Project Number: 2-WLASS.GH

Water and Wastewater Infrastructure Assessment

9 August 2022

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Revision 1	Updated in line with client feedback
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Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Waipa 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 18 May 2022.

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

This report outlines the outcome of a high-level review of water and wastewater infrastructure needs and constraints as they apply to Plan Change 26 which is to enable housing intensification in all residential zones of Cambridge, Te Awamutu and Kihikihi.

The assessment and outcomes presented in this report are based on master planning and associated modelling undertaken by Waipa District Council between 2020 and 2022. The water and wastewater models were developed by WSP Ltd and cover the urban centres of Cambridge, Te Awamutu, and Kihikihi.

2 Scope of this assessment

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

(a) Review existing modelled populations (at 2050) versus new planned populations arising from PC26 which are assumed to be realised by 2035.
(b) Review existing system performance maps and planned infrastructure upgrades out to 2050.
(c) Review stormwater maps produced by Te Miro Water showing where flooding may limit development.
(d) Carry out a desktop assessment using existing system performance information and manual calculations to determine the following:

(i) Where additional development can be accommodated by the existing network and already planned upgrades.
(ii) Where additional development can be accommodated by the existing network and planned upgrades if they are brought forward in time.

(e) Produce town maps indicating where development in line with PC26 is likely to be able to be accommodated, giving regard to the stormwater maps and associated areas not suitable for development.

Hydraulic modelling is planned to be undertaken to validate the conclusions reached in the desktop assessment. This report will be updated when the modelling has been completed.

3 Assessment method

3.1 Existing model context

The section outlines the key master planning and modelling aspects relevant to this assessment, and the approach taken. This section is not an exhaustive summary of the model build and masterplan reports which should be referred to for additional detail if required.

The following is noted for context:

(a) Existing masterplan populations are based on 2019 actual populations. Future population predictions included a 5 % allowance for growth to 2050 and an occupancy reduction factor. It was assumed that occupancy reduction would offset growth within existing built areas for the purpose of the master plan. Therefore, no increase in population had been applied to the 2050 models for master planning purposes.
(b) Water modelling assesses hydrants failing at both FW2 and FW3.

(i) An initial assessment was based on the FW2 condition which is the minimum acceptable for residential areas. Hydrants failing only the FW3 condition may

have more capacity for development but were only assessed for commercial and industrial areas.

(ii) *A secondary assessment was undertaken to refine the 'developable areas' based on adjacent or nearby commercial areas (if available) achieving FW3 due to the need for some conservatism until modelling is carried out and because manual calculations are not practical for water.*

3.2 Assessment approach

The following approach was undertaken for the assessment:

1 Update the 2050 master plan water and wastewater models (Refer to Section 4.3).

2 Interrogate system performance maps inclusive of planned infrastructure upgrades as follows:

   (a) Two scenarios:

      (i) *Existing master plan models in 2050 including planned infrastructure*
      (ii) *Plan Change 26 updated model including planned infrastructure (at 2035)*

   (b) Two waters:

      (i) *Water supply – minimum pressure and hydrants failing at FW2 (residential) and FW3[1] (commercial/industrial).*
      (ii) *Wastewater – pipe utilisation (relative depth of flow, surcharge, and overflows).*

3 Identify areas in the existing water and wastewater networks where spare capacity exists and development at higher densities may be possible, based on:

   (a) FW2 (water)
   (b) Minimum modelled pressure of 30 m (water)
   (c) Less than 70 % pipe utilisation in peak wet weather/ less than 50 % over most of an area (wastewater).

4 Cross-reference the individual water and wastewater maps, and stormwater maps (by others) to identify common areas only to refine the potential developable areas.

5 Identify where planned projects could be brought forward to service infill and higher density development in the identified areas.

3.3 Limitations

The following limitations are noted:

- The master plan model has a development horizon of 2050. PC26 densities are assumed to be realised by 2035. The assessment uses the 2050 master plan models inclusive of planned infrastructure as if they represent the 2035 scenario (e.g. planned upgrades would need to be brought forward to at least 2035).
- The increase in density is applied as an average whereas in reality, it could be biased towards certain areas.
- Not all the existing wastewater network can be practically assessed manually so a selection of key pipelines has been assessed to provide an indication of capacity only.

[1] Note: Council's Water supply Bylaw 2012, outlines that council only endeavours to achieve FW2 within the reticulated network. Anything above (i.e. FW3) needs to be done on-site. Industrial and commercial areas were assessed against FW3 for master planning purposes only.

- Water networks cannot be easily assessed manually so a more conservative approach has been taken where possible. Only commercial and industrial areas have been modelled for FW3 but these were reviewed where they are near residential areas. Not all residential areas could be assessed for FW3 because some are not close to commercial or industrial.

4 Development density

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

4.1 Plan Change 26 proposed density

The table below outlines the density targets in dwellings per hectare aligning with future proof.

https://futureproof.org.nz/assets/FutureProof/Future-Proof-Strategy-section-C.pdf

• Other brownfield areas	Tier 1	30 in defined intensification areas	TBC
Te Awamutu/Kihikihi		25-35 in defined intensification areas 20-35 in greenfield locations	Frequent
Pirongia		20-35 in greenfield locations	TBC
Cambridge/Hautapu		25-35 in defined intensification areas 20-25 in greenfield locations	Frequent

The target densities for this assessment are shown in Table 1. A combined range for greenfield and intensification areas is presented for simplicity at this stage.

It should be noted that the proposed density in dwellings per hectare was converted to an equivalent density in persons per hectare. Existing model densities are in persons per hectare. The conversion was made for ease of comparison and for inputting into the models.

Table 1 New planned density for this assessment

Location	Smart growth target density in dwellings per hectare	Density in person/hectare assuming 2.7 person per dwelling
Te Awamutu / Kihikihi	20-25-35	54-68-95
Cambridge	20-25-35	54-68-95

Note: the lower range applies to new growth areas and the higher range applies to existing areas of development.

4.2 Review against currently planned densities

This section compares currently modelled (planned) densities against those required by the plan changes. Where the Current Modelled density is the same or more than the Plan Change densities, it is generally concluded that there will be no adverse effects. Additional commentary is provided in Section 5 Where the opposite is the case.

Figure 1 shows the Cambridge growth areas from the 2050 Waipa Growth Strategy.

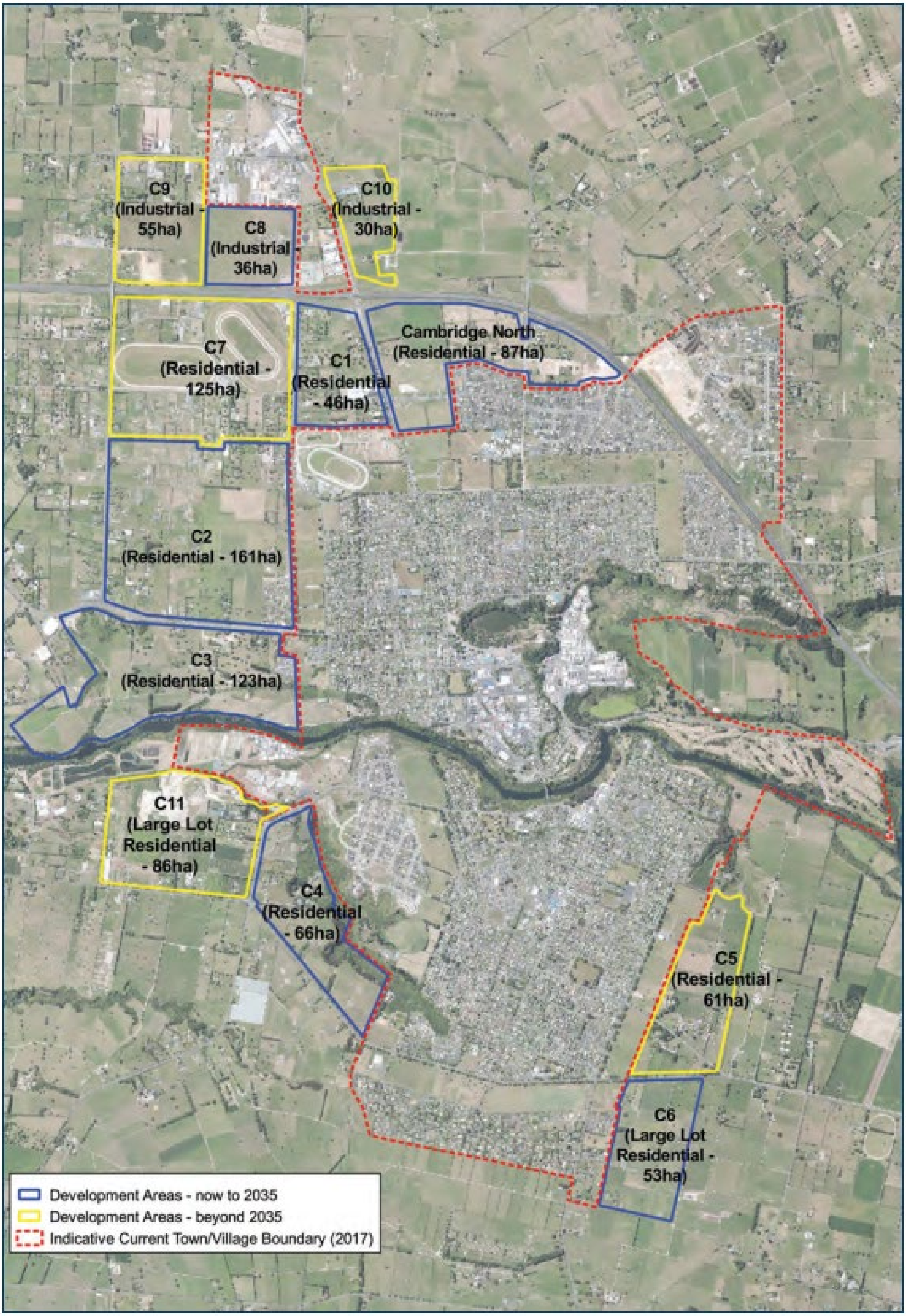

Figure 1 Cambridge growth area

Table 2 presents a comparison of existing planned density and plan change density for Cambridge.

Table 2 Cambridge comparison of density

Area	Current Model density (persons per hectare)	Plan change density (persons per hectare)	Comment
Leamington	~25	68-95	Lower than required by the plan change
Cambridge central	~25	68-95	Lower than required by the plan change
Cambridge east	~15	68-95	Lower than required by the plan change
Cambridge north (south)	15-25	54-68	Treated as a new growth area due to age. Lower than required by the plan change
Cambridge north (west, central, east)	50-65	54-68	OK
C1	50-65	54-68	OK
C2	45	54-68	Lower than required by the plan change
C3	5	54-68	Lower than required by the plan change
C4	28	54-68	Lower than required by the plan change
C5	28	54-68	Lower than required by the plan change
C6	Not modelled	54-68	Not assessed
C7	17	54-68	Lower than required by the plan change
C11	Not modelled	54-68	Not assessed (not in PC26)

Figure 2 shows the Cambridge growth areas from the 2050 Waipa Growth Strategy for reference alongside Table 3.

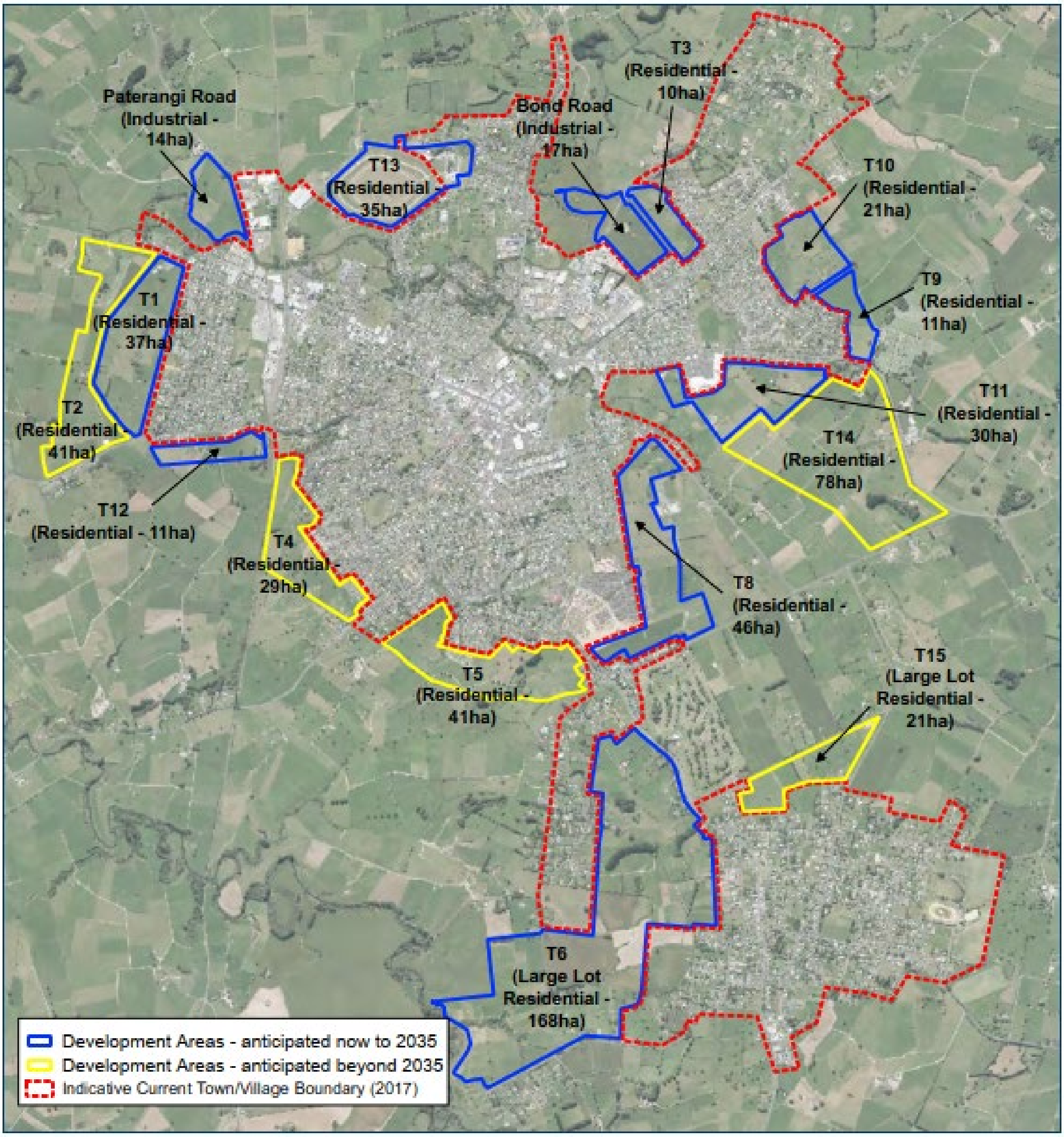

Figure 2 Te Awamutu and Kihikihi growth areas (Waipa 2050 Growth Strategy)

Table 3 presents a comparison of existing planned density and plan change density for Te Awamutu.

Table 3 Te Awamutu comparison of density

Area	Current Model density (persons per hectare)	Plan change density (persons per hectare)	Comment
Te Awamutu existing	~25	68-95	Lower than required by the plan change
Kihikihi existing	10-15	68-95	Lower than required by the plan change
St Ledger Road	Not modelled	68-95	Very low density Lower than required by the plan change
Paterangi Road	45	54-68	Not assessed (Industrial - not in PC26)
Bond Road	45	54-68	Not assessed (Industrial - not in PC26)
T1	27	54-68	Lower than required by the plan change
T2	27	54-68	Lower than required by the plan change
T3	27	54-68	Lower than required by the plan change
T4 north	26	54-68	Lower than required by the plan change
T4 south	26	54-68	Lower than required by the plan change
T5	27	54-68	Lower than required by the plan change
T6	Not modelled	54-68	Not assessed (not in PC26)
T8	27	54-68	Lower than required by the plan change
T9	27	54-68	Lower than required by the plan change
T10	27	54-68	Lower than required by the plan change
T11	32	54-68	Lower than required by the plan change
T12	27	54-68	Lower than required by the plan change
T13	27	54-68	Lower than required by the plan change
T14	45	54-68	Lower than required by the plan change
T15	Not modelled	54-68	Not assessed

4.3 Model assessment approach

The current 2050 water and wastewater planning models are based on:

- 2019 populations for existing built areas.
- Population density equivalents for planned growth areas.

The population densities in Section 4.1 are overall densities and are not in a form easily translated into the models. To allow the models to be updated efficiently the following approach was agreed with WDC:

- Add 5 % growth to all existing developed areas (effectively reinstating the planned growth noted in Section 3.1 – as agreed with WDC).
- Increase population density to the upper bound of the plan change density, as required based on Table 1, Table 2 and Table 3 in Section 4.2, for all residential growth areas.
- Assume full uptake by 2035. This means that the 2050 master plan model effectively becomes a 2035 model, therefore, representing an increase in density in the first 10 to 15-year period.

- Consequently, all planned projects will effectively be brought forward to 2035 and assessed against the higher modelled population density.

This approach is assumed to adequately approximate the impacts of the Plan Change for the purpose of this assessment.

5 Enable Housing Supply assessment (PC26)

This section discusses the areas in Table 2 and Table 3 that do not meet or exceed the plan change densities in current planning. The discussion is related to existing network performance and ability of the areas to service development at higher densities.

New development areas that are classed as being OK (in Table 2 and Table 3) are included in current master planning at a density representative of the plan change. However, it should be noted that those areas will contribute to existing network conditions so would be part of any holistic solution. These areas have been assigned a rating based on overall network implications, but they are not discussed separately.

5.1 Water reduction measures

On-lot measures such as rainwater or greywater re-use could influence peak water use but may not be reliable enough to completely offset the effects of infill and intensification. Both are rarely used in New Zealand towns. If they are, they are typically only used intermittently for things such as garden watering.

Greywater reuse can reduce the volume of water discharged to the existing wastewater networks. However, similar limitations currently apply to rainwater in that non-discharging uses such as garden watering cannot be always relied on.

Comprehensive and frequent use would be required to result in a level of benefit that would result in water demand and discharges being reduced in a strategic planning sense. Therefore, **for the purpose of this assessment, water reuse is not recommended to be accounted for.**

Inflow and infiltration reduction could have a sufficient effect on existing wastewater networks. Reasonable reductions could be achieved in any catchment that currently sees high I&I rates. However, a significant investment is required to eliminate I&I from poor networks to such a degree and it is typically not relied upon by itself.

The potential scale and benefit of I&I reduction would need to be assessed against the cost of that versus upgrades in the network. It should also be noted that I&I reduction in aged networks can be an ongoing investment unless networks are substantially replaced with new. **I&I reduction is not considered in this assessment at this stage.**

It is noted that while water reduction measures could be considered for individual growth areas, implementation for all new development across entire towns is probably of greater benefit and more easily applied in policy. WDC has undertaken a Water Management Plan in 2019[2], that they are implementing.

5.2 Cambridge

The 'Current Model' refers to the 2050 master plan network with Current Model density. Whereas the 'Plan Change Model' refers to the current 2050 masterplan network (as if at 2035) with the plan change population densities (Table 2). The system performance maps are available in Appendix C.

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[2] Waipa District Water Management Plan, November 2019

5.2.1 Existing network – Leamington

Water

The predicted minimum water pressures in the current model in the Upper and Lower Leamington areas are generally in the range of 20-30 m. Some hydrants are predicted to fail FW2 criteria across Leamington, with the most being in Lower Leamington.

The predicted minimum water pressure in the Plan Change Model is not significantly different to the current model. Minimum pressures typically range between 20-30 m across Leamington.

Fire flow in the Plan Change Model is unchanged from the current model. Parts of the network may be able to accommodate some infill and intensification on a local level. However, wider redevelopment across the area could cause issues requiring strategic upgrades - modelling is required to increase certainty.

Wastewater

Much of the network in the current model is predicted to operate under a surcharge condition in wet weather. The trunk network downstream to the treatment plant is also predicted to surcharge. Two potential overflows are identified in the model result, which are within the local network.

The trunk network downstream to the treatment plant is still predicted to surcharge in the Plan Change Model. Two potential overflows are identified in the local network.

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

5.2.2 Existing network – Cambridge central

Water

The predicted minimum water pressure in central Cambridge is generally less than 20 m in the Current Model. Only southern areas at a lower elevation near the Waikato River are predicted to exceed 20 m. It is noted that the minimum pressures fall below 20 m for less than 30 minutes during peak hours and so are deemed acceptable.

A significant number of hydrants are predicted to fail FW3. FW2 has not been assessed for the central town area due to a large portion of properties are categorised as commercial requiring FW3 (the model does not consider FW2 in commercial/industrial areas).

The results are unchanged in the Plan Change Model. The minimum pressures of most of Cambridge central remain below 20 m. The minimum pressures stay below 20 m for less than 30 minutes during peak times, like the Current Model results.

Wider redevelopment across the area could cause issues requiring strategic upgrades.

Wastewater

Much of the Current Model network is predicted to operate under a surcharge condition in wet weather, particularly in the northwest. The trunk network downstream to the treatment plant is also predicted to surcharge. No overflows are identified in the Current Model.

The Plan Change Model network remains under a surcharge condition in wet weather. In particular, the sewer main located on Taylor Street is predicted to surcharge more. No overflows are identified in the Plan Change Model.

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. **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.**

5.2.3 Existing network – St Kilda

St Kilda is currently planned at about half of the plan change density.

Water

The predicted minimum water pressure in St Kilda is generally in the range of 10-20 m in the Current Model. A Significant number of hydrants are predicted to fail FW2.

Both minimum pressure and fire flow results are unchanged in the Plan Change Model. **Wider redevelopment across the area could cause issues requiring strategic upgrades - modelling is required to increase certainty.**

Wastewater

The Current Model network is predicted to have spare capacity with most areas having a pipe utilisation less than 50 % in peak wet weather. However, surcharging predicted in the network upstream of the St Kilda sewer pump station discharging to the existing Cambridge network.

The Plan Change Model shows similar results. Some of the sewer mains are predicted to have spare capacity to accommodate for the plan change density in St Kilda. The network upstream of the St Kilda pump station remains in a surcharging condition.

No overflows are identified in either model.

Although infill and intensification are not likely to adversely affect the local network, trunk infrastructure from the St Kilda sewer pump station and downstream through Cambridge would be affected. **Infill and intensification above current planned densities will contribute to issues requiring strategic upgrades though the Cambridge network and on to the treatment plant.**

5.2.4 Future growth areas

Growth areas C4 and C5

Growth areas C4 and C5 had Current Model densities lower than the Plan Change Model densities. The growth areas were updated with increased densities (demands) in the Plan Change Model.

The minimum pressure for C4 and C5 growth cells is between 20-30 m in the Current Model. The minimum pressure for C5 growth cell stayed within the same range when it was modelled at the higher limit in the Plan Change Model. However, the minimum pressure for C4 growth cell is below 20 m in the Plan Change Model.

Water reduction measures in these growth areas could be enough to allow intensification at slightly higher levels. However, the application of water reduction measures on a wider basis is probably better, as noted in Section 5.1 (Ref.1).

Growth areas C1, C3, C7 and Cambridge north

Growth areas C1, C3, C7 and Cambridge north had Current Model densities lower than the Plan Change Model densities. The growth areas were updated with increased densities (demands) in the Plan Change Model.

Minimum water network pressures stay above 20 m for all four growth cells. Hydrants are not assessed in the future growth areas.

All areas will discharge through the central Cambridge trunk waste network south to the treatment plant. The existing trunk network downstream of the areas has capacity limitations that these areas will contribute to.

Densification above current planned densities will contribute to issues that are likely to require additional strategic upgrades though the Cambridge water and wastewater networks.

5.3 Te Awamutu

The 'Current Model' refers to the 2050 master plan network with Current Model density. Whereas the 'Plan Change Model' refers to the current 2050 masterplan network (as if at 2035) with the plan change population densities (Table 3). The system performance maps are available in Appendix C.

5.3.1 Existing network – Te Awamutu

Water

The predicted minimum water pressure in Te Awamutu area in the Current Model is generally as follows:

- In the range of 10-20 m in southern and south-eastern areas.
- Greater than 20 m in, central area, north-western areas around the Mangapiko Stream and west of the North Island Main Trunk Railway.

Some hydrants are predicted to fail FW2 and FW3 in various locations across Te Awamutu. Residential areas in the vicinity of Station Road and Goodfellow Street do not have any failing hydrants.

The predicted minimum water pressure in Te Awamutu area in the Plan Change Model is generally as follows:

- Below 20 m in the West side and some of the southern and south-eastern areas.
- In the range of 20-30 m in the central area and most of the southern areas.
- Greater than 30 m in north-western areas around the Mangapiko Stream and west of the North Island Main Trunk Railway.

Fire flow results in the Plan Change Model are not significantly different to the Current Model.

Parts of the network may be able to accommodate some infill and intensification on a local level, but system performance could be affected elsewhere. Wider redevelopment across the area could cause issues requiring strategic upgrades - modelling is required to increase certainty.

Wastewater

Most of the upper existing networks in Te Awamutu are predicted to have spare capacity with most areas having a pipe utilisation less than 50 % in peak wet weather. However, surcharging predicted in much of the trunk network where upper network flows combine, and strategic sewers on to the treatment plant in both the Current Model and the Plan Change Model. The trunk network is pressured due to the plan change population density.

Six potential overflows are identified in the current model. The number of spilling manholes increased to seven in the Plan Change Model.

Wastewater is predicted to accumulate in the storage tanks at the Albert Park pump station in a wet weather event, in the Current Model and the Plan Change Model. The storage tanks are predicted fill more in the Plan Change Model.

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 trunk sewer network.**

5.3.2 Existing network – Kihikihi

Water

The predicted minimum water pressures in the Current Model are generally as follows:

- In the range of 10-20 m in the north-western corner dropping to less than 10 m along Golf Road.
- Greater than 20 m in the remaining areas of Kihikihi.

Some hydrants are predicted to fail FW2 and FW3 in various locations across Kihikihi. There are no large areas that do not have any failing hydrants.

The predicted minimum water pressure in the Plan Change Model in Kihikihi is generally as follows:

- Dropping below 20 m in the north-western corner and along Golf Road.
- Greater than 20 m in the remainder of Kihikihi.

Fire flow results in the Plan Change Model are unchanged from the Current Model. However, WSP has already advised WDC that the fire flow in Kihikihi could be improved by installing a fire booster pump at the Rolleston Road reservoir.

Most of the network may be able to accommodate some infill and intensification on a local level, but fire flows may be further affected, and system performance could be affected elsewhere. **Wider redevelopment across the area could cause issues requiring strategic upgrades - modelling is required to increase certainty.**

Wastewater

Most of the upper local network in Kihikihi (both in the Current Model and the Plan Change Model) is predicted to have spare capacity with most areas having a pipe utilisation less than 50 % in peak wet weather. However, surcharging predicted in some pipelines.

A key issue for Kihikihi is capacity in the transfer 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 overflows predicted in the Current Model (2050) and the Plan Change Model (2035).

One additional potential overflow is identified in the Plan Change Model along the Kihikihi Transfer Sewer.

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 trunk sewer network downstream through the transfer sewer and within Te Awamutu.**

5.3.3 Future growth areas

All the assessed growth areas have currently planned densities lower than the plan change densities. The growth areas were updated with increased densities (demands) in the Plan Change Model.

The Plan Change Model predicts growth cells T2 and T10 will fail to meet the increased demands with minimum water pressures falling below 20 m. All other assessed growth cells still meet the minimum level of service (pressure) requirement in the Plan Change Model.

All areas will discharge through the central Te Awamutu trunk waste network and on to the treatment plant. The existing trunk network downstream of the areas has capacity limitations that these areas will contribute to.

Densification above current planned densities will contribute to issues that are likely to require additional strategic upgrades though the Te Awamutu water and wastewater networks.

6 Developable areas mapping

An exercise was carried out to map the likelihood that areas can be developed at higher densities, based on the Plan Change Model results.

6.1 Individual water and wastewater mapping

Mapping was carried out separately for water and wastewater based on Plan Change Model system performance maps and the information in preceding sections of this report.

The mapping is interpretive based on a traffic light system where:

- Green – does not appear to have significant constraints within or downstream of the area.
- Orange – has some apparent constraints or could affect the wider network. May have current modelled densities at or close to the plan change densities.
- Red – has significant apparent constraints either locally or downstream, and/or has current planned densities less than the plan change densities.

It should be noted that the status of areas considers potential wider network effects. While an area may appear to be developable from a local perspective it could be red or orange due to wider network issues.

The nature of water and wastewater networks means that it is difficult to identify small areas where development may occur. This results in larger areas all with a similar rating due to the interconnected nature of the networks.

The individual maps are presented in Appendix A.

6.2 Compiled mapping

A compiled map has been developed based on the following:

- Overlaying the water and wastewater initial coarse maps and combing areas as follows:
  - Two reds remain red.
  - One red overrides orange = red.
  - Two orange remains orange.
  - One orange overrides green = orange.
  - Two greens remain green.
- Overlaying stormwater maps (by others) and removing areas deemed potentially unsuitable for development due to drainage or flooding issues.

The compiled map is presented in Appendix B.

7 Summary and conclusions

The nature of water and wastewater networks means that wider network issues typically govern developability, not only local conditions. This means that even future growth areas could require additional infrastructure or upsizing of planned infrastructure. This also results in large areas being rated together as opposed to smaller areas being identified for development.

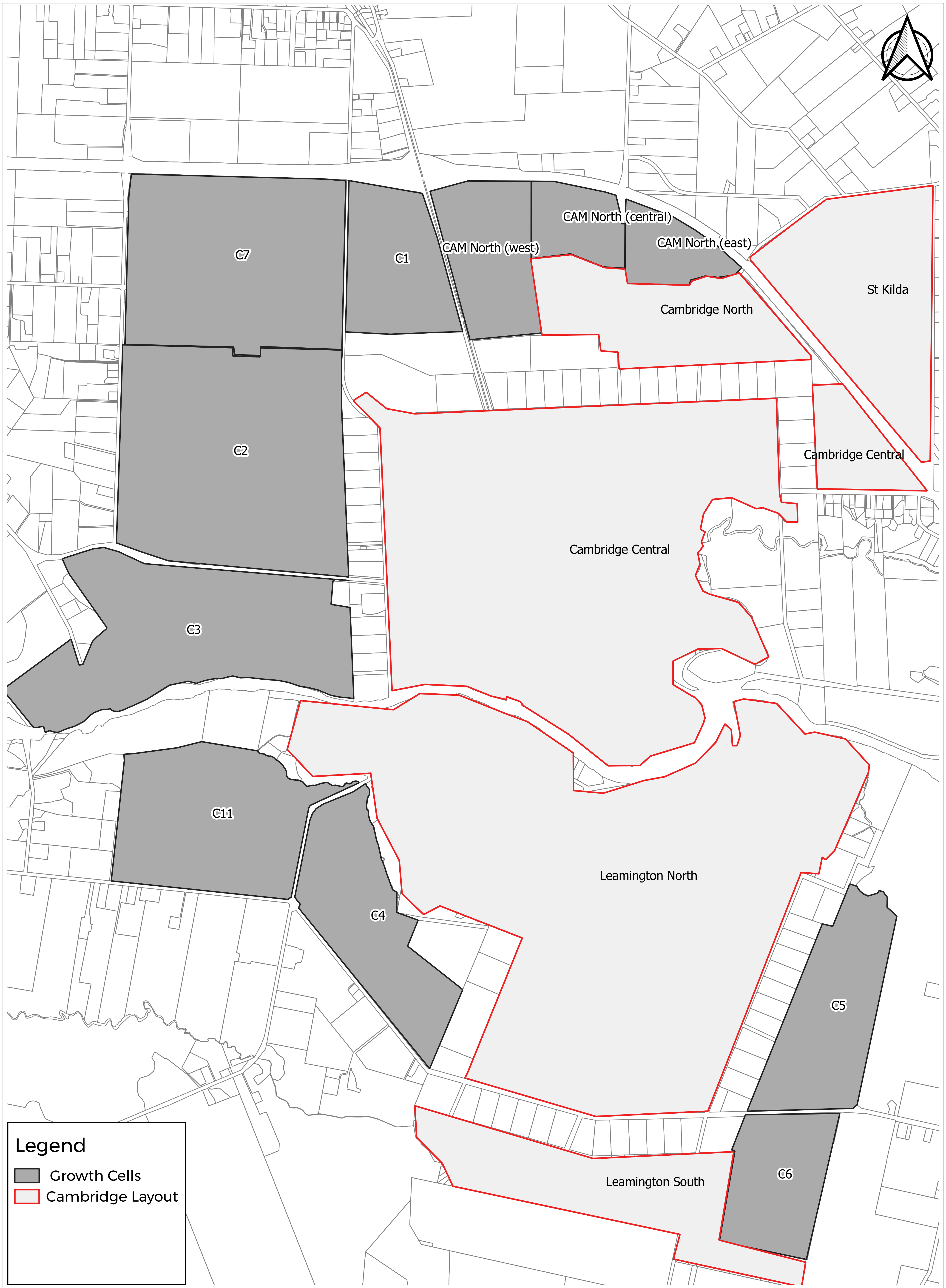
All areas have constraints. The combined water and wastewater constraint map results in no areas being suitable for development without constraints (green).

- The Cambridge area of Leamington to the south of the Waikato River has some constraints (orange).
- Cambridge to the north of the Waikato River has significant constraints (red) except for future growth areas C2, C3, and C7 which have some constraints (orange).
- Kihikihi township has significant constraints (red).
- Te Awamutu has significant constraints (red) except for areas in the northwest (closer to the wastewater treatment plant) that have some constraints.

The assessment has been made on the basis that the plan change densities will be achieved by 2035 as opposed to 2050. All new infrastructure currently planned to be implemented between 2035 and 2050 would therefore need to be brought forward to a least 2035.

This assessment shows that development at plan change densities is constrained and additional infrastructure would need to be defined through additional assessment. Bringing forward existing planned infrastructure earlier than 2035 has not been assessed because it will not enable development.

Appendix A
Water and Wastewater rating maps



CLIENT			PROJECT		
Waipa District Council	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
			Appendix A - Cambridge Layout Plan		
	DRAWN	APPROVED			
	P. Galabadage	J. Viyakesparan			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:20000	2-WLASS.GH	04/08/2022	R0

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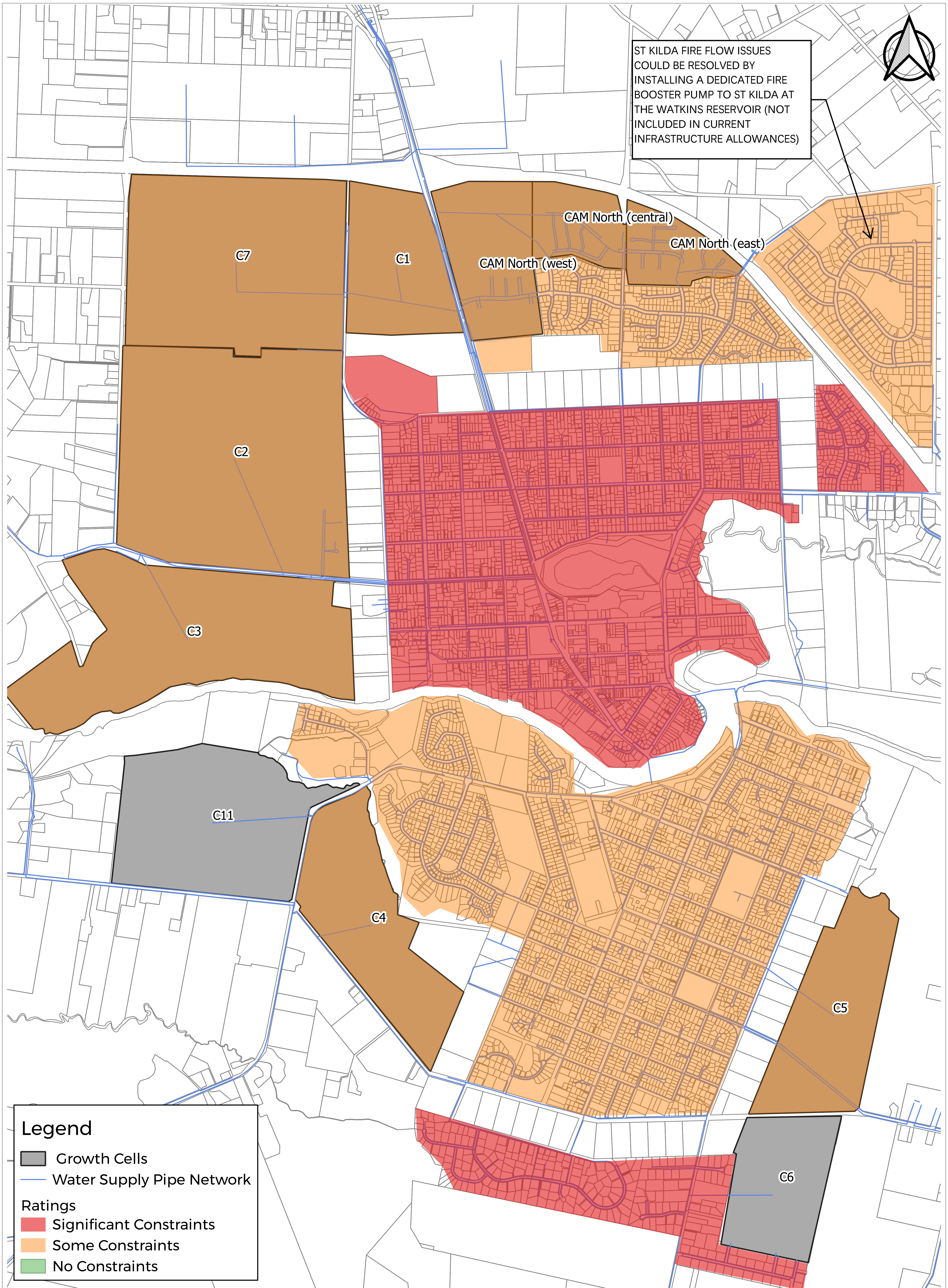

CLIENT			PROJECT		
Waipa District Council	WSP Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
			Appendix A - Water Supply Network Rating Cambridge - Cambridge Capacity Assessment (2050 Plan Change)		
	DRAWN	APPROVED			
	P. Galabadage	J. Viyakesparan			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:20000	2-WLASS.GH	08/08/2022	R1

File Ref: U:\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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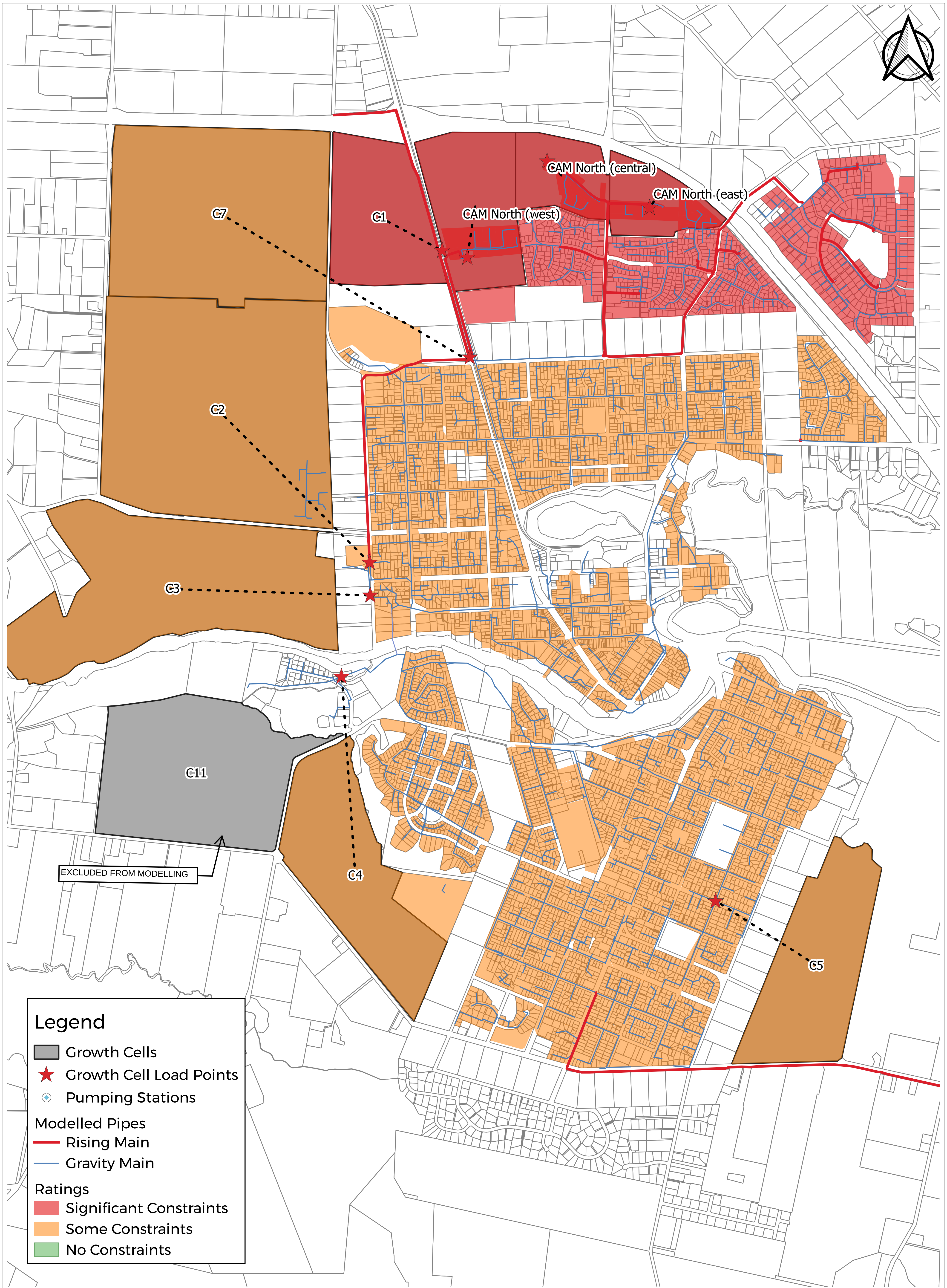

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
	DRAWN	APPROVED	SHEET		
	H. Li	C. Mills	Appendix A - 2050 Wastewater Network Rating Cambridge Peak Wet Weather Flow Capacity (2050 Plan Change Network)		
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:20,000	2-WLASS.GH	08/08/2022	R1

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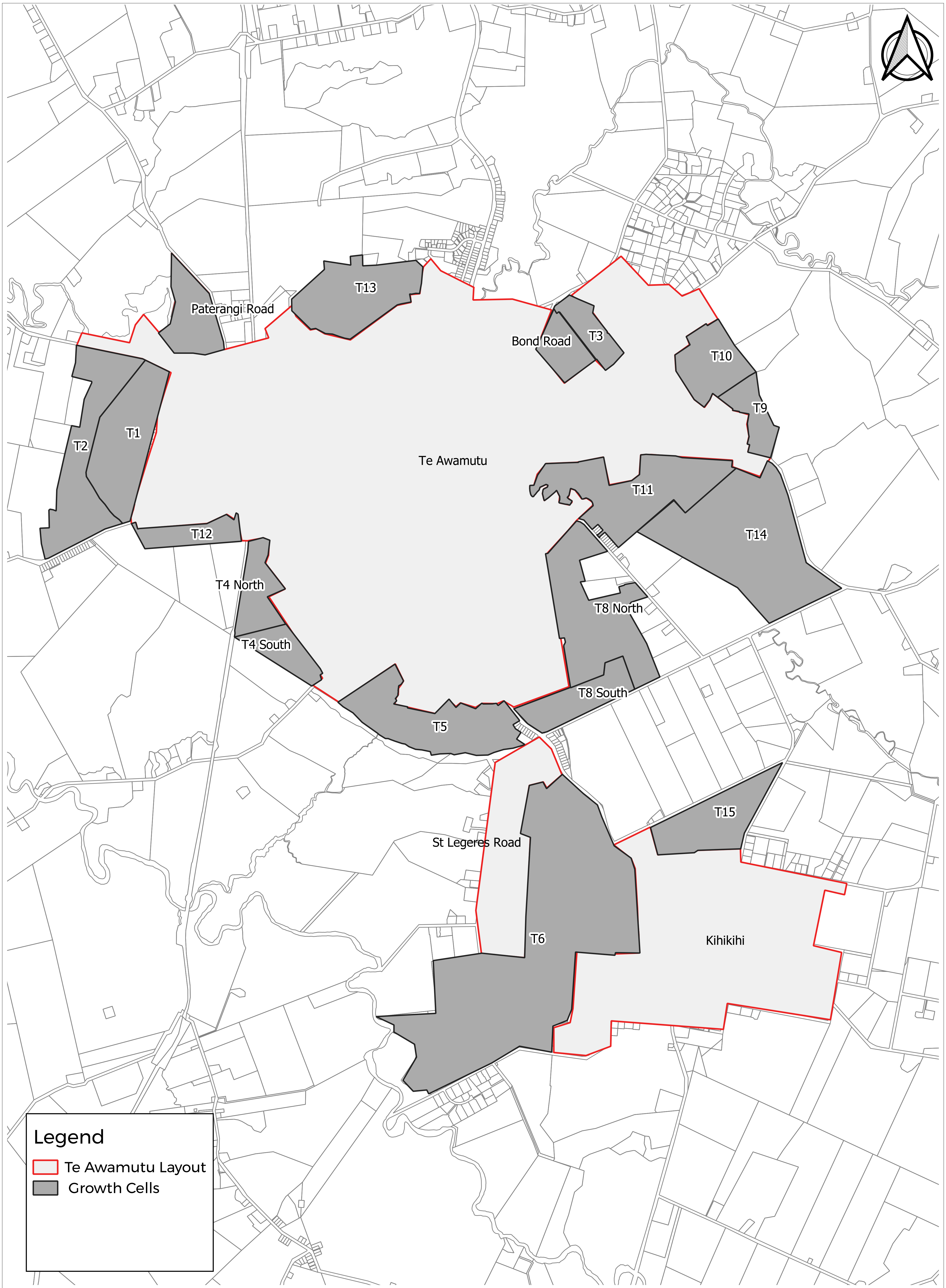
Document Set ID: 10847490
Version: 4, Version Date: 10/08/2022



CLIENT		PROJECT		
Waipa DISTRICT COUNCIL	wsp Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
		SHEET		
	DRAWN: P. Galabadage / APPROVED: J. Viyakesparan	Appendix A - Te Awamutu Layout Plan		
	SHEET NUMBER: 1 of 1 / SCALE: 1:25000	PROJECT NUMBER 2-WLASS.GH	REVISION DATE 04/08/2022	REVISION R0

File Ref: U:\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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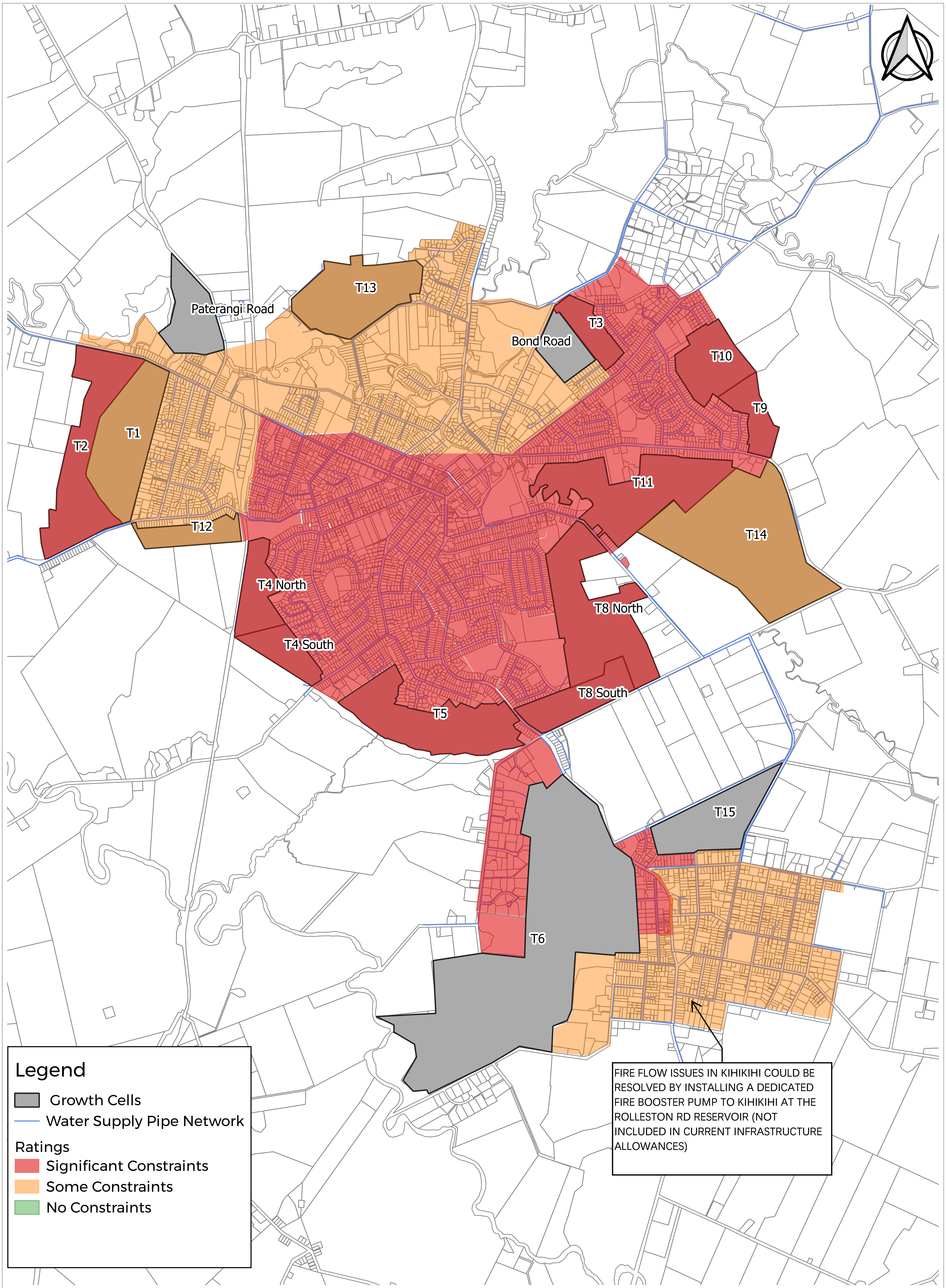

CLIENT: Waipa District Council	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	PROJECT: Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment
	DRAWN: P. Galabadage / APPROVED: J. Viyakesparan	SHEET: Appendix A - 2050 Water Supply Network Rating Te Awamutu - Te Awamutu Capacity Assessment (2050 Plan Change)
	SHEET NUMBER: 1 of 1 / SCALE: 1:25000	PROJECT NUMBER: 2-WLASS.GH / REVISION DATE: 08/08/2022 / REVISION: R1

File Ref: U:\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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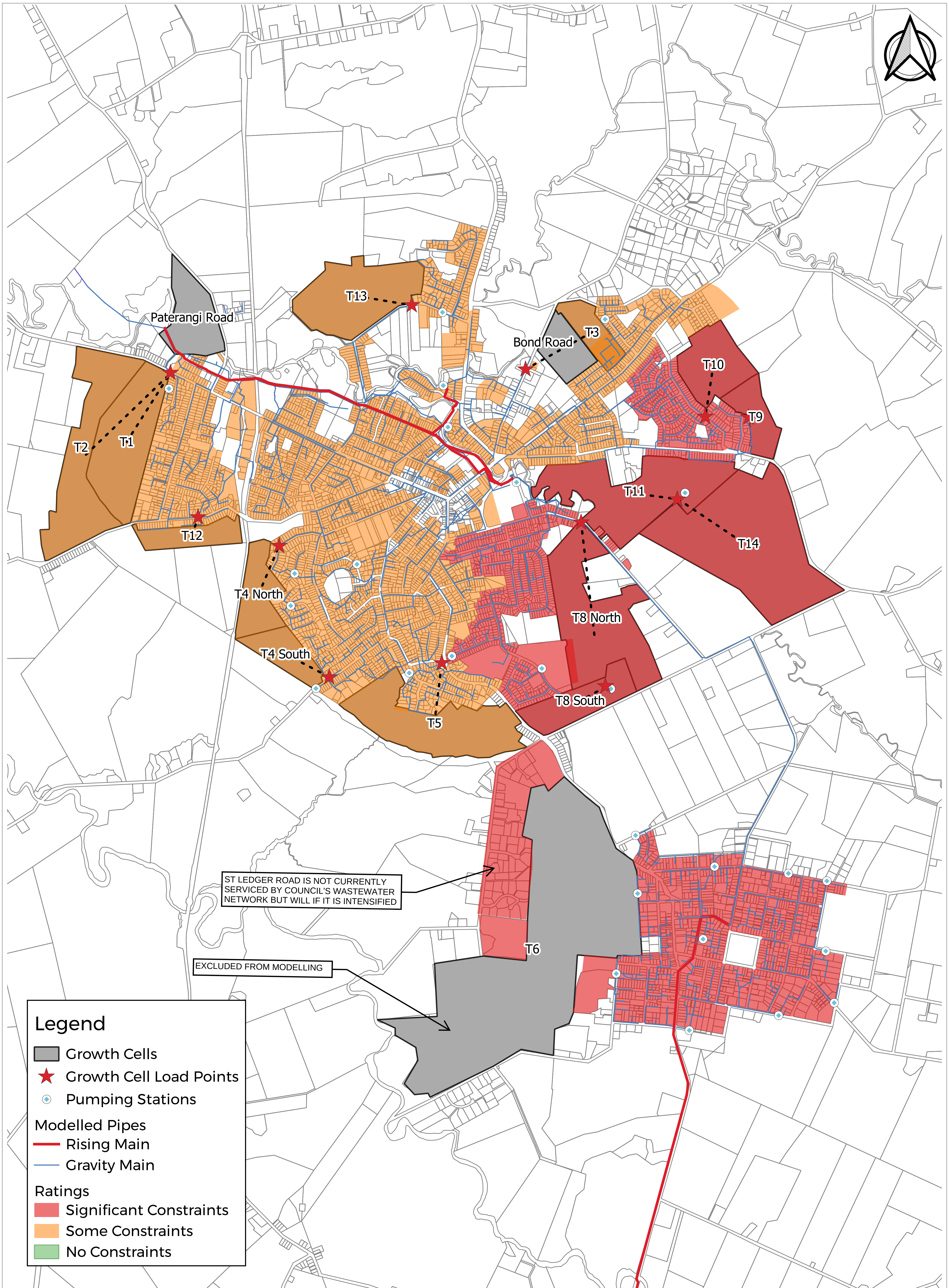

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp — Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
			Appendix A - 2050 Wastewater Network Rating Te Awamutu Peak Wet Weather Flow Capacity (2050 Plan Change)		
	DRAWN	APPROVED			
	H. Li	C. Mills			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:25,000	2-WLASS.GH	04/08/2022	R0

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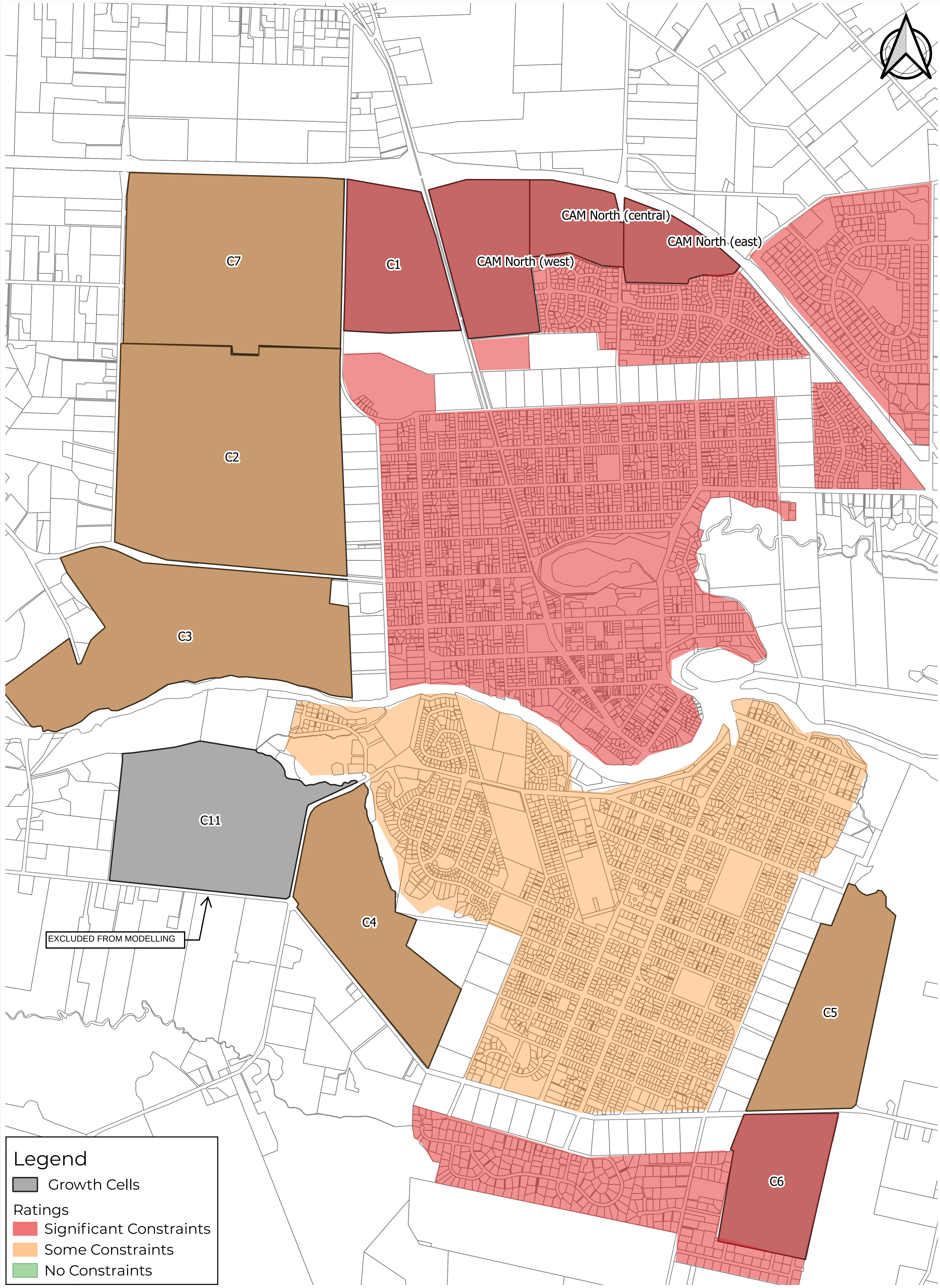
Appendix B
Compiled rating map



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

SHEET
Appendix B - Combined Network Rating
Cambridge - Cambridge Capacity Assessment

DRAWN	APPROVED			
S. Cheevers	C. Hardy			
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:20,000	2-WLASS.GH	05/08/2022	R0

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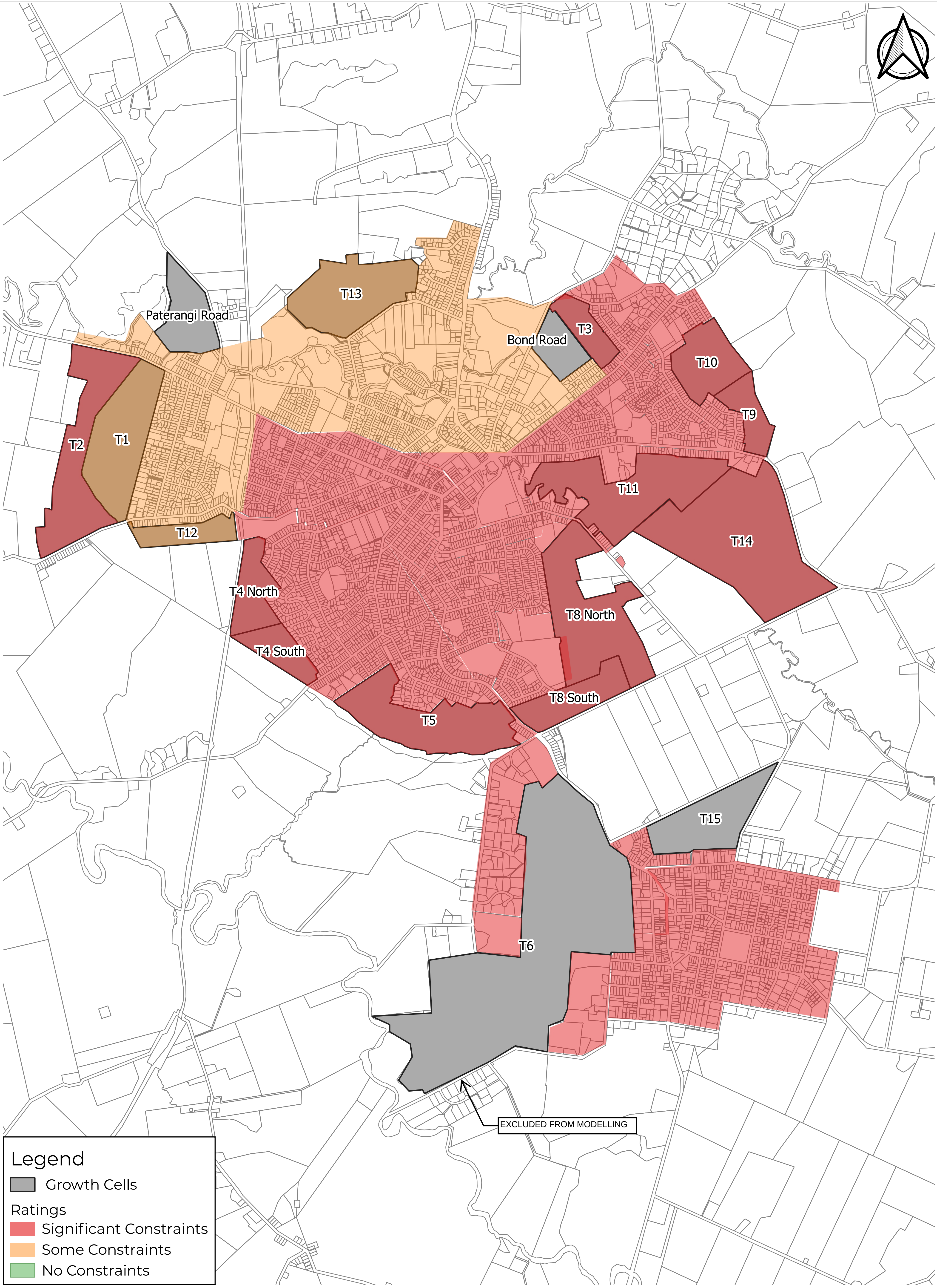

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
	DRAWN	APPROVED	Appendix B - Combined Network Rating Te Awamutu - Te Awamutu Capacity Assessment		
	S. Cheevers	C. Hardy			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:25,000	2-WLASS.GH	05/08/2022	R0

File Ref: U:\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Ratings - For SC.qgz

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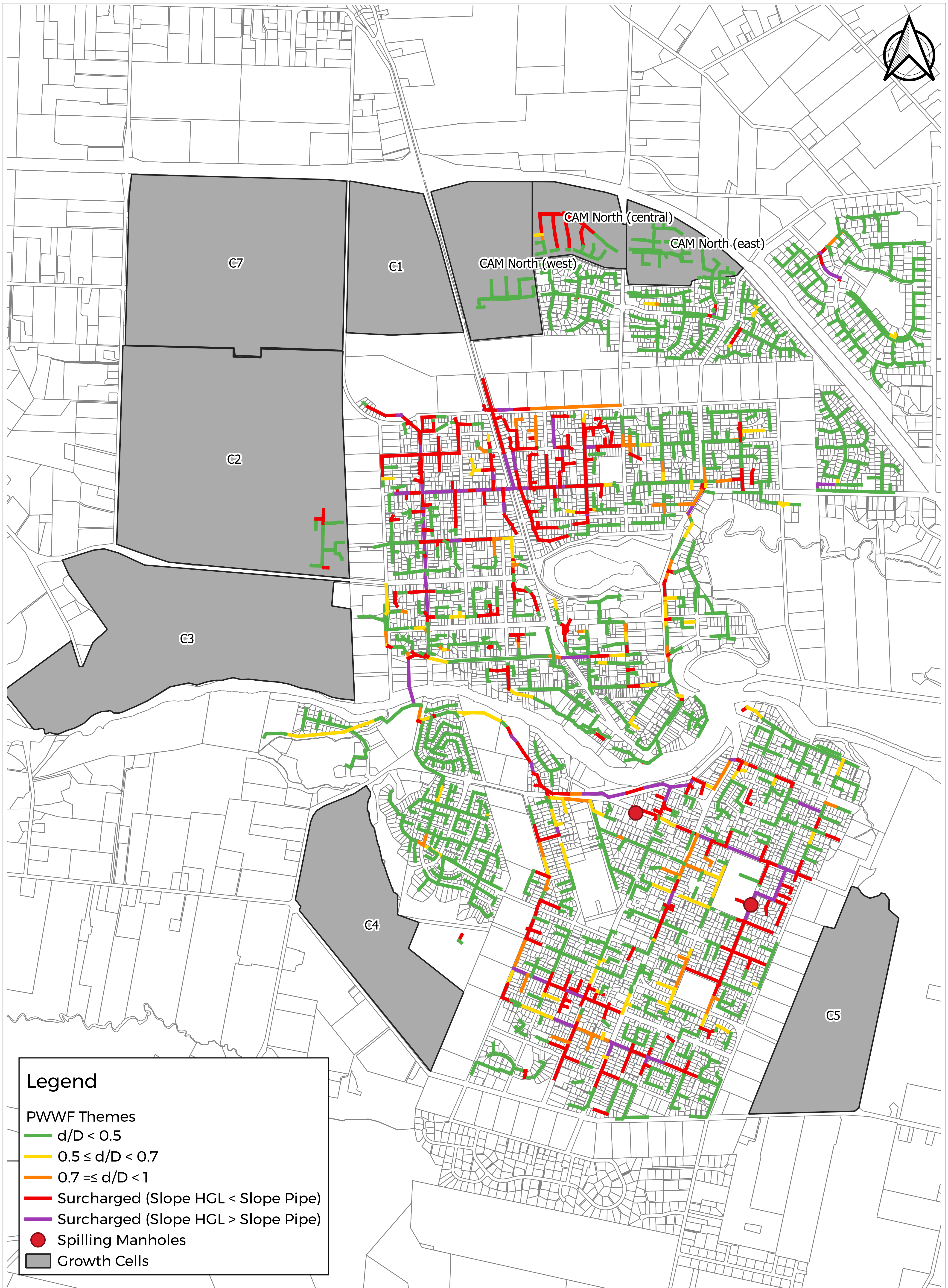
Appendix C
System performance maps



CLIENT: Waipa DISTRICT COUNCIL	wsp — Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand	PROJECT: Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment
	DRAWN: H. Li; APPROVED: C. Mills	SHEET: Appendix C - 2050 System Performance Maps Cambridge Peak Wet Weather Flow Capacity (2050 Networks and Growth)
	SHEET NUMBER: 1 of 1; SCALE: 1:20,000	PROJECT NUMBER: 2-WLASS.GH; REVISION DATE: 04/08/2022; REVISION: R0

File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment.qgz

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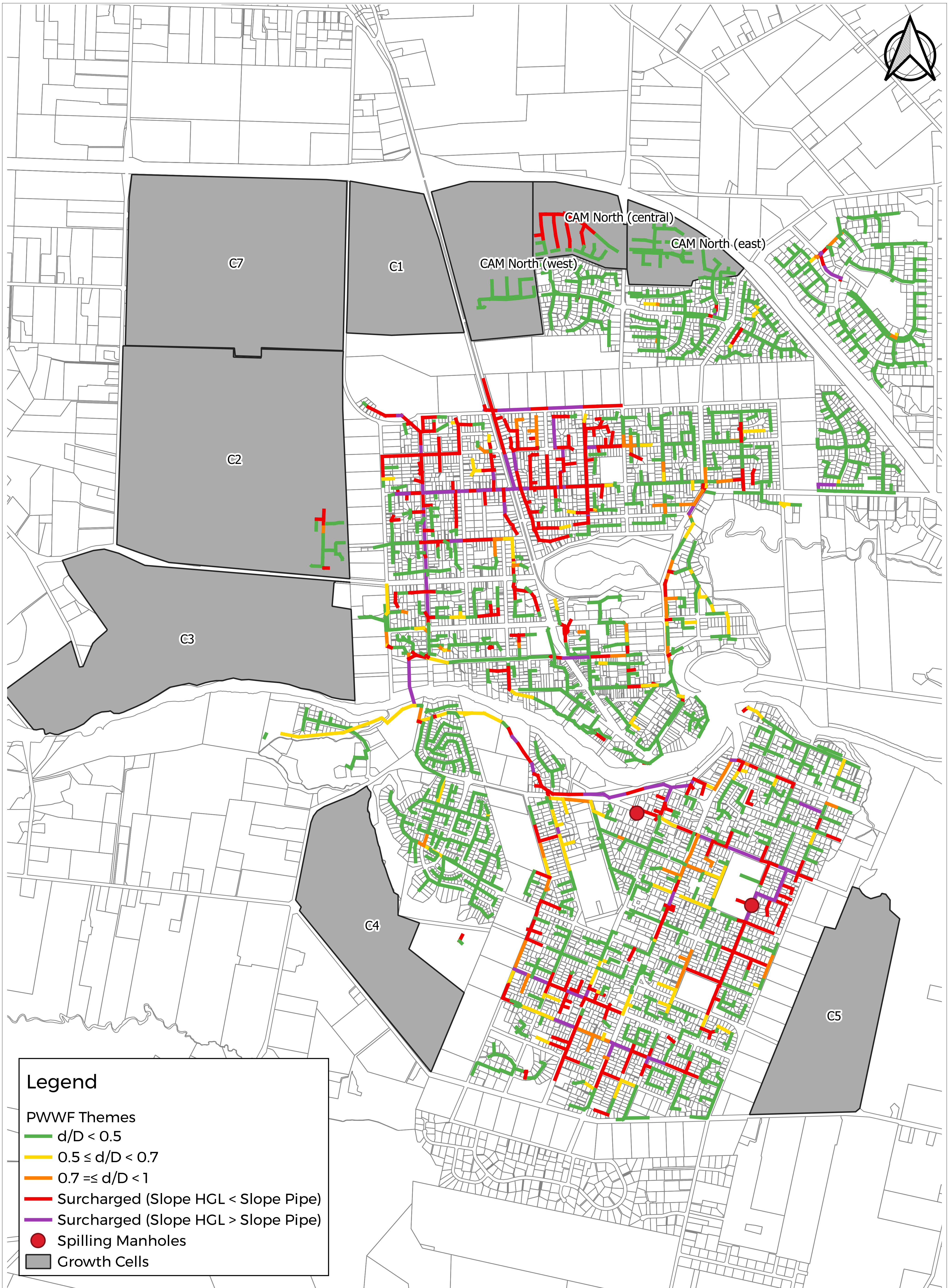

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
			Appendix C - 2050 System Performance Maps Cambridge Peak Wet Weather Flow Capacity (2050 Plan Change Network)		
	DRAWN	APPROVED			
	H. Li	C. Mills			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
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File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment.qgz

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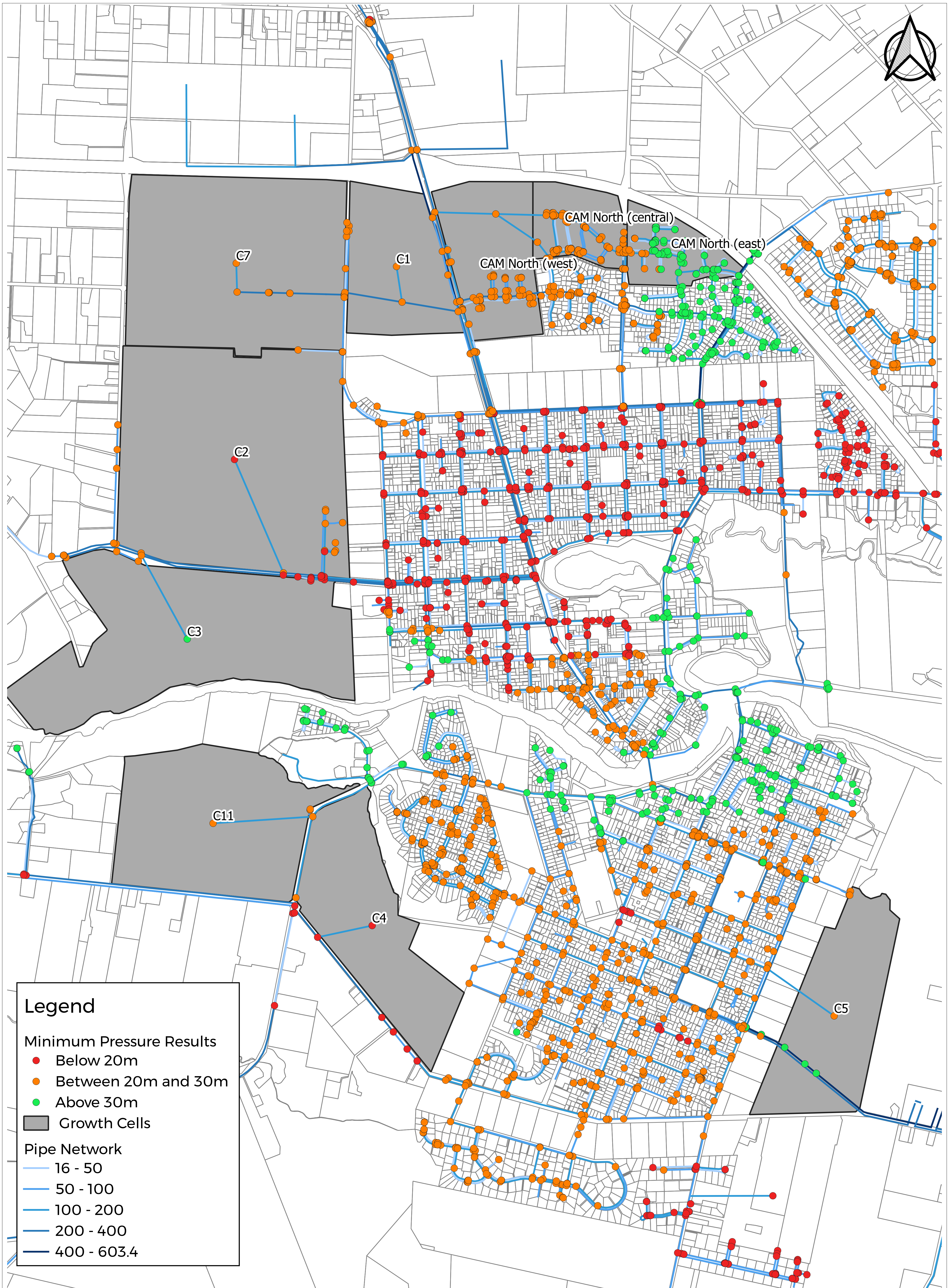

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Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET
Appendix C - 2050 System Performance Maps
Cambridge - Minimum Pressure Results After Plan Change (2050 Plan Change Network)

DRAWN	APPROVED			
P. Galabadage	J. Viyakesparan			
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:20000	2-WLASS.GH	04/08/2022	R0

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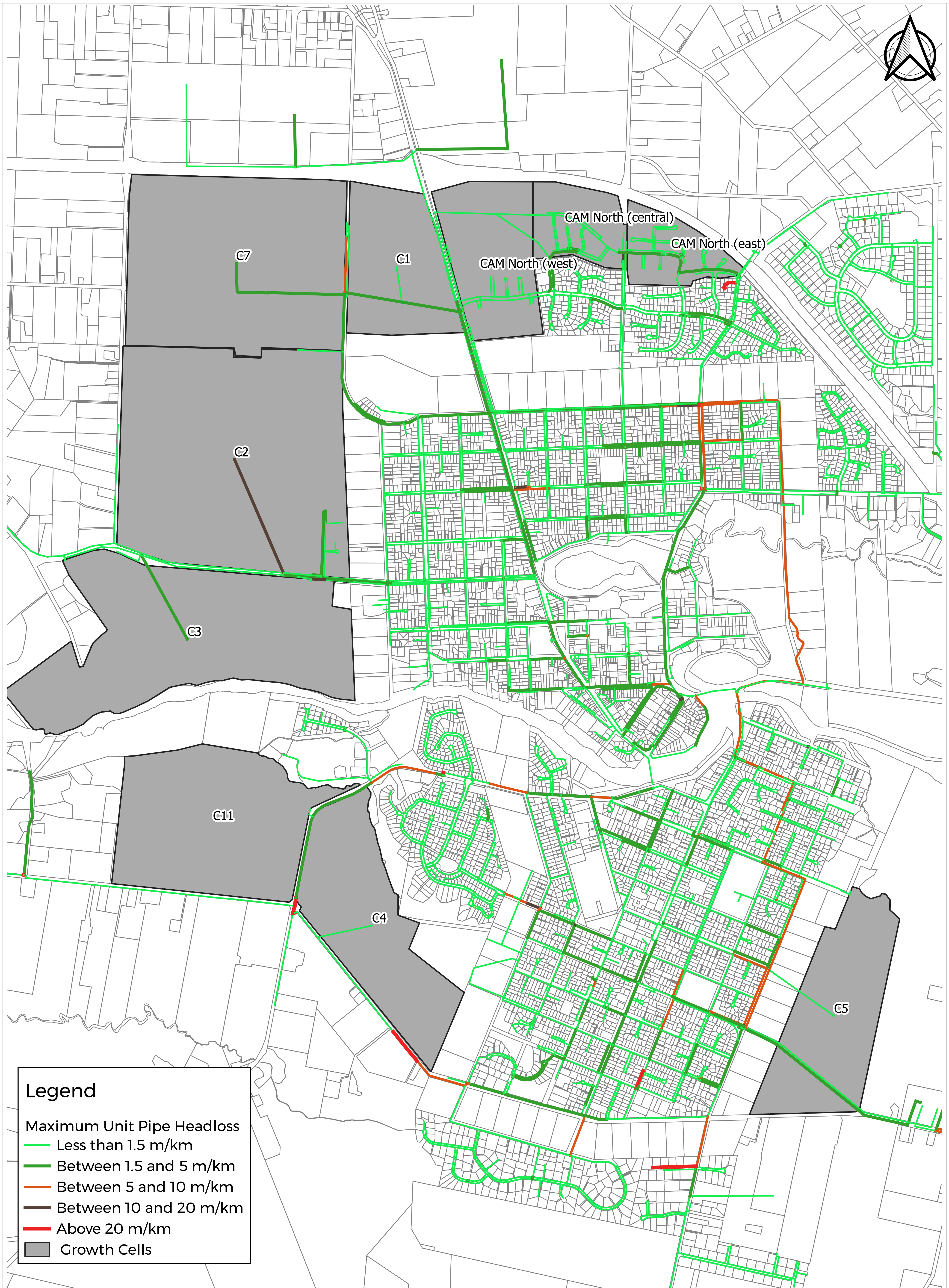

CLIENT			PROJECT
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment
			SHEET Appendix C - 2050 System Performance Maps Cambridge - Maximum Unit Headloss Results after Plan Change (2050 Plan Change)
	DRAWN P. Galabadage	APPROVED J. Viyakesparan	
	SHEET NUMBER 1 of 1	SCALE 1:20000	PROJECT NUMBER 2-WLASS.GH · REVISION DATE 04/08/2022 · REVISION R0

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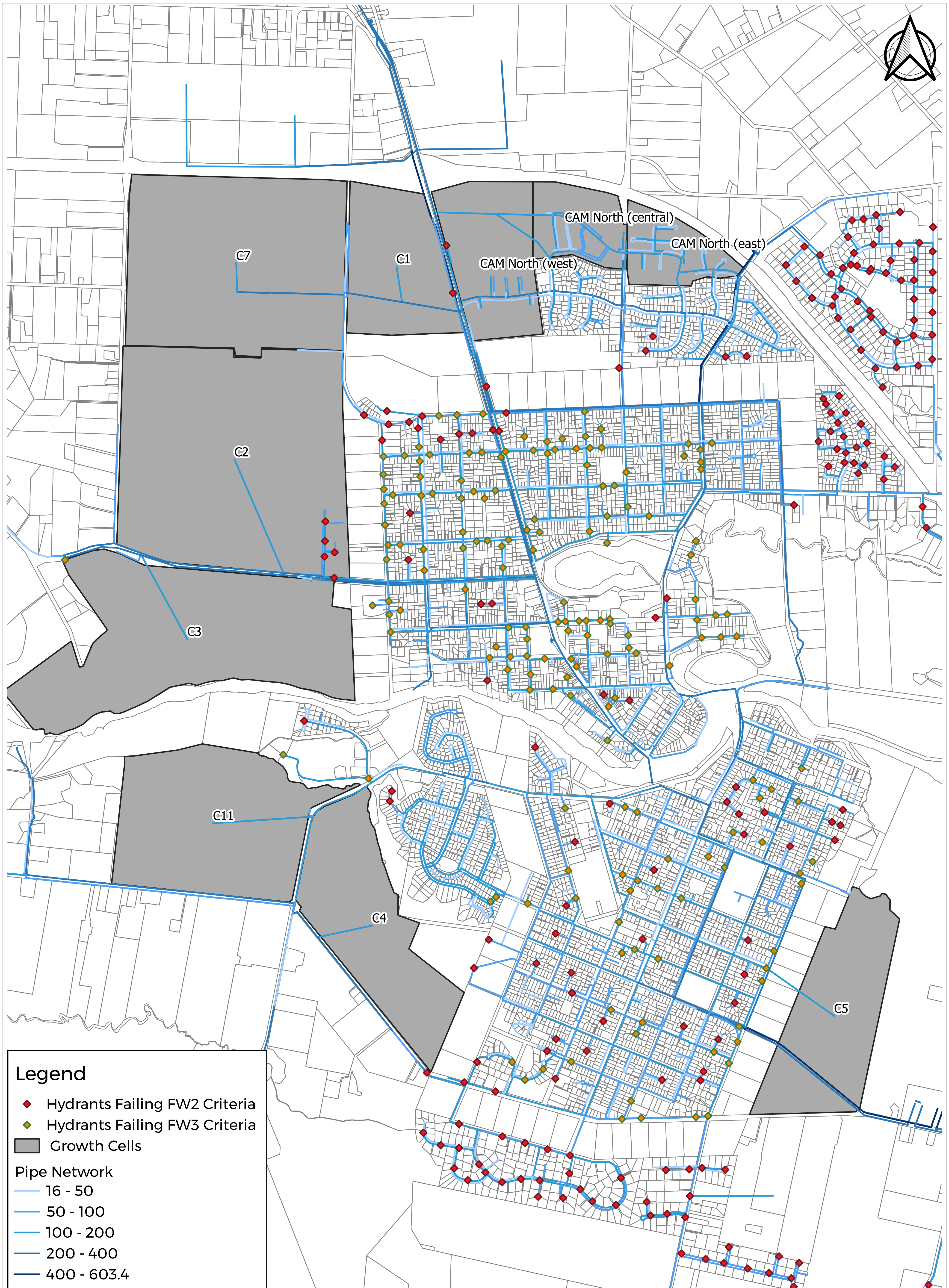

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
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	P. Galabadage	J. Viyakesparan	Appendix C - 2050 System Performance Maps Cambridge Hydrants failing for FW2 and FW3 criteria After Plan Change		
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
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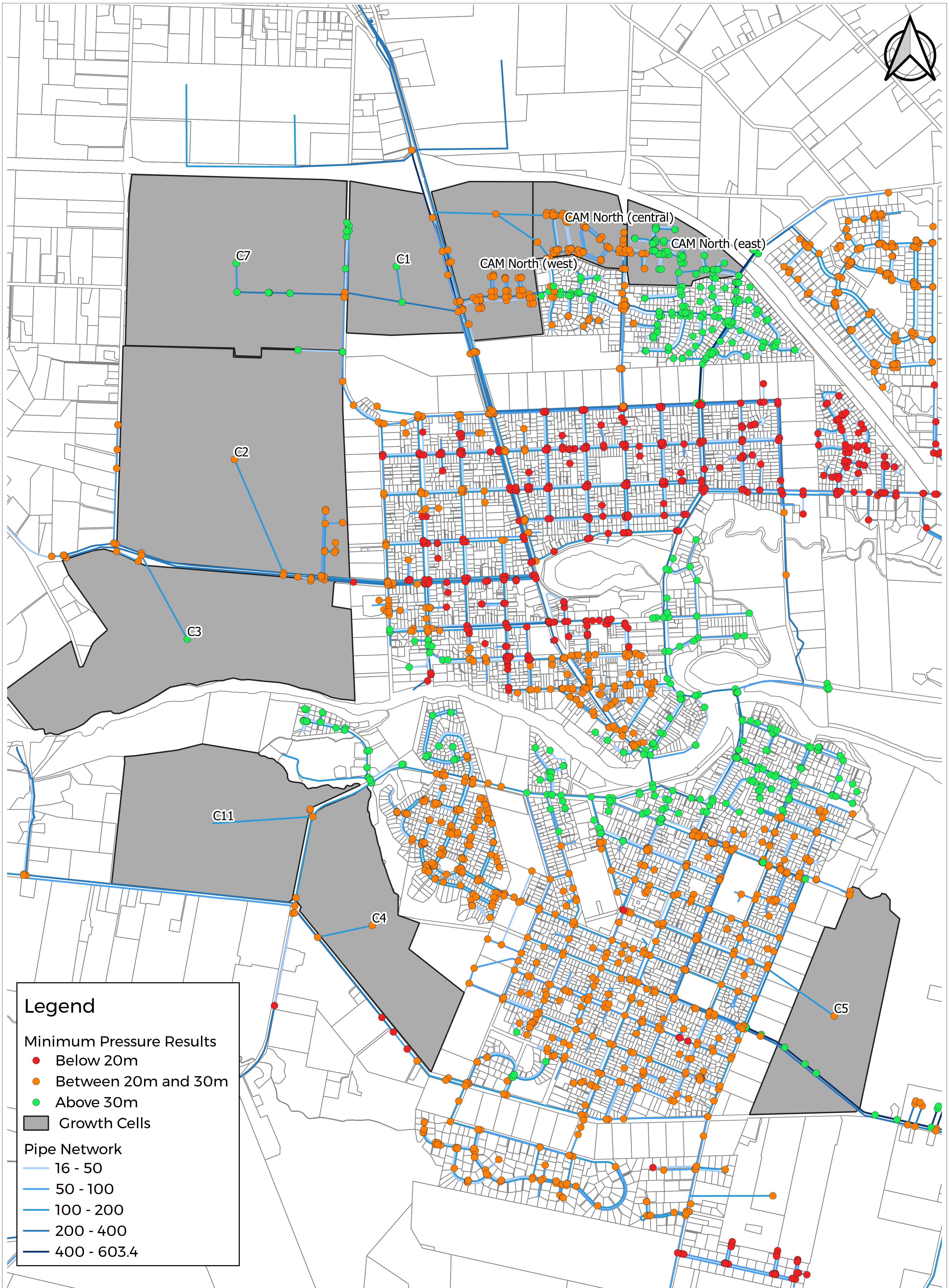

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
			Appendix C - 2050 System Performance Maps Cambridge - Minimum Pressure Results before Plan Change (2050 Network and Growth)		
	DRAWN	APPROVED			
	P. Galabadage	J. Viyakesparan			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
	1 of 1	1:20000	2-WLASS.GH	04/08/2022	R0

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PROJECT: Waipa District Council
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SHEET: Appendix C - 2050 System Performance Maps
Cambridge - Maximum Unit Headloss Results before Plan Change
(2050 Network and Growth)

DRAWN	APPROVED	PROJECT NUMBER	REVISION DATE	REVISION
P. Galabadage	J. Viyakesparan	2-WLASS.GH	04/08/2022	R0

SHEET NUMBER	SCALE
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File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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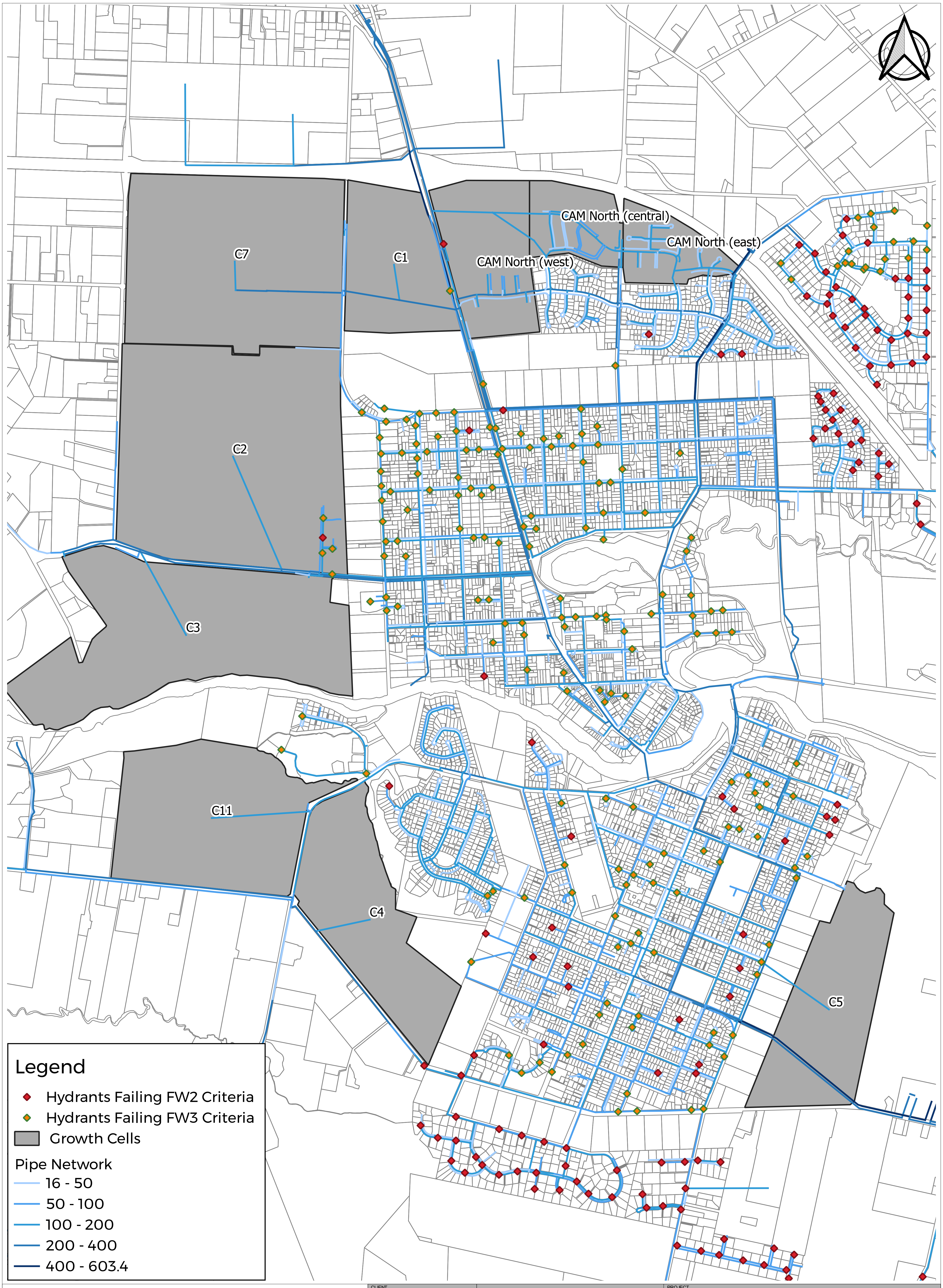

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PROJECT
Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET
Appendix C - 2050 System Performance Maps
Cambridge -Hydrants failing for FW2 and FW3 criteria before Plan Change (2050 Network and Growth)

DRAWN	APPROVED		
P. Galabadage	J. Viyakesparan		
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION

SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:20000	2-WLASS.GH	04/08/2022	R0

File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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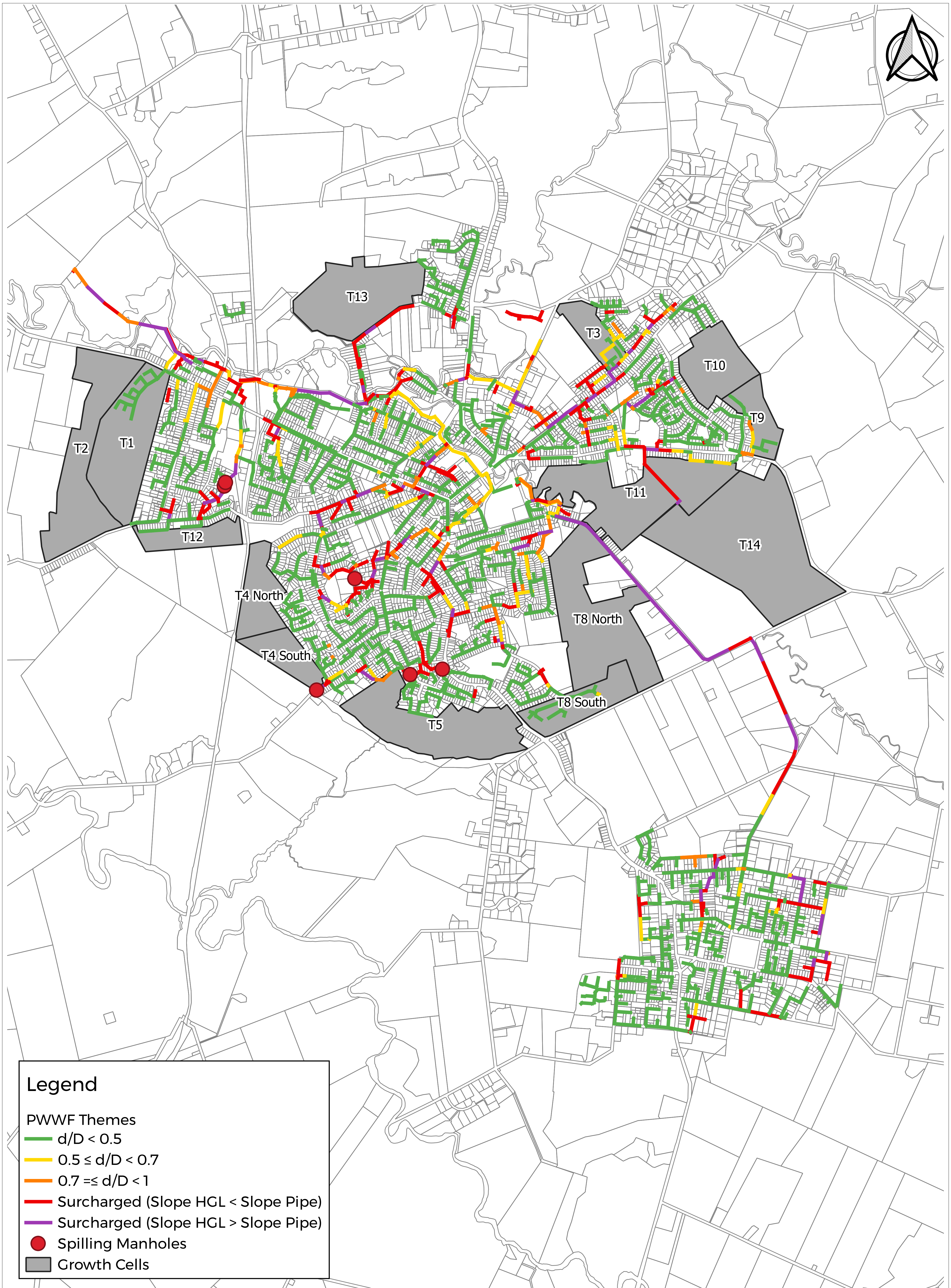

CLIENT			PROJECT
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment
			SHEET Appendix C - 2050 System Performance Maps Te Awamutu Peak Wet Weather Flow Capacity (2050 Networks and Growth)
	DRAWN H.Li	APPROVED C. Mills	
	SHEET NUMBER 1 of 1	SCALE 1:25,000	PROJECT NUMBER 2-WLASS.GH · REVISION DATE 04/08/2022 · REVISION R0

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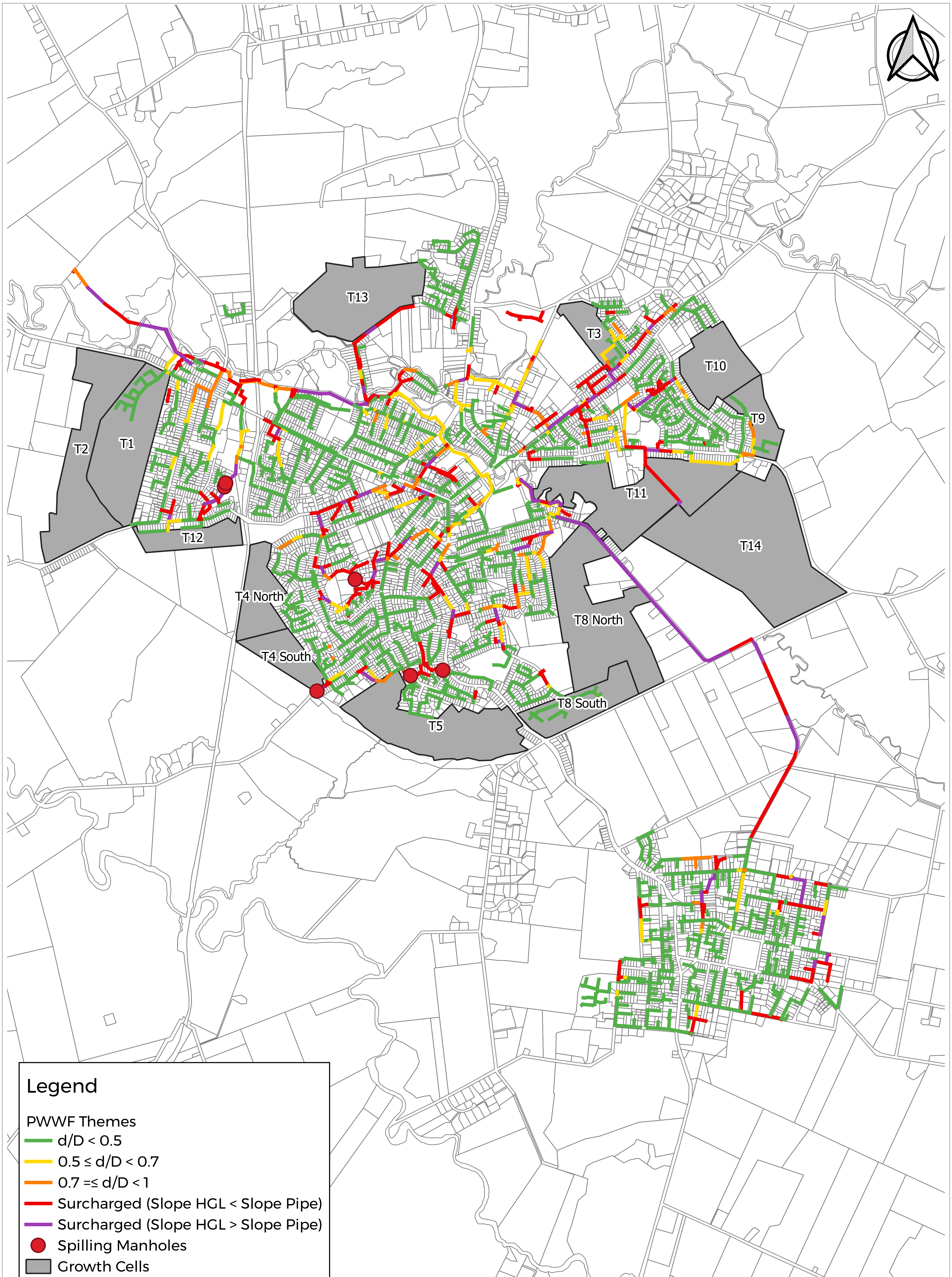

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
	DRAWN H. Li	APPROVED C. Mills	SHEET Appendix C - 2050 System Performance Maps Te Awamutu Peak Wet Weather Flow Capacity (2050 Plan Change Network)		
	SHEET NUMBER 1 of 1	SCALE 1:25,000	PROJECT NUMBER 2-WLASS.GH	REVISION DATE 04/08/2022	REVISION R0

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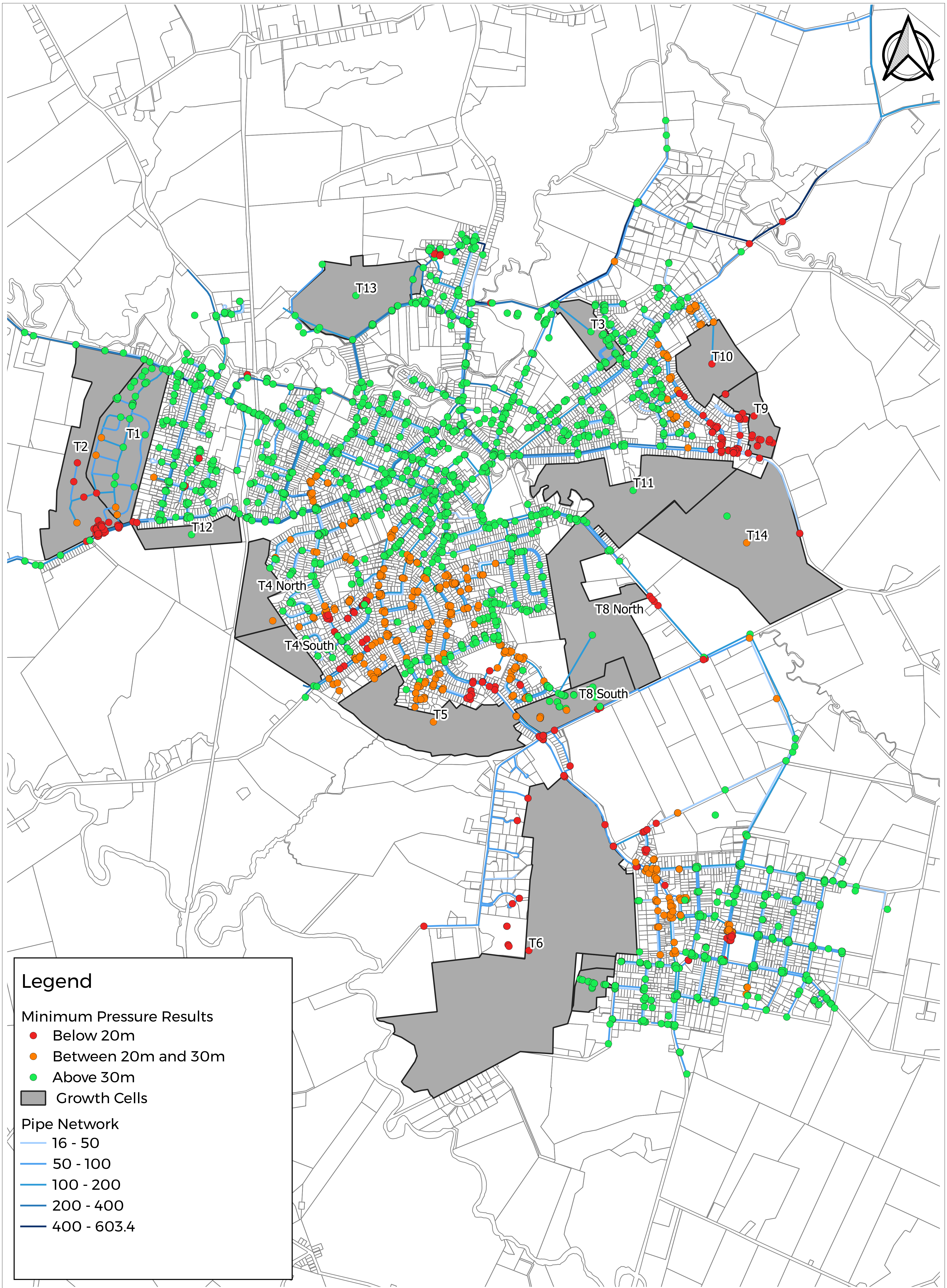

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET		
	DRAWN	APPROVED	Appendix C - 2050 System Performance Maps Te Awamutu - Minimum Pressure Results after Plan Change (2050 Plan Change)		
	P. Galabadage	J. Viyakesparan			
	SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
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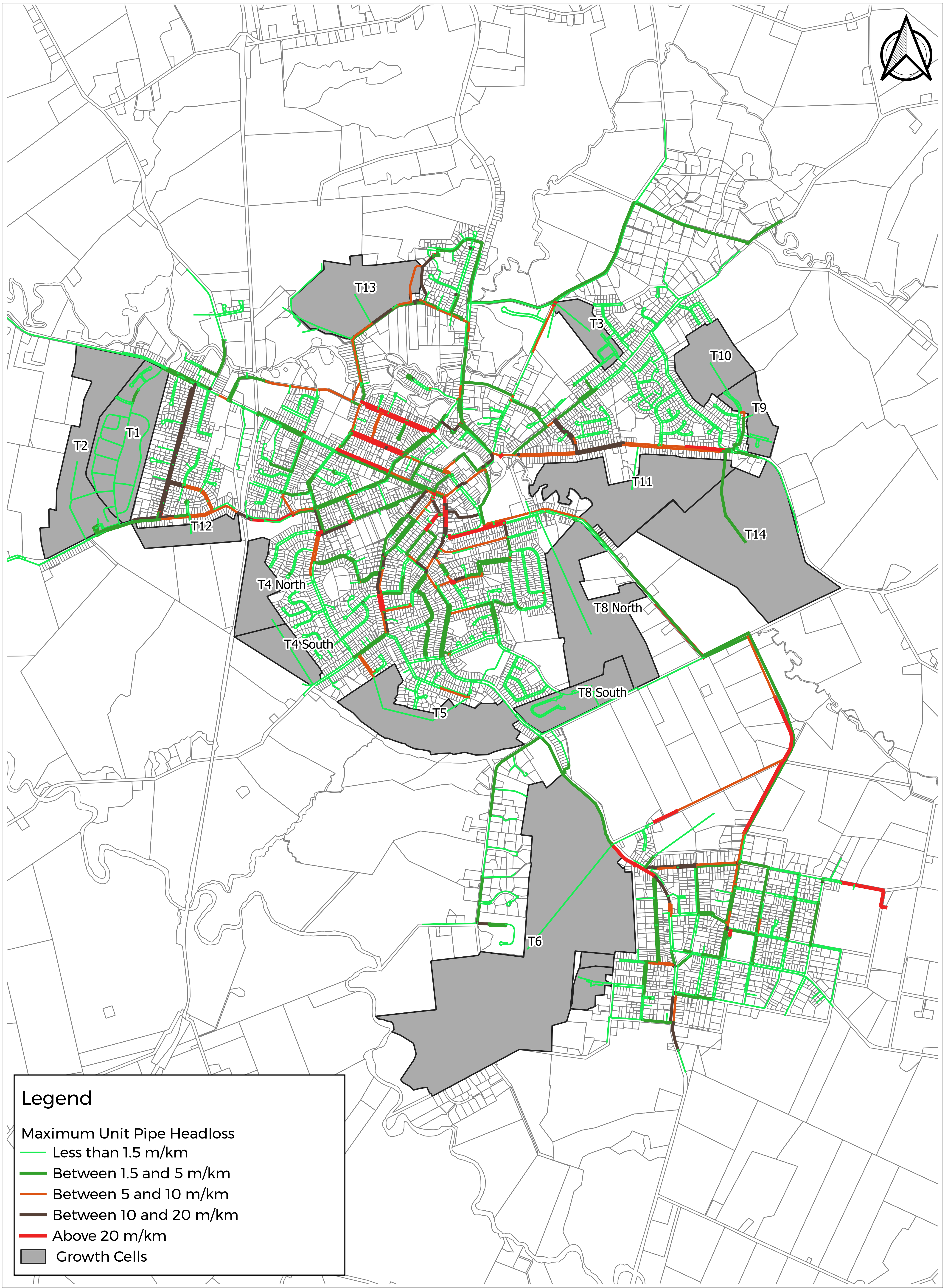

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CLIENT: Waipa District Council	wsp — Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand		PROJECT: Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment
			SHEET: Appendix C - 2050 System Performance Maps Te Awamutu - Maximum Unit Headloss Results after Plan Change (2050 Plan Change)
	DRAWN: P. Galabadage	APPROVED: J. Viyakesparan	
	SHEET NUMBER: 1 of 1	SCALE: 1:25000	PROJECT NUMBER: 2-WLASS.GH; REVISION DATE: 04/08/2022; REVISION: R0

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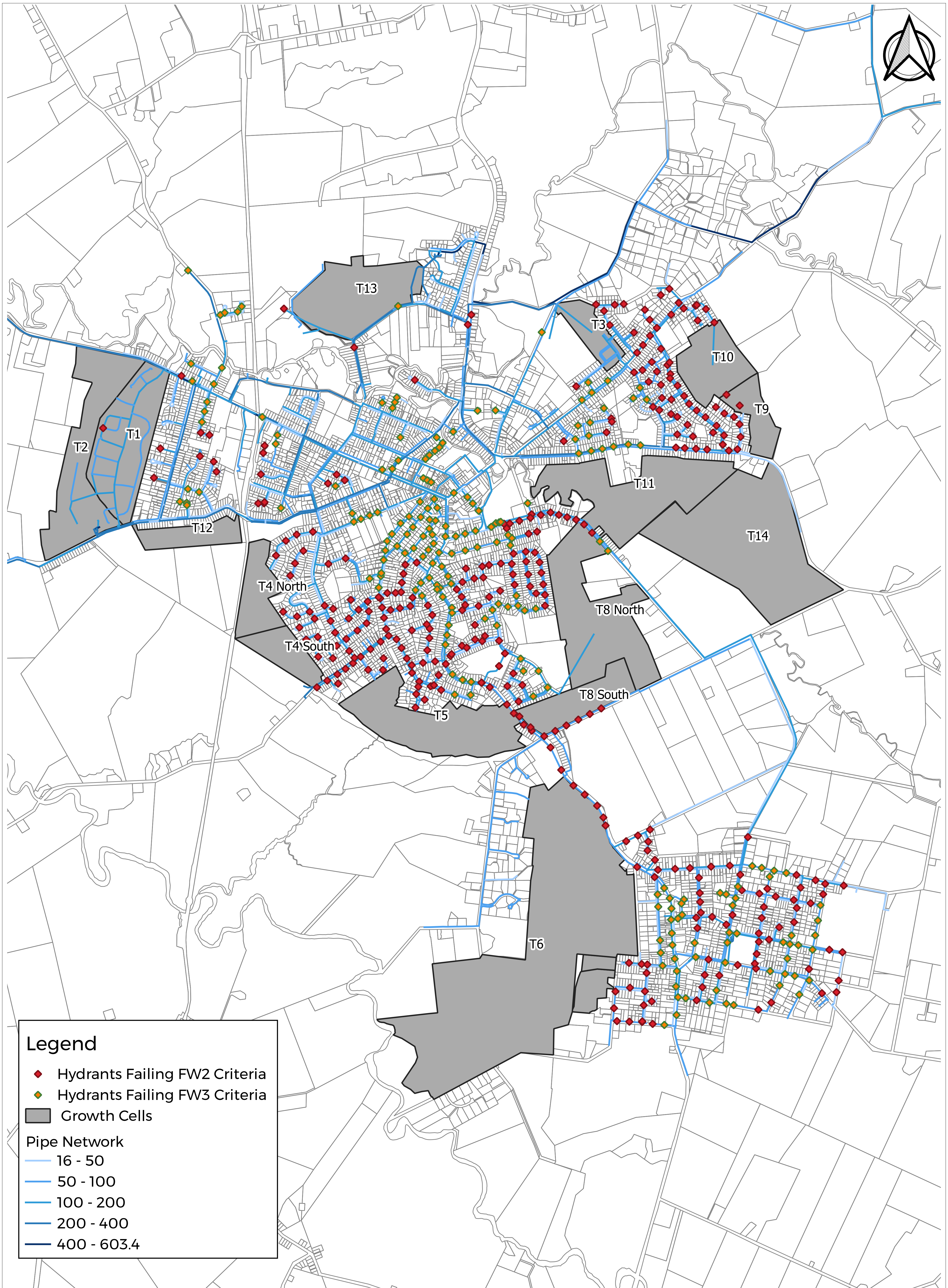

CLIENT			PROJECT		
Waipa DISTRICT COUNCIL	wsp Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand		Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
			SHEET Appendix C - 2050 System Performance Maps Te Awamutu - Hydrants failing for FW2 and FW3 criteria after Plan Change (2050 Plan Change)		
	DRAWN P. Galabadage	APPROVED J. Viyakesparan			
	SHEET NUMBER 1 of 1	SCALE 1:25000	PROJECT NUMBER 2-WLASS.GH	REVISION DATE 04/08/2022	REVISION R0

File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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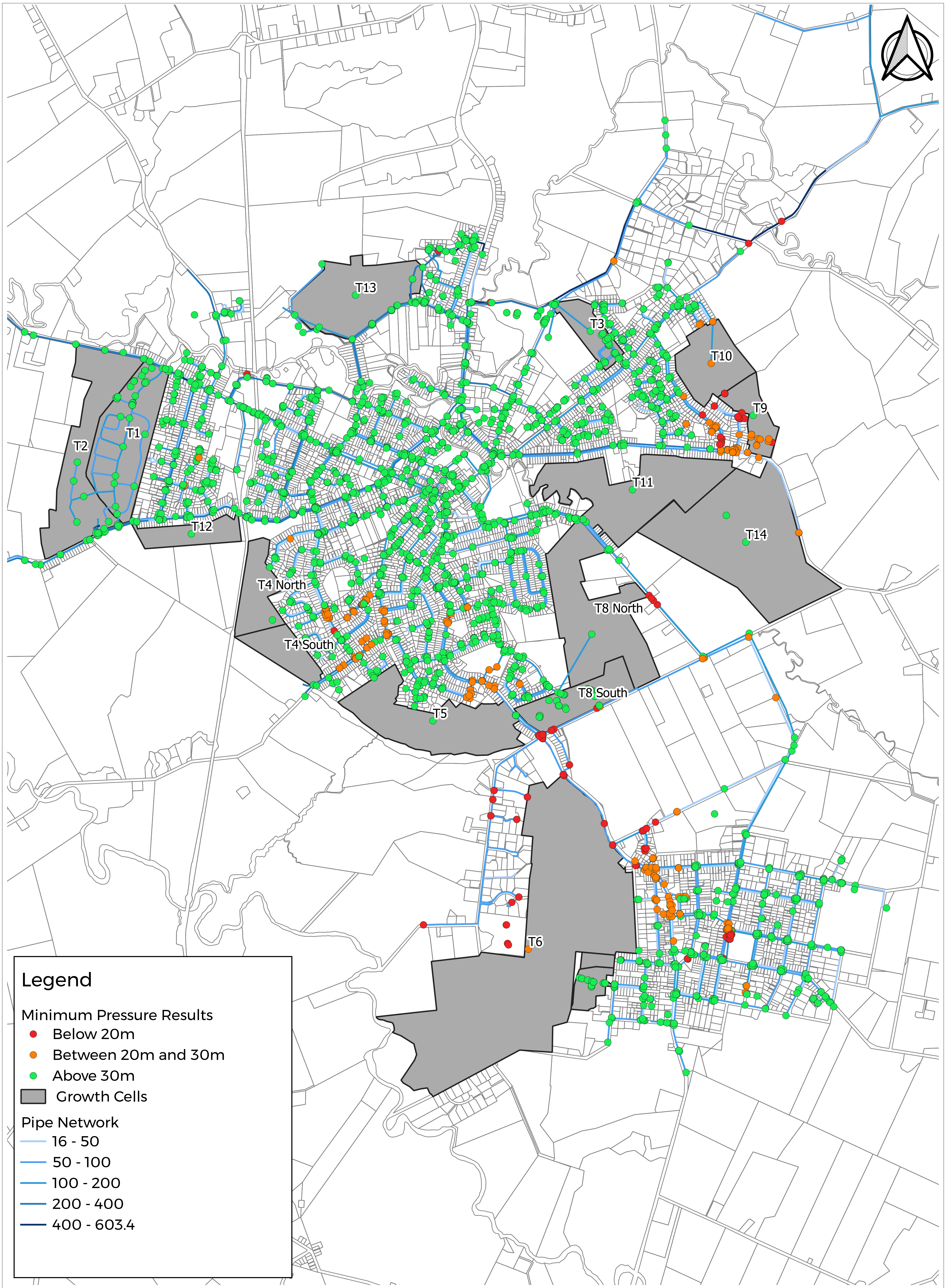

CLIENT		PROJECT		
Waipa DISTRICT COUNCIL	wsp Hamilton Office, Level 2, 160 Ward Street, Hamilton 3204, New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment		
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		Appendix C - 2050 System Performance Maps Te Awamutu - Minimum Pressure Results before Plan Change (2050 Networks and Growth)		
DRAWN	APPROVED			
P. Galabadage	J. Viyakesparan			
SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:25000	2-WLASS.GH	04/08/2022	R0

File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

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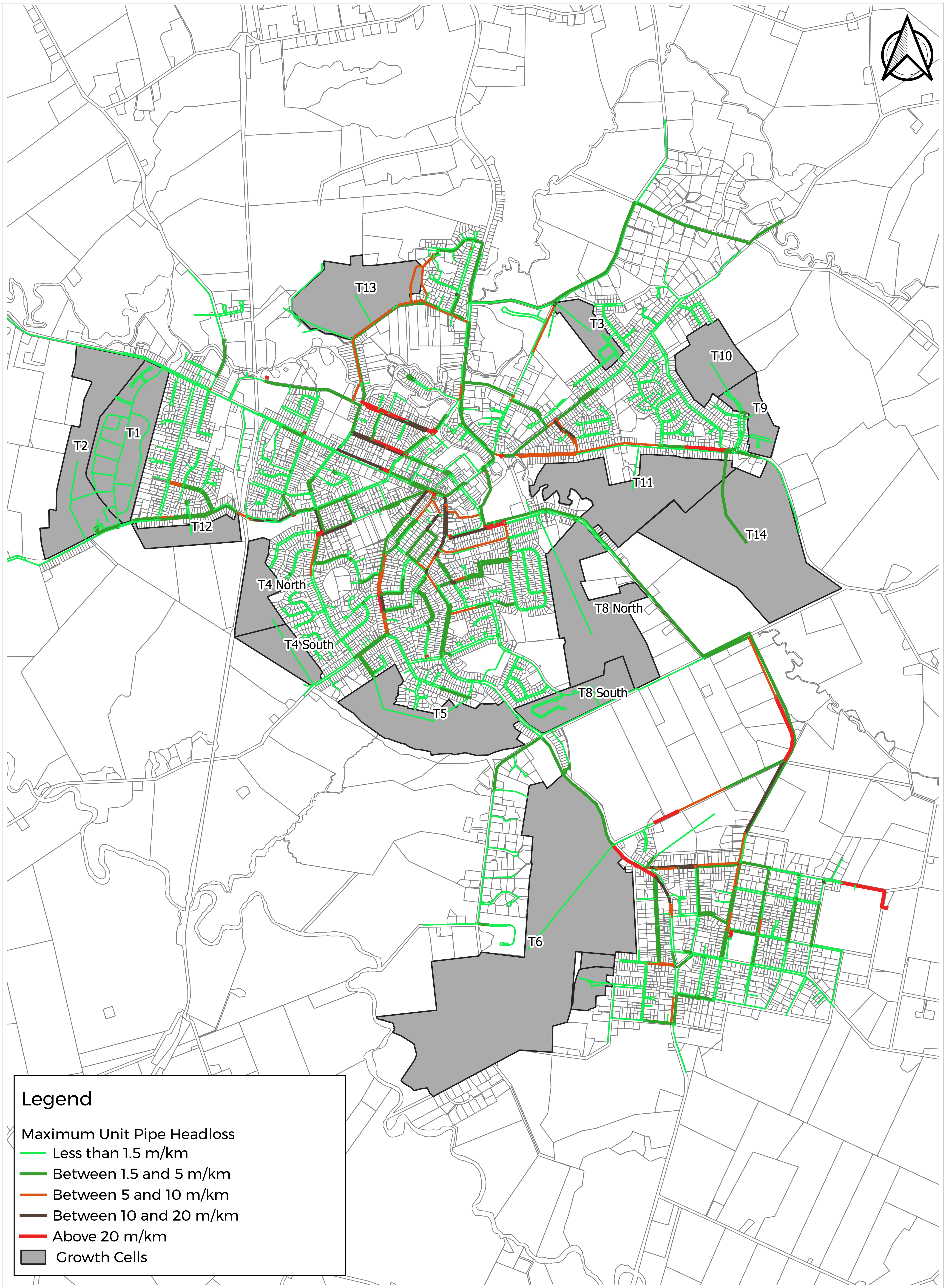

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P. Galabadage	J. Viyakesparan
SHEET NUMBER	SCALE
1 of 1	1:25000

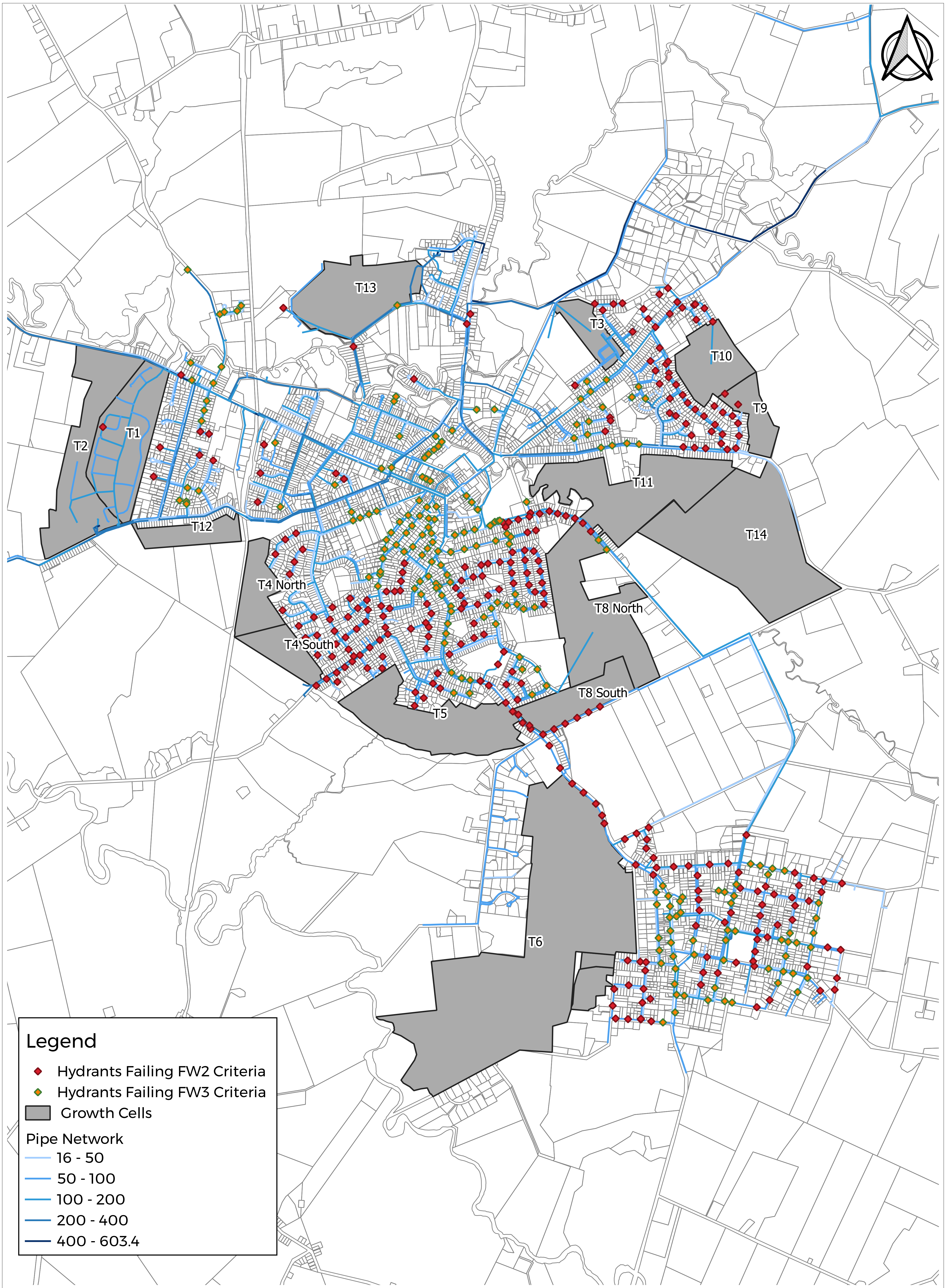
PROJECT
Waipa District Council
Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment

SHEET
Appendix C - 2050 System Performance Maps
Te Awamutu - Maximum Unit Headloss Results before Plan Change (2050 Network and Growth)

PROJECT NUMBER	REVISION DATE	REVISION
2-WLASS.GH	04/08/2022	R0

File Ref: \\corp.pbwan.net\ANZ\ProjectsNZ\2W\2-WLASS.GH Water and Wastewater Infrastructure Asse\Home\400 Project Outputs\03_Tech_Docs\02_Tech_Out\01_WIP_Draft outputs\GIS\Maps - WDC Infra Assessment - Water only.qgz

Original Sheet Size: A3 [W = 297, H = 420]   Plot Date: 2022-07-29 07:42:38 by Galabadage, Pramodi (pga191)



CLIENT		PROJECT
Waipa DISTRICT COUNCIL	wsp Hamilton Office Level 2, 160 Ward Street Hamilton 3204 New Zealand	Waipa District Council Plan Change 26 - Water and Wastewater Infrastructure Capacity Assessment SHEET Appendix C - 2050 System Performance Maps Te Awamutu - Hydrants failing for FW2 and FW3 criteria before Plan Change (2050 Network and Growth)

DRAWN	APPROVED
P. Galabadage	J. Viyakesparan

SHEET NUMBER	SCALE	PROJECT NUMBER	REVISION DATE	REVISION
1 of 1	1:25000	2-WLASS.GH	04/08/2022	R0

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