TAUPŌ DISTRICT COUNCIL
NORTHERN ACCESS STUDY (STAGE 1)
TAUPŌ CONTROL GATES BRIDGE

29 MAY 2024

CONFIDENTIAL

TAUPŌ DISTRICT COUNCIL NORTHERN ACCESS STUDY (STAGE 1)

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REV	DATE	DETAILS
1.0	22/04/2024	Draft Report for Internal Review
2.0	10/05/2024	Issued to TDC for Review – Draft Final
3.0	29/05/2024	TDC comments address. Final version issued to TDC.

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ABBREVIATIONS

ADT	Average Daily Traffic
CAS	Crash Analysis System
CBD	Central Business District
ETA	Eastern Taupō Arterial
HPMV	High Productivity Motor Vehicles
IL3	Importance Level 3
LGA	Local Government Act
LoS	Level of Service
MCA	Multi-Criteria Analysis
NZTA	New Zealand Transport Agency Waka Kotahi
ONF	One Network Framework
P50	50th Percentile
P95	95th Percentile
POE	Point of Entry
RCA	Road Controlling Authority
SH1	State Highway 1
TCG	Taupō Control Gates
vph	Vehicles per hour

EXECUTIVE SUMMARY

Taupō is a growing community with significant plan changes and planned development occurring. As a result, this is putting strain on the transport network, especially the critical connection between the Taupō Central Business District (CBD) from Taupō North via the Taupō Control Gates (TCG) Bridge. This part of the transport network has very little resilience in terms of route choice.

The Northern Access Study project aims to address this constraint in the Taupō transport network, with the project consisting of two stages. Stage 1 involves investigating potential river crossing options to support growth occurring in the North Taupō and alleviate pressure off the existing TCG Bridge. At the end of Stage 1, a preferred river crossing option is decided and is taken to Stage 2. Stage 2 involves looking at intersection improvements and making recommendations to the roading network to support the preferred river crossing option.

This report summarises the optioneering process of the Northern Access Study (Stage 1). This is because Taupō is expected to experience significant amounts of growth in the future which will further increase demand on the TCG Bridge.

Based on the updated Taupō Transport Model done by Abley:

- In 2023, the TCG Bridge is operating at a LoS E in both AM and PM peak hour.
- In 2033 and 2053+ (Full Development Scenario), the TCG Bridge is predicted to be operating at a LoS F for both the AM and PM peak, meaning it is at capacity and there is queuing and delays occurring.
- Travel times towards the Taupō CBD from Acacia Bay Road via the TCG Bridge in the AM peak is expected to triple, increasing from 7 minutes in 2023 to 23 minutes in 2053+

These results show that another connection is needed to cope with the additional growth demand North of Taupō.

Additionally, apart from bridges on the Eastern Taupō Arterial (ETA) and Aratiatia Road, both of which are more than 5km from the TCG Bridge, the TCG Bridge is the only north-south connection across the Waikato River between Taupō CBD and north of Taupō. This highlights potential resilience issues in the network.

A background assessment was completed which informed the options develop and assessment. The following three objectives were identified and agreed by TDC in the longlist workshop:

- **Objective 1:** Provide sufficient transport facilities to **support growth** to the North of Taupō & improve efficiency of the road network.
- **Objective 2:** Improve the **resilience** of the road network.
- **Objective 3:** Improve **mode share** on alternative transport uses.

The four longlist options were proposed:

- A1 – Four lane bridge at the existing location
- B1 – Retain the existing two lane bridge + new two lane bridge at Ōpepe Street
- C1 – Convert bridge to pedestrian / bike access only + new four lane bridge at Ōpepe Street
- D1 – Three lane bridge at the existing location (tidal flow)

These options were assessed using a Multi-Criteria Analysis (MCA) comparing the objectives, and a range of agreed criteria. The results showed that Option B1 scored the best overall, followed by Option A1. It was agreed to discard Option C1 and include an additional Option B2 in the shortlist, which looks at a second bridge crossing landing at Waikato Street near Oruanui Street.

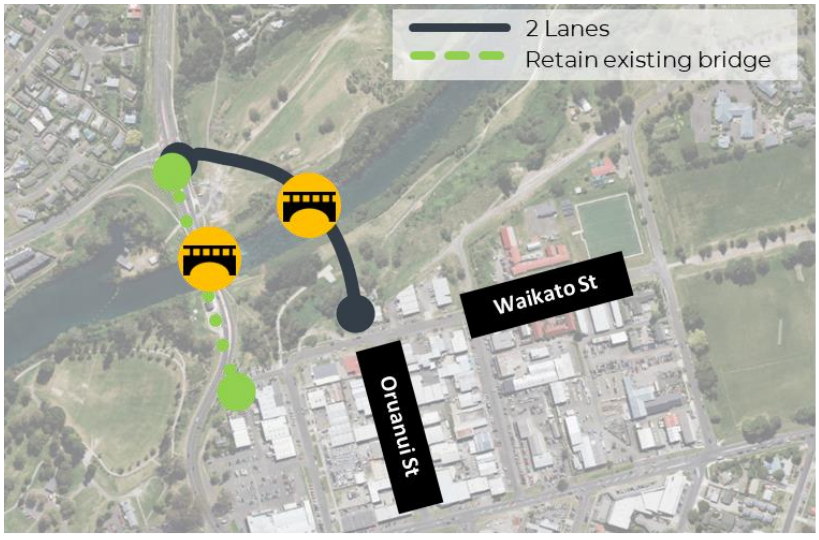
A shortlist option assessment was undertaken for Options A1, B1 and B2 and D1 which involved updating the scores in the MCA based on the results from the Taupō Transport Model, SIDRA modelling at key intersections and the high level cost estimation.

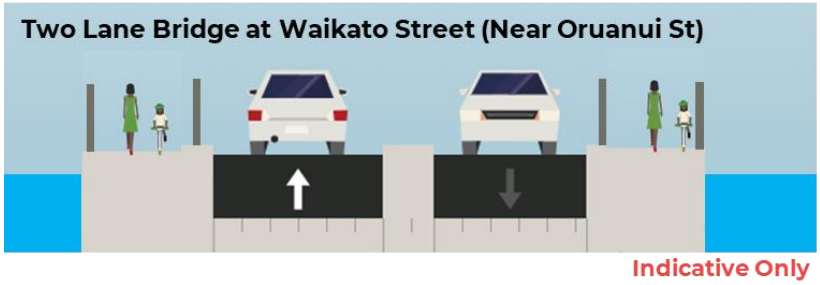
The Taupō Transport Model shows that there are noticeable improvements in terms of total travel time for Option B2 compared to Option A1 and D1:

- In 2053+ (Full Development Scenario), for the worst performing peak period (AM Peak) and peak direction (Acacia Bay Road to Taupō CBD), Option B2 is expected to improve travel times from 23 minutes to around 14 minutes.
- In the 2053 Sensitivity Testing which reflects a more realistic growth projection for 2053, for the worst performing peak period (AM Peak) and peak direction (Acacia Bay Road to Taupō CBD), Option B2 is expected to improve total travel times to 10 minutes in total (previously 14 minutes under Option B2 2053+ (Full Development Scenario)).

A shortlist workshop was then held to discuss the updated MCA scores for the shortlist options. It was agreed that Option B2 best aligns with the project objectives. The TDC Steering Group have agreed that the preferred option is Option B2.

The preferred option (Option B2) involves retaining the existing two lane bridge and proposing an additional new two lane bridge with walking and cycling facilities.





Indicative Only

As part of the Stage 2, roading network improvements will be looked at to support the preferred option.

As this project progresses to the next phases, it is recommended that TDC revisit the Environmental and Cultural impacts for the preferred option. This is because it was agreed with TDC that Environmental and Cultural impacts will not be assessed in this project. In the next phases, TDC have plans to undertake iwi / cultural engagement.

As part of Stage 2, a Point of Entry (POE) document will be prepared to discuss how the activity/potential investment should progress through the Business Case Approach (BCA). The recommendation above may be explored at the Business Case Phase.

1 INTRODUCTION

WSP was engaged by Taupō District Council (TDC) to undertake an assessment (known as the Northern Access Study) to investigate the transport network to support growth occurring in the North of Taupō and alleviate pressure off the existing Taupō Control Gates (TCG) Bridge. The TCG Bridge is a critical connection between the Taupō Central Business District (CBD) and Taupō North with this part of the transport network having very little resilience in terms of route choice.

The Northern Access Study Project consists of two stages. Stage 1 involves investigating potential river crossing options across the Waikato River, between the CBD and north of the TCG Bridge. A preferred river crossing option will be decided at the end of Stage 1. Stage 2 involves looking at intersection improvements and making recommendations to the roading network to support and connect to the preferred river crossing option.

This report will only focus on Stage 1 of the Northern Access Study and outlines the background context of the TCG Bridge and the project study area, explores the potential river crossing options which will address the identified problems/objectives of the project using the Multi-Criteria Analysis (MCA) Framework, and will identify the preferred river crossing option.

1.1 PROJECT SCOPE

The Northern Access Study consists of two stages as outlined in Figure 1-1 and Figure 1-2.

Stage 1 is a combination of the following:

- Updating the Taupō District Transport Model (completed by Abley).
- Undergo optioneering processes (including an MCA) for the river crossing options.
- Confirms the Preferred Option.

Stage 2 includes undertaking refined SIDRA modelling, making recommendations to the roading network to support the preferred river crossing option and preparing the Point of Entry (POE) Document.

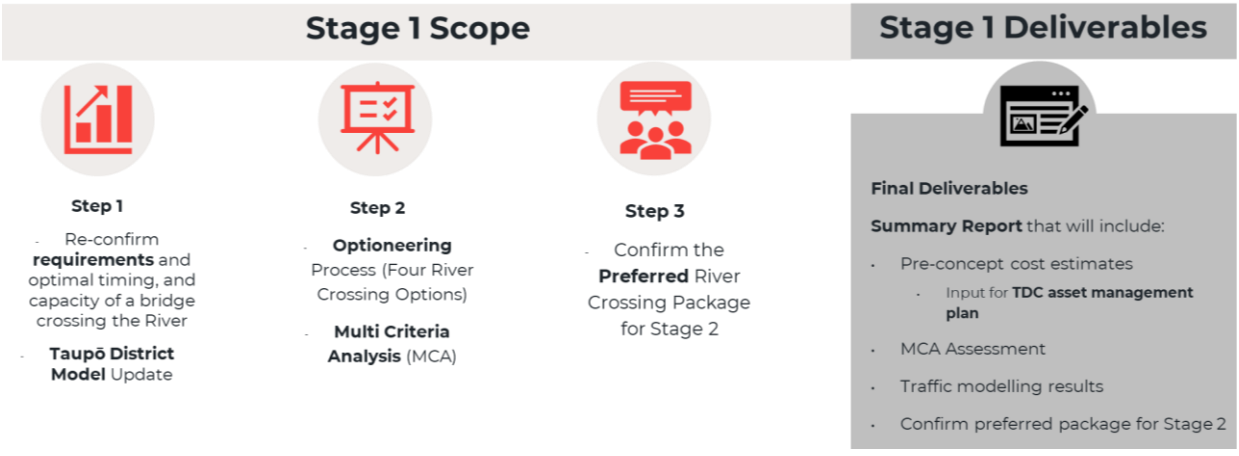


Figure 1-1: Stage 1 Scope of the Northern Access Study

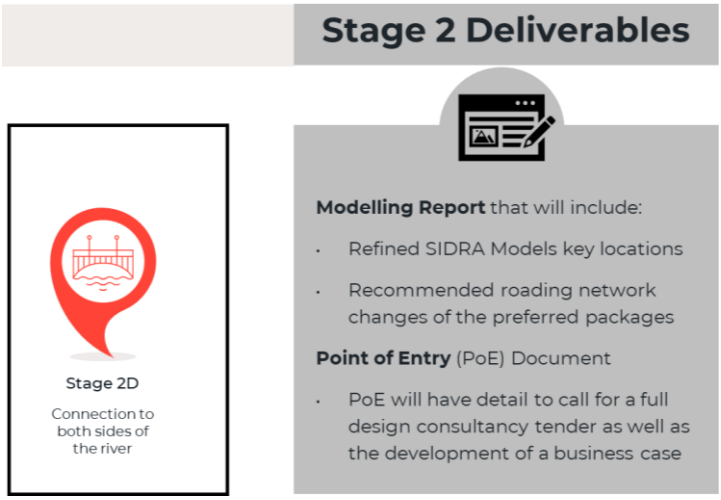


Figure 1-2: Stage 2 Scope of the Northern Access Study

2 STUDY AREA

The extent of the study area for the Taupō Northern Access Study can be shown in Figure 2-1 below. The study area includes north and south of the TCG Bridge and parts of the Taupō CBD such as Ōpepe Street, Pāora Hapi Street, Spa Road and Tongariro Street.

Four intersections will also be looked at as part of the project, to determine the traffic performance and local impacts of the preferred option. These intersections are:

- Norman Smith Street / Wairakei Drive
- Spa Road / Tongariro Street
- Ōpepe Street / Spa Road
- Pāora Hapi Street / Tītīraupenga Street

Figure 2-1: Study area of the Taupō Northern Access Study (Source: Base Map from Taupō District Council Map Viewer).

2.1 SURROUNDING LAND USE

Figure 2-2 shows the land use zoning of the study area from the Taupō District Plan. The study area is surrounded by the following zones:

- Taupō Town Centre Pedestrian Precinct
- Taupō Town Centre Retail Expansion Precinct

- Taupō Town Centre Commercial Fringe Precinct
- Rural Environment
- Residential Environment
- High Density Residential

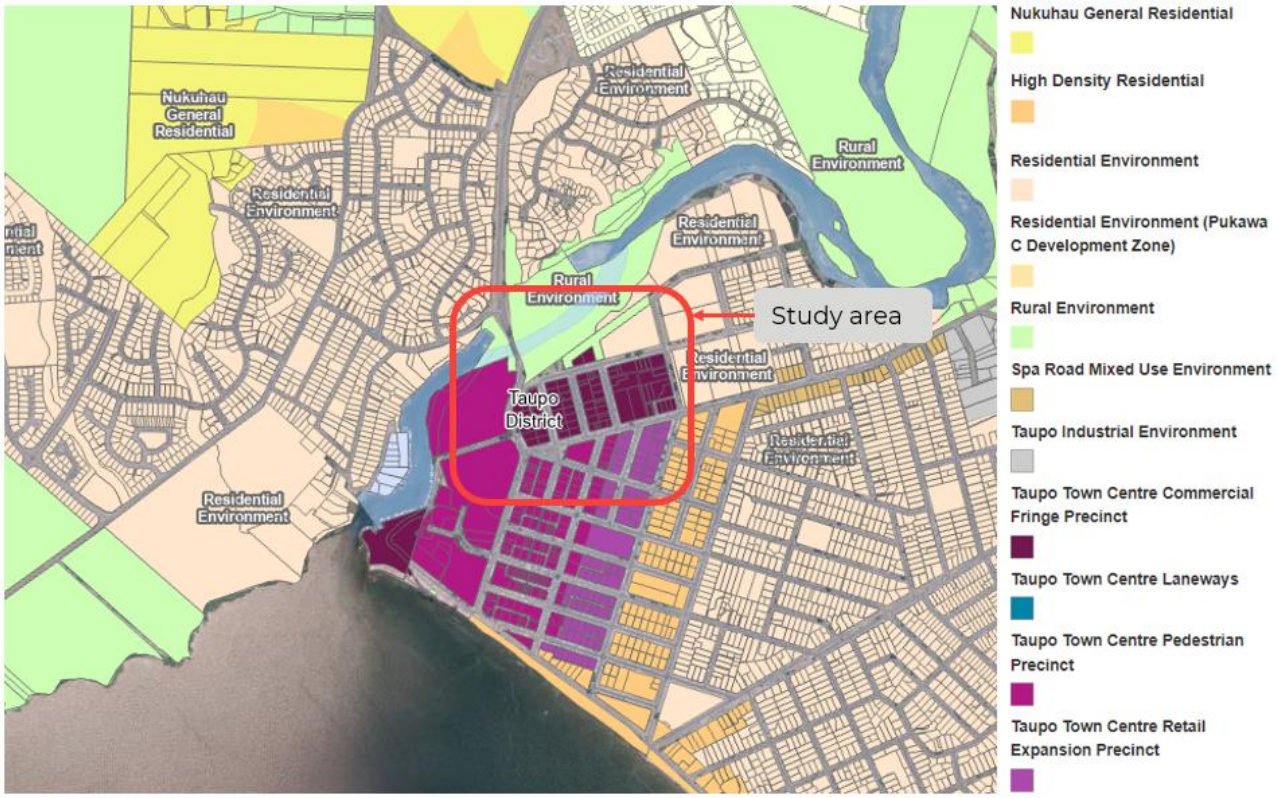


Figure 2-2: Land Use Zoning of Taupō Study Area from the Taupō District Plan (Source: Taupō District Plan Map Viewer).

3 EXISTING PLANS AND STRATEGIES

3.1 TAUPŌ DISTRICT 2050 DISTRICT GROWTH MANAGEMENT STRATEGY (2018)

The Taupō District 2050 District Growth Management Strategy (2018) is a growth management strategy which outlines where Taupō District Council anticipates future growth to occur. As shown in Figure 3-1, the Strategy notes that in the next 30 years, Taupō will:

- Need an additional 3000 lots over the next 30 years, in addition to the 5000 potential residential lots as at 2018, to meet residential land demand
- Need an additional 98ha of land for industrial growth in the next 30 years.
- Want to encourage intensification, as there are no plans to expand the commercial areas at present.

Figure 3-1: Residential growth in the next 30 years for Taupō. (Source: Taupō District 2050 District Growth Management Strategy).

A key area of interest is the future residential growth area just north of the TCG Bridge as shown in Figure 3-2 which will increase demand on the TCG Bridge, particularly for those travelling into the Taupō CBD. Refer to Section 3.5.1 which discusses Plan Change 37 where it rezones land identified as Future Residential Growth into a mix of General Residential and Medium Density Residential.

Figure 3-2: Future Development Pattern for the Taupō Northern Growth Areas. (Source: Taupō District 2050 District Growth Management Strategy 2018)

Growth assumptions for this strategy have been included as part of the Taupō Transport Model Update and will be considered when analysing the proposed options.

3.2 TAUPŌ DISTRICT LONG TERM PLAN 2021-31

In the Transport section of the Taupō District Long Term Plan 2021-31, the community outcomes sought for transport activities are:

- Economy – our communities prosper in a thriving local economy with a diverse range of rewarding employment opportunities.
- Environment – a shared responsibility for places we are proud of.

The Plan also notes the potential negative effects if transport activities are not managed properly:

- Social well-being – the social costs associated with crashes on our roading network.
- Economic well-being – businesses not being able to transport goods and services efficiently.
- Environmental well-being – effects on the environment from vehicle emissions and contaminants on our transport network entering the stormwater network.

This project will ensure that the preferred option aligns with the community outcomes sought in the plan.

3.3 TAUPŌ URBAN COMMERCIAL AND INDUSTRIAL STRUCTURE PLAN 2011

The Taupō Urban Commercial and Industrial Structure Plan 2011 is a planning document prepared under the Local Government Act 2002 (LGA). It provides a vision for future planning of the Taupō town centre and new industrial areas. The Plan purposely provides direction over the next 20 years

to which one of the identified projects identified in the plan is the Second River Crossing. The second river crossing is a long-term priority project after 2022.

As shown in Figure 3-3, the plan identifies two potential bridge locations linking to Waikato Street and Ōpepe Street. This has been looked at and considered during the development of our long list options assessment.

Figure 3-3: Proposed Development Pattern for the town centre (Source: Taupō Urban Commercial and Industrial Structure Plan)

3.4 TAUPŌ DISTRICT COUNCIL TRANSPORT STRATEGY – CONNECTING TAUPŌ 2020 – 2050

The Taupō District Council Transport Strategy – Connection Taupō 2020 – 2050 has a vision which involves making it easier to get to the people and places we want, safely and sustainably.

They also have seven commitment and order of priorities where they will maintain and enhance Taupō's transport network which are:

1. safe
2. inclusive
3. walking and cycling friendly to support sustainable choices
4. supporting the vibrancy of our town centres and fostering social and economic interactions
5. well connected to the rest of New Zealand
6. resilient and reliable
7. maintaining predictable travel times in the face of growth.

The Taupō Northern Access Study will consider these priorities as part of the options assessment as part of the project.

3.5 PLAN CHANGES / DEVELOPABLE LAND

The following sections covers key Taupō District Plan Changes of relevance to the Study Area.

3.5.1 PLAN CHANGE 37: NUKUHAU PRIVATE PLAN CHANGE

Plan Change 37 sought to change the zoning of 77.78 hectares of Rural Environment zoned land to a mix of General Residential and Medium Density Residential as shown in Figure 3-4. It also sought to provide a Neighbourhood Shopping Centre (Shops) overlay over an area in the proposed General Residential Zone and areas of stormwater and recreation reserves. Plan Change 37 supports the Taupō District 2050 – Growth Management Strategy as it enables future growth development in the northern growth area, accommodating about 780 additional dwellings.

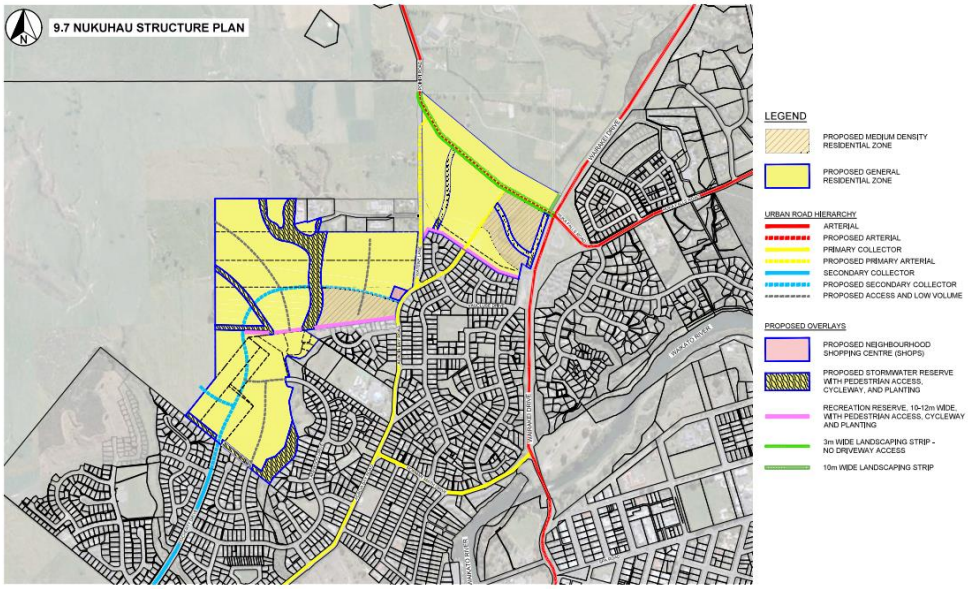


Figure 3-4: Nukuhau Structure Plan (Taupō District Council)

With the zoning change now in effect and reflected in the District Plan, there is heightened urgency to improve access across the Taupō, as this zoning change will lead to increased demand on the existing TCG Bridge.

3.5.2 PLAN CHANGES 38 TO 43

TDC recently had a series of Plan Changes (Plan Changes 38 to 43) to the Taupō District Plan. The following Plan Changes are of relevance to the project:

- Plan Change 39 (Residential Building Coverage) – proposes to increase building coverage from 30% to 35% for the Residential and Nukuhau General Residential Environments. This adjustment will facilitate in accommodating a greater number of occupants within each dwelling.
- Plan Change 42 (General Rural and Rural Lifestyle Environments) – proposes changes to some areas marked as General Rural Environment to Rural Lifestyle Environment, with most of this zoning taking place north of the Taupō CBD (see Figure 3-5). Under Rural Lifestyle Environment, this allows for relaxation of subdivision rules and enables the allowance for minor dwellings.

The plan changes identified above create additional housing development prospects which could induce more demand on the existing TCG Bridge.

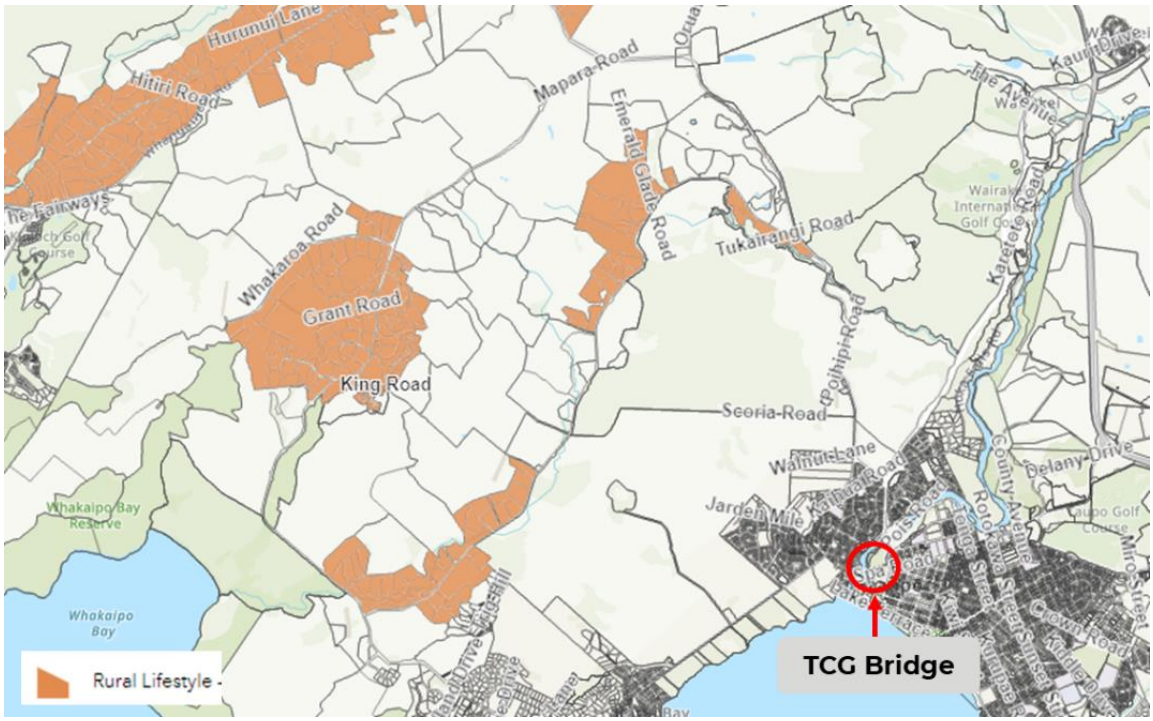


Figure 3-5: Areas proposed as Rural Lifestyle Environments (Source: Taupō District Council Public Policy Proposals Map).

3.5.3 RANGATIRA E TRUST LAND

There is a large area of land at 416 Acacia Bay Road, Taupō owned by Rangatira E Trust as shown in Figure 3-6. TDC have noted that Rangatira E Trust have significant aspirations to develop this land, however at this stage, the timeline is unclear.

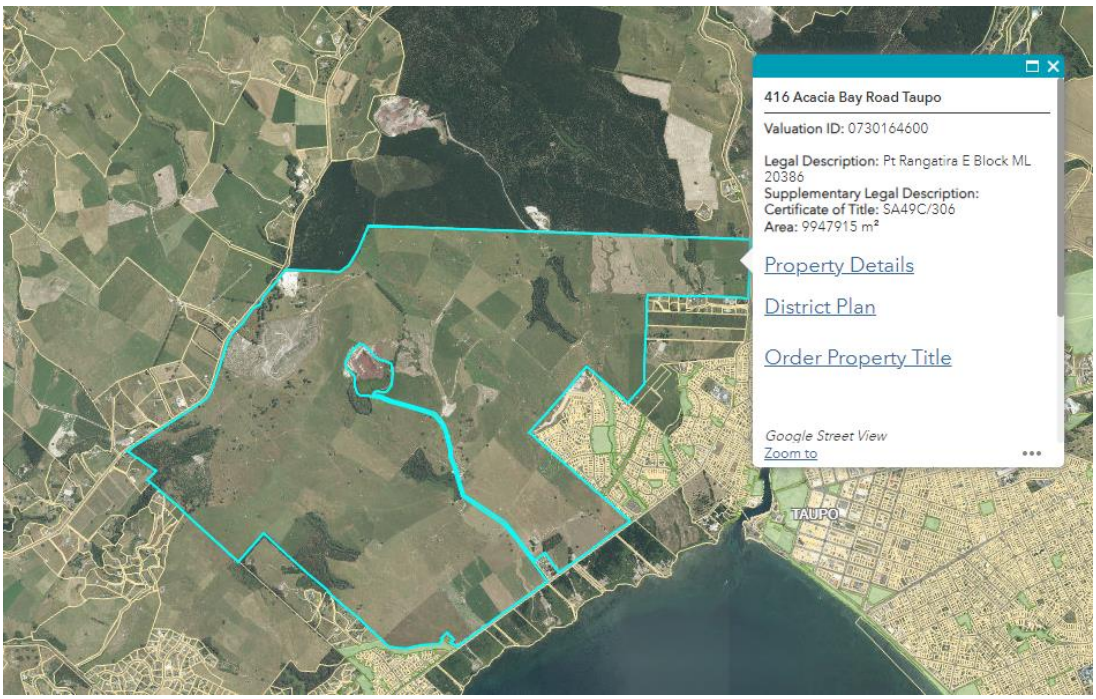


Figure 3-6: Land owned by Rangatira E Trust (Source: Taupō District Council Mapi Services).

4 TRANSPORT NETWORK

4.1 ROADING NETWORK

Table 4-1 identifies the main roads within the study area as well as their road hierarchy, posted speed limit and average daily traffic (ADT) of each road.

Table 4-1: Roading network attributes in the study area

Road Name	Road Hierarchy	Posted Speed Limit	ADT[1]
Norman Smith Street	Primary Collector	50 kph	13366 (15/01/2024)
Wairakei Drive	Arterial	50 kph	12761 (11/07/2022)
TCG Bridge	Arterial	50 kph	28487 (15/01/2024)
Tongariro Street	Arterial/ Primary Collector	50 kph 30 kph (Town Centre)	28487 (15/01/2024)
Spa Road	Arterial	50 kph	18146 (15/01/2024)
Pāora Hapi Street	Secondary Collector	50 kph 30 kph (Town Centre)	2266 (15/01/2024)
Tītīraupenga Street	Secondary Collector	50 kph	1991 (15/01/2024)
Ōpepe Street	Secondary Collector	50 kph	1603 (15/01/2024)

4.2 TAUPŌ CONTROL GATES BRIDGE

The TCG Bridge is a 2-lane bridge located on Tongariro Street, with a shared path on the eastern side and a footpath on the western side. Apart from bridges on the Eastern Taupō Arterial (ETA) and Aratiatia Road, both of which are more than 5km from the TCG Bridge, the TCG Bridge is the only north-south connection across the Waikato River between Taupō CBD and north of Taupō. This highlights a potential network resilience issue in Taupō's Transport network. The width of the traffic lanes, pedestrian footpath, and shared path of the TCG Bridge is shown in Table 4-2.

The primary purpose of the TCG Bridge is to control the flow of the Waikato River, with carrying traffic across the river being a secondary purpose. Supporting other services is the tertiary purpose of the TCG Bridge. The TCG Bridge is not owned by TDC. However, TDC does own the road surface and has an agreement with owner to have TDC's infrastructure supported on the bridge.

[1] Extracted from MobileRoads

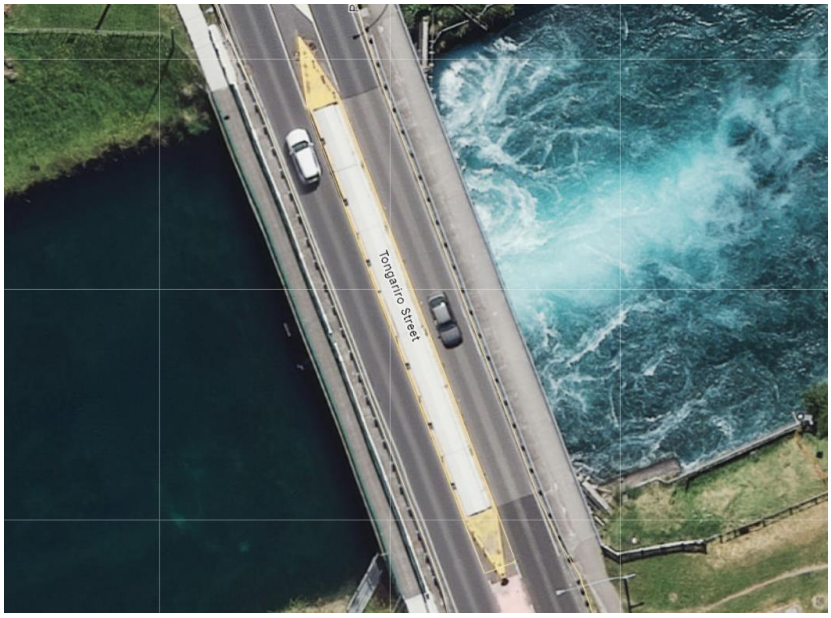


Figure 4-1: Aerial view of the TCG Bridge (Source: Taupō District Council's Mapi Services).

Table 4-2: Width of a traffic lanes, shared path and footpath on the TCG Bridge

Left Pedestrian Path	Northbound Traffic Lane	Median	Southbound Traffic Lane	Right Shared Path
~1.5 m	~3.3 m to 3.4 m	~2.7 to 2.9m	~3.3 m to 3.4 m	~2.8 m

4.2.1 FUTURE DEMAND OF THE TCG BRIDGE AND SURROUNDING NETWORK

In 2020, WSP was commissioned to assist with the Nukuhau Private Plan Change 37. The transport assessment explained that by 2030, TCG Bridge will be operating at Level of Service (LoS) F (Table 4-3), potentially up to 20 minutes of delay through the bridge. LoS gives an indicator of the degree of amenity to vehicle users on a network; this report uses LoS as an indicator of network performance. Long queue lengths and delays on the TCG Bridge could create safety risks at other locations such as Norman Smith Street and Acacia Bay Road as it can impact user visibility when approaching intersections. It also increases driver frustration, resulting in aggressive behaviour, which can increase the risk of crashes. The report noted that by 2041, another bridge crossing or upgrade/ replacement of TCG Bridge will be required to cope with traffic demand in Taupō with or without the Nukuhau Development.

In 2023, Abley was commissioned by WSP on behalf of TDC to prepare a 2033 and 2053+ (Full Development Scenario) future years Taupō Transport Model. Figure 4-2 shows the predicted LoS of TCG Bridge and the surrounding transport network in 2023, 2033 and 2053+ (Full Development Scenario). The LoS represents the entire peak hour (AM Peak – 8am to 9am; PM Peak – 5pm to 6pm). To summarise:

- In 2023, the TCG Bridge is operating at a LoS E in both AM and PM peak hour. This means that the bridge is close to capacity and there is virtually no freedom to select the desired speed and to manoeuvre within the traffic stream. In the PM peak, the southbound lane on

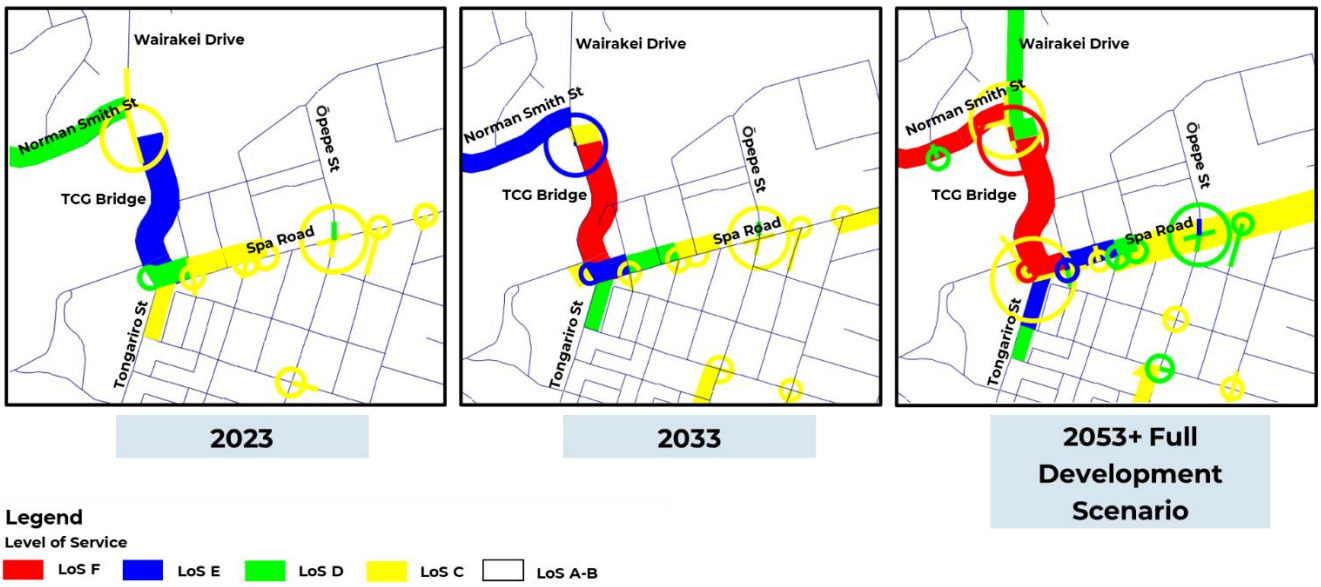
the TCG Bridge is operating at a LoS C. Norman Smith Street and Spa Road towards the Spa Road / Tongariro St roundabout is currently operating at a LoS C and D.

- In 2033, the TCG Bridge is predicted to be operating at a LoS F for both the AM and PM peak, meaning it is at capacity and there is queuing and delays occurring. This also impacts the streets connecting to the TCG Bridge as Norman Smith Street (towards the Norman Smith Street / Wairakei Drive intersection) and Spa Road (towards Spa Road / Tongariro Street roundabout) are predicted to be operating at an LoS E, meaning it is close to capacity. This shows that the current problems experienced on the network in these locations will be exacerbated by growth out beyond 2023. Travel times towards the Taupō CBD from Acacia Bay Road in the AM peak will increase from 7 minutes in 2023 to 9 minutes in 2033.
- In 2053+ (Full Development Scenario), due to the quantum of growth anticipated, there is widespread LoS issues across the Taupō transport network. The TCG Bridge and Norman Smith Street are predicted to operate at a LoS F, with Spa Road and Tongariro Street predicted to be operating at a LoS E near the roundabout in both AM and PM peak. Travel times towards the Taupō CBD from Acacia Bay Road in the AM peak is expected to triple, increasing from 7 minutes in 2023 to 23 minutes in 2053+ (Full Development Scenario).

Overall, these results reach similar conclusions from the 2020 Transport Assessment in terms of needing another connection to cope with the addition growth demand in the North of Taupō.

See Appendix A for more details on the Taupō Transport Model methodology and growth assumptions.

LoS Comparison: Existing State Morning Peak



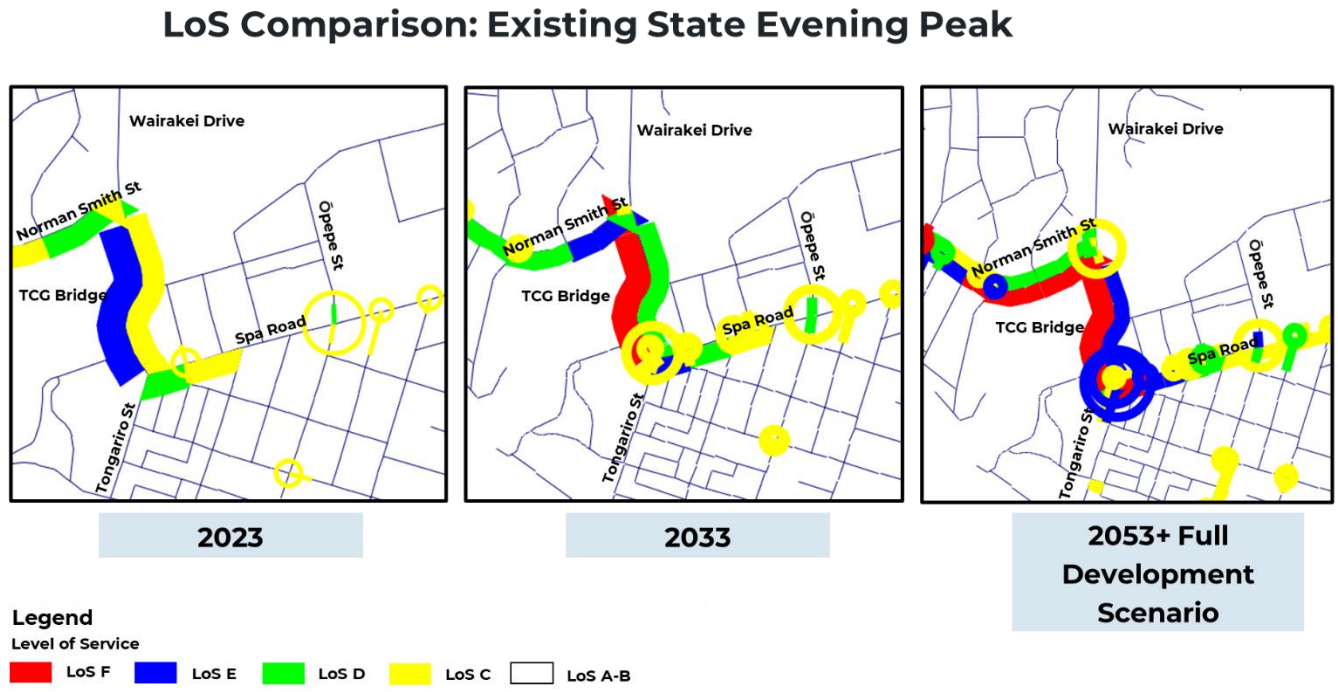


Figure 4-2: LoS Comparisons of the Taupō Transport Network in 2023, 2033 and 2053+ (Full Development Scenario) for AM and PM Peak (Source: Taupō Transport Model Update by Abley).

Table 4-3: Taupō Transportation Model LoS Criteria

Definition of LoS				
LoS	Description	Link (Vehicles per hour)	Taupō Transportation Model LoS criteria	
			Intersection (delay/veh)	
			Priority	Signal/ Rotary
LoS F	Forced flow. The amount of traffic approaching a point exceeds that which can pass it. Flow break-downs occur, and queuing and delays occur.	In excess of 900-1700 depending on link type	50 sec	80 sec
Los E	Traffic volumes are at or close to capacity and there is virtually no freedom to select desired speed and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause break-downs in operation.	Between 720-1360 depending on link type	35 sec	55 sec
LoS D	Approaching unstable flow where all drivers are severely restricted in their freedom to select desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor and small increases in traffic flow will cause operational problems	Between 585-1105 depending on link type	25 sec	35 sec

LoS C	Stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience has declined noticeably	Between 450-850 depending on link type	15 sec	20 sec
LoS B	Stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is less than LoS A.	Not Applicable	Not Applicable	
LoS A	Free flow in which drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of comfort and convenience is excellent.			

4.2.2 STRUCTURAL INTEGRITY OF THE TCG BRIDGE

The TCG Bridge was built in 1941 and has an 80-year-old design life. The footpath and shared path facility of the TCG Bridge has a different load limit compared to the traffic lanes on the TCG bridge. As a result, they are not meant for carrying vehicles.

Due to the control gates function, any additional modifications and additional load to the bridge can be challenging to carry out. Refer to Section 10.2 which analyses the challenges of adding an additional lane on the TCG Bridge.

Regardless of the preferred option, it is recommended that further assessments are carried to understand the structural integrity of the TCG Bridge as this project progresses to the next phases.

4.3 KEY INTERSECTIONS

The characteristics of the 4 key intersections (Figure 2-1) are discussed in the following sections.

4.3.1 NORMAN SMITH STREET/ WAIRAKEI DRIVE

The site characteristics of Norman Smith Street and Wairakei Drive intersection (as shown in Figure 4-3) are as follow:

- The intersection is a 3-legged signalised intersection.
- The overall site width, boundary to boundary is between 20m to 50m, kerb to kerb is between 14m and 19m.
- There is a signalised pedestrian crossings on Wairakei Drive North and Norman Smith Street.
- The intersection is about 100m away from the TCG Bridge.
- There is an off-road shared path on the east side of Tongariro Street and the northern side of Norman Smith Street.

Figure 4-3: Aerial view of the Norman Smith Street and Wairakei Drive intersection (Source: Taupō District Council's Mapi Services).

4.3.2 SPA ROAD / TONGARIRO STREET

The site characteristics of Spa Road and Tongariro Street intersection (as shown in Figure 4-4) are as follow:

- The intersection is a 3-legged roundabout.
- The overall site width, boundary to boundary is between 30m to 34m, kerb to kerb is between 15m and 20m.
- There is a pedestrian refugee island on Spa Road and Tongariro Street South.
- There is an on-road protected cycle lane on Tongariro Street South.

Figure 4-4: Aerial view of the Spa Road and Tongariro Street intersection (Source: Taupō District Council's Mapi Services).

4.3.3 ŌPEPE STREET / SPA ROAD

The site characteristics of Ōpepe Street and Spa Road intersection (as shown in Figure 4-5) are as follow:

- The intersection is a 4-legged staggered signalised intersection.
- The overall site width, boundary to boundary is between 20m to 30m, kerb to kerb is between 12m and 30m.
- There is a pedestrian crossing Spa Road (eastern side), on Ōpepe Street and Tītīraupenga Street.
- There is an on-road, un-protected bi-directional cycle lane on Spa Road.

Figure 4-5: Aerial view of the Ōpepe Street and Spa Road intersection (Source: Taupō District Council's Mapi Services).

4.3.4 PĀORA HAPI STREET/ TĪTĪRAUPENGA STREET

The site characteristics of Pāora Hapi Street and Tītīraupenga Street intersection (as shown Figure 4-6) are as follow:

- The intersection is a 4-legged priority controlled (stop) intersection.
- The overall site width, boundary to boundary is around 30m, kerb to kerb is around 10m.

Figure 4-6: Aerial View of Pāora Hapi Street and Tītīraupenga Street intersection (Source: Taupō District Council's Mapi Services).

4.3.5 EXISTING INTERSECTION PERFORMANCE

SIDRA v9 Traffic Model software was used to determine the traffic performance of the 4 existing intersections. Only AM and PM peaks periods have been modelled for this assessment.

For the Norman Smith Street / Wairakei Drive and Spa Road / Tongariro Street intersections, traffic turning count from traffic survey data[2] were used in the SIDRA models, whereas for Spa Road / Ōpepe Street / Tītīraupenga Street and Pāora Hapi Street / Tītīraupenga Street traffic turning counts were extracted from the updated Taupō Transport Model.

The default gap acceptance values were used to establish the base model. Site queue length data for the analysis period was unavailable, but the typical cycle times and phasing diagrams were used for the Norman Smith Street / Wairakei Drive Intersection and Spa Road / Ōpepe Street / Tītīraupenga Street Intersection to determine the current intersection performance in 2023. The SIDRA models were calibrated as close to the 2023 LoS as possible, adopting cycle times provided from SCATs data for the AM and PM, respectively.

Table 4-4 to Table 4-7 summarises the LoS, delay times and queue lengths for each intersection from the SIDRA models. In SIDRA, the site LoS method has been set to the default, meaning the LoS shown in Table 4-4 to Table 4-7 is based on delay times only. Table 4-8 provides LoS definitions based on delay only (for vehicles). For more information on the turning count volumes and detailed SIDRA Modelling results, see Appendix B.

[2] WSP engaged with Team Traffic to conduct turning count traffic surveys at Norman Smith Street / Wairakei Drive and Spa Road / Tongariro Street as part of the Taupō Mode Update. Survey dates are 28 Nov 2023 and 29 Nov 2023.

Table 4-4: Norman Smith Street / Wairakei Drive Intersection

Peak Hour	Road Name	LoS	Average Delays (seconds)	Queue Distances (m)
AM	Wairakei Drive (North)	LoS C	33	158
	Tongariro Street (South)	LoS B	13	81
	Norman Smith Street (West)	LoS D	35	189
PM	Wairakei Drive (North)	LoS B	12	57
	Tongariro Street (South)	LoS D	39	278
	Norman Smith Street (West)	LoS B	19	49

Table 4-5: Spa Road / Tongariro Street Intersection

Peak Hour	Road Name	LoS	Average Delays (seconds)	Queue Distances (m)
AM	Tongariro Street (North)	LoS A	6	54
	Spa Road (East)	LoS B	13	43
	Tongariro Street (South-West)	LoS A	5	15
PM	Tongariro Street (North)	LoS A	5	25
	Spa Road (East)	LoS B	15	114
	Tongariro Street (South-West)	LoS D	45	99

Table 4-6: Spa Road / Ōpepe Street / Tītīraupenga Street Intersection

Peak Hour	Road Name	LoS	Average Delays (seconds)	Queue Distances (m)
AM	Ōpepe Street (North)	LoS D	36	20
	Spa Road (East)	LoS F	219 (~3.5 minutes)	587
	Tītīraupenga Street (South)	LoS F	152 (~2.5 minutes)	147
	Spa Road (West)	LoS E	71 (~1 minute)	311
PM	Ōpepe Street (North)	LoS D	37	26
	Spa Road (East)	LoS E	75 (~1 minute)	325
	Tītīraupenga Street (South)	LoS D	48	30
	Spa Road (West)	LoS D	37	192

Table 4-7: Pāora Hapi Street / Tītīraupenga Street Intersection[3]

Peak Hour	Road Name	LoS	Average Delays (seconds)	Queue Distances (m)
AM	Tītīraupenga Street (North)	N/A	1	1.5
	Pāora Hapi Street (East)	LoS B	11	1.4
	Tītīraupenga Street (South)	N/A	1	0.7
	Pāora Hapi Street (West)	LoS C	16	19.6
PM	Tītīraupenga Street (North)	N/A	1	1.5
	Pāora Hapi Street (East)	LoS A	10	1.2
	Tītīraupenga Street (South)	N/A	1	0.6
	Pāora Hapi Street (West)	LoS B	11	17.6

Table 4-8: Delay (SIDRA) method for LoS definitions based on delay only (for vehicles)

Level of Service	Control delay per vehicle in seconds (d)		
	Signals	"SIDRA Roundabout LOS" method (1)	Sign Control
A	d ≤ 10	d ≤ 10	d ≤ 10
B	10 < d ≤ 20	10 < d ≤ 20	10 < d ≤ 15
C	20 < d ≤ 35	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ **55**	35 < d ≤ **50**	25 < d ≤ **35**
E	**55** < d ≤ 80	**50** < d ≤ 70	**35** < d ≤ 50
F	80 < d	70 < d	50 < d

For Standard Left, Standard Right and New Zealand setups in SIDRA INTERSECTION, this is the default LOS Method for vehicles. Level of Service Target = LOS D is indicated by the table.

(1) The default *Roundabout LOS Method* is the ***SIDRA Roundabout LOS*** method for roundabouts which is unique to SIDRA INTERSECTION. It has been recommended by AUSTROADS - AGTM03-20, Guide to Traffic Management Part 3: Transport Study and Analysis Methods (2020), Table 7.3.

Overall, at present, the Spa Road / Ōpepe Street / Tītīraupenga Street Intersection is the worst performing intersection out of the four intersections as it is operating at LoS F with delays up to 3.5 minutes. The other three intersections are operating with less than 45 second delay.

4.3.6 FUTURE INTERSECTION PERFORMANCE

Table 4-9 to Table 4-12 shows the overall intersection performance and delay times for the four key intersections in the future years 2033 and 2053+ (Full Development Scenario). The same methodology was used to model the intersections for the future years as outlined in Section 4.3.5.

[3] SIDRA only provides LoS for the east and west leg as this intersection is a priority-controlled (Stop) intersection

Turning volumes for 2033 and 2053+ (Full Development Scenario) for all intersections were extracted from the Taupō Transport Model.

Table 4-9: Norman Smith Street / Wairakei Drive Intersection Performance in 2033 and 2053+ (Full Development Scenario).

Norman Smith Street / Wairakei Drive			
		2033	2053+ (Full Development Scenario)
AM	LoS	LOS F	LOS F
	Avg Delays	2 min delay	6.5 min delay
PM	LoS	LOS D	LOS F
	Avg Delays	49s delay	3.5 min delay

Table 4-10: Spa Road / Tongariro Street Intersection Performance in 2033 and 2053+ (Full Development Scenario)

Spa Road / Tongariro Street			
		2033	2053+ (Full Development Scenario)
AM	LoS	LOS A	LOS D
	Avg Delays	7.6s delay	43s delay
PM	LoS	LOS F	LOS F
	Avg Delays	~2 min delay	4 min delay

-Table 44-11: Spa Road / Ōpepe Street / Tītīraupenga Street Intersection Performance in 2033 and 2053+ (Full Development Scenario)

Spa Road / Ōpepe Street / Tītīraupenga Street			
		2033	2053+ (Full Development Scenario)
AM	LoS	LOS F	LOS F
	Avg Delays	3.5 min delay	5 min delay
PM	LoS	LOS F	LOS F
	Avg Delays	1.5 min delay	4.5 min delay

Table 4-12: Pāora Hapi Street / Tītīraupenga Street Intersection Performance in 2033 and 2053+ (Full Development Scenario) [4]

Pāora Hapi Street / Tītīraupenga Street			
		2033	2053+ (Full Development Scenario)
AM	LoS	LOS B (East) LOS C (West)	LOS C (East) LOS F (West)
	Avg Delays	6.5s delay	23s delay
PM	LoS	LOS B (East) LOS B (West)	LOS B (East) LOS C (West)
	Avg Delays	6s delay	8s delay

Overall, all intersections except for the Pāora Hapi Street / Tītīraupenga Street Intersection are expected to have performance issues by 2033, where at least one of the peak periods is expected to operate at a LoS F. By 2053+ (Full Development Scenario), both signalised intersections (Norman Smith Street / Wairakei Drive and Spa Road / Ōpepe Street / Tītīraupenga Street) are expected to perform the worst out of the four intersections as both peak periods are operating at an LoS F and have over 4-minute delays. In Stage 2, intersection improvements through SIDRA modelling refinements are expected to improve these performance issues.

4.4 ONE NETWORK FRAMEWORK

Figure 4-7 shows the One Network Framework (ONF) classification for the streets in the study area. The study area mainly consists of Activity Streets, Local Streets and Urban Connectors. The definitions of the classifications are provided below:

- Activity Streets – provide access to shops, entertainment venues, community facilities and commercial, trades and industrial businesses for everyone. They support medium to high levels of people walking, cycling, using public transport, or driving through the area.
- Local Streets – primarily provide quiet and safe residential access for all ages and abilities. They are part of the fabric of our neighbourhoods and facilitate local community access. Local Streets are the most common and most diverse streets in urban areas. There are low levels of on-street activity and movement by people walking, cycling, and driving.
- Urban connectors – make it safe, reliable, and efficient for people and goods to move between different parts of urban areas. They have high levels of motor vehicle traffic, including freight. They often support public transport and provide major routes for cyclists. There are low levels of pedestrian activity associated with people moving along the road.

[4] *Delay times present for the overall intersection. LoS is only applicable for the East / West approach.*

Figure 4-7: One Network Framework Classification of the Study Area (Source: New Zealand Transport Agency MegaMaps Road to Zero Edition 2).

Depending on the preferred option, ONF classifications may need to be revisited once the preferred option is decided. This is because the preferred option may change the movement function of certain streets in the study area due to an increase or decrease in traffic. It is recommended to carry out a Movement and Place Assessment when this project progresses to the next phases.

4.5 PUBLIC TRANSPORT

There are two main bus services in the Taupō District: Taupō Connector and Connect2Taupō. These bus services vary in frequency throughout the week. The key roads for each route have been noted in Table 4-13 as these routes could be impacted by the preferred option.

Table 4-13: Bus services within the study area

Bus Route	Key roads within the study area
33 – Taupō Connector: between Wharewaka and Nukuhau	Norman Smith Street, Wairakei Drive, TCG Bridge, Tongariro Street, Spa Road
34 – C2T: Acacia Bay to Taupō	Norman Smith Street, Wairakei Drive, TCG Bridge, Tongariro Street, Spa Road
35 – C2T: Kinloch to Taupō	Wairakei Drive, TCG Bridge, Tongariro Street, Spa Road
36 – C2T: Tūrangi to Taupō	Tītīraupenga Street, Spa Road, Pāora Hapi Street
37 – C2T: Tokoroa to Taupō	Wairakei Drive, TCG Bridge, Tongariro Street, Spa Road

38 – C2T: Wairakei to Taupō	Wairakei Drive, TCG Bridge, Tongariro Street, Spa Road

4.6 ACTIVE MODES

Figure 4-8 shows the existing active modes network along the TCG Bridge and identifies the quality of the cycling facilities. Cycling routes / shared path facilities are mainly present to the north of the TCG Bridge, along Spa Road and south of the Spa Road / Tongariro Street intersection. The map shows that there are overall noticeable gaps in the cycling network in Taupō. As mentioned in Section 4.3, the TCG Bridge has a footpath on one side and a shared path on the other side. The TCG Bridge is the only north-south active modes link over the Waikato River near the CBD.

Overall, in line with the Taupō District Council Transport Strategy – Connection Taupō 2020 – 2050 which has a priority to enhance the transport network to support walking and cycling friendly facilities, this project has ensured one of the project objectives focuses on active modes. This project will contribute to enhancing the active modes connections from the north of Taupō to the CBD.

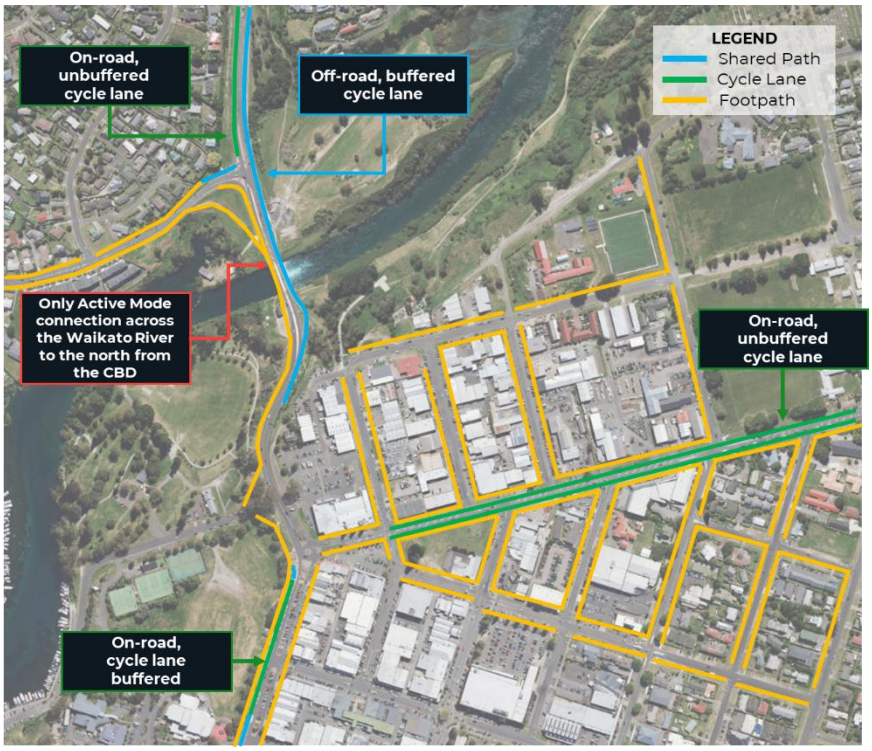


Figure 4-8: Active modes network in the study area (Source: Base map from Taupō District Council's Mapi Services

4.7 SAFETY

Crash history for the study area was obtained from the New Zealand Transport Agency Waka Kotahi (NZTA). Crash Analysis System (CAS) was used to provide a high-level understanding of the crash patterns and safety concerns. Figure 4-9 shows the extent of crashes searched in the CAS.

The crash data extracted looked at the period between 2013 to 2023.[5]

CAS classifies crashes based on severity of the injury and can either be Fatal, Serious Injury Crash, Minor Injury Crash and Non-Injury Crash. The definitions for each crash severity type are below:

- Fatal: a road crash that results in death.
- Serious Injury Crash: a road crash where any of the parties required medical attention and was taken to hospital.
- Minor Injury Crash: a road crash where no one needed any medical attention but sustained some bruising and superficial cuts.
- Non-Injury Crash: a road crash where no one sustained any injuries. The police might not always attend these crashes.

These are colour coded as noted in the legend on Figure 4-9. Where there are a mix of colours within a circle with a number in the middle, this represents a cluster of crashes with different crash severities. The number in the circle represents the number of crashes in that area. It should be noted that the CAS groups crashes together based on the level of zoom in the map and as a result, the grouped crashes in Figure 4-9 only provides an approximate representation of the crash locations.

[5] CAS search date 9 May 2024

Figure 4-9: Extent of crashes analysed in CAS. (Source: CAS)

The crash history shows that there was a total of 203 crashes recorded in the 10-year period: 4 serious, 46 minor and 153 non-injury crashes. There were no fatal injury crashes.

There were only six non-injury crashes on the TCG Bridge over the past 10 years, where all the crashes were rear end crashes. This is typical across a bridge and no particular safety concerns were identified. At the proposed connection point at Ōpepe Street, one minor injury crash was observed along Ōpepe Street. This was due to a lack of driving experience (no license), so likewise, no safety concerns were highlighted.

Table 4-14: Table showing Crash Severity against Crash Type (Road Safety Movement Group) for crashes in the Taupō Study Area (Source: CAS).

	Serious Crash	Minor Crash	Non-injury Crash	TOTAL
Bend-Lost Control/ Head on	0	5	10	15
Crossing/ Turning	1	25	62	88
Miscellaneous	0	0	1	1
Overtaking	0	1	14	15
Pedestrian vs Vehicle	3	7	1	11
Rear end/ Obstruction	0	7	59	66
Straight-Lost Control/ Head on	0	1	6	7
TOTAL	4	46	153	203

Table 4-14 shows the crash types in the study area. “Crossing/ turning” crashes were identified as the most common type of crash. Looking at the crash history over the past 5 years (2018 – 2023) the same trend is observed where crossing/ turnings crashes were the most common. On closer investigation of the crossing/ turning crashes, the majority of these occurred at the priority-controlled intersections. Speed was not identified as a major cause of these crashes. The main contributing factors were identified as:

- Did not see another party until too late.
- Failed to give way.
- Alcohol/ drugs.

Three of the serious injury crashes involved collisions with pedestrians.

- Driver pulled into a car park on Tongariro Street and ran over a pedestrian’s foot.
- Intersection of Ruapehu Street/ Pāora Hapi Street – right angle crash, failure to stop and give way.
- Intersection of Taniwha Street/ Spa Road – scooter travelling on the footpath at a fast pace. Collision with a vehicle exiting driveway.
- On Spa Road – toddler ran into the road chasing after a ball.

11 pedestrian vs vehicle crashes were observed: three serious injury and seven minor injury crashes. 10 of these incidents occurred on Spa Road. Reoccurring/ frequent situations included pedestrians failing to check for vehicles before crossing at unsignalised locations (including splitter islands at roundabouts).

Overall, while there are a high number of crashes in the last 10 years, most of the crashes were non-injury crashes (153 out of 203). These results are considered typical and expected as the study

area is within the town centre in an urban environment with multiple intersections. No specific crash trends were identified through this assessment that require immediate improvement especially with the relative low speed environment of the study area. However, Spa Road is an area where there are safety concerns as most of the serious crashes (pedestrian vs vehicle crashes) occurred on Spa Road. This presents an opportunity in Stage 2 of the Northern Access Study to suggest safety improvements to address these safety concerns.

5 PREVIOUS STUDIES ON THE SECOND RIVER CROSSING

5.1.1 TAUPŌ NORTHERN OUTLET AND CBD INVESTIGATION – FINAL REPORT: QUALITY ASSURANCE STATEMENT (2018)

An improvement in the economy and local development resulted in an increase in traffic both along the ETA and into/ through the CBD. The 2018 report assesses options that are expected to improve the traffic flow along Huka Falls Road, to and including the CBD.

A second bridge crossing joining Wairakei Drive to Ōpepe Street, in the vicinity of the TCG bridge, was considered at a detailed design level, but put on hold after confirmation that the ETA would be built.

Objectives of the investigation was to:

- Improve connectivity of the transport network.
- Improve the efficiency of the transport network.

The assessment investigates a second bridge crossing (Option B4). This option is expected to provide additional capacity and facilitate traffic better along Norman Smith Street. This enables further residential development north of the Waikato River. The investigation proposed a new bridge downstream from the existing bridge that enables four lanes from Norman Smith Street to the Tongariro Street intersection. The assessment notes potential land acquisition issues.

5.1.2 TAUPŌ TOWN SECOND BRIDGE CROSSING – SCHEME ASSESSMENT REPORT (2006)

This assessment proposes a second bridge crossing 350 m downstream of the existing TCG bridge (Figure 5-1 and Figure 5-2). The cross section of the bridge is as follows: two 3.5 m lanes, 1.5 m shoulder, 2 m footpaths.

This is expected to provide travel time savings, vehicle operating savings and improve safety. The new alignment is expected to encourage traffic to avoid the CBD to access the waterfront on Lake Terrace. Tītīraupenga Street will act as the main route for traffic to the waterfront. There are several intersections where Tītīraupenga Street does not have priority, and those intersections may need to be investigated to meet the changes in traffic demand.

The new alignment will cut into Ōpepe Street. This may impact the funeral home and Taupō Nui-a-Tia College who use the Ōpepe Street / Rickit Street/ Motutāhae Street loop for access. There are also several residential/ commercial properties with access on the west of Ōpepe Street.

The proposed design suggested changes to the following intersections:

- Signals at Ōpepe Street / Spa Road (this intersection is currently signalised)
- Roundabout at Norman Smith Street/ Wairakei Drive for the new bridge to connect to

Part of the Waikato River (to the north of the proposed location) is used by kayakers and other river users. It was proposed that access is maintained via provision of a pathway under the bridge.

The assessment highlights some environmental considerations for the study area, such as the potential for unrecorded archaeological sites to be affected by the new alignment and the need for vegetation removal on the left side of the Waikato River. Local Iwi concerns preclude all construction works within the river thus bridge supports need to be located some distance away from the edge of the river.

Figure 5-1: Second Bridge Crossing (Source: Taupō Town Second Bridge Crossing – Scheme Assessment Report 2006)

Figure 5-2: Second Bridge Crossing (Source: Taupō Town Second Bridge Crossing – Scheme Assessment Report 2006)

As part of the options assessment process, a second bridge option located at Ōpepe Street has been considered in the longlist options.

5.1.3 OTHER STUDIES LOOKING AT A SECOND RIVER CROSSING

TDC has provided WSP with additional studies done previously which look at a second crossing in different locations not linking to Ōpepe Street. These are:

- Second river crossing where it runs parallel to the existing TCG Bridge and where the landing point is at Nukuhau Street (Figure 5-3). This from the Taupō Urban Commercial and Industrial Structure Plan 2011 (refer to Section 3.3).
- Second river crossing where the landing point is at Oruanui Street / Waikato Street and connects into Norman Smith Street (1999) (Figure 5-4).

Both landing points will be considered as part of this project. The Nukuahu Street landing point may be considered in Stage 2 depending on the preferred option when upgrades are made to the local network, as there are opportunities to divert traffic to another location from the existing TCG Bridge. The Oruanui Street landing point has been considered as part of the options assessment process.

Figure 5-3: Second river crossing where the landing is at Nukuhau Street (Source: The Taupō Urban Commercial and Industrial Structure Plan 2011).

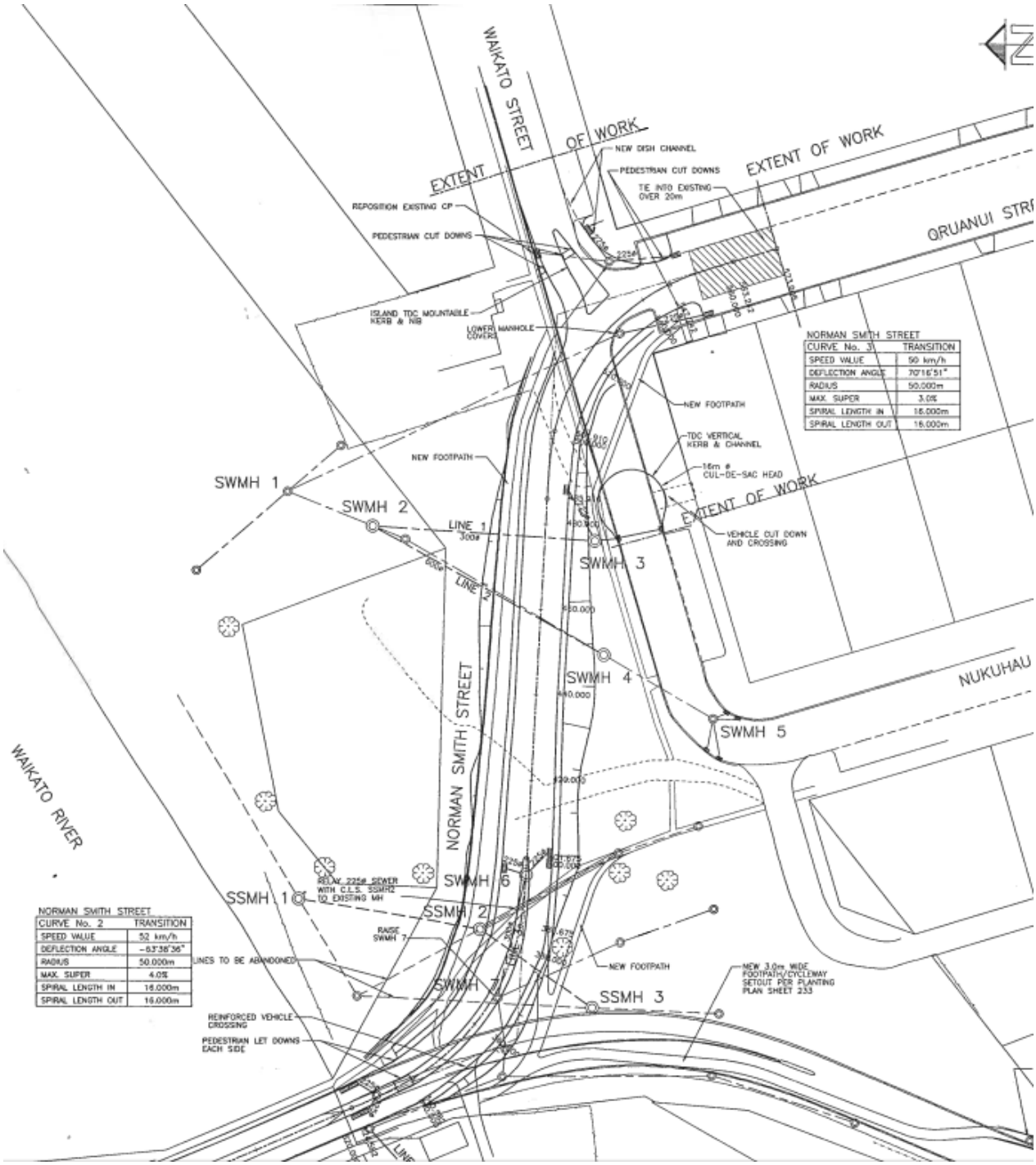


Figure 5-4: Second river crossing where the landing point is at Oruanui Street / Waikato Street (Source: Transit New Zealand State Highway 1 (SH1) 1999 Study).

6 PROBLEMS & OBJECTIVES

Figure 6-1 summarises the key problems agreed for the Taupō Northern Access Study based on the background data collected. The problems and objectives were proposed and agreed upon by TDC at the MCA Follow Up Discussion Workshop held on the 2nd of February 2024 and are the basis for the options development.

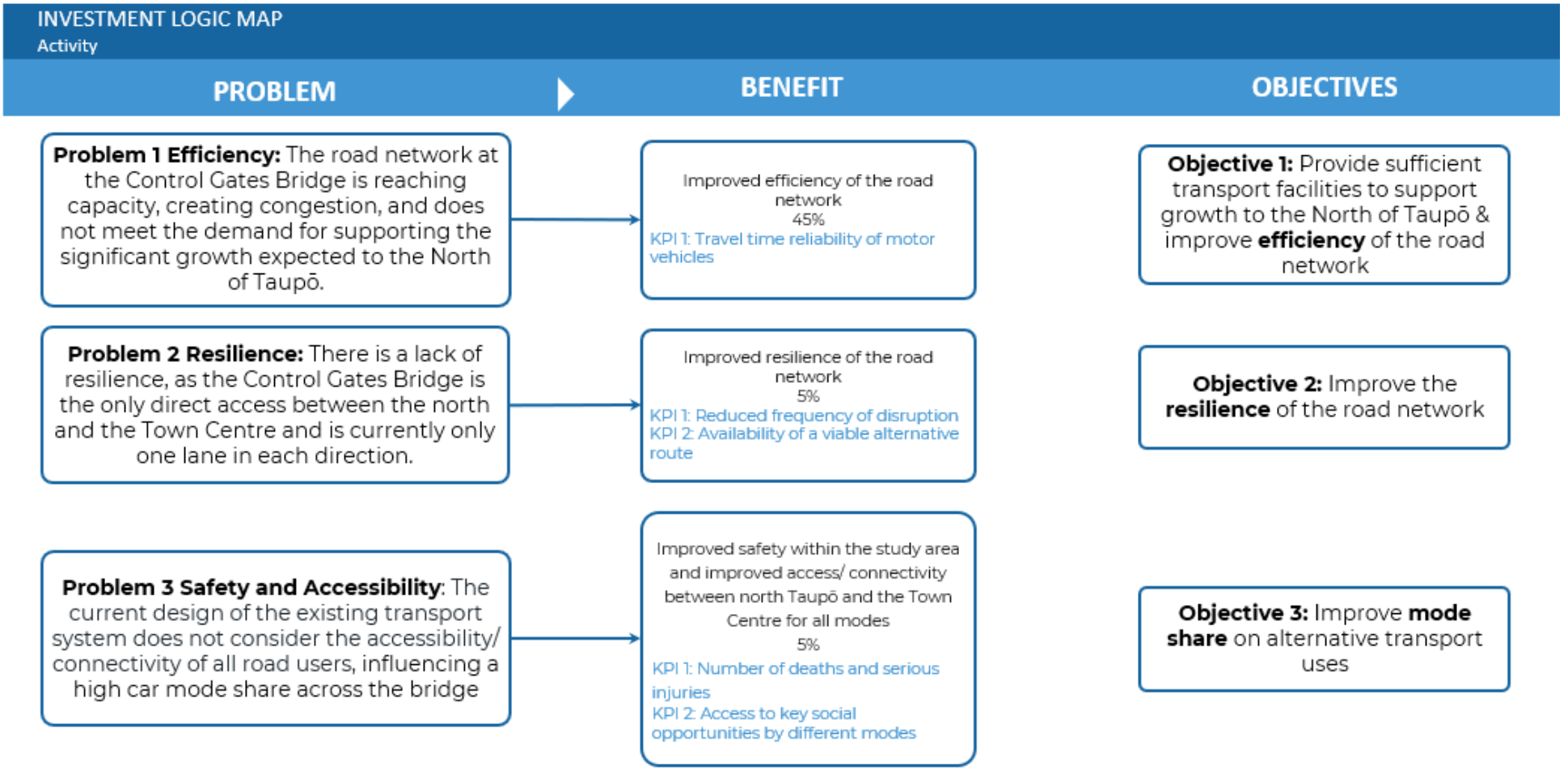


Figure 6-1: Problems and Objectives

7 ASSESSMENT FRAMEWORK

An MCA was used as a tool to assist in determining the recommended approach for option selection. The MCA provides a consistent approach to aid decision making, following the NZTA MCA Guidance[6] and has been utilised as a two-stage assessment to evaluate the different options proposed. This framework was discussed and agreed with TDC in a meeting held on the 2nd of February 2024.

The two-stage process includes:

- MCA Stage One: Assess each intervention in relation to the identified objectives.
- MCA Stage Two: Assess each intervention based on risks, potential impacts and opportunities as outlined in Table 7-2.

Table 7-1: Project Objectives

	Criteria	Weighting
Project Objectives	Provide sufficient transport facilities to support growth to the North of Taupō & improve **efficiency** of the road network	45%
	Improve the **resilience** of the road network	5%
	Improve **mode share** on alternative transport uses	5%

Table 7-2: Stage 2 of the MCA

	Criteria	Sub Criteria	Weighting
Risks, Impacts and Opportunities	Development (Technical Complexity/ Achievability)	Design, Site Characteristics & Constructability	5%
		Consentability	5%
	Environmental and Cultural impacts	Environmental Impacts	TBC
		Cultural Value	TBC
	Social and Land Impacts	Social Impacts	5%
		Land Considerations	10%

[6] https://www.nzta.govt.nz/assets/resources/multi-criteria-analysis/multi-criteria-analysis-user-guidance.pdf

The MCA enables the options to be ranked against different criteria which will help determine the preferred option. TDC were involved in the MCA process and the decision-making process, which helped create more robust and clear objectives. Figure 7-1 illustrates the MCA process undertaken to reach the preferred option.

Figure 7-1: Options and MCA Development Process

The effects from the option interventions are assessed using a seven-point effects scale (-3 to +3 as shown below), with the key risks also identified. The individual ratings are available in Table 7-3 below.

Table 7-3: MCA Seven Point Effects Scale (Source: NZTA Multi-Criteria Analysis User Guidance[7])

Magnitude	Definition	Score
Large positive (+ve)	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.	3
Moderate positive (+ve)	Moderate positive impact, possibly of short-, medium- or long-term duration. Positive impacts may be in terms of new opportunities and outcomes of enhancement or improvement.	2
Slight positive (+ve)	Minimal positive impact, possibly only lasting over the short term. May be confined to a limited area.	1
Neutral	Neutral – no discernible or predicted positive or negative impact. Counterfactual could be the do-minimum or do-nothing,	0
Slight negative (-ve)	Minimal negative impact, possibly only lasting over the short term, and definitely able to be managed or mitigated. May be confined to a small area.	-1
Moderate negative (-ve)	Moderate negative impact. Impacts may be short-, medium- or long-term and are highly likely to respond to management actions.	-2
Large negative (-ve)	Impacts with serious, long-term and possibly irreversible effect leading to serious damage, degradation or deterioration of the physical, economic, cultural or social environment. Required major rescope of concept, design, location and justification, or requires major commitment to extensive management strategies to mitigate the effect.	-3

In both the longlist stage and shortlist stage, it was agreed with TDC that Environmental and Cultural Impacts will not be assessed as part of this project but will be revisited as the project progresses to the next phases. TDC have plans to undertake iwi / cultural engagement as this project progresses further in the next phases. Environmental and Cultural impacts will still remain in the MCA, with weightings to be confirmed in the next phase.

[7] https://www.nzta.govt.nz/assets/resources/multi-criteria-analysis/multi-criteria-analysis-user-guidance.pdf

8 LONGLIST OPTIONS

A longlist workshop was held on the 22nd of January 2024 and was attended by TDC and the WSP Team. The proposed problems, objectives and longlist options were agreed in the workshop.

The four longlist options are shown in Figure 8-1 below. The longlist option only focuses on the bridge component as Stage 2 looks at changes to the road network once a preferred option is decided. Walking and cycling facilities are also not assessed at the longlist stage as these facilities will be added to the preferred option.

Figure 8-1: Four longlist options and their descriptions (Source: basemap from Taupō District Council's Mapi Services).

8.1 LONGLIST OPTIONS ASSESSMENT

The scores for the longlist options are provided in Table 8-1. The ratings were based on a high-level assessment of the options against the objectives and potential risks, impacts and opportunities. This is because, at the time of the longlist workshop, the Taupō Transport Model had not been updated yet. These ratings were reviewed and agreed by TDC during the longlist workshop and the MCA Follow Up Discussion Meeting.

It was agreed in the MCA Follow Up Discussion Meeting that the financial impacts will not be included in the MCA but will be assessed separately.

8.1.1 MCA DISCUSSION

The Pros and Cons of each option were discussed during the workshop. This has been noted as follows:

- All options provide the opportunity to improve capacity in the north-south direction across the Waikato River
- All options assist with supporting growth and improving the efficiency of the road network, with Option B1 performing better than Options A1, C1 or D1.

- Option B1 scored the best against the 3 project objectives compared to the other options (although for the scoring of Objective "Mode Share on Alternative Transport Uses," Option C1 performs slightly better compared to Option B1).
- Options B1 and C1 improve resilience of the road network by providing an alternative route across the Waikato River.
- Options B1 and C1 scored the worst in terms of "technical complexity" and "consentability" as a new bridge connecting to Ōpepe Street will need a flyover or a long bridge due to the large elevation difference.
- Option C1 scored the best in terms of supporting the project objectives "Mode Share on Alternative Transport Uses" compared to the other options, given that it converts the existing TCG Bridge into an active modes only bridge. However, we note that at this stage, walking and cycling have not been considered, and will be added to the preferred option once finalised. The preferred option will look to implement walking/ cycling facilities for active mode users between the north of Taupō and Taupō CBD and will be designed to standard.
- Options A1 and D1 scored the lowest in terms of land considerations as these options are less likely to require land acquisition compared to Option B1 and Option C1.
- Options A1 and D1 are very similar and as a result, have similar scores against all of the sub-criteria.

Option B1 scored the best overall (retain the existing two lane bridge + new two lane bridge at Ōpepe Street). However, TDC has requested for the inclusion of an additional option in the shortlist, similar to Option B1, which looks at a second bridge crossing landing at Waikato Street near Oruanui Street. This is based on a previous study undertaken that considered a second crossing.

Option C1 scored the worst overall (Rank 4). TDC has noted that Option C1 takes away a functional asset when converting the TCG Bridge into an active modes only bridge and also noted that Option C1 may be susceptible to public backlash if chosen. As a result, Option C1 has been discarded and will not be assessed in the shortlist stage.

8.1.2 SHORTLISTED OPTIONS

At the end of the workshop, four options were agreed and recommended for the shortlist assessment. These were:

- A1 – Four lane bridge at the existing location
- B1 – Retain the existing two lane bridge + new two lane bridge at Ōpepe Street
- B2 – Retain the existing two lane bridge + new two lane bridge at Waikato Street (near Oruanui Street)
- D1 – Three lane bridge at the existing location (tidal flow)

Table 8-1: MCA Scoring – Longlist Options

Criteria		A1 - Four lane bridge at the existing location	B1 - Retain the existing two lane bridge + new two lane bridge at Ōpepe Street	C1 - Convert bridge to pedestrian/ bike access only + new four lane bridge at Ōpepe Street	D1 - Three lane bridge at the existing location (tidal flow)
Criteria	**Sub Criteria**				
Project Objectives	Support Growth to the North of Taupō & Improve Efficiency of the Road Network	2	3	2	2
	Resilience of the Road Network	2	3	2	2
	Mode Share on Alternative Transport Uses	1	1	2	1
Development (Technical Complexity/ Achievability)	Design, Site Characteristics & Constructability	-2	-3	-3	-2
	Consentability	-1	-3	-3	-1
Environmental and Cultural Impacts	Environmental Impacts	TBC	TBC	TBC	TBC
	Cultural Value	TBC	TBC	TBC	TBC
Social and Land Impacts	Social Impacts	1	1	1	1
	Land Considerations	0	-2	-2	0
	Weighted score	8.55	9.9	5.85	8.55
	Rank	2	1	4	2

9 SHORTLIST OPTIONS

A shortlist workshop was held on the 4th of April 2024 and was attended by TDC and the WSP Team.

The four shortlist options can be found in Figure 9-1.

Figure 9-1: Shortlist options and their descriptions (Source: basemap from Taupō District Council's Mapi Services).

9.1 SHORTLIST OPTIONS ASSESSMENT

Table 9-2 provides the scores of the shortlist options. The scores and rating have been updated based on results from the Taupō Model Update, SIDRA Modelling and inputs from specialists. These ratings have been reviewed and agreed by TDC during the shortlist workshop. See Appendix C to E for more details on the Taupō Transport Model results, SIDRA Modelling as well as the detailed MCA assessment.

9.1.1 TAUPŌ TRANSPORT MODEL RESULTS

Figure 9-2 to Figure 9-7 shows the predicted network performance based on the LoS for all four shortlist options in the year 2033 and 2053+ (Full Development Scenario). For Option A1, it is assumed that there are 4 lanes from Spa Road / Tongariro Street intersection to Norman Smith Street / Wairakei Drive intersection. For Option D1, it is assumed that there will be 3 lanes between Spa Road / Tongariro Street intersection to Norman Smith Street / Wairakei Drive intersection.

In 2033, it was predicted that:

- AM is the worst peak out of the two peaks.
- All options improve the LoS of the Taupō transport network when compared to the existing transport network in 2033 in both AM and PM.
    - In the AM peak, Options A1, B1 and D1 improve the LoS of the TCG Bridge from LoS F to D. Whereas Option B2 performs slightly better improving the TCG Bridge to LoS C.

- In the PM peak, there is less people using the second bridge in Options B1 and B2. This is because the TCG Bridge is the most direct route to Norman Smith Street or Wairakei Drive when travelling from the CBD. For Options A1 and D1, queues and delays appear at Spa Road near the Spa Road / Tongariro Street Roundabout, unlike Options B1 and B2.

- The second bridge under Options B1 and B2 helps with diverting traffic away from the CBD.

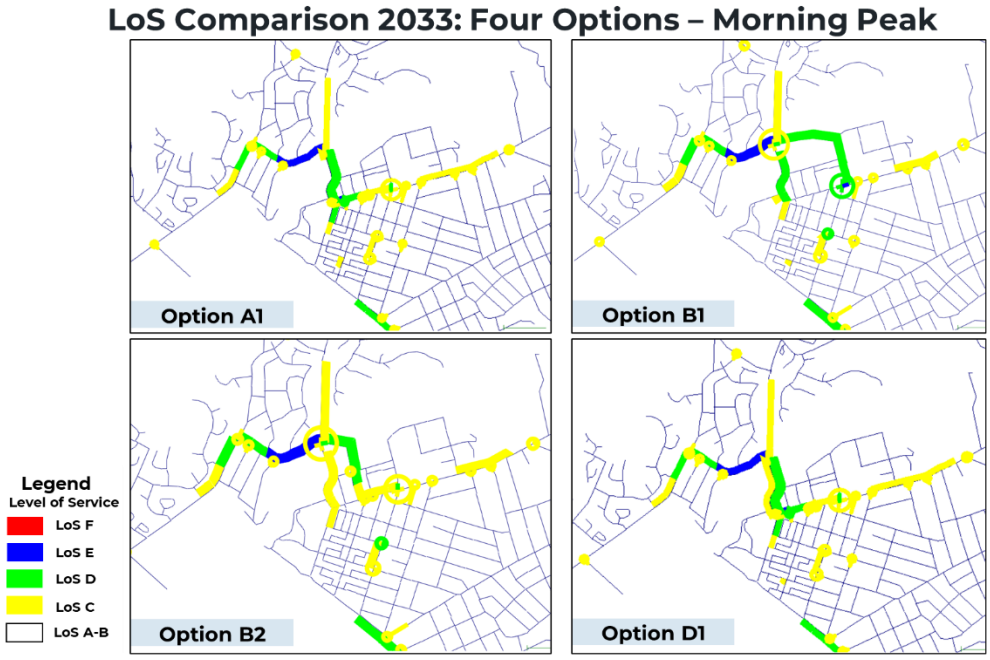


Figure 9-2: LoS maps for the four shortlist options – AM Peak 2033 (Source: Taupō Transport Model).

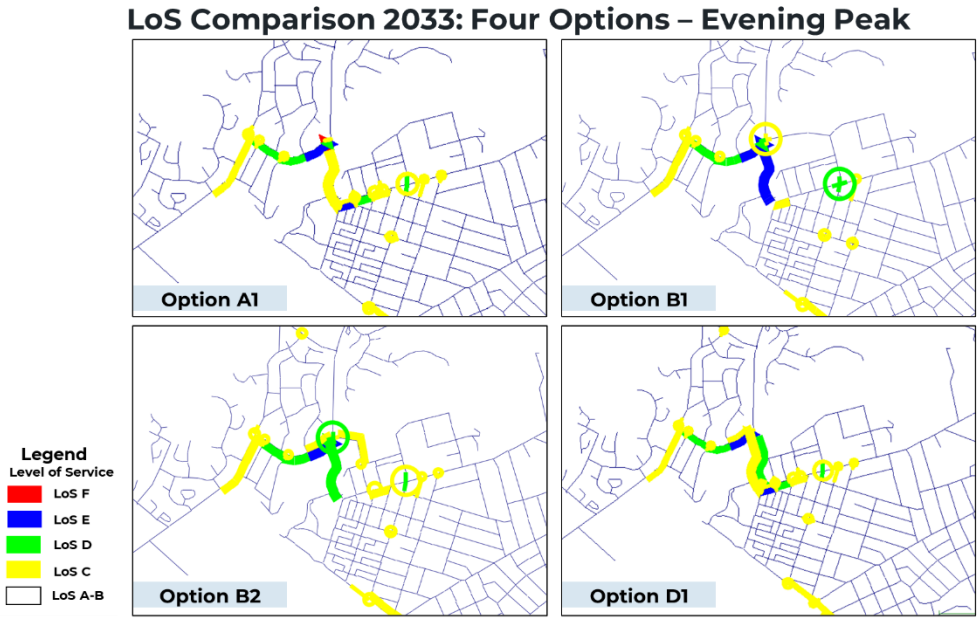


Figure 9-3: LoS maps for the four shortlist options – PM Peak 2033 (Source: Taupō Transport Model).

		23 Base	33 Base	33 Opt A1	33 Opt B1	33 Opt B2	33 Opt D1
AM	LoS C	3.5	2	3.2	2.6	3.4	3.6
	LoS D	0.5	3.2	4.1	4.1	3.3	4.1
	LoS E	0.5	0.5	0.6	0.5	0.5	0.6
	LoS F	0	0.5	0	0	0	0
PM	LoS C	2.2	2.8	3.5	2.8	3.4	3.9
	LoS D	0.4	2	1.7	1.3	2	2.2
	LoS E	0.4	0.4	0.4	0.7	0.2	0.4
	LoS F	0.1	0.5	0.1	0	0	0
Ranking from Worst to Best based on LoS E and F:				1st	2nd	4th	3rd

Figure 9-4: Lane Kilometres at Given LoS in 2033 (AM and PM) under the four shortlist options – ranking based on LoS E and F only (Source: Taupō Transport Model).

In 2053+ (Full Development Scenario), it was predicted that:

- Due to high levels of anticipated growth in Taupō forecasted in 2053+ (Full Development Scenario), when comparing network performance for all four options against the existing transport network, there is only minor improvements to the overall LoS when compared to the existing transport network in 2053+ (Full Development Scenario). This is shown in Figure 9-7.
- In the AM peak, the TCG Bridge, Norman Smith Street and Acacia Bay Road is predicted to operate at a LoS F under all four options.
- In the PM peak, the TCG Bridge is predicted to operate at a LoS E for Options A1 and D1 whereas for Options B1 and B2, the TCG Bridge is predicted to operate at an LoS F. However, for Options A1 and D1, the LoS issues have been shifted to the Spa Road / Tongariro Street roundabout. Notably, Redoubt St is being used as an alternative route for northbound traffic on Tongariro St in Option A1 and Option D1 due to delays at the Spa Road / Tongariro Street roundabout.
- Options B1 and B2 are predicted to help with alleviating pressure off the existing TCG Bridge for both AM and PM.

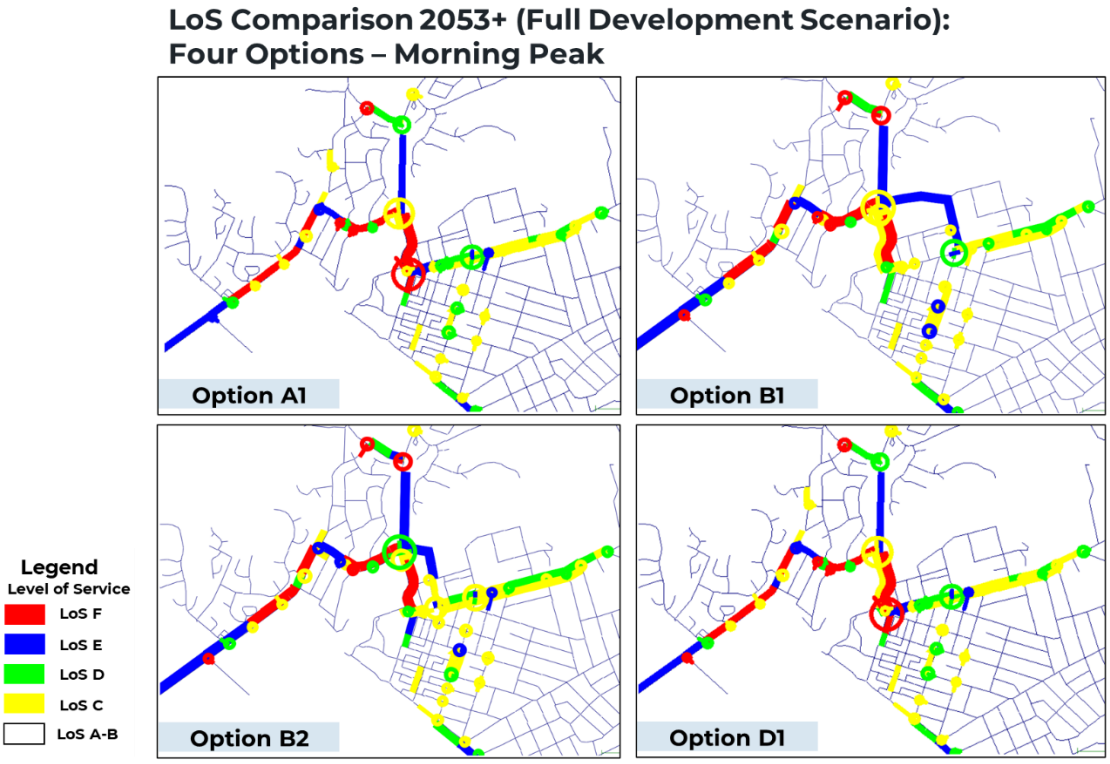


Figure 9-5: LoS maps for the four shortlist options – AM Peak 2053+ (Full Development Scenario) (Source: Taupō Transport Model).

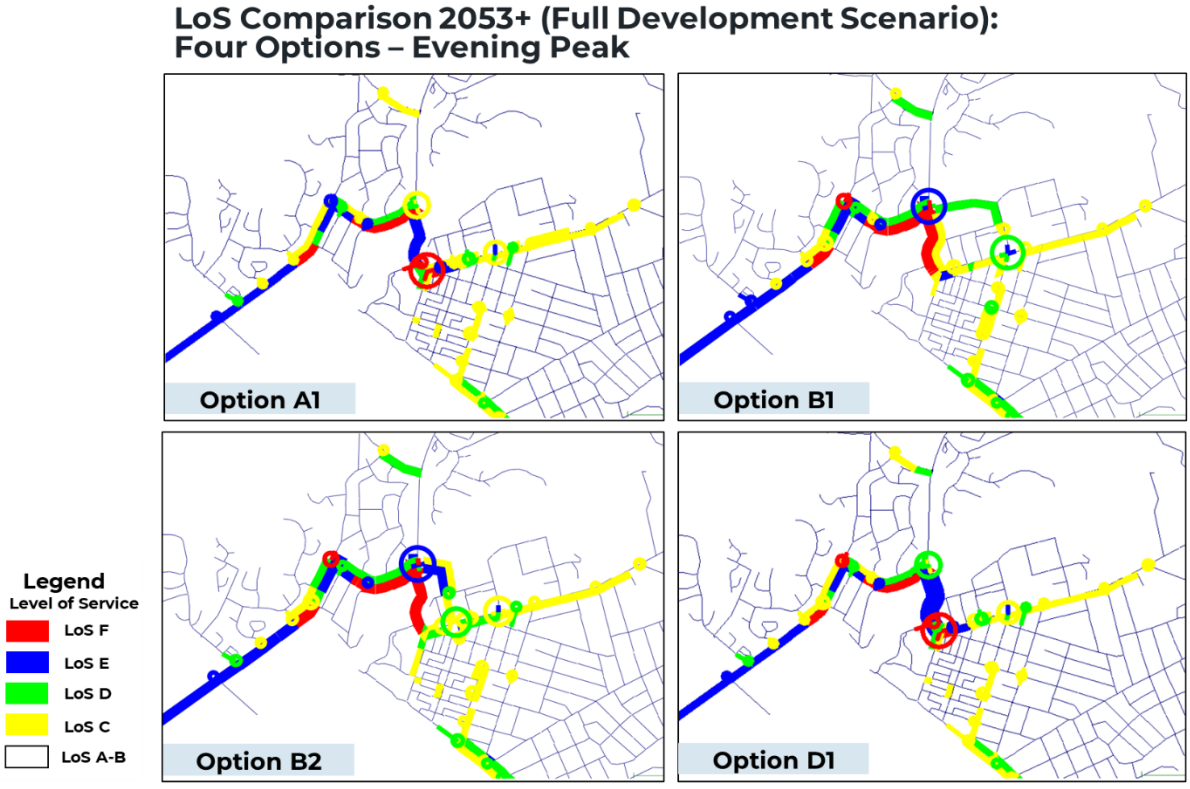


Figure 9-6: LoS maps for the four shortlist options – PM Peak 2053+ (Full Development Scenario) (Source: Taupō Transport Model).

Note: 2053 in this image refers to 2053+ (Full Development Scenario)

		53 Base	53 Opt A1	53 Opt B1	53 Opt B2	53 Opt D1
AM	LoS C	4.8	5.1	5.2	5.3	5.4
	LoS D	3.2	3	3.3	3.5	3.1
	LoS E	4.2	4.3	5.1	4.9	4.3
	LoS F	1.8	2.8	1.7	1.7	2.8
PM	LoS C	6	6.3	5.7	6	5.6
	LoS D	3	3.3	4	3.9	3.3
	LoS E	4.6	4.9	4.4	4.7	5.7
	LoS F	1.4	0.9	1.2	1.2	0.9
Ranking from Worst to Best based on LoS E and F:			**2nd**	**3rd**	**4th**	**1st**

Figure 9-7: Lane Kilometres at Given LoS in 2053+ (Full Development Scenario) (AM and PM) under the four shortlist options – ranking based on LoS E and F only (Source: Taupō Transport Model).

Travel times were analysed to further understand the impacts of the network performance of the four shortlist options. The following routes were analysed to assess the travel time difference for the four shortlist options. They routes use the TCG Bridge and are as follow:

- Travelling from Acacia Bay Road to Tītīraupenga Street in the AM peak, and vice versa in the PM peak
- Travelling from Huka Falls Road to Tongariro Street in the AM peak, and vice versa in the PM peak.

These results are shown in Figure 9-8 and Figure 9-9. To summarise:

- In 2033, for both AM and PM peak, there is only small improvements to total travel time under all four options when comparing to the base scenario. These improvements are predicted to be roughly 1 to 2 minutes.
- In 2053+ (Full Development Scenario), there are noticeable improvements in terms of total travel time under the four options. Options B1 and B2 are predicted to have the lowest travel time in total (around 14 minutes) in both the AM and PM peak compared to Options A1 and D1 (refer to Figure 9-8 and Figure 9-9). Notably in the PM Peak, for Option A1, there is only a slight improvement in terms of travel (by 1 minute) when travelling in peak direction.

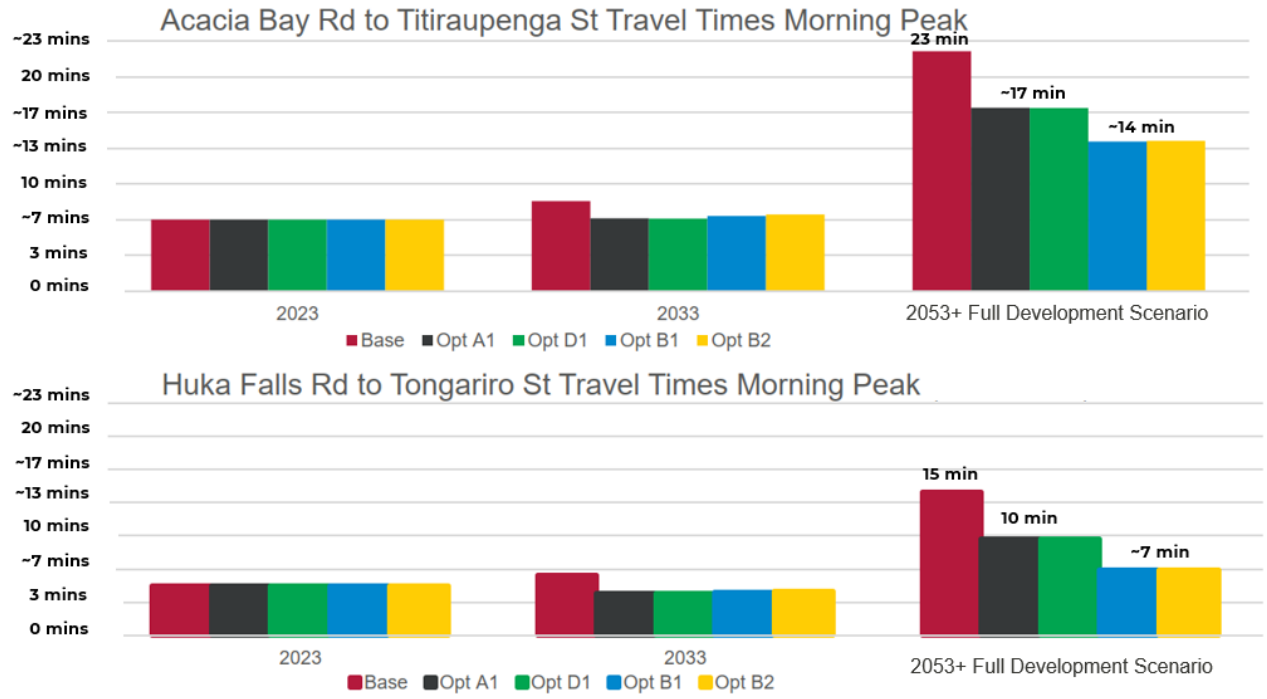


Figure 9-8: Travel Time Graphs – AM Peak (Source: Taupō Transport Model).

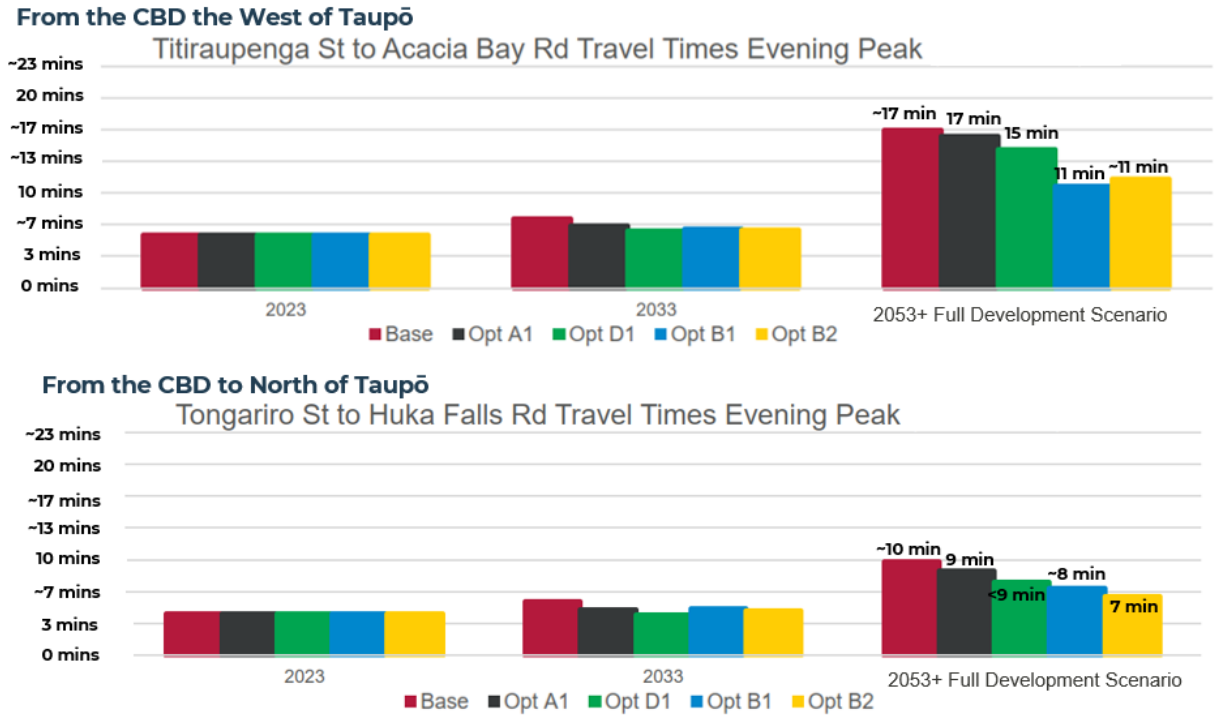


Figure 9-9: Travel Time Graphs – PM Peak

9.1.1.1 SENSITIVITY TESTING

Due to the significant amount of growth anticipated in 2053 and beyond, sensitivity testing was carried out to adjust the growth assumption and total development numbers (Infill and Greenfields) in 2033 and 2053, to reflect a more realistic growth potential in Taupō. Other assumptions included a school in Nukuhau and a shopping centre in the north of Taupō. Refer to Appendix F for more details on the Sensitivity Testing. TDC agreed to only do sensitivity testing for Option B2 as it was clearly the best performing option.

Overall, the sensitivity testing show slight LoS improvements in the network for both 2033 and 2053. However, bottlenecks at Norman Smith Street and Acacia Bay Road are still present. In the PM Peak, the TCG Bridge is expected to operate at a LoS F.

With the school in place, there is a small northbound increase in flow in the morning due to the addition of the school.

Travel times in the AM peak are also expected to improve under Option B2 as shown in Figure 9-10 below:

- Travel times from Acacia Bay to the CBD will now be 10 minutes (previously 14 minutes) in total.
- Travel times from Huka Falls to the CBD will now be 5 minutes (previously 7 minutes) in total.

Another test was carried out to isolate the impacts of the school. Overall, it is predicted to only have minimal impacts in terms reducing the number of people going into the CBD and minimal improvements on travel time as shown by the orange bar in Figure 9-10. This shows that most people in Taupō are most likely heading to the CBD and SH1 for work purposes.

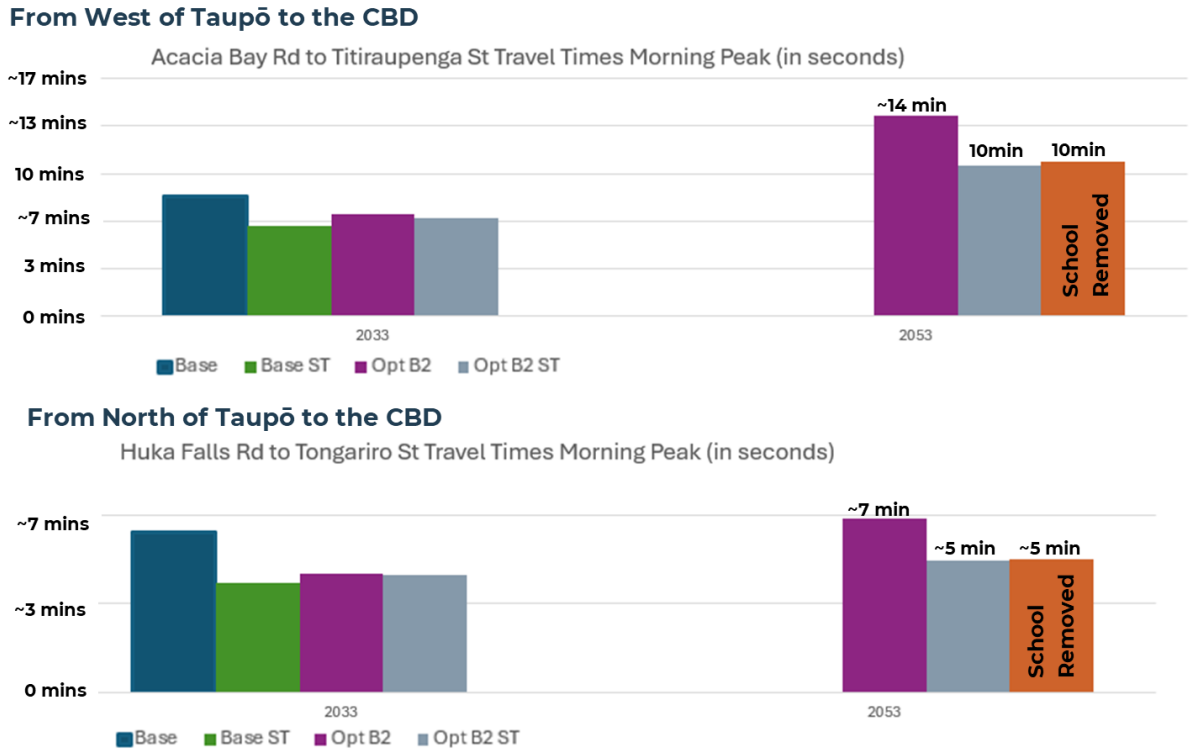


Figure 9-10: Travel Time Graph – Sensitivity Test. Including the removal of the school.

9.1.2 SIDRA MODELLING RESULTS

SIDRAv9 was used to model the impacts of Option A1, B1 and B2 at the 4 intersections outlined in *Section 4.3 Key Intersections*. To see the full results and summary tables, refer to Appendix D.

The key factors to note based on the SIDRA results are:

- For the Norman Smith Street / Wairakei Drive Intersection, this intersection is predicated to perform slightly worse under Options B1 and B2 compared to Option A1. This is because the second bridge connects to this intersection, inducing more traffic at this location. Average delay times are expected to be around 15 to 16 minutes in the AM peak, and approximately 7 minutes in the PM peak in 2053+ (Full Development Scenario), whereas average delay times for Option A1 is expected to be 8 minutes in the AM Peak and 2 minutes in the PM Peak.
- For the Spa Road / Tongariro Street intersection, there are no significant performance issues under the 3 options in 2033 for both peak periods (LoS is expected to be A/B, except for in the PM peak (LoS D) under Option A1). In 2053+ (Full Development Scenario), this intersection is predicted to perform slightly worse under Option A1 compared to Option B1 and B2. PM is the worst performing peak period for this intersection. Under Option A1, in the PM Peak, delays are anticipated to be 4 minutes. This is 1 to 2 minutes higher than Option B1 and B2 in the PM peak.
- For Spa Road / Ōpepe Street / Tītīraupenga Street, under all 3 options, the LoS is predicted to be LoS F in both 2033 and 2053+ (Full Development Scenario). In 2053+ (Full Development Scenario), for both AM and PM peak, average delays for both peak periods is between 4.5 minutes to 10 minutes, with this intersection predicted to perform slightly worse under Option B1 and B2 compared to Option A1.
- There are no significant performance issues for Pāora Hapi Street / Tītīraupenga Street Intersection predicted in 2033 under the 3 options as the east and west approaches are expected to have LoS of A to C. This intersection performs the worst under Option B1 compared to the others in 2053+ (Full Development Scenario), however delays are no more than 1 minute on the west approach.

Overall, Option B1 appears to impact the 4 intersections the most compared to the other options, followed by Option B2. This is likely the case due to the introduction of the second bridge which changes the form of the intersection at Norman Smith Street / Wairakei Drive Intersection and induces more traffic at the Spa Road / Ōpepe Street / Tītīraupenga Street Intersection.

These results also show that intersections improvements are necessary as part of this study as the existing intersection forms cannot cope with the induced traffic demand due to the proposed options. Without improvements to the intersection, the LoS issues will shift to the intersections which will become the bottleneck in the transport network. Intersection improvements will be looked at in Stage 2 of this project once the preferred option is confirmed.

9.1.3 MCA DISCUSSION

The rationale behind the MCA scoring was discussed in the workshop. To summarise:

- All four options score positively in terms of supporting growth north of Taupō and improving the efficiency of the Road Network. However, Options B1 and B2 performs better compared to Option A1 and D1. This is because:

- Whilst all four shortlist options improve the LoS of the existing TCG Bridge (from LoS F to LoS C or D) when compared to the base scenario in 2033, Option B2 performs slightly better over the other options in terms of alleviating capacity on the TCG Bridge.
- In 2053+ (Full Development Scenario), due to the high levels of anticipated growth in Taupō, there is widespread LoS issues in the transport network, with the TCG Bridge operating at a LoS F. However, under Options B1 and B2, the second bridge will help with alleviating pressure off the existing TCG bridge.
- For travel times in the AM peak direction heading into the CBD, in 2053+ (Full Development Scenario), Option B1 and B2 perform the best compared to Option A1 and D1. Option B1 and B2 improve travel times by roughly 8 to 9 minutes compared to the base scenario.
- Both Options B1 and B2 will ease delays at the Spa Road / Tongariro Street roundabout and diverts traffic away from the Taupō CBD.

- Options B1 and B2 scored the best in terms of improving the resilience of the road network because it provides an alternative north-south route from the north of Taupō to the CBD.
- Option B1 has the lowest scores in terms of development (technical complexity/ achievability), followed by Option B2. This is because of factors such as:
  - Needing a flyover bridge for the second crossing due to the large elevation difference over the Waikato River which will involve various geotechnical and hydraulic design considerations.
  - Considerations as to whether a pier support can be placed in Waikato River, and if not, this will result in a long span (>100m) structure, making the detailed design significantly more complex.
  - Relocation of numerous powerlines that run across Ōpepe Street and near Oruanui Street
- In terms of social and land impacts, Option B1 and Option B2 scored the lowest, compared to Options A1 and D1. This is because:
  - Options B1 and B2 will require more land compared to Options A1 and D1 due to the second bridge.
  - For Options B1 and B2, there are nearby community facilities north of Waikato Street (near Ōpepe Street and Oruanui Street) such as the Taupō Community Play Group and the Taupō Kids Community, however design considerations can be made to avoid these community facilities. For Options A1 and D1, there are no notable nearby community facilities.
  - There will be community severance impacts in the CBD due to the increase in traffic on Ōpepe Street or on Waikato Street, with the introduction of the new bridge for Options B1 and B2.

Overall, Option B2 (retain the existing two lane bridge + new two lane bridge at Waikato Street) scored the best (Rank 1), with Option D1 scoring the worst (Rank 4). TDC also noted that Option B1 and B2 have significant benefits for Taupō as they both help divert traffic away from the Taupō CBD.

For Option A1, TDC has requested the score for Project Objective 1 to be changed from 2 to 1.5. This is to reflect Option B1 and B2 having a stronger alignment with Project Objective 1 compared to Option A1. This change has been made as reflected in Table 9-2.

9.1.4 FINANCIAL IMPACTS

High level cost estimates were carried out for Option A1, B1 and B2 to get a rough estimate on the costs of the shortlist option. There was no cost estimate done for Option D1 given its similarities to Option A1. Option D1 will likely have a lower cost compared to Option A1. See Appendix G for the Cost Estimation breakdown forms.

Table 9-1 provides the base costs, P50[8] and P95[9] costs of Option A1, B1 and B2 separated by bridge costs and roading costs.

Table 9-1: High level cost estimates for Option A1, B1 and B2 (Base Costs, P50 and P95)

	Base Cost		P50		P95	
	Bridge	Roading	Bridge	Roading	Bridge	Roading
Option A1	$10m - $15m	$15m - $20m	$10m - $15m	$15m - $20m	$15m - $20m	$20m - $25m
Option B1	$35m - $40m	$35m - $40m	$45m - $50m	$45m - $50m	$55m -$60m	$55m -$60m
Option B2	$30m -$35m	$25m -$30m	$40m - $45m	$30m -$35m	$50m - $55m	$40m - $45m

Please note that the high-level cost estimates in the table above do not rely on any design drawings, as no design work has been completed for this project at this stage. Consequently, these cost estimates are very high-level and are derived from a cost-per-kilometre rate for road and bridge construction. It is advised to exercise caution when using these figures.

Figure 9-11 shows the shortlist options ranked from lowest to highest. Option D1 is the least expensive option followed by Option A1, whereas Option B1 is the most expensive option, followed by Option B2.

[8] P50 refers to project estimates at a 50th percentile and includes contingency.

[9] P95 refers to project estimates at a 95th percentile and includes funding risk on top of the P50 estimate.

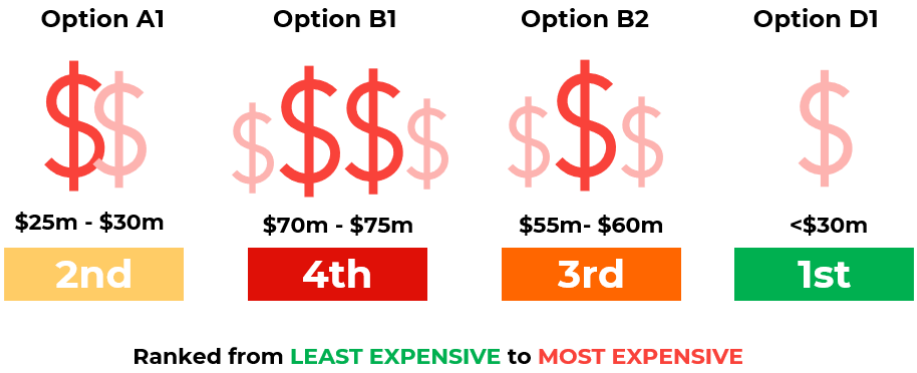


Figure 9-11: Ranking of the shortlist options based on high level cost estimates.

9.1.5 PREFERRED OPTION

It was agreed with the TDC Steering Group in the Shortlist Workshop that Option B2 is the preferred option and will be taken to Stage 2 of the Taupō Northern Access Study.

Table 9-2: MCA Scoring – Shortlist Options

Multi Criteria Analysis		A1 - Four lane bridge at the existing location	B1 - Retain the existing two lane bridge + new two lane bridge at Ōpepe Street	B2 - Retain the existing two lane bridge + new two lane bridge at Waikato Street	D1 - Three lane bridge at the existing location (tidal flow)
Criteria	**Sub Criteria**				
Project Objectives	Support Growth to the North of Taupō & Improve Efficiency of the Road Network	1.5	3	3	1.5
	Resilience of the Road Network	2	3	3	1.5
	Mode Share on Alternative Transport Uses	1	1	1	1
Development (Technical Complexity/ Achievability)	Design, Site Characteristics & Constructability	-1	-3	-2	-1
	Consentability	-1	-3	-3	-1
Environmental and Cultural Impacts	Environmental Impacts				
	Cultural Value				
Social and Land Impacts	Social Impacts	1	-2	-2	1
	Land Considerations	-1	-3	-2	-1
	Weighted score	4.725	5.95	7	4.55
	Rank	3	2	1	4

10 ALTERNATIVE OPTIONS ASSESSED

As part of the optioneering process, TDC had asked WSP to explore a few additional options. These are detailed in the sections below.

10.1 TRAFFIC LANE WIDENING ON THE TCG BRIDGE

TDC had asked WSP to investigate what the implications are on the bridge traffic capacity if the traffic lanes on the TCG bridge were widened by 1 m (both directions) through the removal of the central concrete median. This was to explore an additional (interim) solution to alleviate existing capacity issues on the TCG Bridge, given that the options explored as part of the Northern Access Study (Option B2) could potentially be implemented in a couple of years.

Based on AUSTROADS Guide to Traffic Management Part 3 Transport Study and Analysis Methods, the removal of the central median and widening the road will increase traffic capacity by approximately 5%. Assuming the current bridge capacity is 1600 vehicles per hour (vph) per lane,[10] the potential future traffic lane capacity would be 1680 vph per lane.

This option can be adopted as an interim solution and there is no requirement for a structural assessment to be undertaken, given the loads are expected to remain the same. However, concerns were raised in the shortlist workshop (dated 4th of April 2024) that this option could increase the safety risks as wider lanes could encourage speeding along the bridge, especially during off peak periods.

Guide to Traffic Management Part 3 - *Transport Study and Analysis Methods (Page 81)*	Note that lane width factor is to be applied to adjust the relevant base saturation flow/lane capacity
The lane width factor, w, is as follows: • 0.55 + 0.14w for lane widths between 2.4 and 3.0 m • 1.00 for lane widths between 3.0 and 3.7 m • 0.83 + 0.05w for lane widths between 3.7 and 4.6 m.	▪ 3.4 m traffic lane width - lane width factor = 1 ▪ 4.4 m traffic lane width - lane width factor = 0.83 + 0.05*4.4 = 1.05 i.e. traffic capacity will be increased by 5% with 1 m lane widening

Figure 10-1: Assessment Methodology (Source: AUSTROADS Guide to Traffic Management Part 3 Transport Study and Analysis Methods)

10.2 ADDITIONAL TRAFFIC LANE ON THE TCG BRIDGE - REMOVAL OF CONCRETE BARRIER

TDC has asked the WSP as to whether another lane could be accommodated if the concrete median barrier was removed due to the removal of the control gates.

It was found that another lane could not be accommodated if the concrete barrier was removed due to width of the concrete barrier being about 2.7m – 2.9m (see Figure 10-2). A lane width of 2.7m – 2.9m does not align with the minimum guidance set out in Austroads Guidance Part 3:

[10] Control Gates Bridge Traffic Analysis Note (Abley 2021).

- For urban arterial road widths, a standard lane width of 3.5m is desirable however, where site constraints preclude the use of the desirable standard width, consideration may be given to reducing the traffic lane width to 3.3m.
- For low speed roads with low truck volumes, the recommended lane widths are 3.0 to 3.4m. *The TCG Bridge has an ADT of 28,000 and does not qualify as a low-speed road.*

Additionally, repurposing the footpath and shared path facilities to accommodate for an additional lane is not feasible. This is because the footpath and shared path facilities are constructed as lightweight truss footpaths or clip-on walkways, rendering them unsuitable for vehicular traffic. Consequently, removal of the active modes facilities on the TCG Bridge will disrupt Taupō's existing active modes network, leaving no viable active modes connections across the Waikato River from north of Taupō to the CBD.

Furthermore, it is vital that a structural assessment is carried out to understand the implications of introducing a third lane onto the current TCG Bridge. This is because the TCG Bridge is an old structure, and the introduction of another traffic lane is unlikely to be achievable.

In an event where a third lane is introduced, significant costs will be associated in upgrading the TCG structure to support a third lane and therefore will be challenging given the joint ownership of the bridge.

In addition, as noted in Section 9.1.3, Option D1 (Three lane bridge at the existing location) does not score well against the project objectives as it does not provide the same level of traffic operational benefits and does not improve the resilience of the transport network.

Overall, it is advised that this alternative option is not pursued based on the above.

Left Pedestrian Path	Northbound Traffic Lane	Median	Southbound Traffic Lane	Right Shared Path
~1.5 m	~3.3 to 3.4 m	~2.7 to 2.9 m	~3.3 to 3.4 m	~2.8 m

Figure 10-2: Lane measurements on the existing TCG Bridge

11 PREFERRED OPTION

Option B2 was recommended as the preferred option as illustrated in **Error! Reference source not found.**. This involves retaining the existing two lane bridge and proposing an additional new two lane bridge connecting at Waikato Street near Oruanui Street.

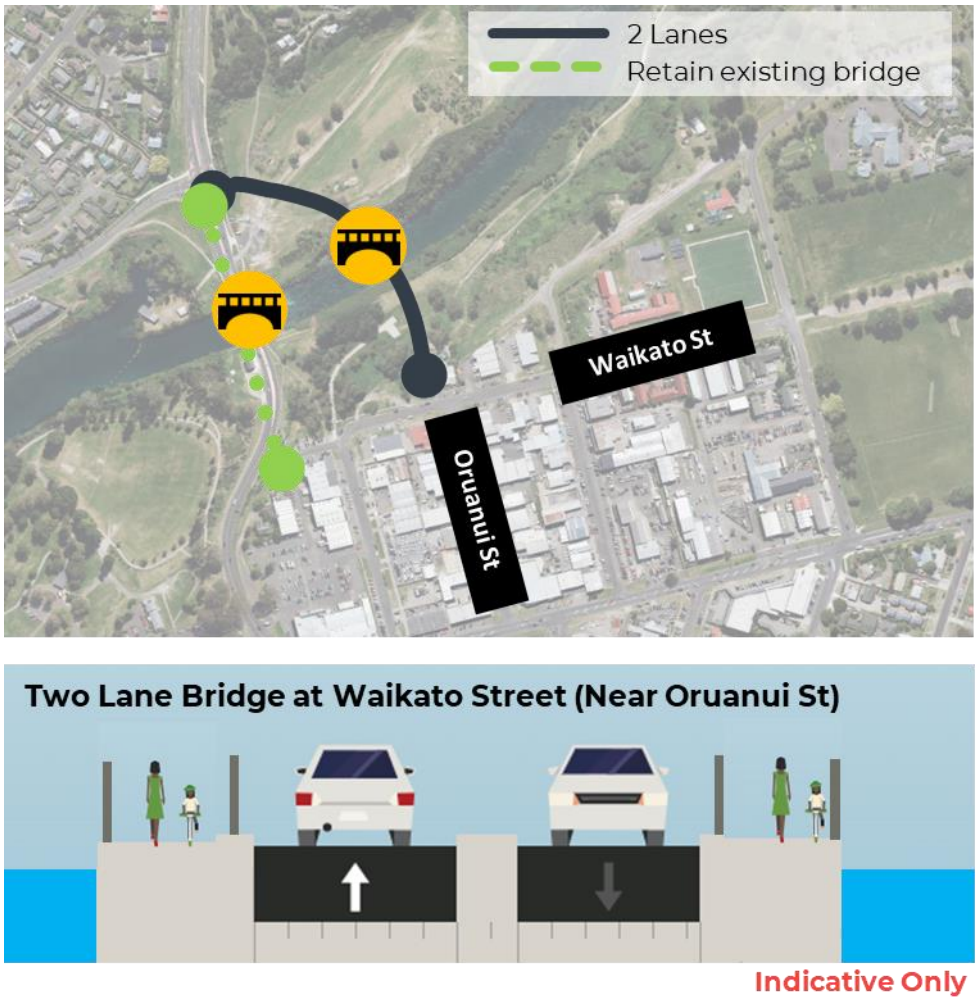


Figure 11-1: Option B2 Map and cross section. (Source: Base Map from basemap from Taupō District Council's Mapi Services; Cross section from Streetmix.net).

The Taupō Transport Model shows that there are noticeable improvements in terms of total travel time for preferred option:

- In 2053+ (Full Development Scenario), for the worst performing peak period (AM Peak) and peak direction (Acacia Bay Road to Taupō CBD), Option B2 is expected to improve travel times from 23 minutes to around 14 minutes.
- In the 2053 Sensitivity Tests which reflects a more realistic growth projection for 2053, for the worst performing peak period (AM Peak) and peak direction (Acacia Bay Road to Taupō CBD), Option B2 is expected to improve total travel times to 10 minutes in total (previously 14 minutes under Option B2 2053+ (Full Development Scenario)).

Overall, the preferred option improves resilience in the transport network by providing an alternative connection over the Waikato River between the CBD and north of Taupō. It supports the anticipated future growth /demand of users traveling to and from the CBD and the north of

Taupō and helps alleviate congestion on the TCG Bridge. Additionally, the second bridge helps with diverting traffic away from the CBD and will improve the overall transport network efficiency which is a desirable outcome for Taupō.

11.1 RECOMMENDATIONS

It is recommended that changes are made to the Taupō roading network and intersections to support the additional second crossing as proposed in Option B2 with walking and cycling facilities. This will be further investigated in Stage 2 of the Taupō Northern Access Study.

As concept designs were not prepared for this project, design development should be progressed at the next phases to confirm the details, assess impacts, and demonstrate engineering and safety compliance.

Environmental and Cultural impacts for Option B2 were not assessed as part of this project. TDC will revisit this and undertake iwi / cultural engagement as the project progresses to the next phases.

These recommendations may be further investigated through a business case. As part of Stage 2 of the Taupō Northern Access Study, a POE document will be prepared to discuss how the activity/potential investment should progress through the Business Case Approach (BCA).

12 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for Taupō District Council ('Client') in relation to Taupō Northern Access Study ('Purpose') and in accordance with the Short Form Agreement with Taupō District Council dated 10 October 2023 ('Agreement'). The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any use or reliance on this Report, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Report by any third party.

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APPENDIX A

TAUPŌ TRANSPORT MODEL FUTURE YEAR REPORT TECHNICAL NOTE PREPARED BY ABLEY

Note: Where it says 2053, this references 2053+ (Full Development Scenario).

APPENDIX B

SIDRA MODEL RESULTS: 2023 BASE, 2033 BASE, 2053 BASE

Note: Where it says 2053, this references 2053+ (Full Development Scenario).

APPENDIX C

TAUPŌ TRANSPORT MODEL: OPTIONS A1 TO D1 RESULTS

Note: Where it says 2053, this references 2053+ (Full Development Scenario).

APPENDIX D

SIDRA MODEL RESULTS: OPTION A1, OPTION B1 AND OPTION B2 (2033 AND 2053)

Note: Where it says 2053, this references 2053+ (Full Development Scenario).

APPENDIX E

DETAILED MCA TABLE

Note: Where it says 2053, this references 2053+ (Full Development Scenario).

APPENDIX F

TAUPŌ TRANSPORT MODEL: SENSITIVITY TESTS

APPENDIX G

HIGH LEVEL COST ESTIMATIONS: OPTION A1, OPTION B1, OPTION B2