050 System Performance Maps
Te Awamutu Peak Wet Weather Flow Capacity
Medium Density Residential Standards (MDRS)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.IJ	08/03/2023	R0

File Ref: U:\Projects\NZ2W\2-WLASS.HP Waipa PC26\Home\03_Tech_Docs\02_Tech_Out\01_WIP\04_Wastewater\GIS\Maps\Maps - WDC Infra Assessment_Wastewater Ratings_PC26.qgz

Original Sheet Size: A3 [W = 297, H = 420]

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