Summary Synthesis Report: Infrastructure Report

Draft Plan Change 26

Prepared for Waipā District Council
Prepared by Beca Limited

16 August 2022

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Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
1	Craig Inskeep Alec Duncan Stephanie Dean	Draft for internal review	15/07/2022
2	Craig Inskeep Alec Duncan Stephanie Dean	Draft for discussion	29/07/2022
3	Craig Inskeep	Final draft	16/08/2022

Document Acceptance

Action	Name	Signed	Date
Prepared by	Stephanie Dean, Alec Duncan, Craig Inskeep		16/08/2022
Reviewed by	Stephanie Dean		16/08/2022
Approved by	Richard Douch		16/08/2022
on behalf of	Beca Limited		

1 Introduction

Beca have been engaged by Waipā District Council (WDC) to provide a summary document which considers the available technical reports prepared by consultants (engaged by WDC) for:

- Water and Wastewater
- Stormwater
- Transportation
- Green infrastructure/public open space

The technical assessments have been prepared in relation to Plan Change 26 Enabling Housing Supply Amendment Act and Plan Change 21 Large Lot Residential for the Waipā District urban areas including Cambridge, Te Awamutu and Kihikihi. This report summarises the findings in relation to Plan Change 26 only.

These technical reports will support the Resource Management Act (RMA) section 32 reporting for Plan Change 26 currently being drafted by WDC. This report is purely a summary of the technical assessment undertaken by others. It isn't a review of the content of those assessments or a recommendation on the application of the assessments. It is purely a summary to aid the reporting planner.

The Resource Management (enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA – EHS) was passed into law on 20 December 2021 to rapidly accelerate the supply of housing in areas where demand for housing is high. Under the National Policy Statement on Urban Development (NPS - UD), the intensification policies are indented to provide greater housing choice and improve affordability within the larger urban areas. As a tier one territorial authority WDC is now required to incorporate the Medium Density Residential Standards (MDRS) into the district plan via an amendment to the zone provisions for residential areas via a notified plan change by 20 August 2022.

The intent of the technical reports is to understand the effects of the housing intensification under the new MDRS on infrastructure, as compared to previous growth expectations and current baseline and identify any constraints to development at the higher densities.

The reports have considered through a range of modelling, spatial analysis and the use of GIS.

2 Residential Capacity Considerations

Within the Waipā district, the existing urban areas are predominately characterised by lower density developments in the form of single detached dwellings up to the densities enabled by the district plan with a minimum net lot size of 500m^2.

The development patterns enabled under the MDRS if adopted for the residential zone, are noted to be substantially different than the current housing provisions. If higher densities are implemented, they would result in a significant step change in both increased density and housing typologies. Including attached dwellings and apartment style buildings up to three stories with the associated expansion in building envelopes to enable the development.

2.1 Current residential capacity

The current capacity of the urban areas within Cambridge/Leamington, Te Awamutu and Kihikihi urban areas have been established by BBO (refer Table 2 of the BBO assessment) as part of the Transportation Infrastructure Assessment[1] which considered the latest rating information for each of the urban areas.

The report also considers the anticipated dwelling capacity (refer Table 3 of the BBO assessment) within each growth cell (without the MDRS provisions).

Based on the yield assumptions applied, the baseline future growth cells of Cambridge/Leamington, Te Awamutu and Kihikihi are anticipated to provide for approximately **9,224 new dwellings** by 2035 based on current district plan provisions, with a further **3,285 new dwellings** provided for post 2035.

2.2 Capacity Increase (Maximum Yield) With MDRS

To accommodate the MDRS, housing density would need to be increased both within the greenfield areas and as site redevelopment in the existing urban areas. The MDRS provisions would enable significantly greater intensification across the urban area for Waipā.

WDC as a Future Proof Partner have engaged Market Economics to undertake Residential Capacity modelling[2] which is based on consistent methodologies across the urban areas of the future proof partners including Hamilton City Council (HCC) and Waikato District Council (WDC). The modelling undertaken considers the baseline level of residential capacity undertaken in 2021 by Market Economics for the NPS-UD as part of the Housing Development Capacity Assessment 2021[3].

For Waipā residential and deferred residential zones (this includes Cambridge, Te Awamutu and Kihikihi including the identified/planned growth cells for residential development), Market Economics modelling provides an indication of what the 'plan enabled' capacity with MDRS provisions applied to the Operative District Plan (ODP) base zones would be. This is reflected in Table 4.1 and 4.2 of their report with an estimated additional **68,900** dwellings comprising:

- **36,500** indicated for Cambridge,
- **27,300** indicated for Te Awamutu, and
- **5,000** indicated within Kihikihi.

Across all areas, greenfield areas represent approximately 38% of the additional capacity with existing urban areas providing 62% of the additional capacity. The report also indicates that redevelopment capacity potentially yields three times that of infill for the residential zones.

This potential capacity increase does not represent likely growth as there are a number of influencing factors. Market economics have also considered each of the urban areas in terms of the commercial feasibility capacity as outlined below.

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[1] Bloxam Burnett and Olliver, *Waipā DC Plan Change 26 (Enabling Housing Supply Amendment Act) & Plan change 21 (Large Lot Intensification): Transportation Infrastructure Assessment , 23 June 2022.*

[2] Market Economics, *2022 Residential Capacity Modelling: Medium Density Residential Standards, Waipa District, 13 June 22* (Draft)

[3] Market Economics, 2021 *NPS- UD housing development Capacity Assessment: Future Proof Partners, 30 July 2021.*

2.3 Estimated Commercial Feasibility Capacity

Market economics have also modelled the commercial feasibility capacity to deliver dwellings, taking into account the need for a step change in the development and includes the purchase costs, site re-development costs, estimated costs of construction and likely sales which is outlined in further detail in the Market Economics report.

Notably, the commercially feasible capacity modelled does not consider any limits occurring through infrastructure constraints. The modelling has been intentionally undertaken by Market Economics at WDC's request to identify areas of potential feasibility without the consideration of infrastructure constraints.

The following are excerpts from the Market Economics Modelling:

The estimated commercially feasible capacity is contained in Table 4-4 with the application of the MDRS to the ODP base zones. It shows the net additional dwellings that are estimated to represent potentially feasible development options for commercial developers. Importantly, the capacity should not be confused with growth – it is a measure of the potential capacity, some of which is likely to get taken up by the market with growth.

*Table 4-3 and Table 4-4 show that there is an estimated commercially feasible capacity of an **additional 6,300 dwellings** across the Waipa District's urban areas. This amounts to around 9% of the plan enabled capacity estimated to represent commercially feasible options.*

Table 4-3: Commercially Feasible Capacity by Zone within Waipa District with the Application of MDRS

	INFILL				REDEVELOPMENT					GREENFIELD				
Hamilton Zone	Standalone	Attached	Apartment	Max Infill	Standalone	Attached	Apartment	Max Redevelopment	Max Infill or Redevelopment	Standalone	Attached	Apartment	Max Greenfield	Max Existing Urban and Greenfie
RESIDENTIAL ZONE	1,900	600	10	1,900	1,500	100	20	1,600	2,800	100	-	-	100	2,900
DEFERRED RESIDENTIAL ZONE	800	30	-	800	300	-	-	300	1,000	2,400	60	-	2,400	3,400
TOTAL	**2,700**	**700**	**10**	**2,800**	**1,900**	**100**	**20**	**1,900**	**3,800**	**2,500**	**60**	**-**	**2,500**	**6,300**

Source: M.E Waipa Residential Capacity MDRS Model, 2022.

Table 4-4: Commercially Feasible Capacity by Location within Waipa District with the Application of MDRS

		INFILL				REDEVELOPMENT					GREENFIELD				
LOCATION	LEVEL	Standalone	Attached	Apartment	Max Infill	Standalone	Attached	Apartment	Max Redevelopment	Max Infill or Redevelopment	Standalone	Attached	Apartment	Max Greenfield	Max Existing Urban and Greenfie
Cambridge	Level 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambridge	Level 4	500	40	-	600	900	-	-	900	1,100	100	-	-	100	1,200
Cambridge	Level 5	1,900	600	10	1,900	800	100	20	800	2,300	2,300	60	-	2,300	4,600
Te Awamutu	Level 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Te Awamutu	Level 2	40	-	-	40	10	-	-	10	40	20	-	-	20	70
Te Awamutu	Level 3	100	-	-	100	20	-	-	20	100	70	-	-	70	200
Te Awamutu	Level 4	100	-	-	100	100	-	-	100	200	20	-	-	20	200
Kihikihi	Level 1	10	-	-	10	-	-	-	-	10	-	-	-	-	10
Kihikihi	Level 2	-	-	-	-	-	-	-	-	-	10	-	-	10	10
Kihikihi	Level 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**TOTAL**	**2,700**	**700**	**10**	**2,800**	**1,900**	**100**	**20**	**1,900**	**3,800**	**2,500**	**60**	**-**	**2,500**	**6,300**

Source: M.E Waipa Residential Capacity MDRS Model, 2022.

Between half and two-thirds (60%; 3,800 dwellings) of the estimated feasible capacity is located within the existing urban area, which is consistent with the existing urban area share of total plan enabled capacity. While greenfield capacity often represents an easier development option (than existing urban development), the modelled rate of feasibility is similar to the existing urban area due to the application of higher development contributions. It is likely that a greater share of greenfield capacity will still be developed, albeit at lower margins.

Nearly all (92%; 5,800 dwellings) of the feasible capacity is estimated to occur within Cambridge, with only a minor share (7%; 490 dwellings) within the combined Te Awamutu/Kihikihi urban areas. This occurs due to the higher value areas within Cambridge, where overall 16% of plan enabled capacity is estimated to be feasible.

This suggests that the uptake of higher growth projections would be realised over a longer term, with development still occurring at a range of densities to match the current markets.

3 Technical Report Summaries and Key Findings

3.1 Water

A water supply infrastructure assessment has been undertaken by WSP consultants.

The WSP assessment is currently a desktop analysis which considers the 2019 hydraulic model for the WDC urban areas. The initial 2019 model considered the following:

- Current baseline system performance for the water supply network including the modelled peak day demand (by population)
- Storage capacity within reservoirs
- Leakage
- Impact of committed upgrades for the network

The model also considered the total demand for the predicted 2050 scenario assuming the growth identified by Waipā 2050 was realised, which included infill and the increase in demand associated with planned growth cells. With the addition of the planned growth cells, the current network performance drops and minimum pressures are not able to be achieved without upgrades.

3.1.1 Key Finding – Water Network Capacity

The model considered capacity and water pressures compared to an acceptable level (>20m) and the availability of firefighting water (FW2 standard as described below). FW2 is the minimum supply of water required by Fire and Emergency New Zealand for firefighting from the reticulated network that complies with the New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008 in residential areas.

The modelled MDRS scenario considers the Waipa 2050 growth predictions, and assumes the anticipated growth for MDRS will be realised by 2035 and will require key infrastructure upgrades previously planned to be actioned earlier. With the increased densities applied, water demand is also increased across the network.

The model highlights that the water pressures would be insufficient across the majority of Cambridge, lower Leamington and Te Awamutu, with pressures dropping or remaining below 20m or failing to meet the FW2 standard.

The network within Cambridge would be considered the most ‘at risk’ of failure with pressures modelled at 0-20m for the majority of the network by the WSP report.

The WSP report identified that the predicted minimum water pressure for the Te Awamutu area in the Plan Change Model is generally as follows:

- Below 20m in the west side and some of the southern and south-eastern areas.
- In the range of 20-30m in the central area and most of the southern areas.

- Greater than 30m in north-western areas around the Mangapiko Stream and west of the North Island Main Trunk Railway.

These areas have been mapped using GIS, the orange and red areas indicating where the network is unlikely to be able to accommodate the proposed increase in population based on the initial model. These maps are provided as Appendix A to the WSP report.

3.1.2 Implications

If not strategically managed to accommodate future growth, inadequate capacity and pressure within the reticulated water supply networks will result in significant adverse effects on the health, safety and well-being of the Waipā communities.

Whilst some localised development could be accommodated within the existing network, it is likely that applying MDRS across the whole of the urban area would require significant strategic upgrades to the reticulated water supply networks to maintain an acceptable level of service.

To manage this, some of the demand increase may also be managed by bringing forward all planned upgrade projects to respond to the higher initial growth within the first 15 years, and Council implementing water conservation mechanisms to reduce the overall demand.

Additional modelling will be required to determine how projected development and population increases can be accommodated within the strategic network. However, there is anticipated to be a tipping point for local developments where network upgrades are required .

3.2 Wastewater

A Wastewater infrastructure assessment and modelling has been undertaken by WSP in conjunction with the water assessment described above.

The assessment considered the wastewater collection system hydraulic models for the communities of Cambridge and Te Awamutu. The model was calibrated in 2019 for use in master planning and has been updated by WSP for the MDRS assessment.

The 2019 model considered the following factors:

- The 2019 baseline
- Expected growth for the 2050 scenario
- Anticipated wastewater flow generation for new growth cells
- Anticipated wastewater flow generation for infill development
- Per capita wastewater generation and extrapolation to consider;
  - Peak wastewater flow velocities
  - Capacity and storage of key infrastructure such as pump stations and inline pipe storage, rising main capacity/retention times vs load points.
- Rates of infiltration from stormwater
- Peak dry and wet weather flow capacities for the network

Taking these factors into account, the overall capacity of the network and risk of surcharge and spilling at manholes can be determined for each of the urban catchments.

For both Cambridge and Te Awamutu in the 2050 scenario under wet weather conditions, some spilling was noted in specific areas, when planned growth (including load points from growth cells) was accounted for within the network and additional emergency storage capacity was likely to be needed in some areas. As the wastewater network is a majority gravity system the lower sections of the network above the wastewater treatment plants are considered the most at risk.

3.2.1 Key findings

A capacity assessment of the wastewater network has been undertaken as an initial desktop exercise by WSP based on the 2050 model, with the anticipated level of growth brought forward to 2035 and an average increase in population applied to the urban areas. Further modelling is required to determine in more detail where capacity may exist within the network and support increased densities.

On the basis of the initial assessment the following key aspects are noted within the assessment and replicated below:

Overall

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 plants. Wastewater maps are appended to the WSP report as Appendix A

Leamington

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.

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.

Cambridge Central

Much of the existing 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.

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.

Cambridge East – St Kilda

The Current Model network is 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 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.

Planned Growth cells – With lower planned density

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

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

Te Awamutu

Most of the upper existing networks in Te Awamutu are predicted to have spare capacity, 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 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 is 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 to 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

Kihikihi

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 and parts of the network may be able to accommodate some infill and intensification on a local scale. However, surcharging is predicted in some pipelines.

The 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 overflow predicted, in the Current Model (2050) and the Plan Change Model (2035).

2050.

One potential overflow is identified in the model results along the Kihikihi Transfer Sewer.

Wider redevelopment within Kihikihi is anticipated to cause issues requiring strategic upgrades. This is due to surcharge conditions and predicted overflows in the trunk sewer network downstream through the transfer sewer and within Te Awamutu.

3.2.2 Implications

Without additional modelling, initial coarse mapping was carried out separately for wastewater based on 2050 system performance maps and the information provided in the WSP wastewater report

These areas have been mapped using GIS with the orange and red areas indicating where the network is unlikely to be able to accommodate the proposed increase in population based on the initial model. This is shown in Appendix A of the wastewater supply infrastructure assessment.

The report considers that while there may be localised capacity within the networks to enable development, this is however tempered with the effects of increasing demand across the wider network and cumulative effects of the additional load demand.

3.2.3 Implications

Surcharge conditions within the wastewater network represent a significant operational and environmental risk and may also result in overflows of untreated wastewater via spilling manholes. These spilling manholes are designed to relieve pressure in emergency situations. However, from the initial modelling results the risk of overflow with increased densities and demand is high across most of the urban networks. Overflow situations are likely to trigger discharge consent non-compliances and could reasonably result in enforcement action being undertaken by Waikato Regional Council. This aspect would also affect the quality of water within the Waikato River and would be in direct conflict with the provisions and intent of Te Ture Whaimana o Te Awa o Waikato.

Inflow and infiltration (I&I) 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 as a mechanism in its own right and needs to be compared to the costs of network upgrades.

3.3 Stormwater

A Stormwater Infrastructure Assessment has been undertaken by Te Miro Water consultants dated 14 June 2022.

3.3.1 Identified Flood Hazard Risk

The report provides a summary of the parcels affected by overland flow paths and flooding risks using a categorisation into High, Medium and Low risk (using a depth vs velocity risk assessment for the 1% AEP flood scenario) for each of the Urban Areas of Cambridge/Leamington and Te Awamutu/ Kihikihi. These aspects are generated by modelling undertaken between 2018- 2021 and will form part of the Natural Hazards overlays and/or incorporated into the current flood hazard zones within the district plan. Specific rules for each of the risk categories and increase in density in these areas (medium – high) will be required and should be avoided or made to require further technical reporting to support appropriate additional development.

3.3.2 Key findings - Stormwater Network Capacity

Te Miro Water have undertaken capacity modelling for the urban stormwater networks to identify the areas of risk. The model inputs considered the existing stormwater asset information provided by WDC, which included the recently completed Waipa District Council Stormwater models from 2018 to 2021. These stormwater models are 1D-2D coupled model using Infoworks ICM v 7.0 which have been developed by WSP for the main townships. This forms the baseline information for the current assessment and to inform Council flood mapping as indicated above.

These baseline stormwater models have been built up from the following:

- 2018 network data
- Survey of key areas during 2019
- Series of staged model runs to test spatial plan growth scenarios
- Inform level of service reviews
- Upgrade strategies necessary for previous catchment management planning (to support the District Wide Stormwater Consent Renewal)

Future Growth cells have generally not been incorporated within the model boundaries and are limited to catchments that flow towards an urban area. The model includes pipes, manhole, open channels, and streams (some modelled as 1D river reaches) as well as hydraulic structures such as culverts.

Te Miro Water have built on this information and also identified the catchments and networks where the capacity is limited within the receiving network for the 10% and 50% Annual Exceedance Probability events (mapped as 2 and 10 year constraint maps). These maps are included in the Te Miro assessment. The mapped areas represent a low level of service and a high risk of surcharge in the stormwater network due to peak flow and run off volumes. These contributing catchments are mapped by Te Miro Water as high risk.

The initial traffic light maps for three waters have also been combined for each of the urban areas by WSP and these are included as Appendix A. A description of the traffic light indicators are provided in Section 4 of this report.

3.3.3 Implications

An increase in density over the current scenario will have an effect on the ratio of impervious surfaces i.e. surface area and therefore the contributing volume of stormwater within each of the sub catchments may also increase and contribute additional volume. Therefore, those networks with capacity limitations in the model would fail with the increased density, and require infrastructure upgrades to reduce the capacity limitations (i.e. those pipes/ infrastructure without capacity or close to current capacity) within the network. Infrastructure upgrades would be needed before the contributing catchment could be intensified, to avoid downstream effects of stormwater on other properties.

Although not considered within the technical reporting, the stormwater network area is within the global discharge consents for the urban areas and within the Waikato and Waipā River catchments. Therefore, Te Ture Whaimana o Te Awa o Waikato applies and will require new infrastructure to demonstrate betterment as well as mitigation of actual and potential effects. Inline treatment of stormwater prior to discharge may also be required. Treatment facilities such as wetlands are typically land hungry and additional areas in the lower reaches of the catchments may also be required for a land treatment option.

3.4 Transport

A Transport Infrastructure Assessment Report has been prepared by BBO dated 23 June 2022. This technical report considers the existing transportation network, the future planned growth cells and considered the high-level macro scale impact of the MDRS provisions on the network using the latest available Waikato Regional Transport Model (WRTM). The assessment also factored in planned upgrades (intersections/infrastructure improvements) to the current network based on available structure plans as part of the baseline information. Models were then run to consider the network growth predicted in 2041 regarding average daily traffic (ADT) expressed as vehicles per day (vpd) with and without the MRDS intensification being taken into account.

3.4.1 Key Findings – Network capacity

Network Capacity Implications of the Increased Residential Density for the Network

Increased residential density results in a significant level of increase in demand across the network. The application of the MDRS would more than double the 2041 baseline demand with notable effects along key corridors. Key corridors are identified as main access routes into and out of residential areas where traffic concentrates, this represents increased demand across the whole network.

The following road corridors were noted to be of specific concern and will likely not remain suitable if the surrounding residential areas are intensified. Further, intensification may result in a change to the roading hierarchy and increased maintenance costs for the network.

Table 1: Road corridors of specific concern if residential areas intensify

Cambridge / Leamington	2041 ADT Without Additional demand (vpd)	2041 ADT with additional demand (vpd)
• SH1B/Victoria Road • Albert Street • Pope Terrace /Cambridge Road	17,500- 20,000	30,000 – 35,000
• Cambridge Road (Kaipaki Road to Pope Terrace)	12,000-14,000	20,00- 24,000
• Tirau Road • Shakespeare Road • Kaipaki Road	7,500 – 9,000	25,000 – 35,000
• Swayne Road (alternate route, congestion influenced by Victoria Road above)	3,500	10,500

Te Awamutu / Kihikihi	2041 ADT Without Additional demand (vpd)	2041 ADT with additional demand (vpd)
SH3	13,500- 22,000	30,000 – 35,000
Alexandra Street Cambridge Road Golf Road St Ledger Road	4,000- 9,000	20,00- 27,000
Paterangi Road Brill Road	1,0000 – 5,000	15,000 – 17,000* depending on the rezoning of area T6 with T^ remaining as Large Lot Residential ADT will likely remain under 5,000

Level of Service -Transportation Links

The Transportation Assessment also considers the Level of Service (LOS) as a performance measure to assess the potential effects on traffic efficiency, these are measured for the peak periods in both the AM and PM peaks. In consideration of LOS operation, the transport assessment uses a scale of A to F as outlined in the assessment. LOS D and better is generally considered acceptable, however, the delays experienced by vehicles on these link connections increases due to increased congestion which also reduces the operable speed.

When the 2041 capacity with additional development is considered, a number of the key access roads also deteriorate to an unacceptable level of service (i.e. LOS E or F) with the factors outlined in the assessment. These include:

Cambridge/Leamington

- Victoria Road/Victoria Street (SH1 Interchange to Pope Terrace)
- Cambridge Road/Pope Terrace (between Kaipaki and Victoria Street)
- Tirau Road and Shakespeare Road,
- Kaipaki Road; and

- Both River bridges at Victoria and Shakespeare Street

Te Awamutu/ Kihikihi

- SH3 north and south of Te Awamutu,
- Paterangi Road and Alexandra Street in the west and central Te Awamutu
- Cambridge Road
- St Ledger Street, (Brill Road and Whitmore Street (Kihikihi)

3.4.2 Implications – Network Capacity

Strategic Upgrades to the network in the locations identified through the provision of additional capacity through widening of the corridors and construction of additional directional lanes (increasing from single lanes each direction to two lanes each direction), would mitigate the effects of the increased densities and resulting traffic increases. Alternatively, a significant modal shift to public transport along specified routes in urban areas would also mitigate traffic increased (i.e., reducing the overall traffic demand) however this has not been quantified at this time.

It is recommended that additional consideration is given to multi modal provisions and facilities to enable a higher mode share on strategic corridors within the network as part of any upgrade works.

The acquisition of land outside of the road corridor to accommodate additional widths may be required. This adds significant consultative and property costs to upgrade works. The costs of these transportation upgrades are noted as being beyond the scope of the current capacity assessments and the identification of corridors that will be affected by the increased density, however, are raised here for awareness.

For local and collector roads these will likely continue to operate effectively (albeit at a lower LOS), however increases in density may also result in changes in amenity and reduction in pedestrian/cycling safety in areas where provisions are currently at minimum standards. On road parking and narrowing of the trafficable lanes will also be an issue within local roads with the increase in residential densities.

3.4.3 Key Findings & Implications – Key Nodes

Key nodes such as connections to State highways and the two bridges across the Waikato River will become problematic, requiring significant mitigation and capacity upgrades in collaboration with other Agencies and Iwi Partners. Bridge upgrades would need to give effect to Te Ture Whaimana o Te Awa o Waikato (Waikato River Vision and Strategy).

3.4.4 Key Findings – Intersections Level of Service

The BBO report considers the operational performance of the key intersections within the network and initial SIDRA analysis undertaken to understand the effects on the LOS for intersections, which include increased approach delays and longer que lengths in both the AM and PM peak periods. Intersections will likely require upgrading to accommodate the additional traffic. 46 key intersections are identified in the BBO report using a Sidra analysis as requiring mitigation with the increase of traffic under the expected MDRS scenario. It is noted that intersection upgrades may not be able to be accommodated within the current roading corridors and changes to intersection forms will necessitate significant additional modelling.

In comparison, only 10 intersections would need improvements to the LOS for the 2041 baseline traffic scenario which suggests the implications of MDRS for the transportation network are significant.

3.4.5 Implications – Intersections

Significant upgrades are needed to intersection form for high volume roads and state highway tie ins across the entire network.

Intersection designs will need to consider safety and multi modal use as part of the upgrades to meet the objectives of the Government Policy Statement on Land Transport 2021, which also add significant costs.

3.4.6 Overall Summary of Transportation Aspects

The Transport Infrastructure Assessment found that increased in traffic as a result of the new MDRS creates a significant increase in traffic volumes from residential areas.

Significant roading infrastructure upgrades in each urban area is required to mitigate traffic increases and maintain an acceptable Level of Service. Recommendations for the upgrade of strategic links and intersections across all growth areas are identified in the assessment as summarised above.

The collective increase in density across all areas (Cambridge/Leamington and Te Awamutu/Kihikihi) will create a cumulative effect, whereby the scale of roading infrastructure upgrades required to adequately service the urban areas would be significant over a 20-year period.

3.5 Parks and Reserves

3.5.1 Summary

A Green Infrastructure/Public Open Space Network Assessment has been undertaken by Xyst Limited. This technical report advises on the existing green infrastructure network within Cambridge, Te Awamutu and Kihikihi, comments on the risks and opportunities associated with the proposed intensification and makes recommendations on where WDC should modify the MDRS to protect the open space network[4].

3.5.2 Key findings / recommendations

A summary of key findings and recommendations are set out below:

1. The implementation of MDRS across Cambridge, Te Awamutu and Kihikihi present a range of potential cumulative and long-term adverse effects on the existing open space networks within these towns. Table 2 of the report outlines the potential adverse effects by reserve category.

2. In order to manage the adverse effects of intensification on open space networks, the report recommends a range of MDRS modifications to:

    - Protect, enhance, restore and reconnect the remnant natural areas to improve their long-term ecological viability and support species that are identified as endangered or at risk such as the Pekapeka-tou-roa (Long-tailed bats).

    - Protect and restore Te Mana o te Wai associated with the Waikato River, the Karāpiro Stream, the Mangapiko Stream, the Mangaohoi Stream and Punui River; waterways which are considered taonga tuku iho by mana whenua and critical in terms of placemaking and well-being.

    - Retain the usability of the full extent of existing parks and reserves to meet the needs of future residents for sport, active recreation, play, and connection with nature and the community.

    - Protect Waipā's cultural and historic heritage.

    - Provide for a healthy urban ngahere (forest) comprising large mature protected trees, street trees and trees within parks and reserves that contributes to Waipā's biodiversity, water

[4] The report reviewed was in draft [June 2022] and therefore was not the final version.

quality, carbon sequestration, air quality, cultural heritage, visual amenity and place making aspirations.

3. To achieve point 2 above, Appendix 8.8 of the report identifies specific areas that should be subject to qualifying matters under the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021. The report sets out options to achieve protection of the open space network through district plan provisions. This includes (but is not limited to):

    - Retaining existing provisions for reserves and protections given to for example, protected trees and biodiversity corridors.
    - Introducing new building setback rules in relation to waterways, biodiversity corridors or SNAs etc.
    - Modifying MDRS to require current standards for site coverage, impermeable surfaces, building setback and the requirement of a minimum of 30% of the net area to be landscaped with native vegetation where for example, development adjoins waterways, biodiversity corridors or SNAs.

4. The above recommendations have been put forward without having been able to review Hamilton City Council's draft rules in their proposed Plan Change 9 Historic Heritage and Natural Environment and Plan Change 12 Growing Up (with a focus on the health and wellbeing of the Waikato River). Hamilton City Council has been considering the impacts of the MDRS on the open space network and particularly the Waikato River for longer than WDC and has greater resource to assess the effects and determine the best approach to avoid, minimise or mitigate the effects on the open space network. For this reason it is strongly recommended that WDC engage with Hamilton City Council to consider whether amending the recommendations in this report to align with Hamilton City Council's rule framework would create a stronger, regionally consistent approach to protecting and restoring the region's open space network.

5. It is anticipated that many of the proposed modifications will align with proposed recommendations to address flooding risks and stormwater management being considered by WDC.

6. Following Plan Change 26, it is also recommended that WDC:

    - Review its open space provisions following plan change 26 to assess whether new reserves and/or extensions to existing reserves are required to meet future population projections, and
    - Develop an urban ngahere (forest) strategy to assess the impact of Plan Change 26 on trees within the urban boundaries and plan for how existing and new trees within WDCs transport corridors and parks and reserves can mitigate the impacts of the likely significant removal of non-protected trees on private properties within each town.

3.5.3 Gaps

The short timeframes and limited budget meant that the site-by-site analysis has been constrained to a desk-top assessment. Further refinement of the recommendations to align with other recommended qualifying matter modifications, and potentially Hamilton City Council and specialist analysis to support proposed modifications are recommended as part of the plan change process.

A review of open space provisions across Cambridge, Te Awamutu and Kihikihi to assess whether new reserves and/or extensions to existing reserves are required to meet future population projections has not been undertaken.

4 RAG constraints Mapping

For Plan Change 26, spatial mapping has been undertaken across all residential zones in Cambridge, Te Awamutu and Kihikihi. These have been mapped using GIS and related to the existing network information held by WDC as part of each of the technical network capacity assessments. These maps adopt a Traffic Light system or Red, Amber Green (RAG) classification system. As these maps have been produced in conjunction with the assessments, these have not been replicated however are referenced throughout. The following methodology has been used in relation to the mapping.

- **Green** – does not appear to have significant constraints or has been allowed for in current planning at densities equal to or higher than the plan change densities, able to be intensified.
- **Amber/Orange** – moderate risk undesirable or insufficient information has some apparent constraints or could affect the wider network. May have current planned densities close to the plan change densities.
- **Red** – at risk, not feasible or not recommended for intensification has significant apparent constraints either locally or downstream, and/or has current planned densities less than the plan change densities.

The status of the areas considers potential wider network effects, so while an area may look fine from a local perspective it could be red or orange due to wider network issues. This results in larger areas being treated with some caution, particularly until detailed modelling is undertaken. For the maps associated with the transportation information, these relate to adapted outputs from the WTRM modelling and have been used to indicate those parts of the network which would be under pressure with the increased growth.

An initial combined three waters map has also been produced by WSP and is attached as Appendix A, which overlays the stormwater, water and wastewater initial coarse maps and combing areas using a rule system 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.

5 Overall Findings and Key Recommendations

5.1 Effects of Additional Densities on Infrastructure

5.1.1 Network upgrades -Costs

To accommodate the MDRS, housing density would need to be increased both within the greenfield areas and as a result of site redevelopment in the existing urban areas.

The MDRS provisions would enable significantly greater intensification across the urban area for Waipā and results in a step change in the housing supply provision within each of the urban areas.

In order for WDC to accommodate the additional MDRS growth, current infrastructure capacity constraints would need to be resolved requiring significant strategic infrastructure network upgrades across all of the three waters and transportation networks.

These upgrades come at a significant initial capital cost, and greatly exceed the scale of anticipated upgrades previously master planned to accommodate growth within Cambridge Te Awamutu and Kihikihi.

Recommendation:

Collectively the cost implications of strategic network upgrades across infrastructure would need to be further considered in relation to WDC strategic infrastructure prioritisation and available funding.

5.1.2 High Risk Assets

The initial modelling indicates an increase in surcharge for both the stormwater and wastewater networks, this would likely result in overflows and adverse environmental effects could also be likely without suitable network upgrades.

Capacity constraints within the water, wastewater and stormwater networks are considered particularly problematic as WDC needs to be able to service the lifeline utilities and remain compliant with environmental quality limits imposed via resource consents for the operation of these services.

WDC operation of the three waters networks needs to consider and provide for Te Ture Whaimana o Te Awa o Waikato in relation to consumptive takes for water and discharge provisions for wastewater and stormwater. Increase in demand/discharge volumes need to be considered in relation to environmental offsets and enhancement/betterment, particularly in relation to water quality for the river. Further improvements may not be feasible given the limitations of available technology and land areas for consideration of alternative discharges.

Recommendation:

On the basis of the modelling and consideration of the implications, it would appear that WDC may have a case for evoking the qualifying matter c) under the National Policy Statement for Urban Development depending on the outcome of more detailed modelling for Water and Wastewater.

5.1.3 Population Increase

The application of MDRS also spreads the potential increase in density and subsequent increase in service demand across the network. This results in the need for a ‘whole of network’ response to new growth as opposed to specific geographical areas allowing for targeted infrastructure upgrades.

This makes the scale and degree of change required significant for the network operator. Even with initially planned upgrades advanced, there are still significant portions of the networks which would eventually fail to continue to operate at the same or acceptable level of service as they do currently.

Recommendation

It may be possible to incentivise the increase in densities in more easily serviceable areas through the reconsideration/reprioritisation of network upgrades, and the advancement and acceleration of planned infrastructure upgrades which relate to the key collection points within the networks. Currently these upgrades have been determined on the progressive integration of green filed areas within identified growth cells, however it may be that this needs to be reconsidered with the anticipated higher rates of infill.

At the completion of the key upgrades specific sub-catchments are then able to be released and give flexibility for the networks to be upgraded progressively.

This could be supported further with advanced modelling for water and wastewater to identify areas where infill growth may more achievable in the short to medium term without broader effects to the network.

Planning for the eventual growth within the networks will still be necessary, however this may allow WDC to progressively complete network upgrades in line with funding allocations.

5.1.4 Consideration of Development

The WSP report concludes that the nature of water and wastewater networks means that wider network issues typically govern developability across the network rather than just local conditions. All urban areas modelled have notable 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. This means that even future growth areas could require additional infrastructure or upsizing of planned infrastructure.

Based on the initial course mapping undertaken, the vast majority of the urban areas across Cambridge and Te Awamutu would be unsuitable and unable to accommodate the MDRS densities across the whole of the network.

The modelling identifies that there is likely some existing capacity within the networks that may be able to accommodate some localised infill but not able to support wider densification across the urban areas.

Recommendation:

For the short-term in the absence of specific neighbourhood details (which is beyond the scope of current modelling), WDC could utilise district plan mechanisms to regulate infill subdivision and landuse as a Restricted Discretionary Activity and require individual developers to undertake infrastructure assessments on a case-by-case basis (similar to a broad Integrated Transportation Assessment) to determine the network effects of their proposed development.

If the format and information required by the infrastructure assessments was controlled through a proforma template to achieve consistency, the information could be collectively used to inform WDC of the areas where development is more desirable for the market. Under this scenario there would be an ultimate tipping point where individual developments result in network effects and require further consideration as to suitability. This mechanism could also be used in conjunction with others such as development agreements to achieve a scalable potion of infrastructure network upgrades in conjunction with the private sector.

5.1.5 Rate of anticipated growth

In consideration of the Market economics report, it is noted that there is a significant difference between the ultimate plan enabled capacity and the commercial feasibility capacity. The commercial feasibility considers

the likely uptake from the market and does not take into account the likely infrastructure related costs which also suggests that the market will still determine the likely demand.

Currently within the urban areas of Cambridge and Te Awamutu there is some existing provision within the master plans to accommodate a level of growth, which would achieve roughly 40% of the identified commercial capacity. Greater visibility of the rate of growth and degree of intensification would assist WDC with the future planning of infrastructure networks and upgrades.

Recommendation

If the MDRS growth rate can be determined for infill, this may assist with the prioritization of infrastructure projects. Noting that a change in residential typologies takes some time to develop and this may redistribute some of the current population within catchment rather than a larger increase in population growth.

6 Risks and Opportunities

6.1 Te Ture Whaimana o Te Awa o Waikato

WDC have an obligation to not only protect but enhance the health and wellbeing of the Waikato River, and other connecting waterways, as the district grows. Te Ture Whaimana o Te Awa o Waikato (Te Ture Whaimana) sets the direction for how this should happen.

Section 77I of the RMA Amendment Act sets out the qualifying matters in applying MDRS and Policy 3 to relevant residential zones. Section 77I(c) includes ‘Te Ture Whaimana o Te Awa o Waikato - the Vision and Strategy for the Waikato River’ as a qualifying matter. This gives WDC the ability to make MDRS and the relevant building height or density requirements under Policy 3 less enabling of development in relation to an area within a relevant residential zone only to the extent necessary to accommodate one or more qualifying matters.

Research undertaken by Hamilton City Council shows that without controls in place, intensification will have a negative impact on the Waikato River. As such, WDC need to consider how Plan Change 26 will both protect the Waikato River and provide for higher densities in appropriate parts of the district. This is particularly important when considering stormwater, wastewater and water use and the associated consequential effects on the Waikato River.

Should WDC wish to adopt Te Ture Whaimana as a qualifying matter, WDC must provide evidence to support this in accordance with section 77J.

WDC may amend the densities and heights required by the MDRS as appropriate and may also look to consider infrastructure capacity assessment requirements, landscaping requirements, permeable surfaces and rainwater tank requirements.

A

Appendix A – WSP combined three waters RAG map

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

Legend
Growth Cells
Ratings
Significant Constraints
Some Constraints
No Constraints

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 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

File Ref: U:\Projects\NZ\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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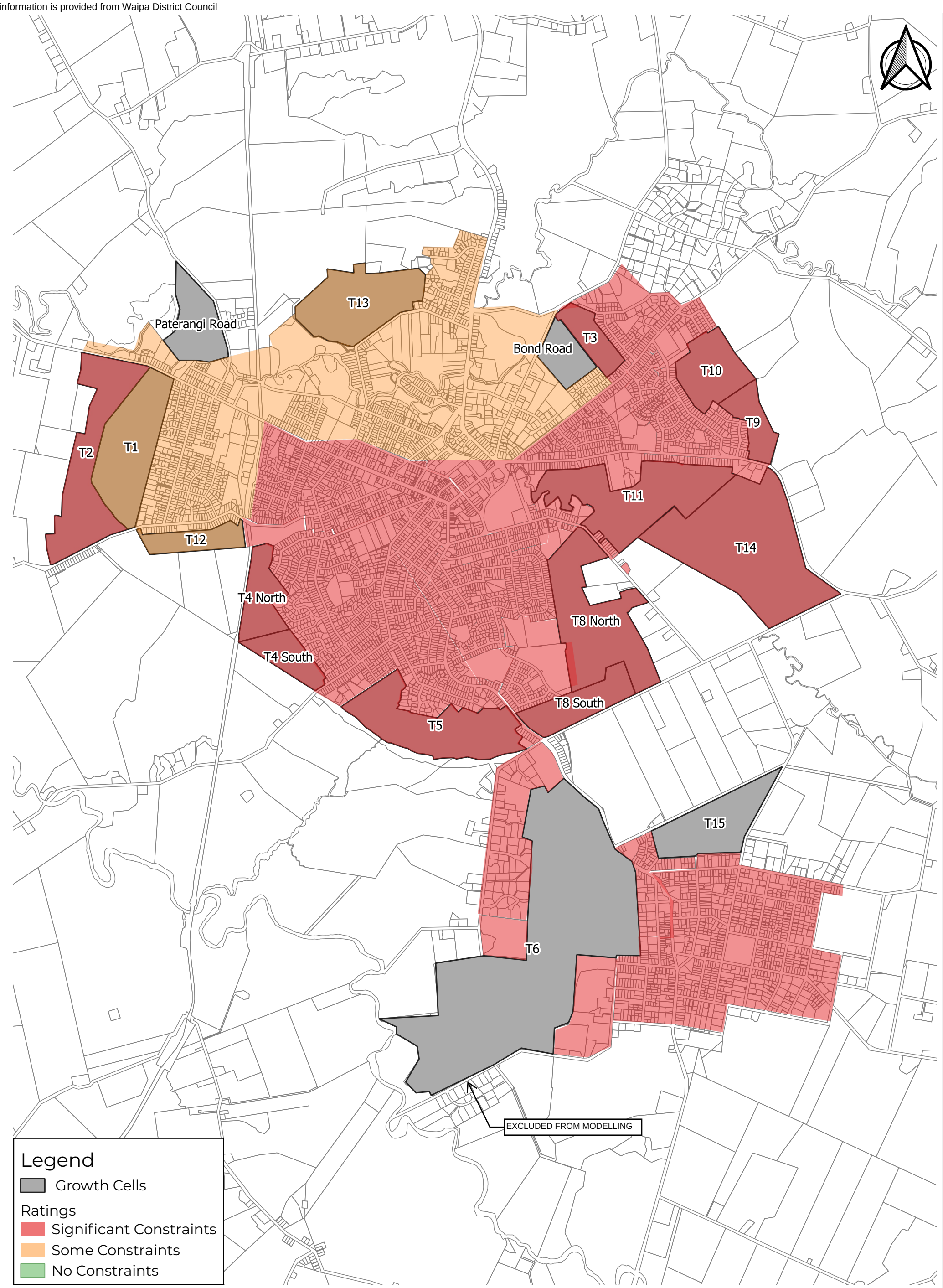

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New Zealand

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

SHEET: Appendix B - Combined Network Rating
Te Awamutu - Te Awamutu Capacity Assessment

DRAWN	APPROVED			
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

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