

Taupo Civic Administration Building Parking Assessment Technical Note

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1. Background

The purpose of this technical note is to detail the findings of modelling carried out to assess the impact of growth on the future parking occupancy rates across the Taupo town centre. The technical note also details the impact on parking supply of locating the new Council Administration Building (CAB) in either the Tuwharetoa / Roberts St or the Lake Terrace / Kaimanawa St locations.

This analysis has been conducted at a high level assessing the total parking demand and supply over the town centre parking area in its entirety. The parking study area considered in this assessment is shown in **Figure 1.1**.



Figure 1.1 Town Centre Parking Zones and Proposed CAB Locations

2. Parking Occupancy Threshold Levels

The key threshold measure used in assessing the performance of the parking area is a parking occupancy of 85%. This threshold has been selected as it represents the level of occupancy where the ability for vehicles to locate a suitable park becomes significantly harder and delays and frustration begin to rapidly increase. Measures to manage demand or increase supply should be timed to come into effect before the 85% threshold is reached.

For a more detailed discussion on key performance indicators refer to the technical note 'Key Performance Indicator Framework' dated 16 May 2019.

3. Baseline Parking Occupancy

3.1 Parking Survey Results

Current public parking occupancy in the town centre is measured regularly by Council and these survey results were provided in order to calibrate the Taupo Parking Demand Model which at the time of writing is still under development. The surveys used for this analysis cover weekday occupancy at 11am and 2pm dated between 29 November 2018 and 16 February 2019. As the survey results for 11am and 2pm were very similar in occupancy rate it is considered suitable for this model to assume 11am as peak occupancy for the purposes of calibration and reporting.

Private occupancy has been taken from a one-off survey conducted by Council staff at the Countdown and Pak'n Save supermarket carparks on 21 May 2019. For the remainder of the private off street parking (which will predominantly be employee only parking with some customer parking) an occupancy of 80% is estimated based on desktop observations using Google Earth.

Public parking supply has been calculated from GIS data provided by Council and private parking supply has been estimated by manually counting carparks from Google Earth aerial photography. The overall parking occupancy was calculated at 75% and this occupancy has been used to calibrate the Transport Model based analysis.

Table 3.1 Parking Inventory and Surveyed Occupancy by Type

Parking Type	Inventory	Occupancy at 11am	Occupancy %
Private	1364	1028	75%
Public	3711	2780	75%
Total	5075	3808	75%

As a sensitivity check it is noted that if the private off street parking peak occupancy were considerably lower at 60% the overall occupancy across all town centre parking supply drops from 75% to 71%.

3.2 Taupo Transport Model Future Demands

The analysis reported in this technical note is intended to be a high-level check of the overall supply and demand growth at a town centre level. It is acknowledged that subareas within the town centre will experience greater demand for parking and that this may already be matching or exceeding the supply in those zones. As the Taupo town centre is relatively compact it is considered appropriate to aggregate this demand focusing on overall supply and demand. In the short-medium term this is considered to provide a satisfactory representation as there is currently ample parking capacity within a 5-10 minute walk of town centre destinations, which can be further supported through the use of wayfinding. At the time of writing the spreadsheet-based Taupo Parking Demand Model is under development and will be available for a more detailed and granular assessment of parking demand and supply.

Parking demands were extracted from the Taupo Transport Model for the morning peak period of 7am-9am and the interpeak period of 9am-4pm. These demands were extracted for the base year of 2013 and the future years of 2021

and 2041. To calibrate to the survey results discussed in section 3.1 the 2019 year was interpolated from the 2013 and 2021 models. The total demands for each period and year are shown in **Table 3.2**.

Table 3.2 Taupo Transport Model Demands by Period and Year

	2013	Interpolated 2019	2021	2041
7am-9am Demand	2799	3214	3352	3785
9am-4pm Demand	6400	6897	7063	7339

3.3 Baseline Parking Occupancy Results

To provide parking forecasts at the required horizons of 10 years, 20 years and 30 years demands from the transport model were interpolated or extrapolated linearly from the closest model years. The demands were then calibrated to the survey at the 2019 year based on the following assumptions, which are considered appropriate for this high-level analysis:

- Assumed 50% of demand from 7am-9am remains parked at 11 am.
- Assumed 10% of demand from 9am-4pm is parked at 11 am.
- Assumed 30% of total supply is occupied at 7am.

The baseline occupancy over the 30 years from 2019 to 2049 is forecast to increase from the current 75% to around 88% in 2049. Occupancy by year is shown in **Table 3.3** with the increase per annum slowing from around 0.5%pa for the first 10 years to around 0.3%pa from 2039 to 2049.

Based on these baseline results, current parking supply should be sufficient to cater for growth over the next 20 years with additional capacity measures required around 2039 when occupancy reaches 85%.

Table 3.3 Baseline Parking Occupancy by Year

	2019	2029	2039	2049
Baseline	75%	81%	84%	88%

4. Impact of CAB Location

If the new CAB location is located outside the town centre parking area at Lake Terrace / Kaimanawa St the equivalent reduction in demand is approximately four years of growth, assuming the new location has provision for enough parking capacity to meet demand for pool car and staff parking.

If the CAB location is selected as Tuwharetoa / Roberts St there is expected to be a slight reduction in capacity from parking lost due to construction of either the CAB alone or development with a co-located bus hub. There is also expected to be an increase in parking demand due to the relocation of approximately 30 staff into the town centre and 30 pool vehicles which are currently located outside the town centre to the CAB.

There is an overall reduction in capacity of around four years without the bus hub, or around five years if the bus hub is included. The option to convert grass berms to parking is expected to make around 80 extra parks available at a relatively low cost and would add around supply for around 3 years of growth offsetting most of the reduction in capacity. The net result is that a CAB in Tuwharetoa Street with 80 berm parks pushes the requirement to add more town centre parking by only 1-2 years.

The year in which occupancy exceeds the 85% mark for new supply options to be considered for each scenario are shown below in **Table 4.1**. Irrespective of the CAB location chosen it is unlikely that additional parking supply will need to be introduced into the town centre in the next 20-25 years.

Table 4.1 Year Occupancy Threshold Reached by Option

CAB Location Option	85% Threshold Reached
Baseline	2042
Lake Terrace / Kaimanawa St	2046
Tuwharetoa St without Bus Hub	2041
Tuwharetoa St with Bus Hub	2040

5. Options for Increasing Parking Supply

The options for increasing parking supply put forward by Council to increase the town centre parking supply are:

- Convert berm parking to angled parking for areas within a 10 minute walking distance of the CAB location. There is currently a supply of 471 parallel carparks that would convert to 601 angled parks, yielding 130 additional carparks.
- Convert the current single-level carpark at Heuheu St to a four storey parking building, yielding 469 additional carparks.
- Include an underground carpark with construction of the CAB at the Tuwharetoa / Roberts St locations, yielding 80 additional carparks.

Based on the changes in occupancy over the 30 year horizon the berm parking is forecast to increase supply by around six years of growth, the Heuheu St carpark provides for 20-25 years of growth and the underground carpark by around four years of growth.

If the berm parking is converted as the first choice to increase supply the 85% threshold would be reached again within the 30 year horizon, around 2042 to 2048 depending on CAB location selection. This indicates that the Heuheu St carpark may still be required as a longer term option to increase supply.

With the high additional cost and limited supply increase the underground carpark as part of the Tuwharetoa / Roberts St CAB location is not required for the town centre parking area to operate efficiently for at least the next 30 years.

An overview of scenario results for all options and years is attached as Appendix A.

6. Growth Rate Sensitivity Testing

6.1 Growth Rates Tested

The growth rates discussed in section 3.2 are derived from the Taupo Transport Model, in which trip growth is primarily driven by Statistics New Zealand household and population projections assuming medium growth forecasts. As a sensitivity test the equivalent Statistics New Zealand high growth projections have been applied to demonstrate the impacts of sustained high growth in residential development over the 30 year forecast period from 2019 to 2049. This test assumes that the overall increase in vehicle trips into the town centre is equivalent to the increase in households in the study area. This assessment is considered conservatively high as it disregards any capacity constraints or changes in travel demand due to increased congestion.

As a further sensitivity test the parking demand from increased tourist activity has been calculated separately using the current 5% per annum growth rate, assuming that each visitor modelled travels to the town centre and requires parking. It is noted that the Tracks transportation model already forecasts tourist activity within the District based on these forecasts but spreads the impacts across the entire study area with a weighting on town centre activity. There is however limited data available to isolate and calibrate parking demand created by visitors as opposed to residents. Subsequently a further sensitivity test is introduced which adds a further 5% growth per annum to 10% of the trip matrix.

A figure of 10% was selected as on census night 2013 approximately 10% of persons recorded within the study area were visitors to the District and the remaining 90% were usually resident.

In combination the tests represent a conservatively high parking demand but is considered indicative of the effects of sustained high residential and tourist growth on parking occupancy within the town centre.

The equivalent growth rates per annum for the base model and the two sensitivity tests are shown in **Table 6.1**. The sensitivity test demands were then modelled using the process discussed in section 3.3 and the results of this modelling for each test are discussed in sections 6.2 and 6.3.

Table 6.1 Baseline and Sensitivity Test Demand Growth Rates by Period

	2019-2029 Growth pa	2029-2039 Growth pa	2039-2049 Growth pa
Baseline	0.97%	0.61%	0.58%
SNZ High	1.04%	0.78%	0.58%
SNZ High + Tourist	1.29%	1.25%	0.90%

6.2 Test Results using SNZ High Household Growth Rate

The Statistics New Zealand high growth residential forecasts result in higher travel demand and parking overall occupancy rates for each period as shown in **Table 6.2**. The year in which each scenario exceeds the recommended 85% occupancy level is shown in **Table 6.3**. Overall, this brings forward the timing whereby additional parking supply is likely to be required around 9 to 12 years to 2031 – 2034 depending on the CAB location option selected.

Table 6.2 SNZ High Growth - Parking Occupancy by Year

	2019	2029	2039	2049
Baseline	75%	81%	84%	88%
SNZ High	75%	83%	90%	95%

Table 6.3 SNZ High Growth - Year Occupancy Threshold Reached by Option

CAB Location Option	85% Threshold Reached
Baseline	2032
Lake Terrace / Kaimanawa St	2034
Tuwharetoa St without Bus Hub	2031
Tuwharetoa St with Bus Hub	2031

6.3 Test Results using SNZ High Household Growth Rate and Additional Tourist Growth

The demands calculated by increasing the growth in tourist parking demand over and above high residential growth changes the proportion of persons visiting the study area on a typical day from around 10% of total population in 2013 to around 17% of the total population in 30 years. This results in parking occupancy rates for each period as shown in **Table 6.4**. The year in which each scenario exceeds the recommended 85% occupancy level is shown in **Table 6.5**.

Overall, this highly conservative assessment brings forward the likely timing of introducing more parking supply by around 12 to 16 years compared to the base case, meaning that additional parking would be required around 2028-2030 depending on the CAB location option selected.

Table 6.4 SNZ High Growth and Additional Tourists - Parking Occupancy by Year

	2019	2029	2039	2049
Baseline	75%	81%	84%	88%
SNZ High + Tourist	75%	85%	96%	104%

Table 6.5 SNZ High Growth and Additional Tourists - Year Occupancy Threshold Reached by Option

CAB Location Option	85% Threshold Reached
Baseline	2029
Lake Terrace / Kaimanawa St	2030
Tuwharetoa St without Bus Hub	2029
Tuwharetoa St with Bus Hub	2028

6.4 Sensitivity Testing Summary

Parking demand which is significantly greater than the base case brings forward the time at which investment in additional parking infrastructure is required by around 9-12 years to 2031-2034 (if high residential growth) or around 12-16 years to 2028-2030 (if high residential and high tourist growth). The additional parking supply options proposed only offset this growth for a relatively short period. Specifically, the conversion of grass berms to angled parking to the east of the town centre provides capacity for only two years of growth whilst the construction of the Heuheu St carpark provides capacity for approximately eight years of growth. The additional capacity in years of growth for each option and scenario is shown in **Table 6.6**.

Table 6.6 Years of Additional Supply by Option and Scenario

Scenario	Parking Growth pa	Heuheu St Carpark Supply @ 85% occ	Berm Conversion Supply @ 85% occ
Baseline	17.6 parks	23 years	6 years
SNZ High	32.9 parks	12 years	3 years
SNZ High + Tourist	50.1 parks	8 years	2 years

High growth in both residential and tourist activity over a prolonged period of 20-30 years would lead to a shortfall in parking supply in the long term. Further parking infrastructure would need to be considered above and beyond the 130 grass berm spaces and Heuheu Street parking building, as total parking supply in the town centre would reach 85% occupied sometime around 2035.

This notwithstanding, the addition of 80 underground parks at significant expense as part of the construction of a CAB is not supported as it would offset only around one year of continued growth in parking demand.

7. Preliminary Recommendations

The preliminary recommendations from this analysis are detailed below:

- A target of 85% occupancy is an appropriate threshold for increasing in parking supply. If occupancy rates regularly exceed 85% congestion due to parking circulation traffic and driver frustration will be significant. It is noted that wayfinding and other parking management measures should be introduced to ensure efficient parking use such that these effects do not eventuate at lower occupancy rates.
- Irrespective of the option selected for the CAB location there is sufficient parking supply in the town centre to accommodate 20-25 years of growth subject to effective wayfinding and parking management. For this reason, and due to the small effect on overall supply, the underground carpark at the Tuwharetoa / Roberts St location is not considered to be essential.
- The conversion of berm parking should be included if the Tuwharetoa / Roberts St CAB location is selected. This would provide additional supply to offset the reduction in carparks at the site currently and would also ensure accessibility to parking for visitors to the CAB site.
- The Heuheu St carpark will be required in the medium to long term and is preferable from a town centre and community point of view compared to expanding berm parking to the east of the town centre, as the central location is well placed to maximise accessibility and support growth in town centre activity.
- Workplace and school travel planning and provision of infrastructure for active modes are supported as effective measures to reduce dependence on private vehicle use and parking demand in the short and long term.

8. Final Recommendation

Feedback is sought from Council on the preferred options to be analysed further in the Taupo Town Centre Parking Model, when it is available.

Appendix A – Occupancy by Option and Year

Options	CAB Specifications			Parking Supply - Base				Base + Convert Eastern Berms				Base + Construct Heuheu Street Building				Base + Berms + Heuheu Street			
	Bus Hub	U/gro und	Berm	2019	2029	2039	2049	2019	2029	2039	2049	2019	2029	2039	2049	2019	2029	2039	2049
Baseline	N	N	N	75.3%	80.6%	84.1%	87.5%												
Tuwharetoa	Y	Y	Y	75.2%	80.5%	83.9%	87.3%	74.1%	79.3%	82.7%	86.0%	71.4%	76.4%	79.6%	82.9%	70.5%	75.4%	78.6%	81.7%
Tuwharetoa	Y	N	Y	75.9%	81.3%	84.7%	88.2%	74.8%	80.0%	83.4%	86.8%	72.0%	77.1%	80.3%	83.6%	71.1%	76.0%	79.2%	82.4%
Tuwharetoa	N	Y	Y	74.9%	80.2%	83.6%	87.0%	73.8%	79.0%	82.4%	85.7%	71.2%	76.2%	79.4%	82.6%	70.3%	75.2%	78.3%	81.5%
Tuwharetoa	N	N	Y	75.7%	81.0%	84.4%	87.8%	74.5%	79.8%	83.1%	86.5%	71.8%	76.8%	80.1%	83.3%	70.9%	75.8%	79.0%	82.2%
Lake Tce	N	N	N	73.9%	79.3%	82.7%	86.2%	72.8%	78.1%	81.5%	84.9%	70.2%	75.2%	78.5%	81.8%	69.3%	74.2%	77.5%	80.7%

Red text indicates options which exceed the target parking occupancy in the town centre