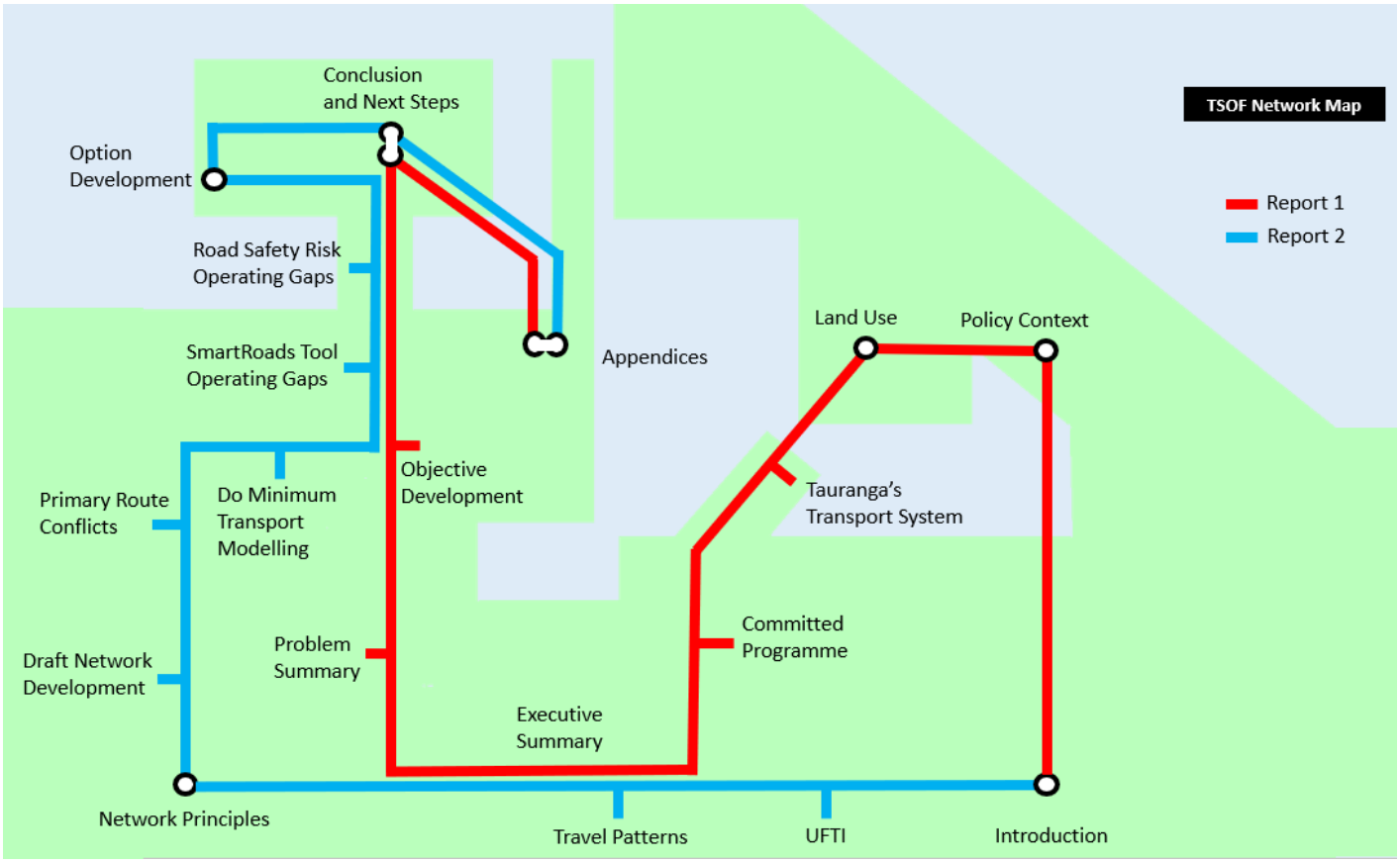
Western BOP Transport System Operating Framework

Report 2: Network Evaluation and Gap Assessment

Prepared for Western BOP TSP Partners

Prepared by Beca Limited

9 October 2020



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Key to the Golden Threads

Look for the icons listed below that highlight the golden threads of key TSP themes followed in this report. The full list of themes can be found in a golden thread table, in the Executive Summary document.

Government Policy Statement for Transport (GPS)

Connected Centres (UFTI)

The four well-beings of social, economic, environmental and cultural.

Revision History

Revision Nº	Prepared By	Description	Date
1	Matthew Kilpatrick	Working Draft for Project Team Workshops	22 May 2020
2	Matthew Kilpatrick, Craig Richards	Draft for TSOF Hold Point 2	9 July 2020
3	Matthew Kilpatrick	Final draft	11 September 2020
4	Tania Hyde	Final	18 September 2020
5	Craig Richards	Incorporated final comments from client	09 October 2020

Executive Summary

This report describes the operating gap and option workshop steps in developing the Transport System Operating Framework (TSOF) for the Western Bay of Plenty (WBOP) Transport System Plan (TSP). The TSP is the framework for delivering the Urban Form and Transport Initiative (UFTI) 'Connected Centres' vision over the next 30 years.

This is Report 2 of 3 for the TSOF where Report 1 (objective setting) and Report 3 (option evaluation) complete the TSOF package.

Figure 1 shows key steps in developing the TSOF. The boxed steps are described in this report.

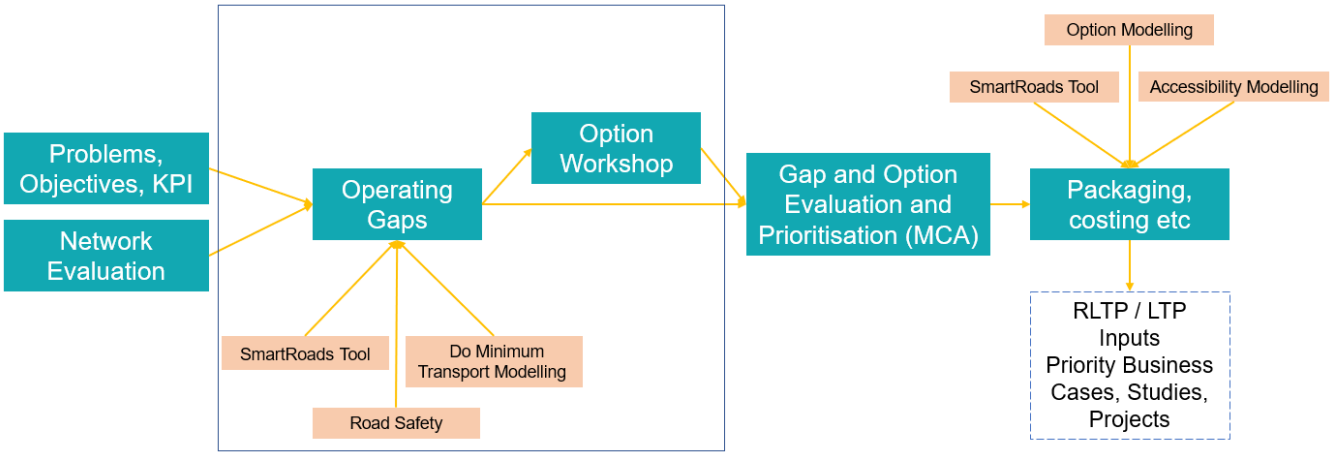


Figure 1: TSOF Methodology Key Steps highlighting Steps Described in this Report

The objectives of this phase in the TSOF development have been to:

- define draft primary and secondary routes for each mode
- identify operating gaps
- draft a long list of options to address the operating gaps.

Primary and Secondary Routes and Pedestrian Activity Centres

Pedestrian activity centres are areas such as the Central Business District (CBD) and town centres where high volumes of pedestrians move around. These areas have a high place function and should provide quality facilities for pedestrians to move and visit. Primary routes are the most significantly important routes for each mode and should provide a high quality of service through direct connections between locations of importance such as the activity centres and large areas of employment. Secondary routes provide local connections to link the primary network routes with local centres, schools, recreation reserves and other community areas.

Primary and secondary routes were drafted based on a set of network principles and background information, including road classifications, travel patterns and relevant projects / studies. A series of workshops were held with the Project Partners[1] (Project Partners) and specialists to review and refine the draft primary and secondary routes.

[1] Tauranga City Council, Bay of Plenty Regional Council, Western Bay of Plenty District Council, Waka Kotahi NZ Transport Agency, KiwiRail, Port of Tauranga

The draft primary routes and pedestrian activity centres are shown in Figure 2 and at a larger scale in **Appendix E**.

Figure 2: Draft Primary Routes and Activity Centres

Mapping the primary and secondary routes shows where two or more modes share the same route, which may result in an undesirable conflict, e.g. cyclists and large mass vehicles such as freight trucks. Mode conflicts can also contribute to a poor level of service (LOS) for users because the current route environment is not maximising an allocation of space to cater for one mode specifically.

Operating Gaps

The option development stage of the TSOF considered options to address operating gaps. Operating gaps exist where the level of service on a primary or secondary route does not achieve the level of service expected for that particular mode / route. A number of tools were used to identify operating gaps:

- The SmartRoads Network Fit Assessment (SmartRoads) tool (a means of defining the location and scale of operating gaps for all modes, based on the existing and anticipated quality of service in each location)
- The Tauranga Transport Model (TTM) 'do minimum' scenario (volumes and level of service information for cars, buses, trucks, cyclists and accessibility maps with only committed improvements assumed in the model)
- Collective and personal road safety risk maps and vulnerable road user crash analysis.

Under the do minimum scenario, in 2028, daily public transport mode share is 1.5% of total trips and 2.5% during the weekday AM peak period. Cycling mode share is 3% daily and 3.6% during the AM peak. These proportions are similar to existing and clearly unacceptable under the TSP project that has an objective to increase travel by public transport, walking and cycling.

Using the SmartRoads tool, transport modelling and safety analysis, approximately 50 significant operating gaps were identified. Significant operating gaps identified include:

- State Highway (SH) 29, SH2 and Hewletts Road level of service operating gaps peak periods
- 15th Avenue / Turret Road level of service operating gap peak periods
- Cameron Road mode conflicts and poor LOS for buses peak periods
- SH29A level of service and safety risk operating gaps
- Safe, attractive and direct primary cycle network operating gaps
- Arataki area poor level of service and accessibility operating gaps
- Otumoetai loop (Chapel, Ngatai, Waihi Roads) conflict between primary bus and cycle routes
- Poor accessibility to the CBD from Welcome Bay and eastern suburbs, in particular
- High safety risk across all modes in the Te Papa Peninsula and Arataki suburbs, in particular.

A full list of significant operating gaps is provided in **Appendix H**.

Draft Option Development

Options to address the operating gaps were considered by the Project Partners and specialists at an option development workshop. Four sub-areas (northern, central, east-west and eastern) were defined to assist this step of the process.

Photos 1: Option Development Workshop Discussions

The workshop process identified around 80 potential projects that could be implemented to address the identified conflicts and operating gaps.

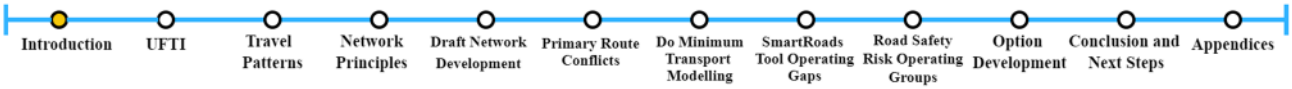
The potential projects and interventions include a broad range of options across the intervention hierarchy; namely integrated planning, demand management, use and adjustment of existing networks and new infrastructure. The full list of these is provided in **Appendix J**.

Next Steps

Operating gaps and options are evaluated in Step 5 of the TSOF process. This involves a multi criteria assessment to prioritise gaps and options, transport modelling of the draft package of options, costing and economics to determine a recommended programme. This is described in the TSOF Report 3 (option evaluation and recommendations).

1 Introduction

This report follows the route set out below. Within the report, yellow dots show the current chapter.



The Western Bay of Plenty Transport Partners[2] (Transport Partners) are leading the development of the TSP in partnership with key stakeholders (Priority One, Iwi, KiwiRail and Port of Tauranga).

The purpose of the TSP is to determine how the Project Partners can translate the Urban Form and Transport Initiative (UFTI) into implementation. UFTI forms the Programme Business Case for transport and land-use in the Western Bay of Plenty sub-region.

The objectives of the TSP are to improve safety and accessibility, increase mode share for public transport, cycling and micro-mobility (E-Scooters / E-Bikes) and maintain freight travel time reliability. A problems and objectives map is provided in **Appendix A**

The first stage of the TSP is to develop a Transport System Operating Framework (TSOF) to guide the development of projects over a 30 year outlook period but with a particular focus on the 0-3, 3-10 and 10-30 year periods. The outcome of the TSOF is an agreed multimodal primary and secondary route network and a recommended programme of improvements to deliver the transport system operating plan.

The recommended programme of improvements will take the form of 'low cost low risk' projects (less than $2m), next stage business cases (SSBC-Lite, SSBC, or DBC), or policy initiatives to support the achievement of the TSP objectives. Improvements can then be used to inform the Waka Kotahi Transport Activity Investment Plan (TAIP) and respective Transport Partner Long Term Plans and the Regional Land Transport Plan.

This report has been prepared during the gap identification and option development stage of the TSOF development, see Figure 3. This report should be read in conjunction with the TSOF Background and Objective Setting report.

TSOF Step	Objective	We are here
1	Establish context and set strategic objectives	
2	Define network attributes and key performance indicators	
3	Identify priority networks and places	
4	Identify network gaps and develop options	★
5	Evaluate options and determine recommended programme	

Figure 3: Basic Outline of TSOF Process

[2] Tauranga City Council, Waka Kotahi NZ Transport Agency, Bay of Plenty Regional Council and Western Bay of Plenty District Council.

Purpose and outline

The purpose of this step was to define the priority routes and activity centres for each mode and identify operating gaps that will need to be addressed through option development.

Operating gaps are identified through analysis in the SmartRoads tool, do minimum transport modelling and safety risk analysis. Operating gaps show the difference between the existing and the desired quality of service for a primary or secondary route, by mode and time of day.

An optioneering workshop was held with the Project Partners and specialists to identify potential interventions to mitigate the identified operating gaps.

Option evaluation in TSOF Step 5 will evaluate and assess the interventions leading to a prioritised programme of studies, projects and business cases.

UFTI states that we cannot afford or have the space to build a transport system to cater for the future demands. The focus must be on optimising the existing corridors and capacity within them. To align with the UFTI recommendation there are a number of ways to optimise the network, as described below.

The overarching priority for the early phases (0-3 years) of the TSOF is optimisation of the system to 'flatten the curve' by reducing the volume of traffic using roads in peak periods and increase throughput of the system without building significant additional capacity. The optimisation model considers network management and travel behaviour change before (targeted) capacity creation.

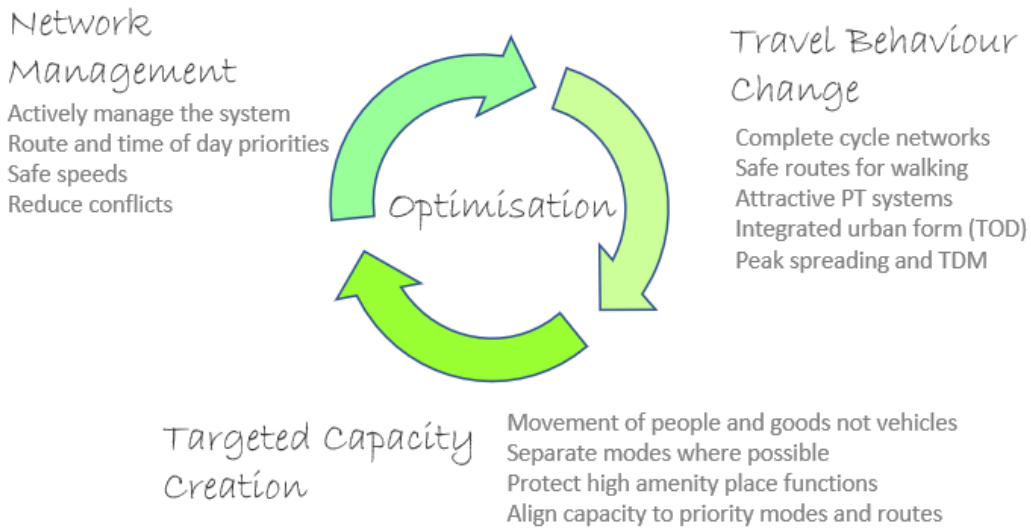


Figure 4: TSOF optimisation model

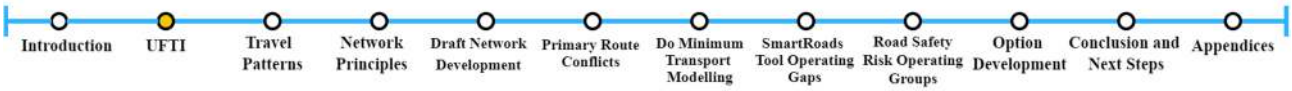
Method for this Step

1. Collation and review of information to inform draft network and place development, including but not limited to:
    - Urban Form and Transport Initiative
    - Tauranga City Council (TCC) Cycle Plan Programme Business Case and route selection work
    - Te Papa Indicative Business Case
    - Te Papa Spatial Framework

- Tauriko Network Plan, Te Tumu Structure Plan and Omokoroa Stage 3 structure plan
- Bay of Plenty Regional Council (BOPRC) PT Blueprint and bus network review work to date
- BOP Regional Public Transport Plan
- NZ Upgrade project information for Takitimu North Link Stage 1 and Takitimu North Link Stage 2
- 2018 Tauranga Network Operating Plan.
- Tauranga City Plan / Proposed Plan Changes (e.g. Plan Change 26): http://econtent.tauranga.govt.nz/data/city_plan/maps/S5/Diagram1.pdf
- Regional Land Transport Plan 2018 (p.30): https://cdn.boprc.govt.nz/media/760427/bay-of-plenty-regional-land-transport-plan-2018-web.pdf

2. Definition of network principles to guide the initial development of draft primary and secondary routes
3. Analysis of origin and destination data from the TTM to understand existing and future travel patterns the route networks need to provide for
4. Development of 'strawperson' primary and secondary routes for each mode for discussion with Project Partners
5. Workshops with the Project Partners and specialists to develop the draft primary and secondary routes for each mode
6. Gap analysis using the SmartRoads tool, TTM and road safety risk maps
7. Optioneering workshop with the Project Partners to discuss possible supply and demand side options to address conflicts and operating gaps
8. Draft long list of possible interventions for testing and assessment in Step 5.

2 UFTI



The UFTI defines the long-term land use and transport vision for the Western Bay of Plenty sub-region, forming the Programme Business Case under which the TSP is delivered. The UFTI final report is a key guiding document for the TSP and is available via the UFTI website (ufti.org.nz).

The UFTI 'Connected Centres' land use and transport programme is based around the concepts of higher density residential neighbourhoods and a multimodal transport system collectively delivering improved accessibility to social and economic opportunities across the sub-region. The multimodal transport system is necessary as "we cannot afford to, nor do we have the space within the sub-region and city, to build roading necessary to cater for the expected future demand"[3].

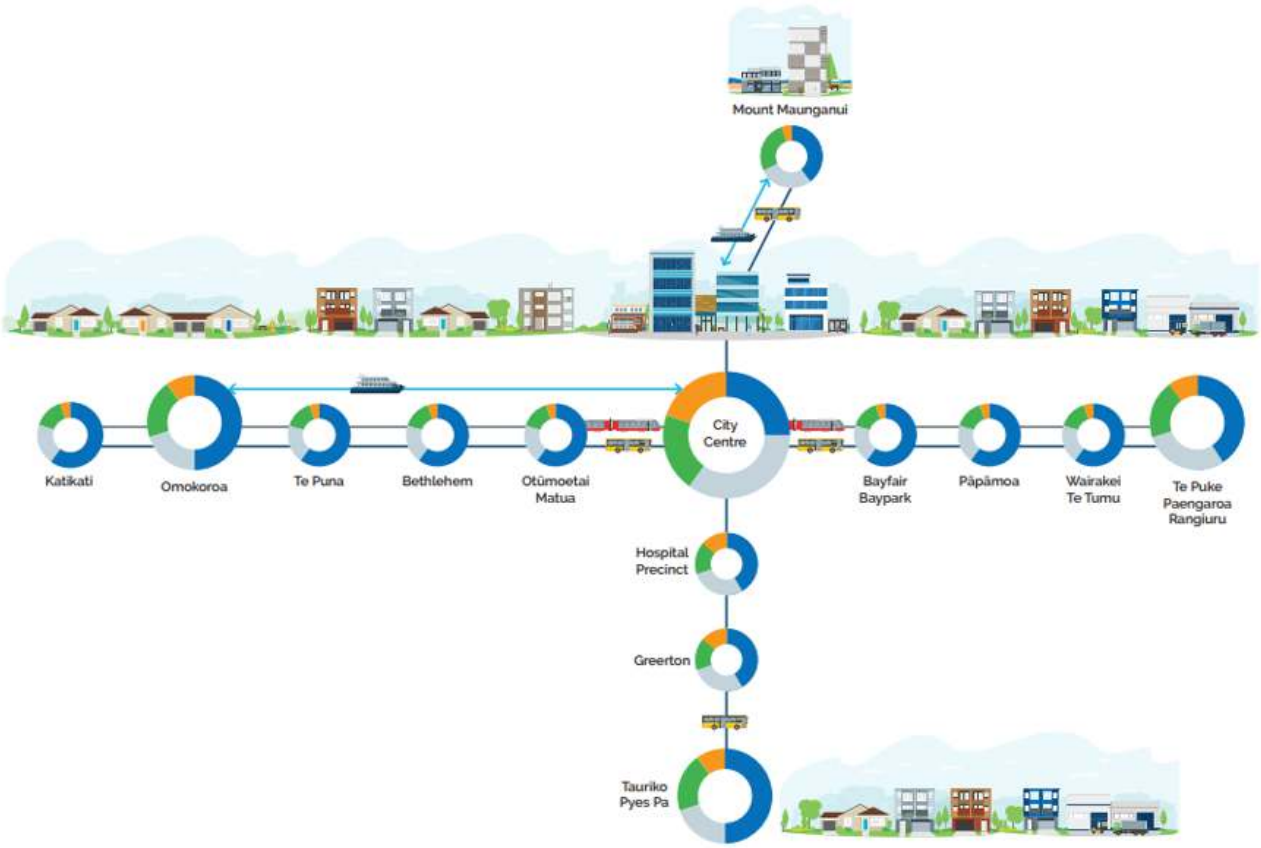


Figure 5: UFTI Connected Centres Concept Diagram

The UFTI strategic transport journeys, Figure 6 below, shows the sub-regional journeys and recommended movement / mode priorities to support the UFTI end state intent. The TSP will build on this work and, through more detailed analysis of conflicts and operating gaps, may recommended changes.

[3] UFTI Final Report

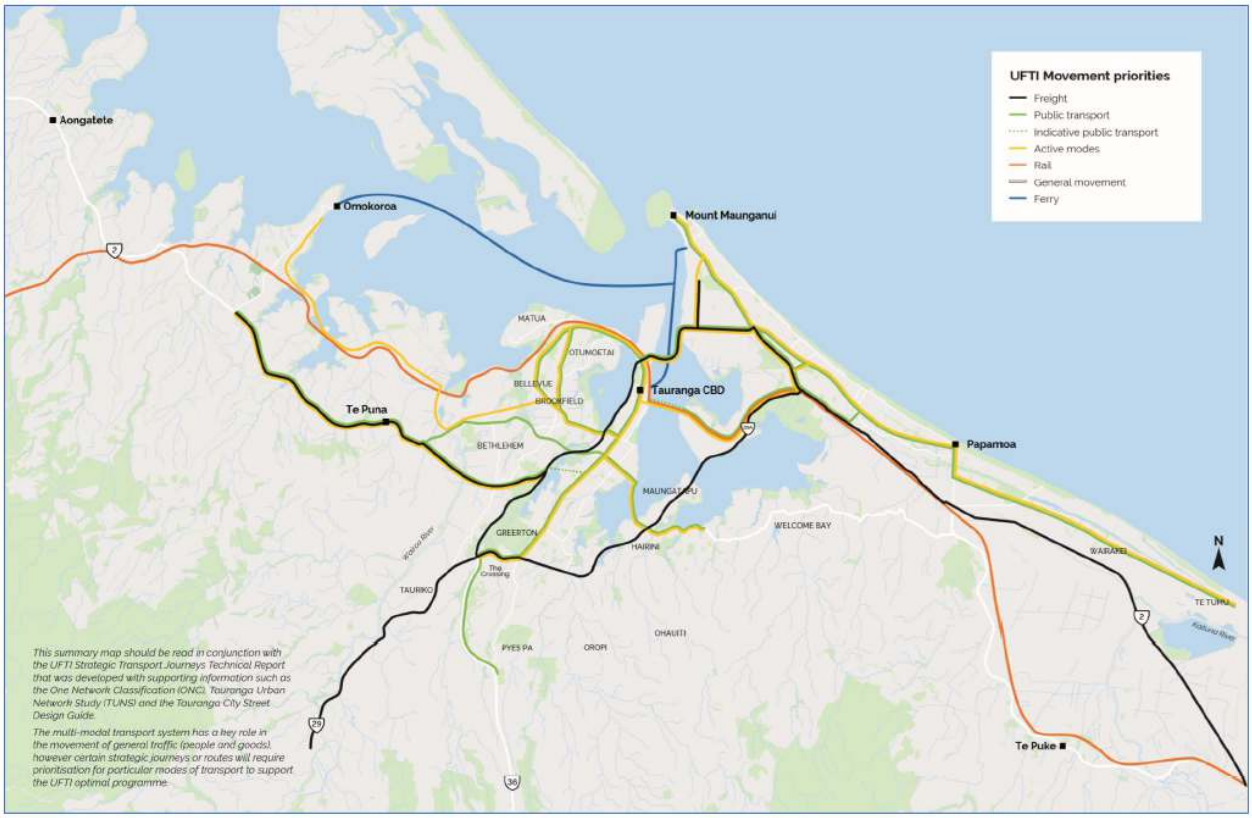


Figure 6: UFTI Strategic Journeys

The TSP considers the UFTI 30-year scenario in detail. In this, the transport modelling undertaken for UFTI includes a number of policy and system assumptions that can inform the TSOF option development, including:

- A network of managed lanes (freight, HOV, Bus) and dedicated bus lanes as well as interchange / park and ride locations as shown in Figure 7
- The TCC major cycleways network is in place by 2048
- Additional bus routes and services are provided
- Increased application of parking cost within the Te Papa Peninsula.

Figure 7: Priority Networks and Interchange in UFTI 30 Year Transport Model Scenario

The UFTI final report defines a series of Packages recommended to deliver the Connected Centres programme. Each package contains a series of key moves with anticipated timing. For example, the UFTI central corridor package includes key moves around completing the Te Papa and Cameron Road business cases, improving Turret Road to support multimodal access and confirming locations of public transport hubs and interchanges. The option development undertaken for the TSOF links directly to each of the UFTI packages and key moves through the TSOF operating gaps. The following diagram provides an example:

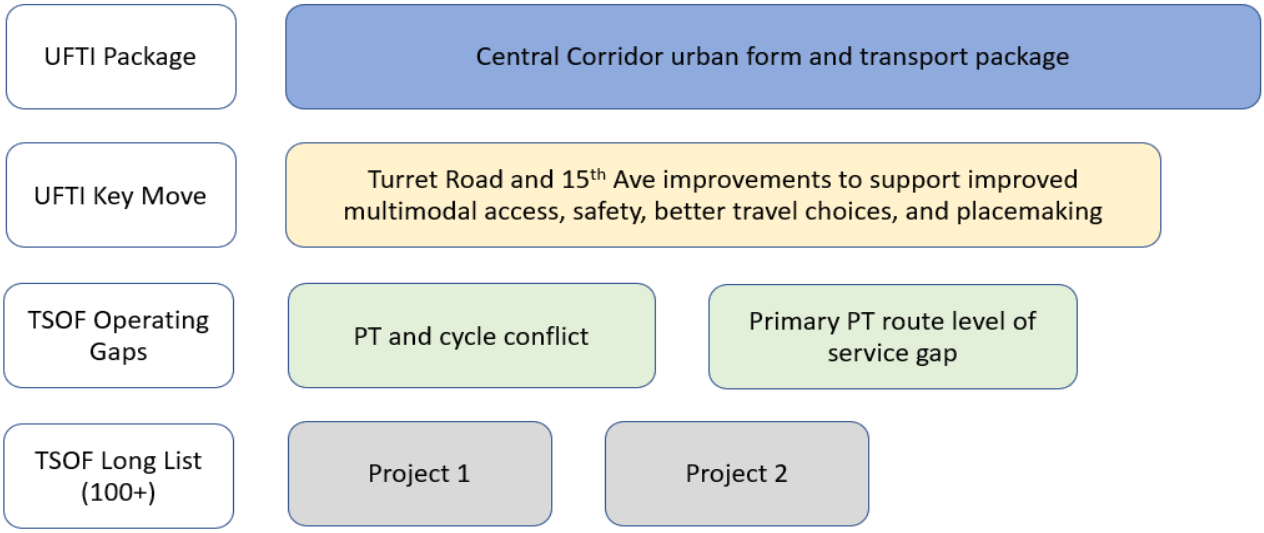
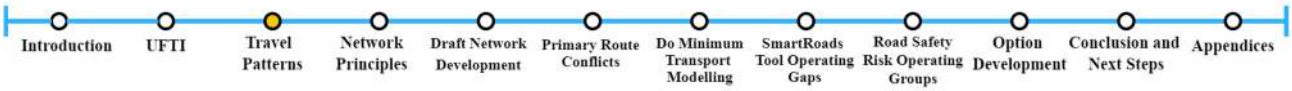


Figure 8: Alignment between UFTI Packages and TSOF Long List Option Development

3 Travel Patterns



Understanding the demand for travel across the sub-region helps to identify the primary routes and checks that the draft routes align with key movements for now and in the future. Connecting key origins and destinations via high quality of service routes provides the best opportunity for successful patronage / use of the proposed routes.

Detailed analysis of origin and destination (O/D) data from the TTM has been undertaken to gain an understanding of movement patterns within the sub-region over time (e.g. based year 2018; 10 year; 20 year and 30-year time periods). This section provides a summary of this analysis and outlines the key findings that inform the route development and review. Further information is provided in **Appendix B**.

3.1 Summary of Findings

Whilst the TTM consists of 34 sub-areas, to simplify the analysis travel patterns between nine broad areas have been considered. Zones within the TTM were grouped into these areas along key transport corridors, e.g. the zones along the SH2 north corridor, and zones with similar land use patterns, e.g. the Te Papa Peninsula.

The nine areas considered in this analysis are shown in Figure 9.

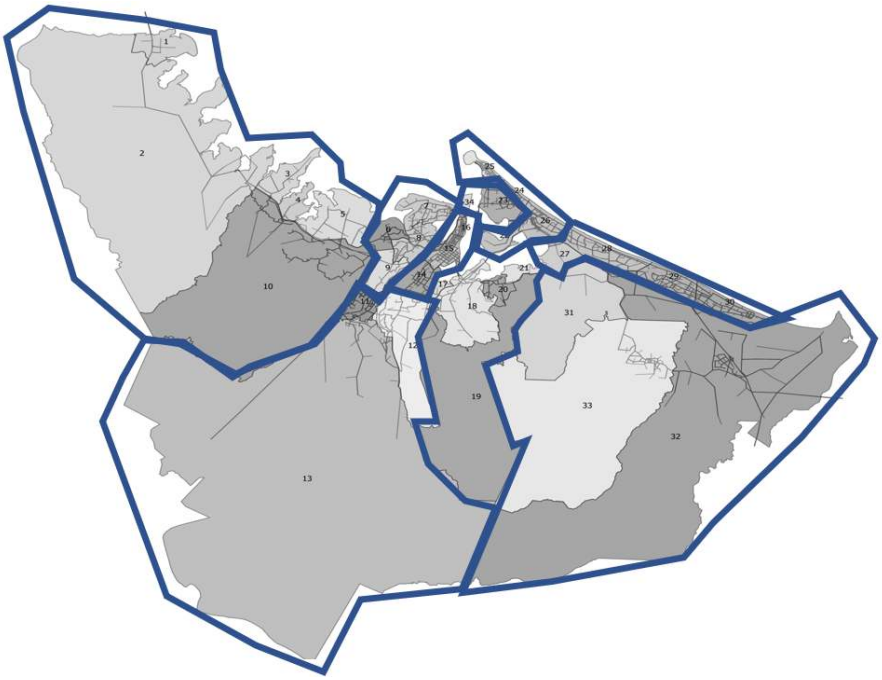


Figure 9: TTM Zones Grouped for Analysis

The following table shows movement patterns between these areas for the 2048 (30 year) scenario. This scenario utilises the UFTI 30-year land use assumptions. The table uses private car trips as an indicator of personal travel demand between origins and destinations. Private car movement data provides the best available indication of personal travel as car trips represent a very high proportion of all trips (circa 90%) and

are not constrained by bus routes, cycle networks etc. The bar charts show the highest destinations (across) for each origin (down).

Table 1: Demand for Travel Between Grouped Transport Model Areas

	Destinations												
Origins	NORTH	OTUMOETAI	SOUTH	CENTRAL	WELCOME BAY	Port/Hewletts	ARATAKI	PAPAMOA	EAST	Total	% of total	Rank	% internal
NORTH	4395	615	637	688	128	232	219	78	143	7134	11%	6	62%
OTUMOETAI	452	3499	937	1685	261	496	501	146	128	8104	13%	4	43%
SOUTH	353	738	4271	1628	460	367	327	173	173	8490	13%	3	50%
CENTRAL	384	1547	1621	5100	703	550	570	215	196	10886	17%	1	47%
WELCOME BAY	102	305	698	952	971	149	340	236	171	3923	6%	8	25%
Port/Hewletts	95	160	239	358	36	731	693	130	141	2583	4%	9	28%
ARATAKI	123	361	312	654	227	1188	3690	934	349	7837	12%	5	47%
PAPAMOA	64	182	291	432	248	566	1531	5661	1298	10273	16%	2	55%
EAST	83	78	178	215	115	250	375	851	2827	4971	8%	7	57%
Total	6051	7485	9185	11712	3147	4529	8245	8424	5425	64202	100%		49%
% of total	9%	12%	14%	18%	5%	7%	13%	13%	8%				
Rank	6	5	2	1	9	8	4	3	7				

Table 1 shows a dispersal of travel demand between areas with no single area attracting or producing more than 18% of all trips. In other words, while the central Te Papa Peninsula area attracts the highest volume of trips, this still only represents 18% of all trips.

Within each of the nine areas, there is a high volume of internal trips (trips with the same origin and destination) - 49% of all trips are internal to these areas. This shows the importance of providing quality local connections for walking and cycling to key local destinations such as employment areas, schools and parks etc (as well as for longer trips), so these trips can be made by sustainable and efficient transport modes. It is notable however that Welcome Bay has much lower internalisation (25% compared to 49% on average). This is possibly due to the lower provision of jobs, schools, and shopping facilities in Welcome Bay.

The central (Te Papa Peninsula) area is the largest producer and receiver of trips (17% of trips produced and 18% received). Following that, the South area and Papamoa area are the second and third highest receivers of trips respectively. Papamoa and Otumoetai are the second and third highest producers of trips respectively.

Somewhat of a pattern is evident in that trips through the northern, central and south / west areas tend to stay in these areas and trips in the eastern areas tend to stay in these areas, as shown in Figure 10.

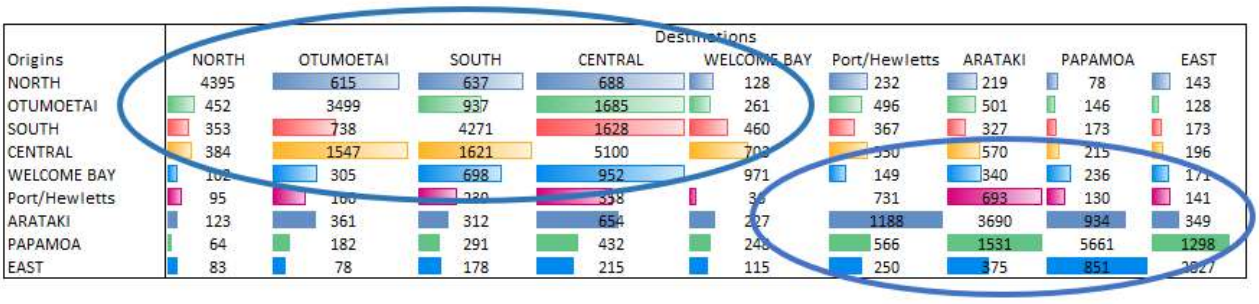


Figure 10: Clusters of Higher Trip Ends Between Areas to the North / South and East

The ten highest movements between the nine areas (internal movements excluded) are shown in Table 2.

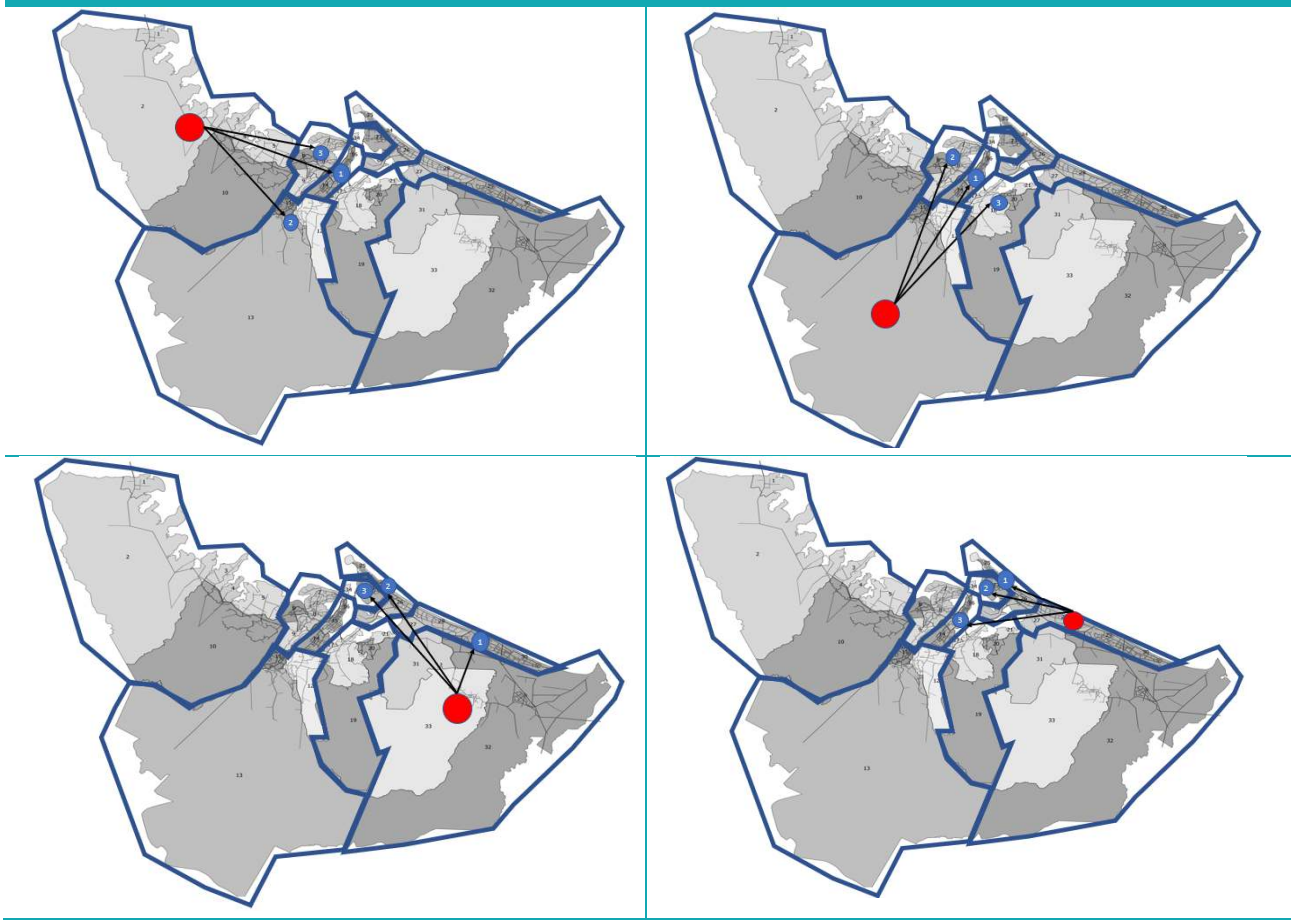
Table 2: Movements Between Areas Ranked from Highest to Lowest Movement with Top 10 Movements Highlighted

	NORTH	OTUMOETAI	SOUTH	CENTRAL	WELCOME BAY	Port/Hewletts	ARATAKI	PAPAMOA	EAST
NORTH		19	18	16	63	45	47	70	59
OTUMOETAI	26		9	1	40	24	23	58	62
SOUTH	33	12		2	25	30	36	53	54
CENTRAL	28	4	3		13	22	20	48	50
WELCOME BAY	66	38	14	8		57	35	44	55
Port/Hewletts	67	56	43	32	72		15	61	60
ARATAKI	64	31	37	17	46	7		10	34
PAPAMOA	71	51	39	27	42	21	5		6
EAST	68	69	52	49	65	41	29	11	

From this, providing for movement along the corridors between Otumoetai – Te Papa, and South – Te Papa should support high volumes of movement. Likewise, providing for movement along the Papamoa corridor, between Mount Maunganui and Te Tumu should support a high volume of trips, as should providing for movement along the Welcome Bay - Te Papa corridor.

Figure 11 shows the top three travel demands for each of the nine areas.

Top Three Movements from Each Area

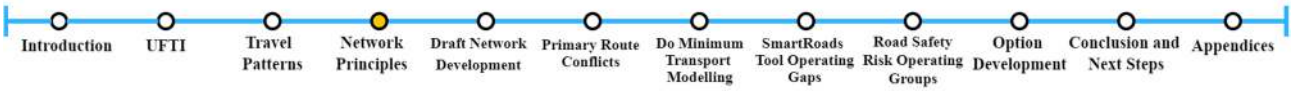


Top Three Movements from Each Area

Figure 11: top three travel demands for each area

Origin / destination movement diagrams for each of the 34 sub-areas within the TTM is provided in **Appendix B**.

4 Network Principles



A set of principles were developed to assist with the drafting of primary and secondary routes for each mode. The principles are mode specific and define what a primary and secondary route should deliver in terms of providing for major movements between key origins and destinations.

The network principles are informed by a range of existing information including:

- The objectives and outcomes described in the TSOF Background and Objective Setting report
- The 2018 Tauranga Network Operating Plan (NOP)
- Relevant mode specific guidelines such as the Christchurch City Council cycleways design guide
- Input from BOPRC bus network specialists and the Regional Land Transport Plan (RLTP)
- Examples from other NOPs in place around New Zealand and Australia.

Table 3: Network Principles

Mode	Route type	Network Principles
Pedestrians/ mobility impaired 	Primary	Provide connections and space for high volumes of pedestrian movement and placemaking within pedestrian activity centres[4].
	Secondary	Provide safe linkages within walking catchments to/from activity centres and other key destinations such as; major employers, libraries, local centres, residential areas, schools, recreation reserves, public transport nodes.
Cycles/ micro-modes[5] 	Primary	Provide safe and reasonably direct connections suitable for less confident cyclists to activity centres, major employers and on routes with high concentrations of school trips. Removed where possible from routes where there are higher volumes of large mass vehicles such as buses and trucks.
	Secondary	Connect primary routes and provide connectivity to key destinations such as; local centres, libraries, residential areas, schools, recreation reserves, public transport nodes.
Public Transport 	Primary	Connect residential areas with activity centres and major employers via direct routes served by frequent bus services e.g. 15min headway or less.
	Secondary	Provide public transport network coverage that connects suburbs with the primary public transport network and with local destinations and services such as; libraries, local centres, schools, recreation reserves.
Freight 	Primary	Provide inter-regional connections and connectivity to major industrial areas/ ports via higher speed direct routes, avoiding land use conflicts.
	Secondary	Provide connections between the primary freight routes and key business areas/freight trip generators.
General Traffic	Primary	Provide for inter-regional and longer distance sub-regional movement. Minimise conflict with adjacent land uses.

[4] For this project, activity centres are defined as the city centre, sub-regional centres and town centres as described in the Tauranga City Plan and Urban Strategy

[5] For this project, micro-modes are defined as small, typically electric, personal powered vehicles such as e-scooters.

Mode	Route type	Network Principles
	Secondary	Provide connections between residential catchments and activity centres and connectivity to primary traffic routes.

Local route types are not shown in Table 3. These comprise of local roads and pathways with relatively low volumes that can be shared by different modes without significant conflicts / risk. These areas may require some improvements, particularly if safety issues are evident, that will be considered in the TSOF. However, they are not included in the priority network optioneering and evaluation specifically due to the lower volumes and conflicts.

Table 4 provides examples of the type of outcomes that would be envisioned on primary routes for each mode. It is recognised that it will not be possible to achieve these desired outcomes for each mode in every location, especially where multiple primary modes share the same route.

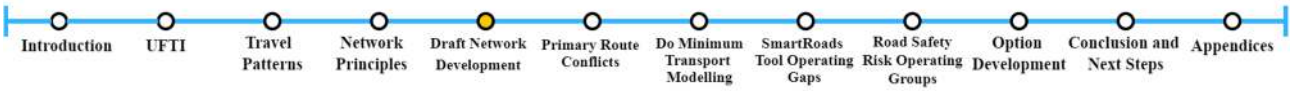
Table 4: Examples of Typical Outcomes Expected on Primary Routes for Different Modes

Mode	Example outcomes for primary routes	
Pedestrians/ mobility impaired	Suitable unobstructed footpaths, quality urban realm, quality CPTED, lighting, signage etc, priority crossings, slow vehicles speeds, below 50km/h (ideally 30km/h) etc.	
Cycles/ micro-modes[6]	Protection/appropriate design for all cycle users, cycle priority at intersections, signage, facilities, e.g. cycle parking at key destinations etc.	
Public Transport	High frequency bus services, bus priority where necessary, quality bus stop facilities (shelter, lighting, real time information etc) and pedestrian connections (paths and crossings) to stops etc.	

[6] For this project, micro-modes are defined as small, typically electric, personal powered vehicles such as e-scooters.

Mode	Example outcomes for primary routes	
Freight	Adequate capacity to support consistent and reliable journey times, safe design features and separated from incompatible modes (e.g. pedestrians, cyclists), priority for through movement at intersections etc.	
General Traffic	Adequate capacity to avoid significant queuing and delay, safe design features, primarily movement function (low/no on street parking and access), safe intersection controls etc.	

5 Draft Network Development



This section of the report describes the initial draft priority routes for each mode within the study area.

At this stage primary and secondary routes for each mode have been developed independently of each other, so that they can be defined without being influenced by possible conflict between modes. Once the routes are defined, gap analysis and option development will consider ways to address conflicts between modes.

5.1 Planned Growth Areas

Tauranga City and Western BoP District Council have been developing structure plans for key urban growth areas over a number of years, and detailed planning and analysis has informed the development of draft transport networks within these areas. UFTI has confirmed these growth area priorities over the next 30 years. This information is used as the basis for defining the draft networks for the TSOF, rather than the TSOF attempting to re-examine these. Current available information on these structure plan areas is provided in **Appendix D**.

5.2 Key Destinations

A map of key destinations (Figure 12) was prepared to inform the primary and secondary route development exercise. Key destinations are locations that regularly generate trips such as employment centres, schools, hospitals, retail areas, parks and reserves and other locations of significance.

These destinations should be connected with high quality transport routes for each mode to ensure they are accessible, and travellers have mode choice. With considerable forecasted growth to occur in the sub-region, the demand for an effective network that links neighbourhoods to these destinations increases. Therefore, it is important to maintain and enhance access to key destinations by all modes to ensure their future viability is secured.

All of the destination and primary and secondary route maps in this report are viewable on the project GIS viewer.

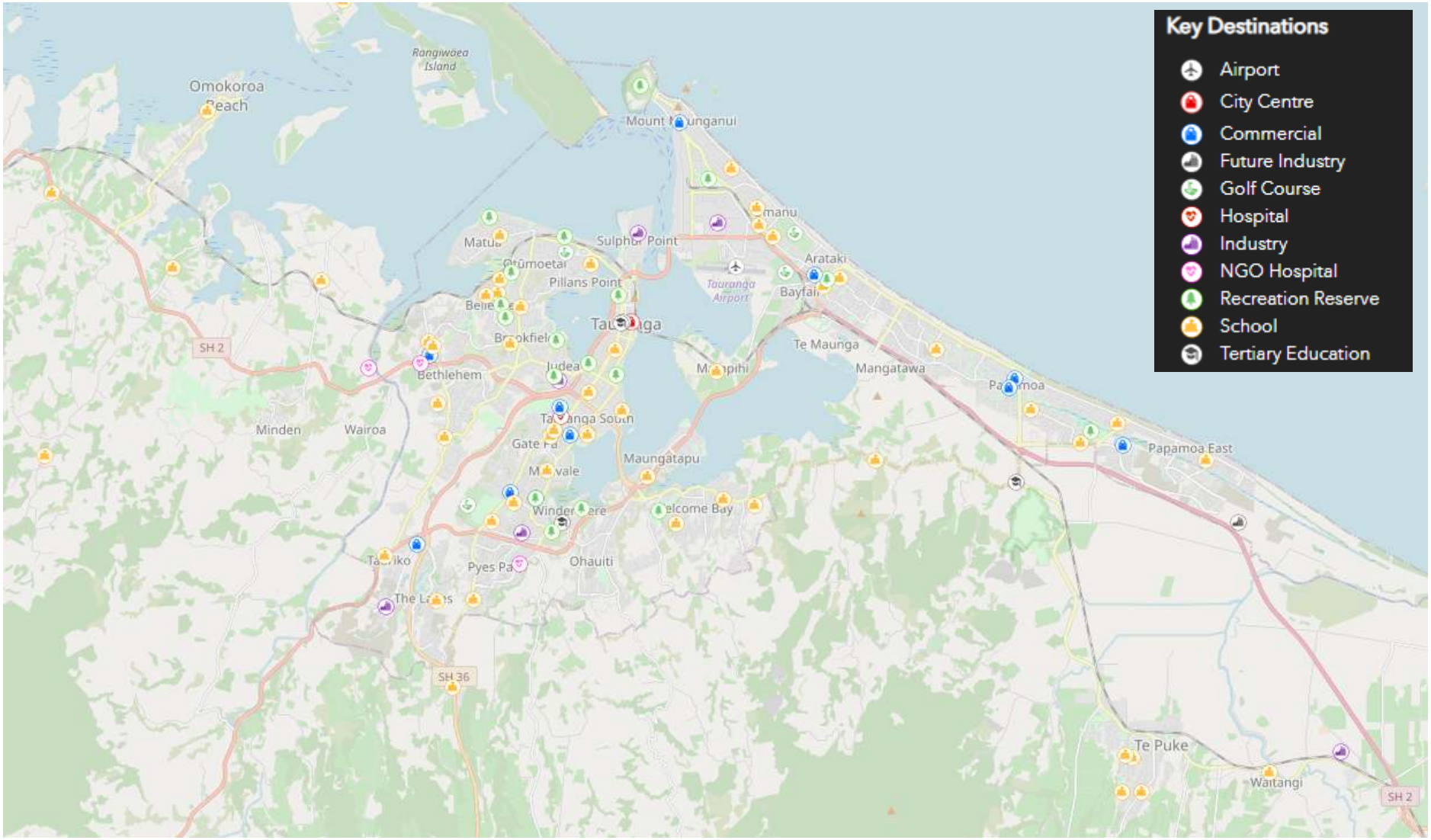


Figure 12: Key Destinations for Network Development

5.3 Pedestrian Activity Centres

The focus of primary network development for pedestrians is to prioritise pedestrian movement in safe and quality environments particularly within, to and from 'activity centres', and to / from key destinations.

Table 5: Pedestrian Network Principles

Mode	Route type	Network Principles
Pedestrians/ mobility impaired 	Primary	Provide connections and space for high volumes of pedestrian movement and placemaking within pedestrian activity centres[7].
	Secondary	Provide safe linkages within walking catchments to/from activity centers and other key destinations such as; major employers, libraries, local centres, residential areas, schools, recreation reserves, public transport nodes.

Activity centres have been defined based on the Tauranga City Plan and Urban Strategy. A 1-kilometre catchment is applied to each to consider a walking time of around 10-12 minutes. These are shown in Figure 13. Primary pedestrian networks are on roads and paths within the activity centres, and secondary networks are within the catchment areas.

[7] For this project, activity centres are defined as the city centre, sub-regional centres and town centres as described in the Tauranga City Plan and Urban Strategy

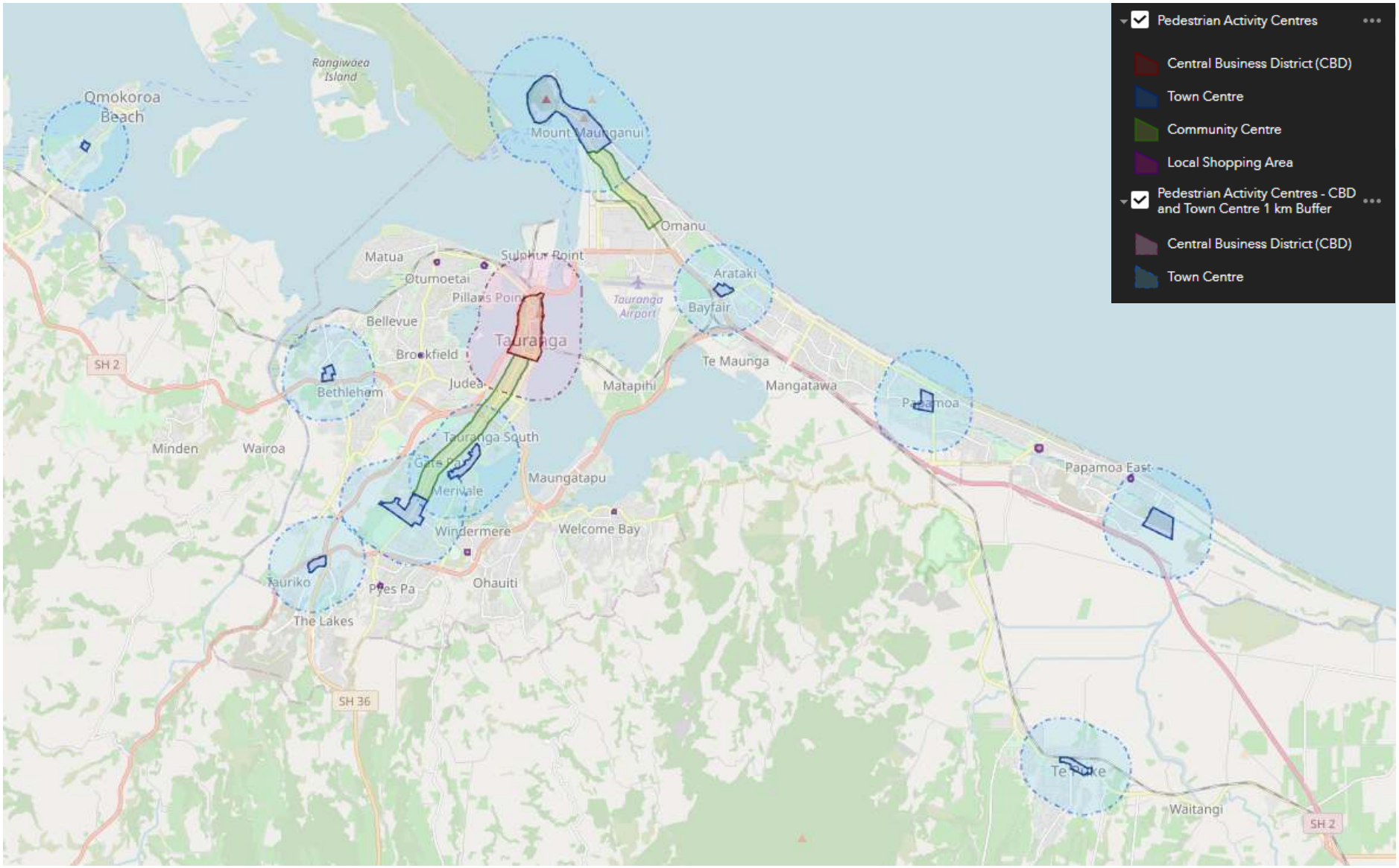


Figure 13: Pedestrian Activity Centres (primary pedestrian) and 1km Buffers (secondary pedestrian)

5.4 Primary and Secondary Routes – Cycling

The proposed primary and secondary routes for cycling reflect work completed to date on the TCC Cycle Plan Programme Business Case and cycle modelling and were revised through a specific workshop with the Project Partners and specialists.

Table 6: Cycle Network Principles

Mode	Route type	Network Principles
Cycles/micro-modes[8] 	Primary	Provide safe and reasonably direct connections suitable for less confident cyclists to activity centres, major employers and on routes with high concentrations of school trips. Removed where possible from routes where there are higher volumes of large mass vehicles such as buses and trucks.
	Secondary	Connect primary routes and provide connectivity to key destinations such as; local centres, libraries, schools, recreation reserves, public transport nodes.

The primary cycle routes, as agreed in draft following the route mapping workshops are displayed in Figure 14 and in **Appendix E**.

These routes deliver an integrated network with variety of routes for both commuter and recreational users. The network provides east and west connections for suburbs using routes outside of the CBD and connectivity with schools to provide children and their families with a safe and convenient route to ride.

The staging and implementation of the secondary cycle network should be considered when the primary network is operational and demand is increasing (unless opportunities arise through other projects). Secondary network investment should be considered as part of the TSOF reviews and funding allocated in the +30 years timeframe.

[8] For this project, micro-modes are defined as small, typically electric, personal powered vehicles such as e-scooters.

Figure 14: Draft Primary and Indicative Secondary Cycle Routes

5.5 Primary and Secondary Routes – Public Transport

The proposed primary and secondary public transport routes have been drafted using the Bay of Plenty Regional Public Transport Plan and other guiding information from BOPRC.

Table 7: Public Transport Network Principles

Mode	Route type	Network Principles
Public Transport 	Primary	Connect residential areas with activity centres and major employers via direct routes served by frequent bus services e.g. 15min headway or less.
	Secondary	Provide public transport network coverage that connects suburbs with the primary public transport network and with local destinations and services such as; libraries, local centres, schools, recreation reserves.

In addition to the network principles for public transport, it is worth considering these three key principles of bus network design from Waka Kotahi[9]

A simple route structure

Simplicity offers two important benefits: it makes the network easier for passengers to understand, and it reduces resource requirements by limiting the number of lines that an operator must provide. Although there are some occasions in weaker markets where multiple lines might operate in a single corridor, creating simple structures generally means using only one line in a corridor.

Stable line and operating patterns

As well as being simple, a network must also be stable. The idea is to provide a consistent, high-quality service across the network all day, rather than operating different service types in peak, off-peak, night and weekend time periods. Where additional services are required to cope with peak demands, this is done by intensifying the basic service frequencies.... Under this model, the addition of express services might be achieved by adding a new 'line' with the same route as the all-stops line, but with a different stopping pattern. The express may be given a name or number that indicates its relationship to the standard line.

Convenient transfers

Easy transferring requires attention to timetables and physical facilities. 'Random' transfers are possible when all lines serving an interchange point operate frequently, generally every 10 minutes (six departures per hour) or better. 'Timed' transfers are needed when services are less frequent, and the timetables for connecting lines must be coordinated…The physical layout of transfer points is also crucial. Short walking distances, clear signage, and protection from the weather and from anti-social behaviour are the key elements (Nielsen 2005, pp100–101).

The following map shows the draft primary and indicative secondary bus routes.

[9] Research Report 396 Public transport network planning: a guide to best practice in NZ cities, NZTA 2010

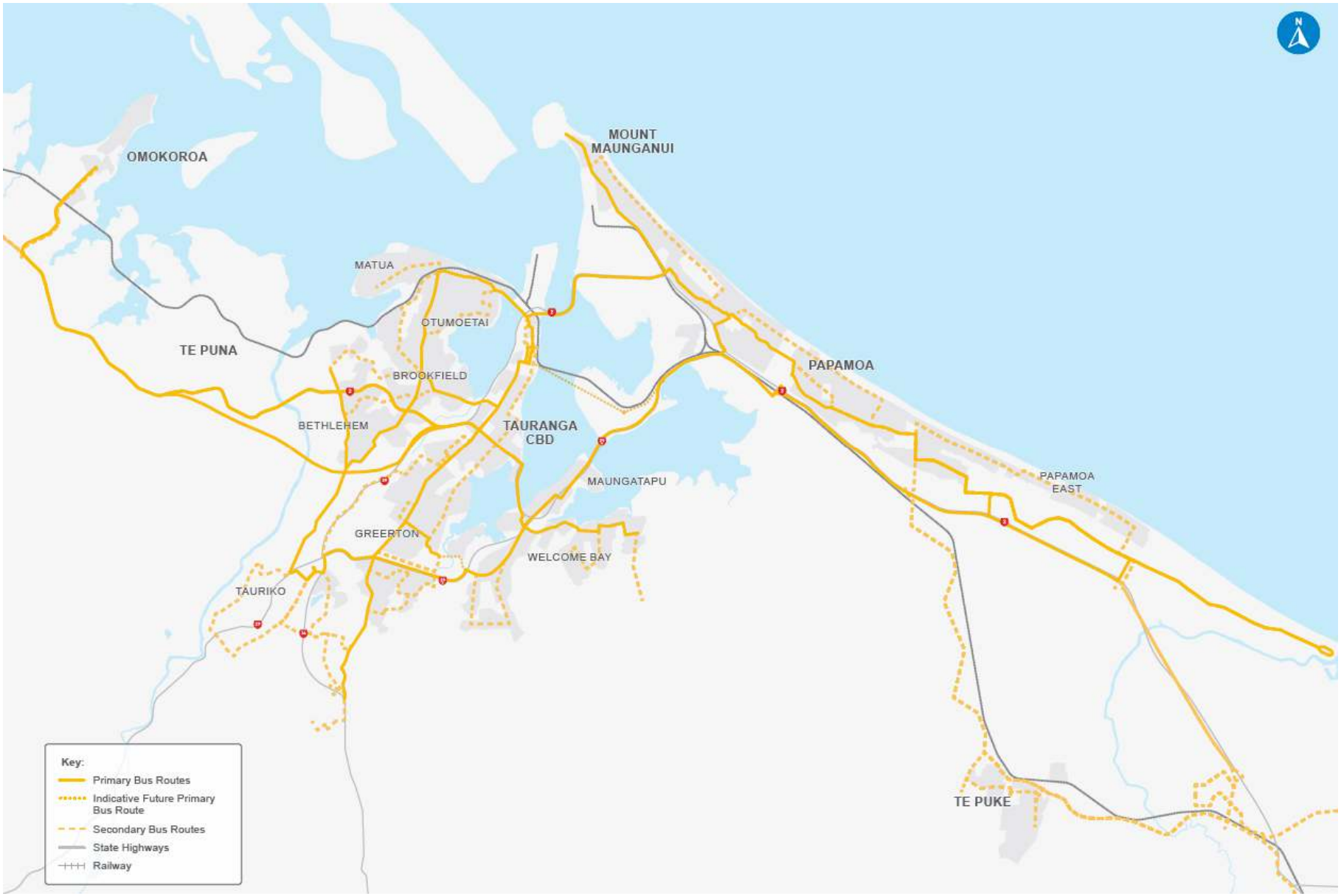


Figure 15: Draft Primary and Indicative Secondary Bus Routes

5.6 Primary and Secondary Routes – Freight

The principles for the freight network are to provide for inter-regional freight movement and avoid activity centres, areas of high pedestrian and cycling demands, crossings etc, but serve businesses.

Table 8: Freight Network Principles

Mode	Route type	Network Principles
Freight	Primary	Provide inter-regional connections and connectivity to major industrial areas/ ports via higher speed direct routes, avoiding land use conflicts.
	Secondary	Provide connections between the primary freight routes and key business areas / freight trip generators.

The following map from UFTI shows the concentration of freight movements in the existing context. The highest volumes (black lines) are observed on SH2 and SH29.

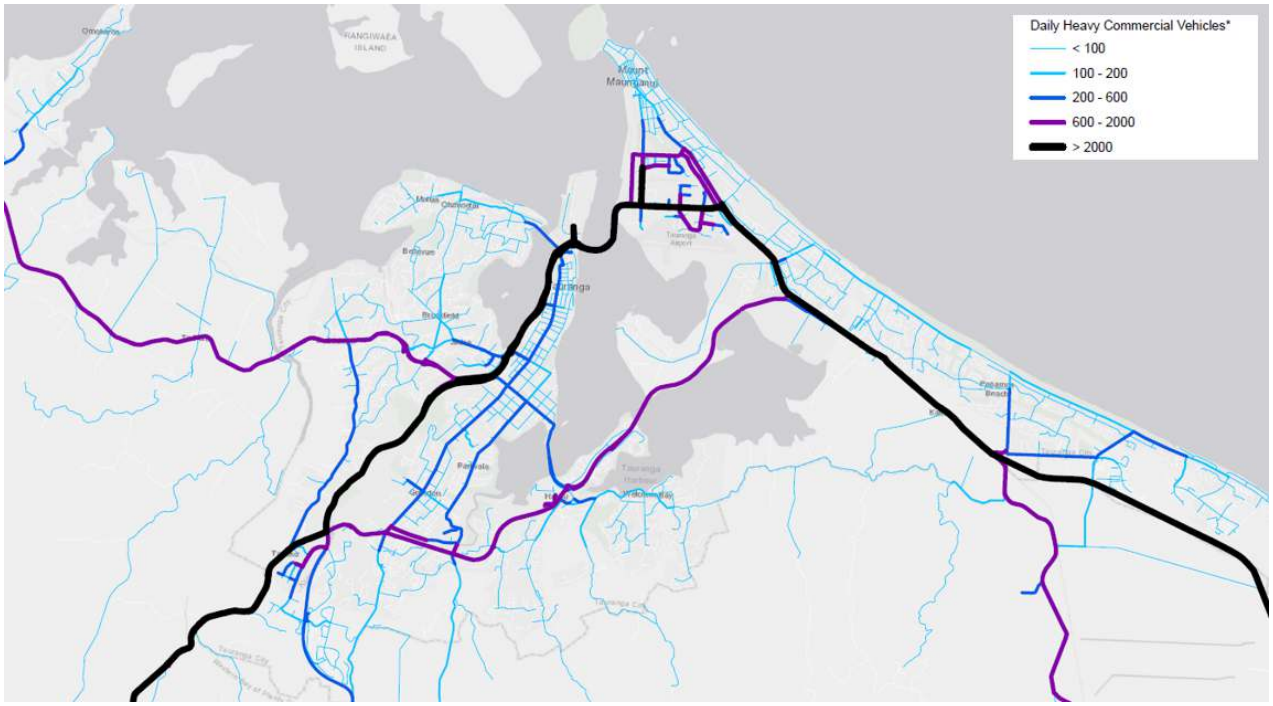


Figure 16: Freight Volume Heat Map (UFTI) – 2019

Figure 16 shows the location of high goods vehicle attraction within the TTM. Areas that generate high goods vehicle movements generally align with the industrial / commercial zoning and include:

- Both sides of the Port
- The Hewletts Road Sub-Area
- Tauriko Business Estate
- Maleme Street Industrial Area
- Judea Industrial Area
- Truman Lane Industrial Area
- Commercial / Industrial Area in Te Tumu
- Fraser Cove, Bayfair and Papamoa Plaza.

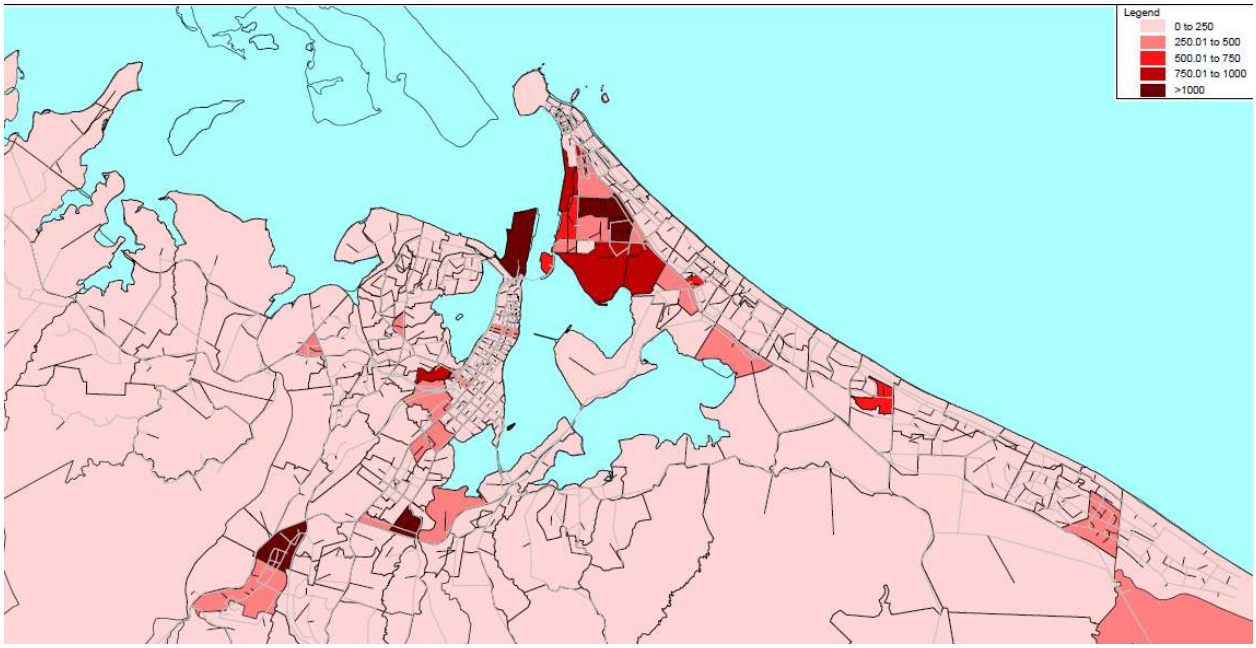


Figure 17: Key Freight Trip Destinations – 2018

Further to this, outputs of an origin / destination freight trip matrix showing the highest volumes of goods vehicles movements to and from transport model zones is provided in **Appendix C.**

The draft primary and secondary freight routes are shown in Figure 17. The freight routes are predominantly on state highways (2, 29 and 29A). Minor use of arterial roads is necessary to link freight on primary routes to major destinations, such as Totara Street. Secondary routes provide access to the key freight generators described above.

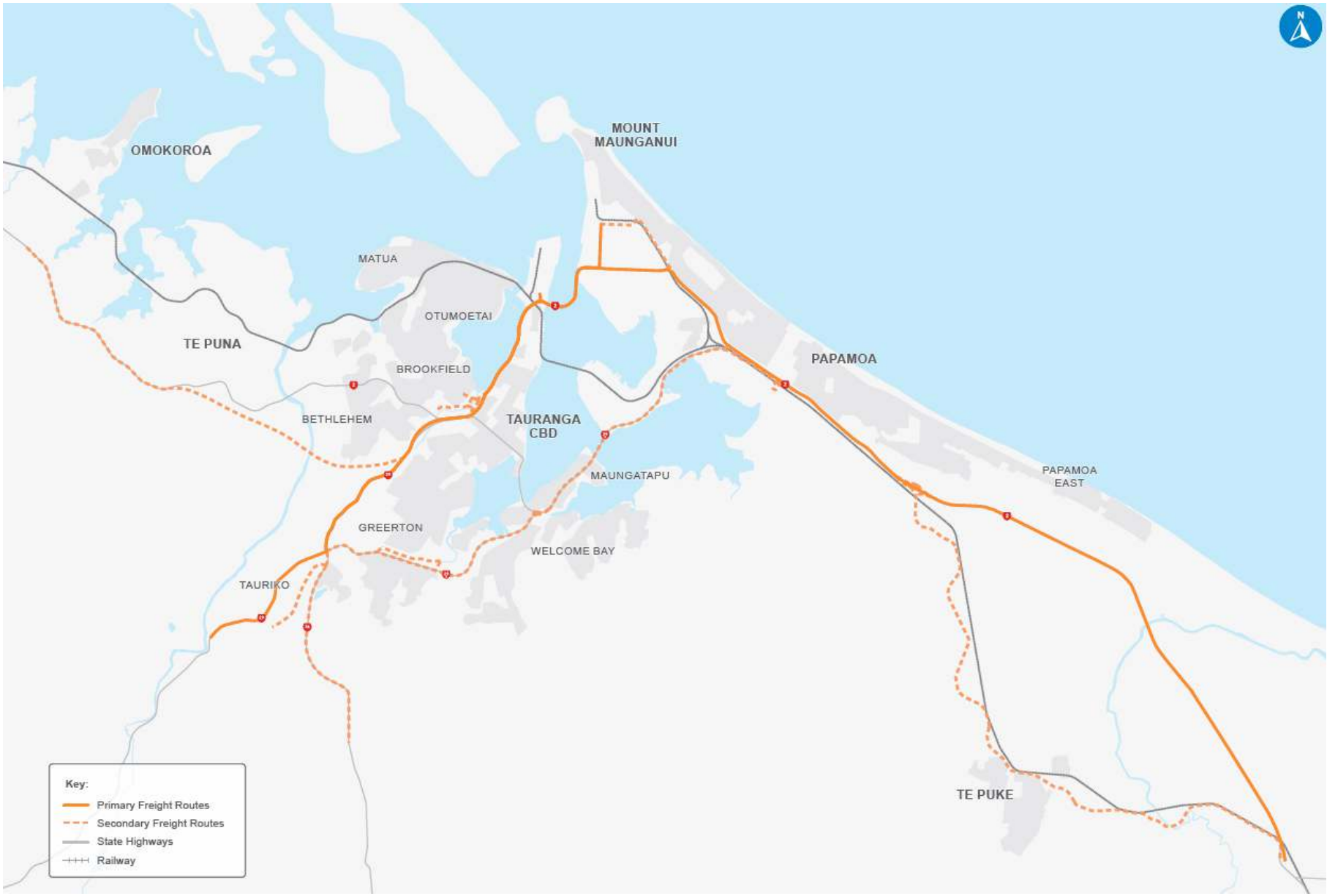


Figure 18: Draft Primary and Indicative Secondary Freight Routes

5.7 Primary and Secondary Routes – General Traffic

The general traffic routes need to provide for trips by car, especially longer distance trips where more efficient alternatives are not available. More efficient alternatives refer to journeys that offer several routes which may offer a more direct and time efficient experience for users.

Table 9: General Traffic Network Principles

Mode	Route type	Network Principles
General Traffic 	Primary	Provide for inter-regional and longer distance sub-regional movement. Minimise conflict with adjacent land uses.
	Secondary	Provide connections between residential catchments and activity centres and connectivity to primary traffic routes.

The draft primary and secondary vehicle traffic routes have been identified using existing information sourced from the Waka Kotahi One Network Road Classification, Tauranga City Council's Tauranga City Plan and the 2018 Tauranga Network Operating Plan.

The current TCC Road Hierarchy[10] is shown in the following map. The state highway and arterial network has been used to define the primary and secondary general traffic routes.

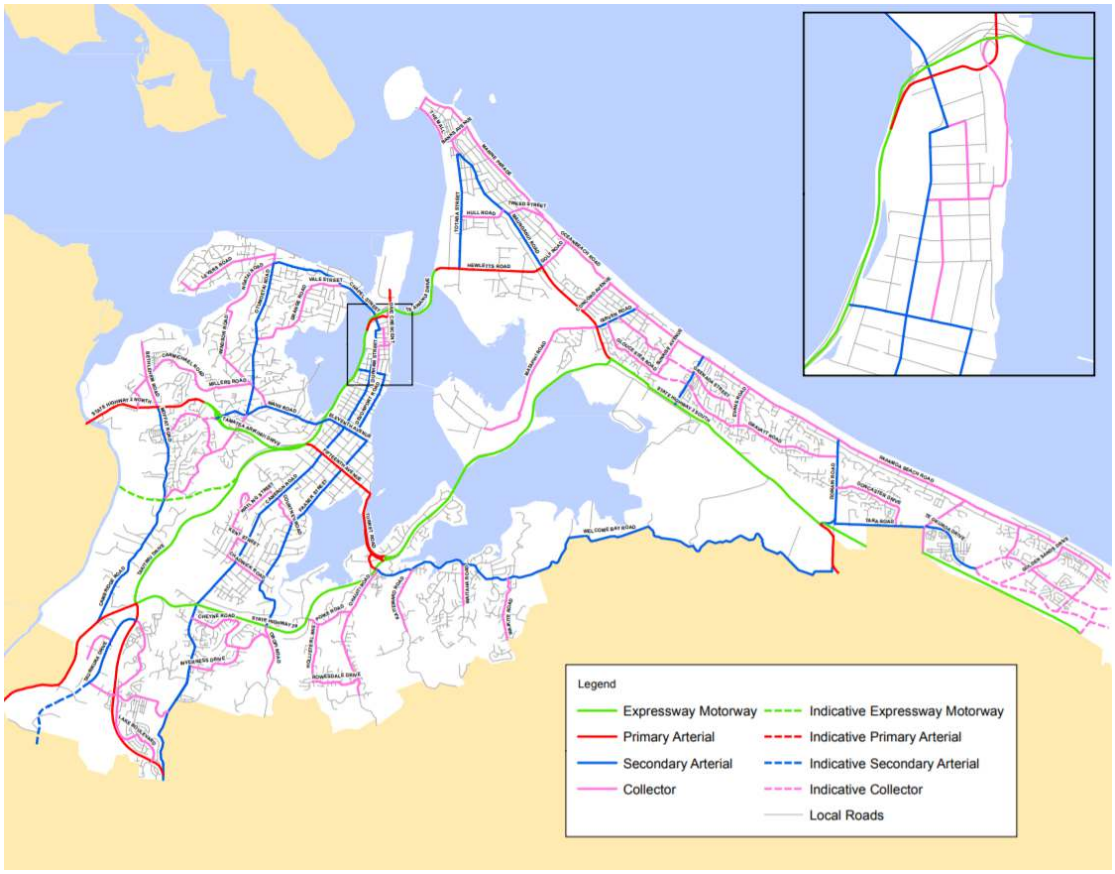


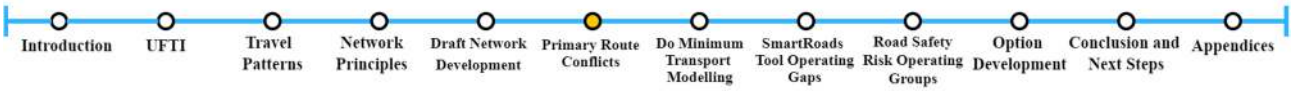
Figure 19: Tauranga City Plan Road Hierarchy

The draft primary and secondary freight routes for general traffic are shown in Figure 19.

[10] Note; the Tauranga City Plan and RLTP are statutory policy documents. Developing a consistent road hierarchy is in the Regional Policy Statement adding further weight to this. The Tauranga City Plan / RLTP may need to be changed as part of the next RLTP / District Plan review if they are inconsistent with UFTI and TSP outcomes.

Figure 20: Draft Primary and Indicative Secondary General Traffic Routes

6 Primary Route Conflicts



This chapter identifies the primary route conflicts arising from the multimodal route mapping exercise described above. Typically, outside of greenfield areas, space available on a route will not be sufficient to adequately provide primary route facilities for multiple modes. It may also not be desirable to plan for modes to share the same primary route if this could create safety issues (cycles and heavy vehicles for example) or result in very wide roads that can be difficult to cross. However, it is also recognised that it will not always be possible to separate modes if there are no suitable alternative routes.

The following maps and lists of route conflicts inform the option development workshop with Project Partners and specialists described later in this report.

6.1 TSOF Sub-Areas

The full TSOF study area was divided into four sub-areas to make it easier to consider conflicts, operating gaps, interventions and to support an efficient option development workshop process. The memo attached in **Appendix F** provides a summary of how and why the sub-areas were defined. Figure 21 shows the sub-areas.

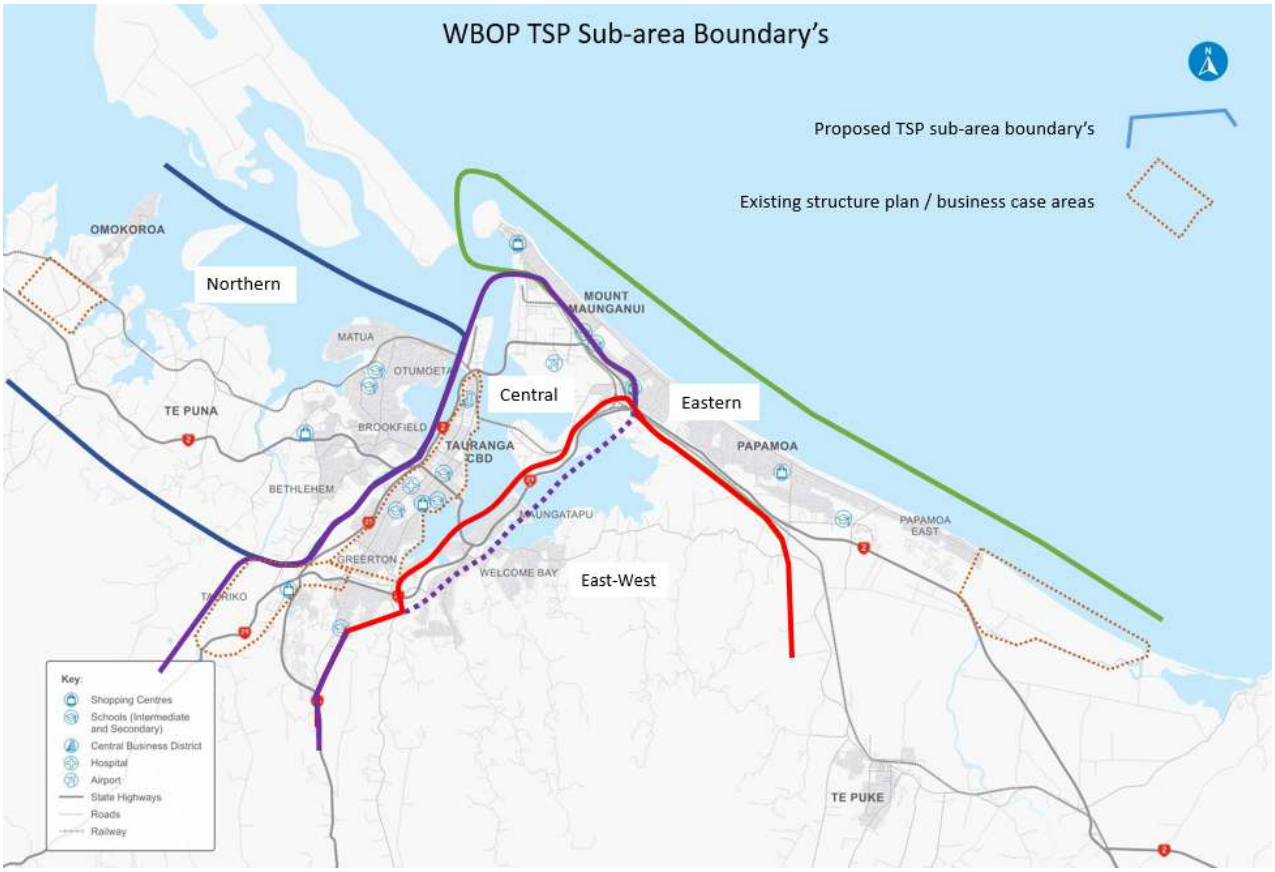


Figure 21: TSOF Sub-Areas

Primary route conflicts are those where there are two or more modes on one route. These are summarised below.

6.2 Northern Sub-Area

Figure 22 and Table 10 show primary route conflicts in the northern sub area.

Figure 22: Northern Sub-Area Primary Route Map Showing Mode Conflicts

Table 10: Northern Sub-Area Primary Route Conflicts

Location	Primary Route Conflicts
Takitimu North Link Stage 1 & 2 (Takitimu Dr to Omokoroa Road)	Traffic, public transport, cycling
Omokoroa Road	Public transport, cycling
Chapel Street / Ngatai Road / Windsor Road / Waihi Road	Public transport, cycling
Moffat Road, Bethlehem Road	Public transport, cycling

6.3 Central Sub-Area

Figure 23 and Table 11 summarise the primary route mode conflicts in the central sub-area.

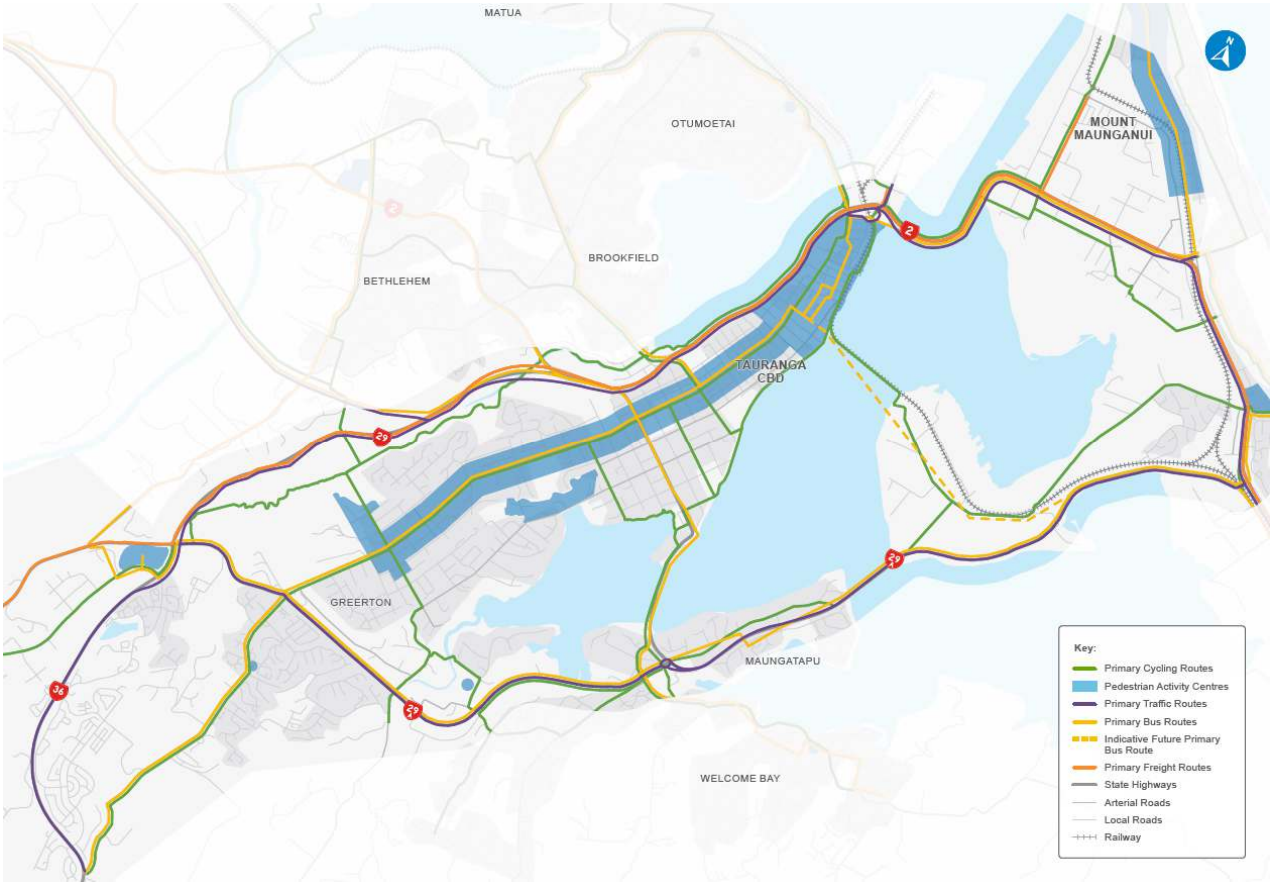


Figure 23: Central Sub-Area Primary Route Map Showing Mode Conflicts

Table 11: Central Sub-Area Primary Route Conflicts

Location	Primary Route Conflicts
Takitimu Drive	Traffic, freight
Cameron Road	Public transport, cycling
15th Avenue	Public transport, cycling
SH29A (Takitmu Drive to Baypark)	Traffic, public transport, cycling (partial)
SH2 (between Chapel Street / Maunganui Road)	Traffic, public transport, freight, cycling (partial)
Pyes Pa Road	Cycling, public transport
Totara Street (between SH2 / Hull Road)	Freight, cycling
Girven Road (between SH2 / Grenada Street)	Cycling, public transport

6.4 Eastern Sub-Area

Figure 24 and Table 12 summarise primary route mode conflicts across routes in the Eastern sub-area.

Figure 24: Eastern Sub-Area Primary Route Map Showing Mode Conflicts

Table 12: Eastern Sub-Area route conflicts

Location	Primary Route Conflicts
Links Avenue / Farm Street / Grenada Street to Sandhurst Drive	Public transport, cycling
State Highway 2	Freight, public transport, traffic
Doncaster Drive	Cycling, public transport
Tauranga Eastern Link	Freight, public transport, traffic

6.5 East – West Sub-Area

Figure 25 and Table 13 summarise mode conflicts across primary routes in the East-West sub-area.

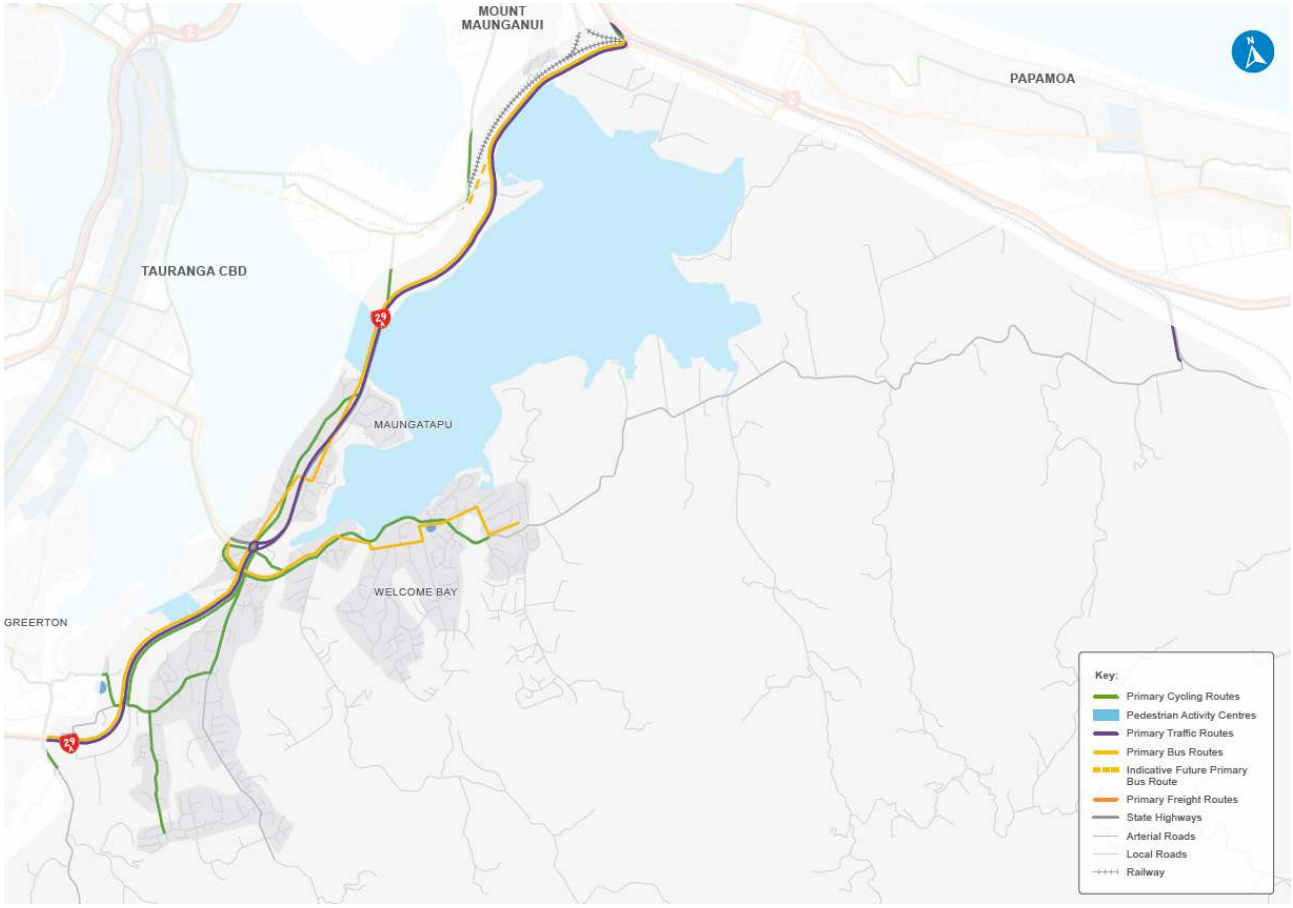
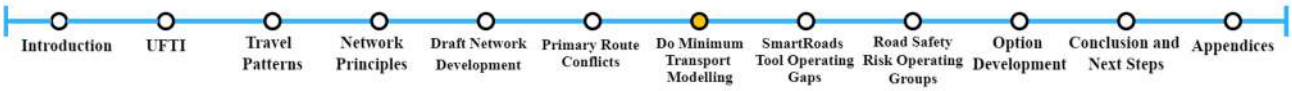


Figure 25: East – West Sub-Area Primary Route Map Showing Mode Conflicts)

Table 13: East – West Sub-Area Primary Route Conflicts

Location	Primary Route Mode Conflicts
SH29A (Oropi Road / Baypark)	Traffic, public transport, cycling (partial)
Welcome Bay Road (James Cook Drive / Turret Road)	Cycling, public transport

7 Do Minimum Transport Modelling



The TTM has also been used to inform the identification of operating gaps. The TTM shows where travel time and reliability will be disrupted due to congestion on the network under existing and future scenarios with projected land use growth under the UFTI programme.

The TTM models car, truck, bus and cycle trips based on the spatial allocation of land use across the sub-region. For this study, the base scenario is 2018 and future scenarios consider 2028 (10 year) and 2048 (30 year) land use.

A 'do minimum' scenario was developed for this gap assessment analysis. The do minimum scenario includes the proposed UFTI land use, however, only includes minimal transport system improvements. In effect, this shows how the transport system will operate without investment to improve operating conditions. Transport system improvements in the do minimum scenario were defined with input from the Transport Partner organisations and include:

- The committed Takitimu North Link Stage 1 / Takitimu North Link Stage 2 project,
- Papamoa East Interchange necessary to provide access to the Te Tumu growth area
- Intersections on SH29 necessary to provide access to the Tauriko West growth area
- Minor increases in bus network coverage and frequency.

Under this do minimum scenario, in 2028, daily public transport mode share is 1.5% of total trips and 2.5% during the weekday AM peak period. Cycling mode share is 3% daily and 3.6% during the AM peak. These proportions are similar to existing levels and are below the targets / KPI's identified for the TSP which ultimately has an objective to increase travel by public transport, walking and cycling.

7.1 Public Transport Travel Time Reliability

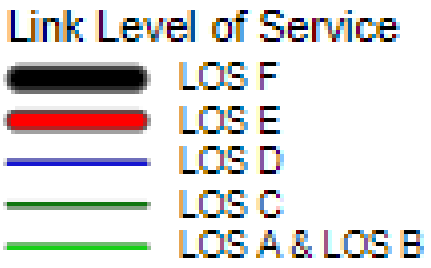
The TSP has an objective to increase mode share for public transport. For this to be achieved bus travel will need to offer comparable or better journey times and reliability (among other factors) to other modes.

TTM modelling in the 2028 do minimum scenario shows where buses will encounter congestion and experience delay during the weekday peak periods. Assuming there is no bus priority provided, as per the do minimum scenario and no / low mode shift to public transport or walking and cycling to reduce traffic volumes, buses using primary existing bus routes in these locations will be delayed in congestion.

The following figures show the modelled level of service (LOS) under the do minimum scenario (2018 and 2028).

LOS is an indicator of travel time delay where LOS A is free flow (uncongested) conditions. LOS E and F represent locations on the network where movement is likely to be disrupted due to congestion and or traffic queues.

Locations of poor LOS (LOS E or F) on primary bus routes are circled in these figures, in these locations buses will experience delay and not achieve the travel time reliability desired for a primary route service.



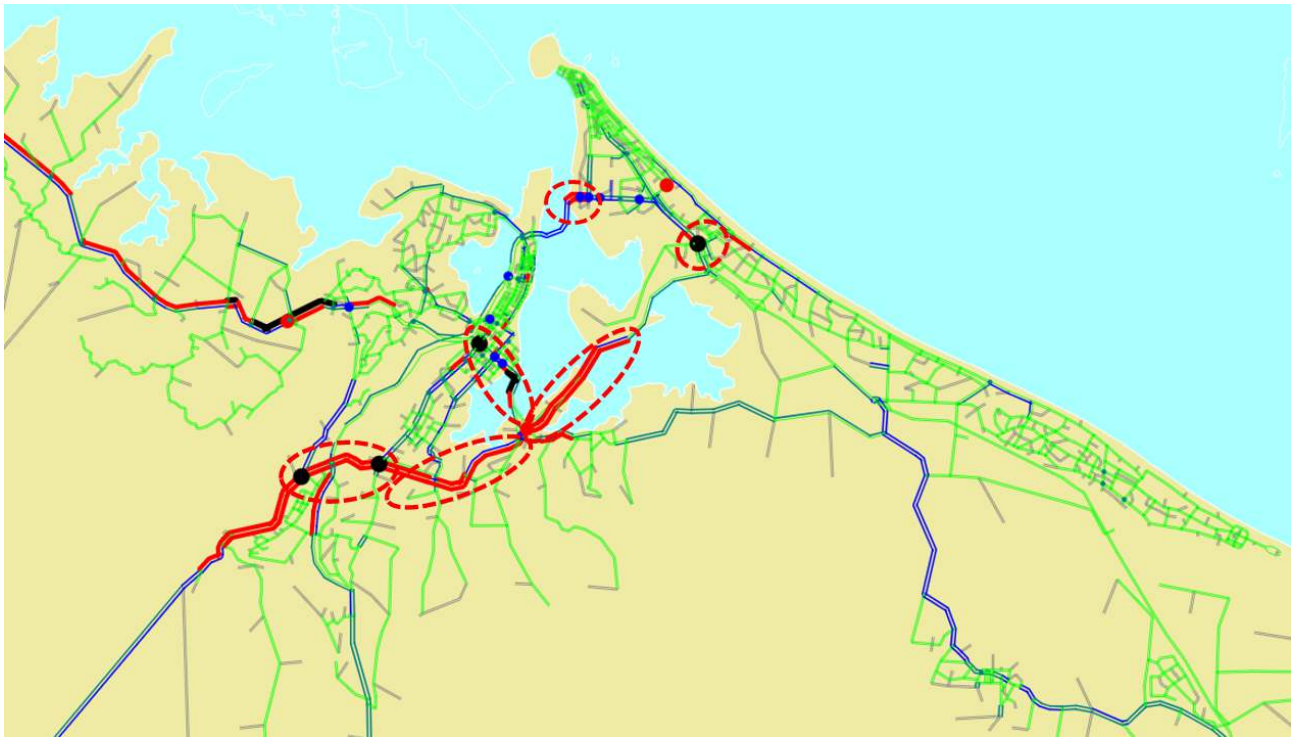


Figure 26: 2018 AM Peak Do Minimum Level of Service with Locations of Delay on Primary Bus Routes Circled

Figure 27: 2028 AM Peak Do Minimum Level of Service with Locations of Delay on Primary Bus Routes Circled

Figure 28: 2028 PM Peak Do Minimum Level of Service with Locations of Delay on Primary Bus Routes Circled

By 2048, without system improvements and mode shift the level of service across the network worsens. Figure 29 shows the network level of service in 2048 under the do minimum scenario, with coinciding locations of delay on primary bus routes circled.

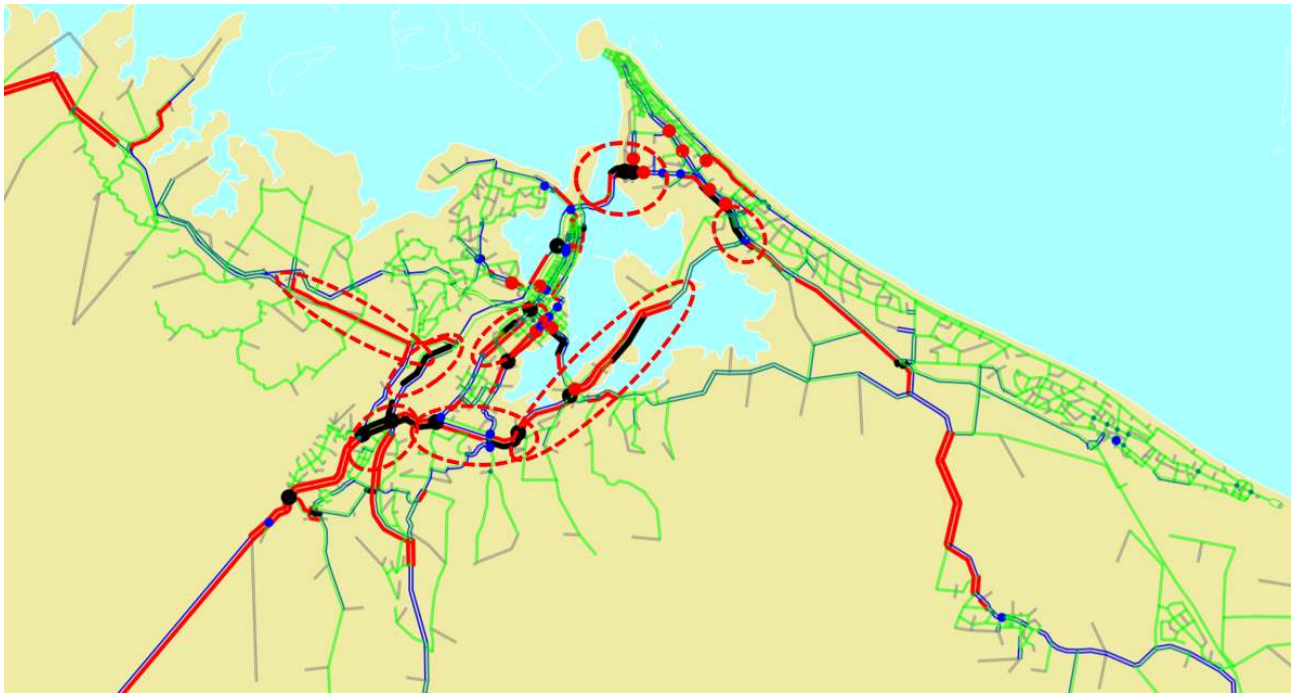


Figure 29: 2048 AM Peak Do Minimum Level of Service with Locations of Delay on Primary Bus Routes Circled

Options to address these level of service operating gaps for the primary bus routes will be considered in the option development section.

7.2 Cycling Quality of Facility

The TSP has an objective to increase mode share for cycling by providing safer, more efficient and interconnected cycle routes.

The TTM for the 2018 do minimum shown below displays the existing level of service for cycling on the primary cycle routes. The level of service ranges between D, E and F widely across the existing cycle network. This reflects the current lack of dedicated infrastructure in the sub-region. Routes with the worst LOS (F) are those located on higher volume routes including SH2 / Takitimu North Link Stage 1, Waihi Road, SH29A and Cameron Road.

The following output if for the 2018 base. The TTM output for cycling is based on infrastructure and not volumes, therefore in a do minimum scenario there will be no changes this in the 2028 and 2048 year periods.

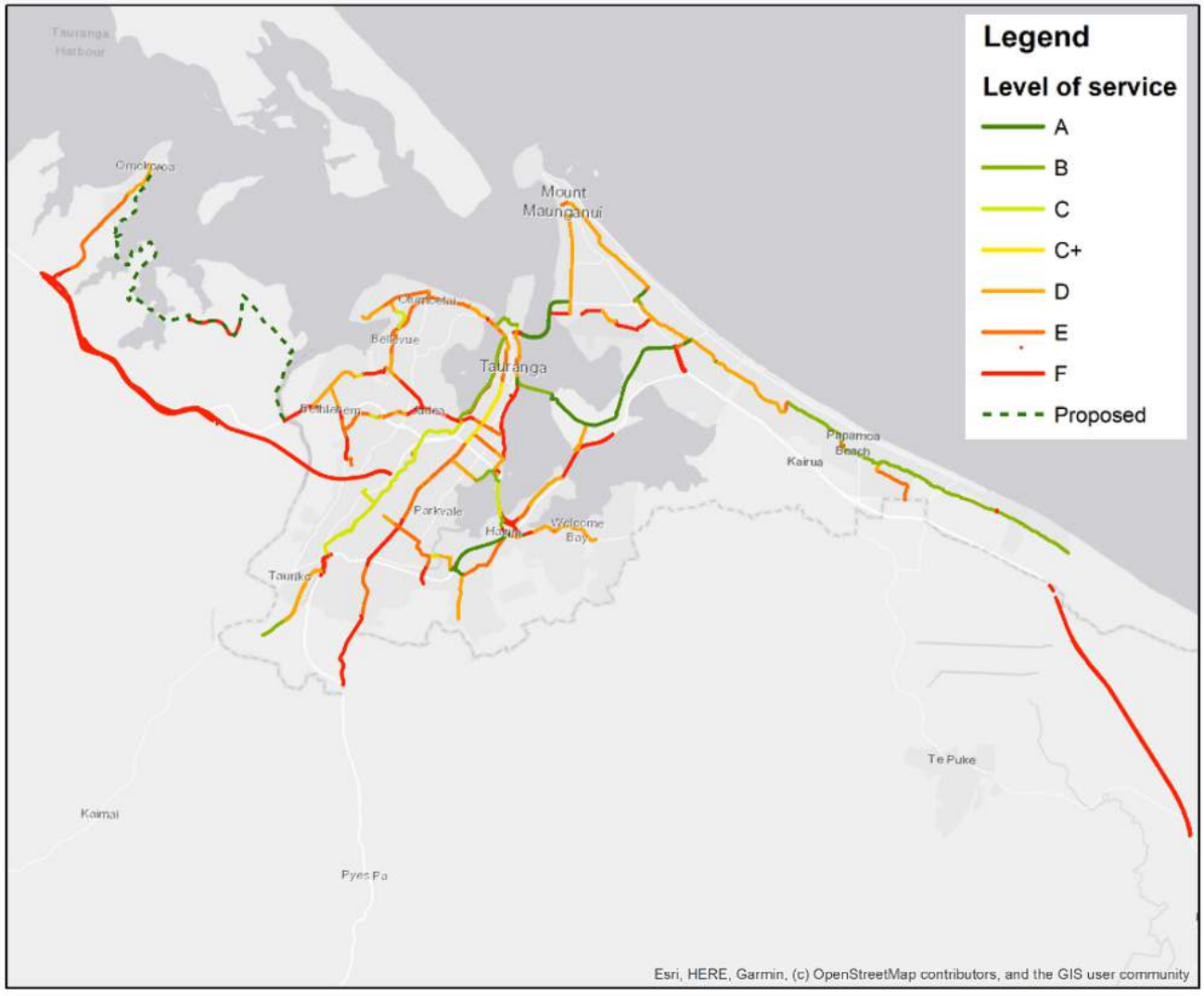


Figure 30: Do Minimum Cycling LOS

The above map shows that most of the primary cycle route network has a poor quality of facility. This indicates a large operating gap for cycling as a high quality of service is expected on primary cycle routes.

7.3 Freight Travel Time Reliability

The TSP has an objective to maintain or improve travel time reliability for freight movements on the primary freight routes during weekday interpeak periods.

The TTM do minimum modelling shows the change in level of service on primary freight routes from 2018 to 2048. Where there is a poor LOS and no priority for freight movements there will be an operating gap for freight vehicles. Where the LOS worsens from the 2018 scenario to the future 2028 or 2048 scenarios the TSP objective will not be achieved.

The following figures show the 2018, 2028 and 2048 do minimum LOS with coinciding locations of poor LOS on the primary freight routes circled.

Figure 31: 2018 Interpeak LOS with Locations of Poor LOS on Primary Freight Routes Circled

Figure 32: 2028 Interpeak LOS with Locations of Poor LOS on Primary Freight Routes Circled

Figure 33: 2048 Interpeak LOS with Locations of Poor LOS on the Primary Freight Routes Circled

The 2048 interpeak scenario highlights several sections of primary freight routes at LOS E and F that are worse than the 2018 operation.

7.4 Accessibility

The TSP has an objective to improve accessibility (population / dwellings within travel time thresholds) to key social and economic opportunities by different modes. The TTM do minimum modelling shows that accessibility will worsen with urban growth, increased travel demand and longer travel times without intervention into the transport system and resulting mode shift.

The following table shows the proportion of total jobs accessible under each of the TTM do minimum scenarios.

Table 14: Accessibility to Jobs in Existing and Do Minimum Scenarios

Scenario	Total Jobs	No. of Accessible Jobs		%age of Jobs Accessible	
		Car within 30 minutes	PT within 45 minutes	Car within 30 Minutes	PT within 45 minutes
2018	94,800	75,776	20,390	80%	22%
2028 Do Minimum	105,000	85,948	23,469	82%	22%
2048 Do Minimum	129,000	93,741	25,890	72%	20%

The current baseline model outputs highlight the significant number of jobs accessible by car within 30 minutes (80% - 75,776 jobs), but also highlights significantly fewer jobs available by PT within a 45-minute travel time (22% - 20,390 jobs). For the 2048 scenario, the number of jobs accessible by car (72%) and PT (20%) reduce which reflects a range of factors including land-use development and increased road congestion. A notable contrast highlighted by the TTM scenarios is the relatively high number of jobs accessible by car within 30 minutes compared to those accessed by PT within 45 minutes.

The following figures show travel time to the central Tauranga area by different modes; car, bus and cycle. These show greater accessibility within 20-minute travel times for locations to the north and south of the city by car, and fairly low accessibility within 20 minutes travel time by bus and cycle. There is greater

accessibility by cycle than bus, reflecting the fact that bus users must wait for a bus whereas cyclists have no such delay.

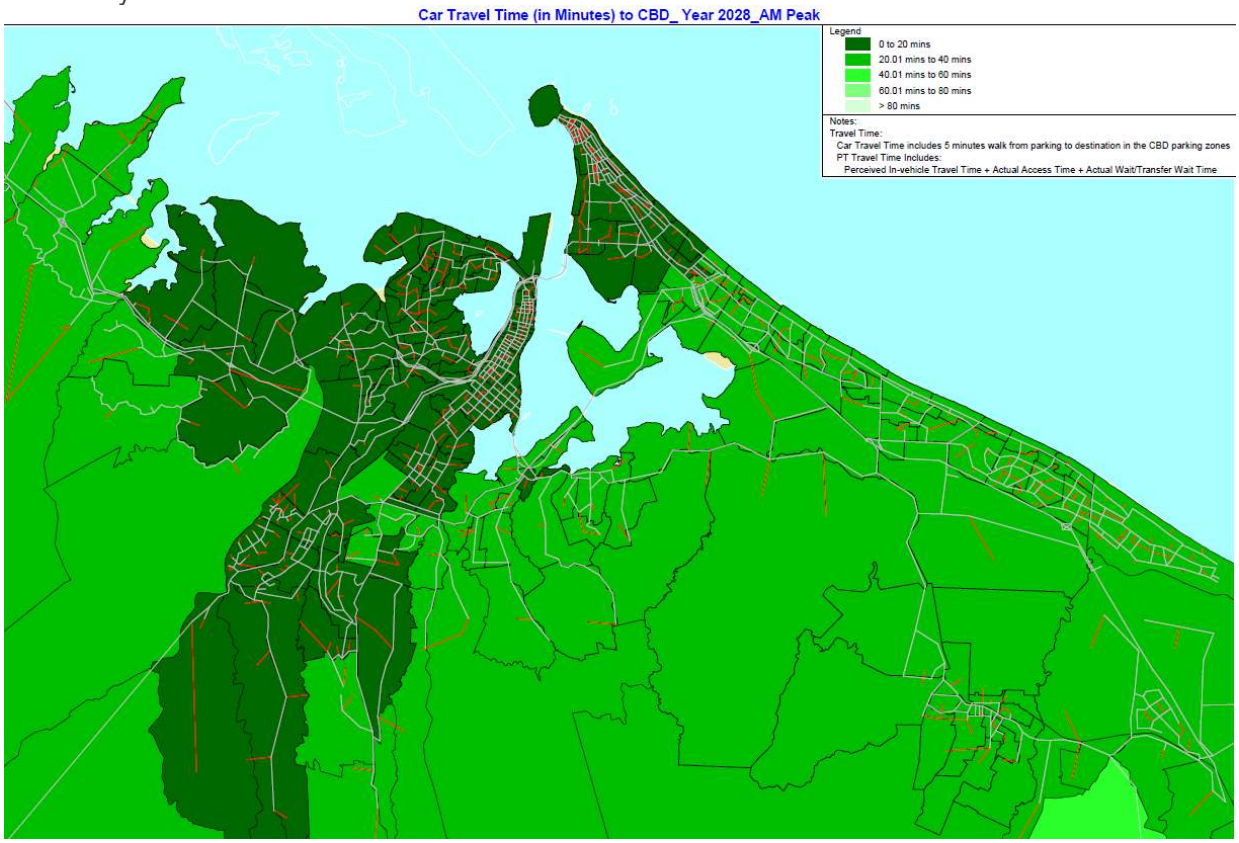


Figure 34: Accessibility to Central Tauranga by Car (2028 AM peak do minimum scenario)

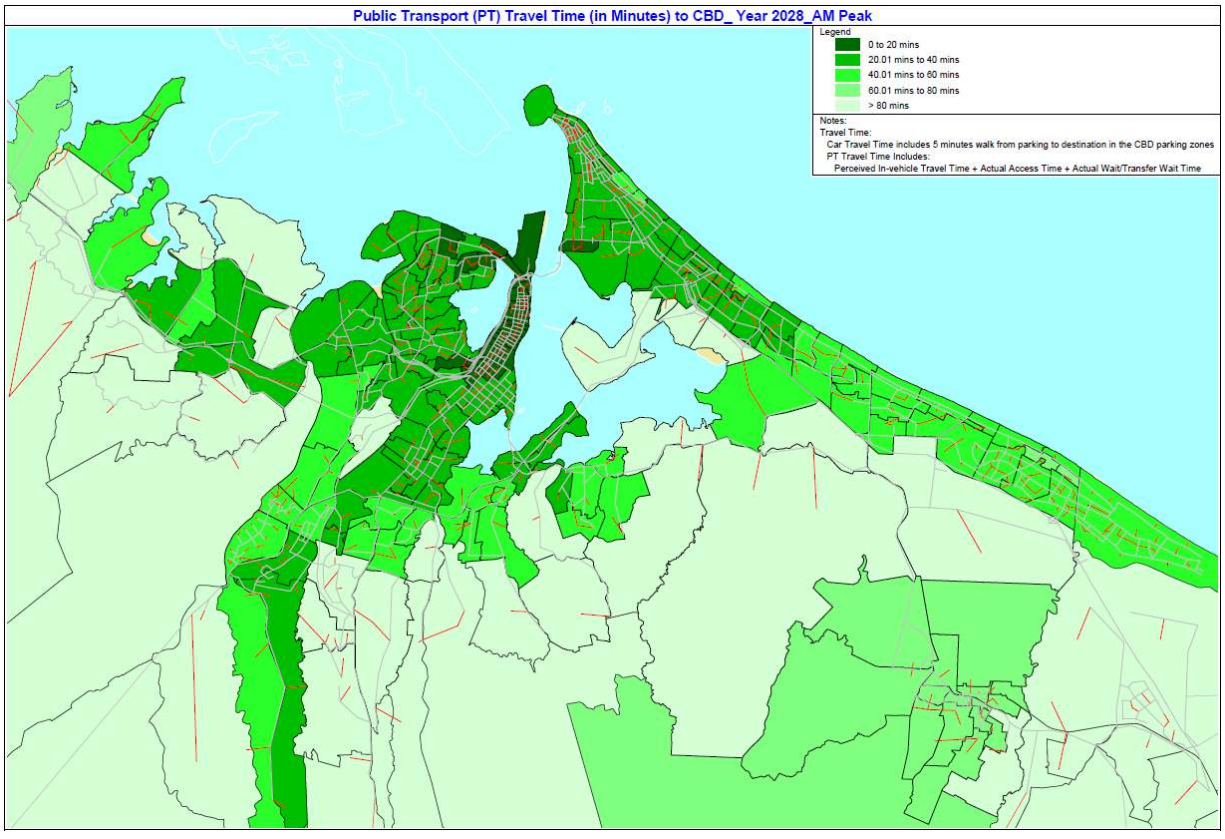


Figure 35: Accessibility to Central Tauranga by Bus (2028 AM peak do minimum scenario)

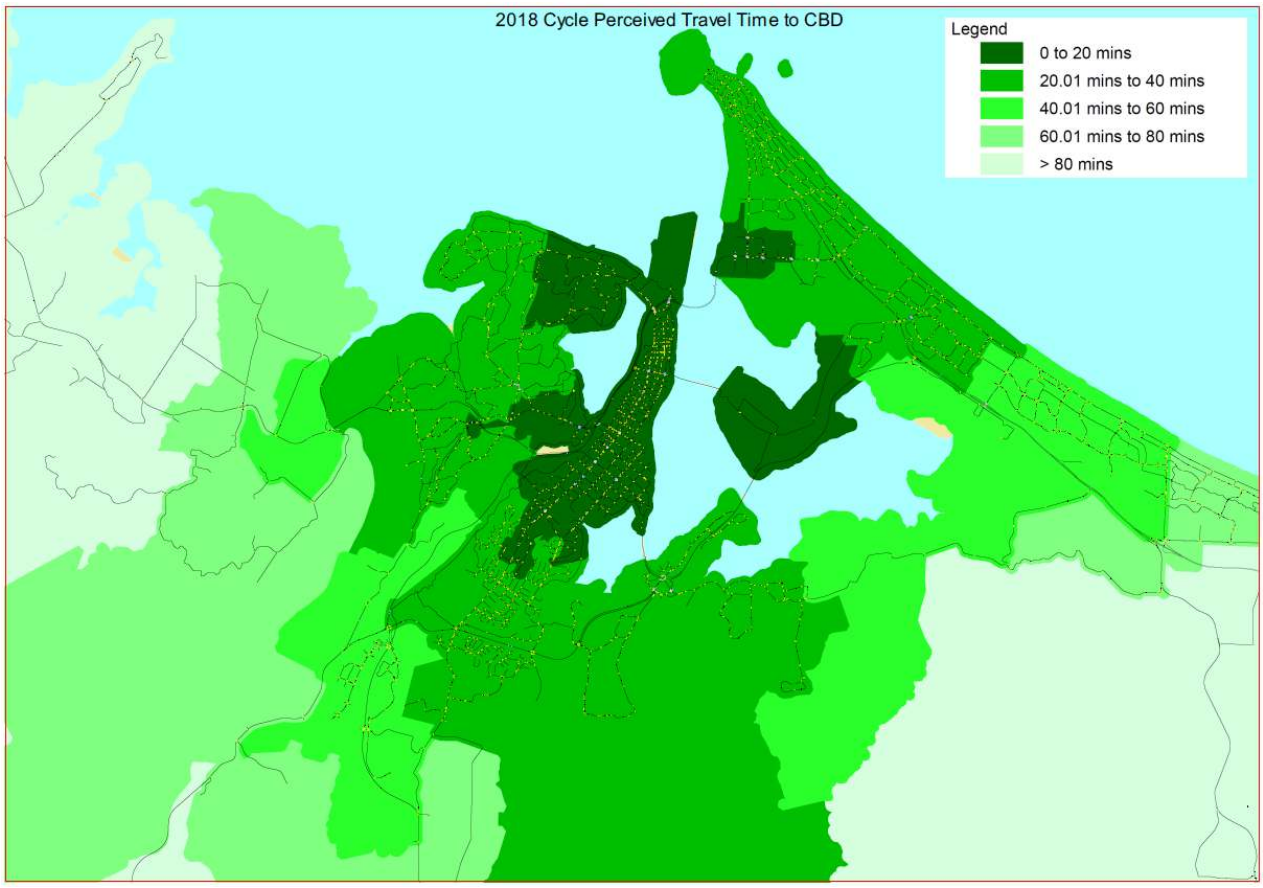
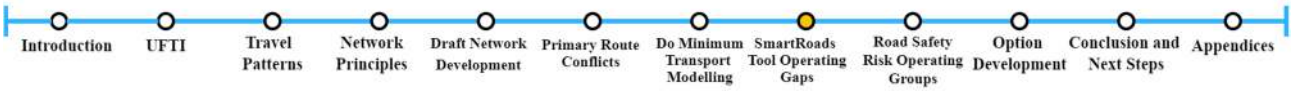


Figure 36: Accessibility to Central Tauranga by Cycle (2018 AM peak do minimum scenario)

8 SmartRoads Tool Operating Gaps



The SmartRoads tool was utilised to assist with the definition of operating gaps across the network. The SmartRoads tool utilises the do minimum TTM outputs and considers the place context of a route to derive operating gaps. A technical note outlining the methodology and findings of the SmartRoads tool analysis is provided in **Appendix G**, and a summary is provided below.

8.1 Purpose

The SmartRoads tool is one component in understanding 'operating gaps' in the transport network, representing the difference between the existing level of service (LOS) and the target LOS for each mode and by time of day. This is important as it ensures options are targeted to areas and modes with the most significant service issues at different times of the day.

8.2 Methodology

A Network Operating Framework (NOF) was first developed for Tauranga using the SmartRoads tool in 2018. For the TSOF, the tool required updating to:

1. Increase the spatial coverage of the tool, extending out to near Te Puke to the east, Katikati to the northwest, and SH29 approaching from the south;
2. Update the transport demands to match those from the recently developed Aimsun transport model;
3. Improve the definition of the network with more roads, streets and routes included as per the Aimsun model network; and
4. Update mode priorities in the tool with priorities derived through workshops with Project Partners for the TSOF.

Basing the TSOF tool network on the Aimsun network has the benefit of the network structure being the same, enabling easier and more rapid translation of scenario model flows to the tool and presenting the information with the same network definition in reporting.

A 2031 scenario is being used as the basis of comparison for the TSOF, being the closest Aimsun forecast year to a decade from today as agreed with the TSOF working group. This scenario will be used to:

1. Identify and understand the network gaps by mode to help inform the generation of options; and
2. As a basis to consider the effectiveness of options (as part of Step 5).

8.3 Network Definition

For public transport, cycling and freight the primary and secondary routes described earlier in this report were translated directly into the tool. The primary and secondary traffic routes were translated as preferred traffic and traffic routes into the tool, maintaining the methodology used in the 2018 Tauranga NOF. Pedestrian priority was defined within pedestrian activity centres.

Base network and traffic data

A 2031 TSOF network was developed from the GIS based Aimsun model network, in a spatial format suitable to be read in the SmartRoads tool.

Demands by mode were extracted from the Aimsun model for each link and matched to the tool using unique IDs. This will allow simple updates as new scenarios or options need to be tested. Three time periods were modelled including morning peak (AM), interpeak (IP) and evening peak (PM), using average hourly traffic flows for general traffic, freight, bus and cycle modes. Pedestrian and interpeak cycling data were not available from Aimsun.

When viewed in SmartRoads, the tool recognises that the relevant transport mode should take priority of movement along the primary and secondary transport routes. This is an important input for determining service gaps on each link, discussed further below.

Activity areas

Activity areas inform how the SmartRoads tool establishes the target LOS and the level of encouragement of each mode. Area categories were initially developed for Australia and have since been redefined to fit the New Zealand context. Activity areas include:

- Activity Area Level 1 (Central Business District) – Significant function as a regional centre with an intense concentration of development and business;
- Activity Area Level 2 (Suburban Centre) – Containing a wide mix of community services and a diverse range of retail and commercial activities;
- Activity Area Level 3 (Local Town Centre) – Providing for the needs of surrounding local communities; and
- Activity Area Level 4 (Local Shopping Area) – Continuous retail or commercial development abutting a major arterial road or state highway.

The SOF team provided the activity areas in Tauranga as shown in Figure 37.

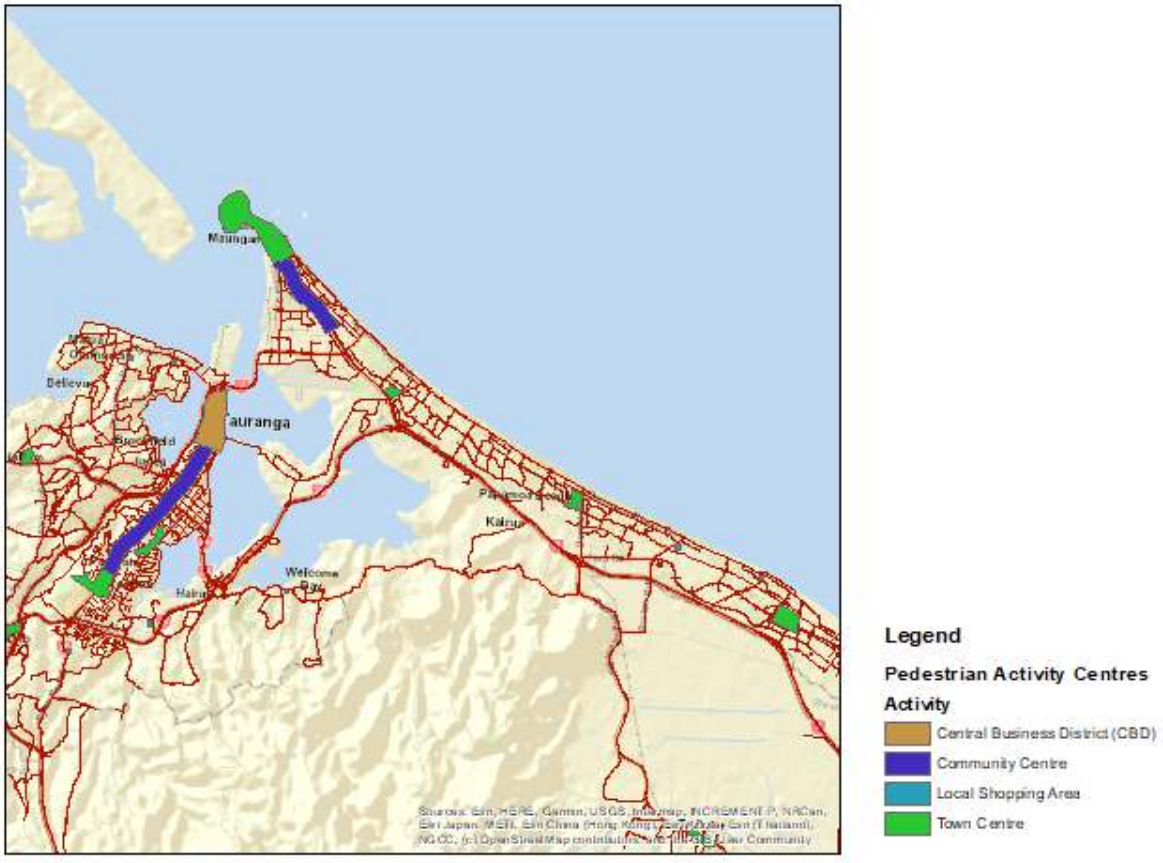


Figure 37: System Operating Framework activity areas

Activity areas were subsequently adjusted to fit with definitions described above, thereby ensuring the tool assigned the appropriate levels of encouragement for each mode. Notably the classification of the Tauranga CBD as Level 1 was deemed unsuitable as SmartRoads considers a Level 1 activity area to be a major urban centre of similar scale to Auckland, Wellington or Christchurch. Updated activity areas are shown in Figure 38.

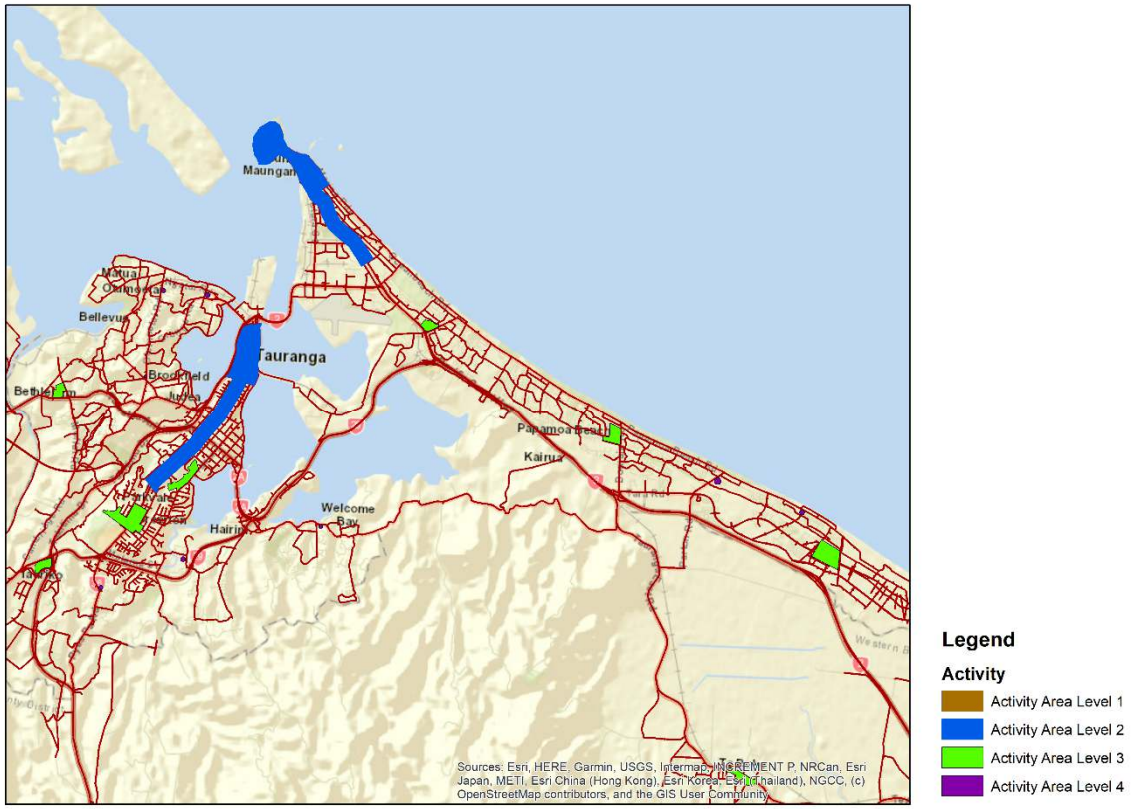


Figure 38: Redefined activity areas

8.4 Base Levels of Service

A base LOS is required for each link, with a letter value between A and F assigned based on how the link performs for different modes. In the 2018 NOF, this was a subjective process where relevant stakeholders collaboratively assessed LOS link by link considering a variety of aspects including mobility, safety, accessibility and amenity. Given the size and structure of the updated network, quantity of links, and time constraints, a simplified approach was adopted which is appropriate for the TSOF network analysis.

Base LOS was calculated using the ratio of posted speed to modelled speed across the time periods based on the Aimsun model outputs for general traffic, freight and public transport. Results below 30% were considered LOS F, while results above 67% were LOS A. These bands are consistent with Tauranga transport modelling protocol, so the congested travel time between the two sources of information is consistent. The LOS bands are shown below in Table 15.

Table 15: General traffic, freight and bus LOS bands

Ratio (%)	LOS
<30	F
30-40	E
40-50	D
50-67	C
>67	A, B

Cycle LOS was based on the relative attractiveness scores for each route from the Tauranga Cycle model, with an 'attractiveness index' value assigned to links. 15 was considered a high standard with designated cycling infrastructure, uninterrupted by vehicle movement. Values between 10 and 12 were regarded as a lower standard and included painted, unbuffered cycle lanes or no specific cycling infrastructure. Links ranked 15 were given a LOS A while values 10 and below were assigned an F, as shown in Table 16. This was necessary to convert the 15 attractiveness factors to LOS ratings.

Table 16: Cycle LOS bands

Attractiveness Index	LOS
15	A
14	B
13	C
12	D
11	E
10	F

The relative attractiveness definitions used to assign cycle LOS values differ slightly from the LOS band definitions used as standard in the tool. Attractiveness index scores were based on the provision of cycling infrastructure on different road types, whereas LOS definitions in the tool also consider other variables including delay, mode conflict, crossing points and disruption at intersections. For links ranked A, E or F, the definitions largely align as highly attractive / unattractive routes for cyclists are also likely to experience low / high levels of conflict and delay. For links ranked B, C and D, the alignment was less uniform. For example, an unsealed path would be ranked C for cycle attractiveness, yet this same path may have low levels of conflict or delay, therefore warranting a higher score based on the tool definitions. These differences in definitions were deemed insignificant with little or no impact on the high city-level outputs required for the SOF.

Vehicle occupancy

Data for each mode is input in vehicles per hours and then assigned an occupancy value by the tool to understand the efficiency of movement of people through the network. Occupancy values are consistent with the previous NOF investigations and are displayed in Table 17.

Table 17: Vehicle occupancy by mode

Mode	Occupancy
General Traffic	1.4
Bus	30.0
Bicycle	1.0
Freight	1.0

Mode encouragement

Based on the defined priority routes and activity areas, the SmartRoads tool assigns levels of encouragement for each transport mode. Levels of encouragement assigned to modes are based on their relative priority on each link, with each level of priority associated with a relative LOS. For example, on a bus priority route, buses are either encouraged or strongly encouraged depending on whether the route falls within an activity area and therefore should experience a relative LOS of B or above. Relative priority of each mode can be represented in the tool as priority arrows with arrow types representing levels of encouragement and associated with a relative LOS. Arrow symbology and corresponding relative LOS is summarised in Table 18.

Table 18: Priority arrows and relative LOS

Arrow types	Relative priority	Relative LOS
	Strongly encourage	A
	Encourage	B
	No specific encouragement	C
	Encourage local access only	D
	Local access only	D-

The tool assigns encouragement to each mode based on time of day, activity area and whether the link falls on a priority route. Table 19 provides an example summary of encouragement for buses.

Table 19: Bus priority within the SmartRoads software

	Place				
	Bus priority within				Not on a bus priority route but within the bus network
Time of day	Outside of activity centres	Local Shopping Area & Community Centre	Major Town Centre	Central Business District	
AM Peak	←	←	←	←	←
Inter Peak	←	←	←	←	←
PM Peak	←	←	←	←	←
Off Peak					←

The following figures display priority arrows for key sections of the Tauranga network. Note, given the number of links within the network, the priority arrow display appears cluttered and difficult to interpret. This

is due to the large number of links to replicate the full extent of Aimsun model network. Images do, however, provide confirmation that the tool is assigning mode priority as intended.

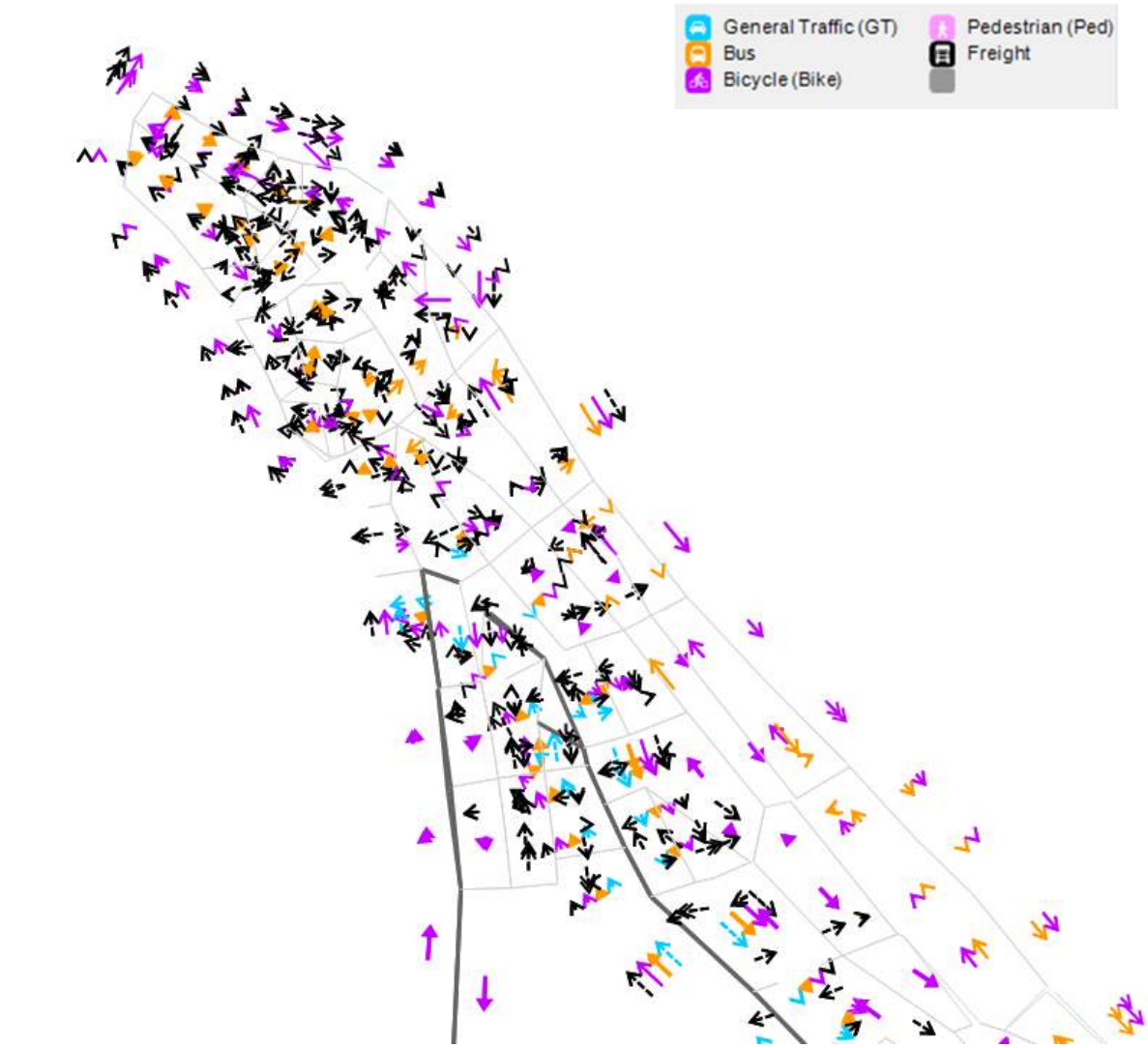


Figure 39: Mount Maunganui priority arrows

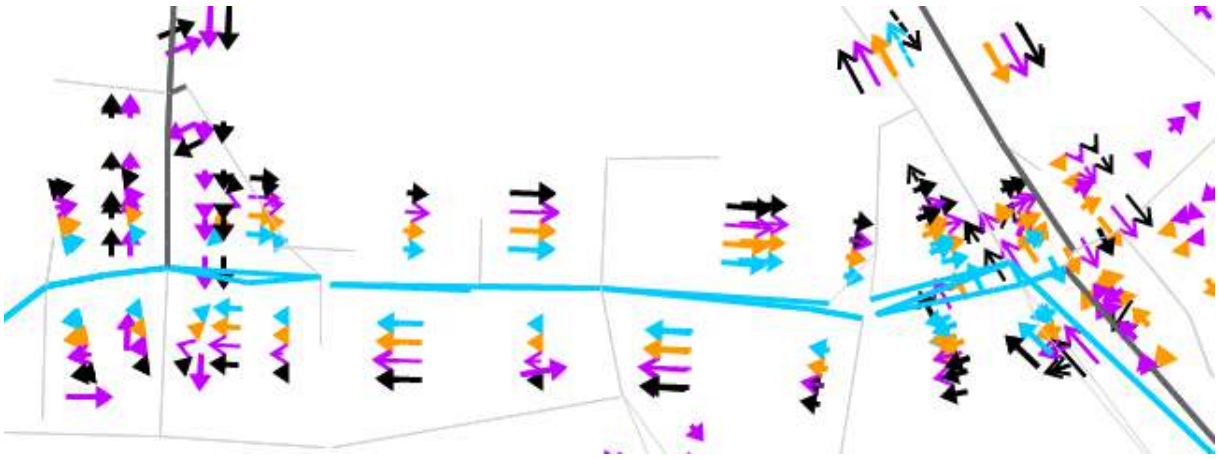


Figure 40: Hewletts Road priority arrows

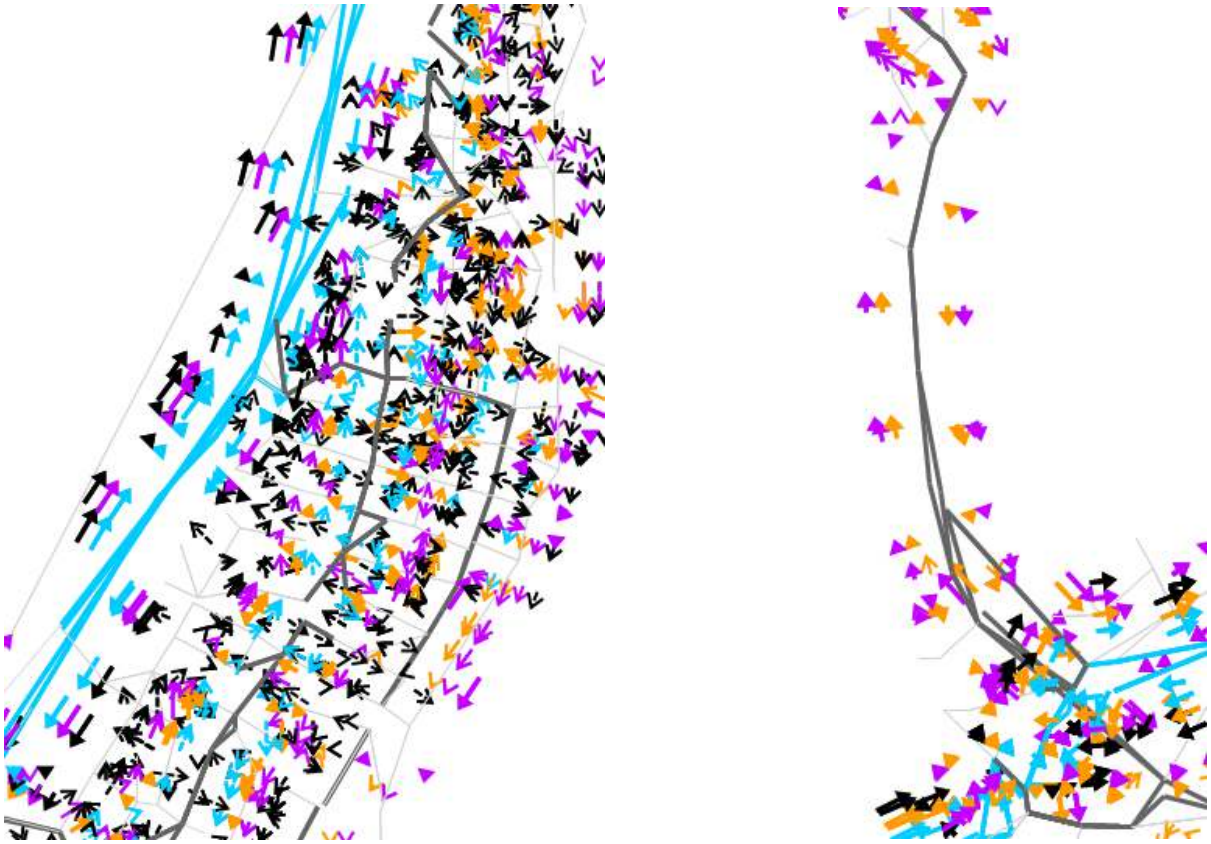


Figure 41: Cameron Road (left) and Turret Road (right) priority arrows

8.5 Operating Gaps

The SOF tool uses strategic routes, user throughputs, LOS and mode encouragement information to determine network operating gaps principally based on the difference between base and target LOS.

Operating gaps are determined by the tool using nationally defined factors related to levels of encouragement, activity areas, throughput, and strategic constants including a mode shift factor and relative efficiency factor.

The gap is then displayed in pie chart form with segments corresponding to a transport mode shown in different colours and segment size related to gap in service for that mode. Gaps can be displayed based on peak periods and across all periods.

Figure 42 shows AM peak operating gaps by mode in Tauranga. The size of the pie charts are relative to the size of the operating gap, considering the volume of users impacted by the gap, with a larger pie chart indicating a more significant gap for many users. Note, due to the scale of the diagram and the relative volume of cyclist across the network, the operating gap for cyclist is small.

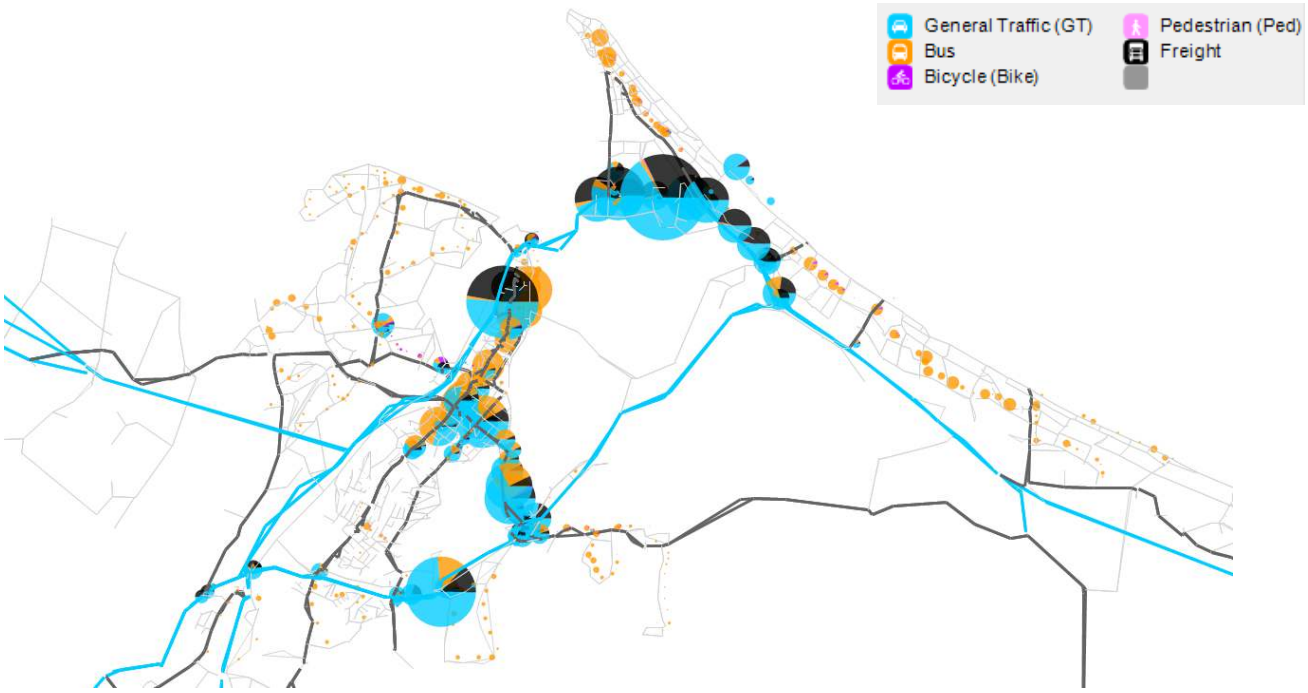


Figure 42: 2031 AM peak operating gaps by mode

As shown, gaps for general traffic (blue) and freight (black) are dominant, with large operating gaps evident around Hewletts Road to the north and Turret Road to the south.

Figure 43 shows operating gaps during the interpeak period. The number and scale of operating gaps is less than the AM peak as the level of delay and volume of users impacted is not as high.

Figure 43: Interpeak operating gaps by mode

Figure 44 shows operating gaps during PM peak hours. In contrast to the AM peak, larger operating gaps for public transport are seen along Cameron Road and around Manganui Road, with smaller gaps for general traffic on Turret Road and Hewletts Road.

In the PM peak the larger operating gaps for public transport is influenced by the significant increase in the number of buses operating in future. There is an assumption in the SmartRaods tool that each bus occupancy is 30 people to represent the 'potential' scale of the gap. So even if there is less delay for buses the scale of the gap increases due to the larger 'potential gap'. This bus occupancy factor is a standard factor applied in the SmartRoads tool.

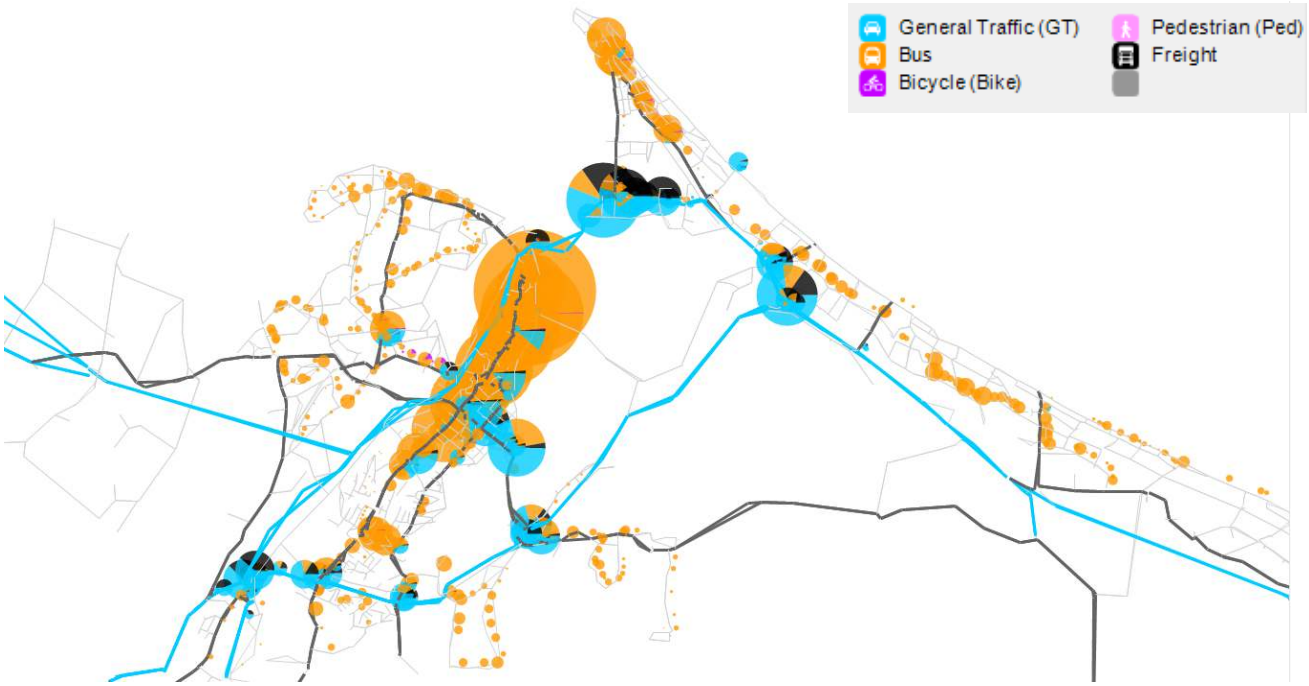
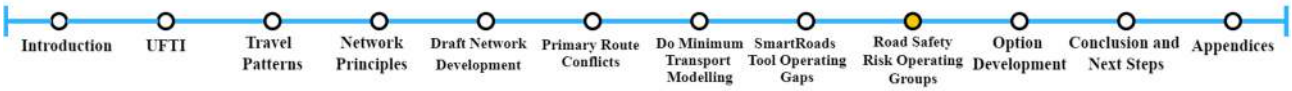


Figure 44: 2031 PM peak operating gaps by mode

While active modes do not present significant operating gaps in this tool, it is noted that modes such as cycling can have supressed demand on the network resulting in small throughput volumes.

9 Road Safety Risk Operating Gaps



The TSP has a focus on safety with an objective of contributing to an outcome where no one is killed or seriously injured in road crashes. Safety is a challenge for the sub-region with around 30 people killed on roads annually and 160 people suffering serious injuries. The cost of these crashes is around $113m per annum.

Personal risk is a measure of the danger to each individual and shows the likelihood of a road user being involved in a fatal or serious injury crash on a particular stretch of road. Figure 45 highlights roads with high (black) and medium high (red) personal risk ratings, these include:

- The Arataki area around Baypark and Bayfair
- The central Te Papa Peninsula Fraser Street and Cameron Road area
- Many rural roads including Welcome Bay Road.

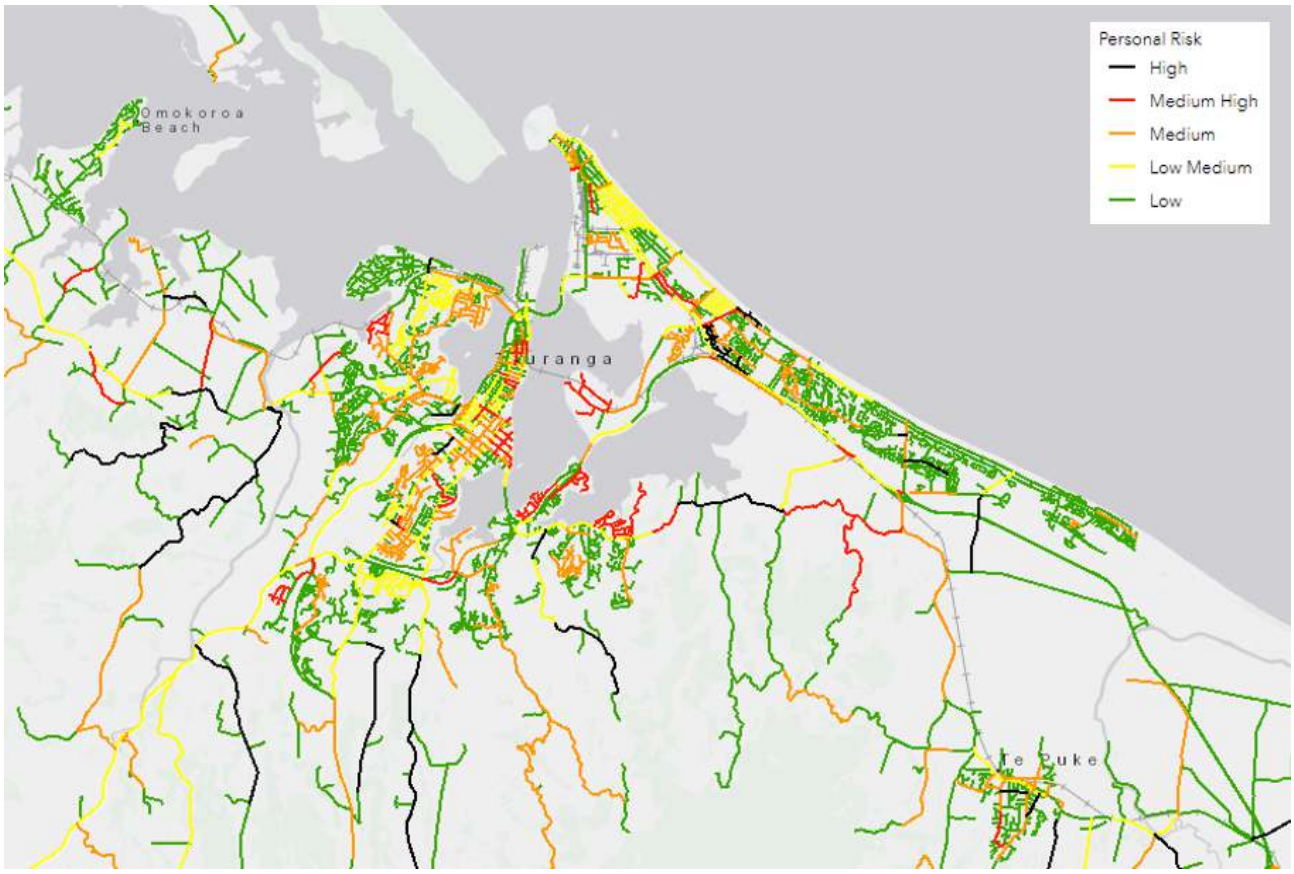
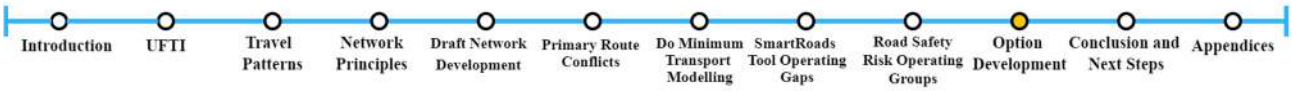


Figure 45: Personal Road Safety Risk Map – based on historic crash data up to 2020

The locations of fatal and serious crashes involving cyclists and pedestrians are shown in Figure 46. Improving safety for these modes is important as the outcome is often severe, and also to encourage mode shift (if users feel safer, they are more likely to walk or cycle).

Figure 46: Fatal and Serious Crashes Involving Vulnerable Road Users with Prominent Clusters Circled – based on historic crash data up to 2020

10 Option Development



The final task in Step 4 of the TSOF development has been to identify a long list of interventions that could be implemented to address the previously described conflicts and operating gaps and deliver the TSP objectives. These interventions will be subject to Project Partner review and feedback leading to refinement and prioritisation in Step 5. The option development and assessment framework for the TSOF was subject to Project Partner review and feedback during Step 4, and is provided in **Appendix I**.

10.1 Workshop

A key part of the long list option identification was a workshop held with the Project Partners and specialists. The purpose of this workshop was to discuss the operating gaps and identify ideas to address these gaps that can be considered as part of the TSOF, or subsequent business case stages of the TSP.

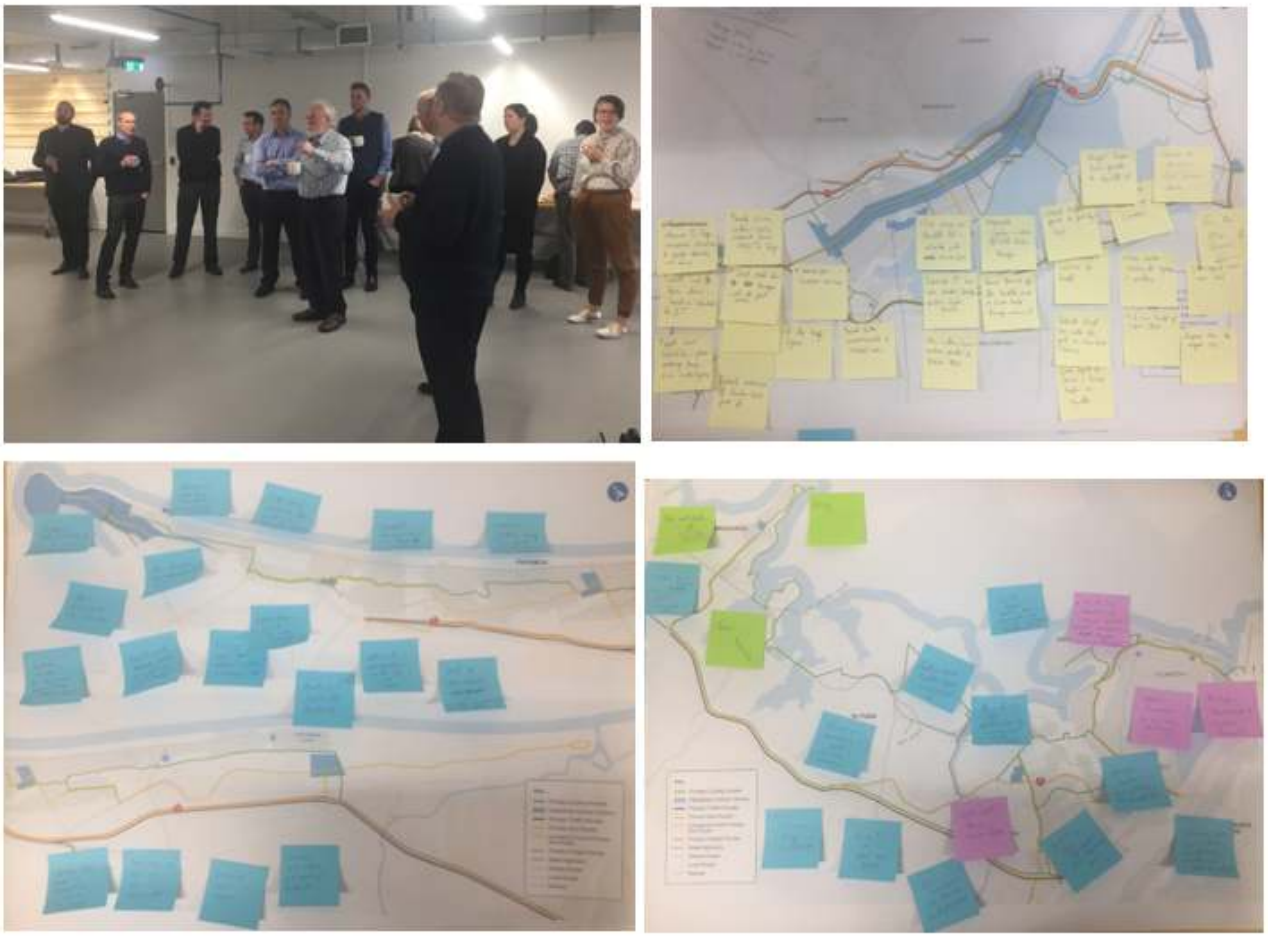


Figure 47: Option Development Workshop Attendee Discussions and Output Examples

10.2 Key Issues for the TSOF to Resolve

The workshop process identified ten distinct 'key issues to resolve', and around 80 potential projects and 150 possible interventions that could be implemented to address the identified conflicts and operating gaps.

The ten key issues to resolve refer to significant operating gaps identified through the TTM or major interventions that could have network wide benefits, or risks if they are unresolved. The nine key issues to resolve are:

1. Northern corridor managed lane definition. Public transport priority and facilities on existing SH2 vs Takitimu North Link Stage 1 / Takitimu North Link Stage 2 routes
2. Form of SH29A to deliver the priority function and support wider network priorities
3. Major public transport interchange locations (between services and park and ride)
4. Managed lane network to deliver adequate benefit and desirable outcomes network wide
5. Form of Turret Road / 15th Ave and Welcome Bay Road to deliver the primary route function
6. Hewletts Road sub-area form to deliver primary route functions
7. Longer term cross harbour (Te Papa – East) cycle and PT routes
8. Welcome Bay internal land uses and network connections
9. Approach to pricing and Travel Demand Management to support the mode shift objective and reduce travel demand.
10. Transport investment is required to unlock planned residential and employment growth e.g. Te Papa, Tauriko, Te Tumu, as identified in UFTI.

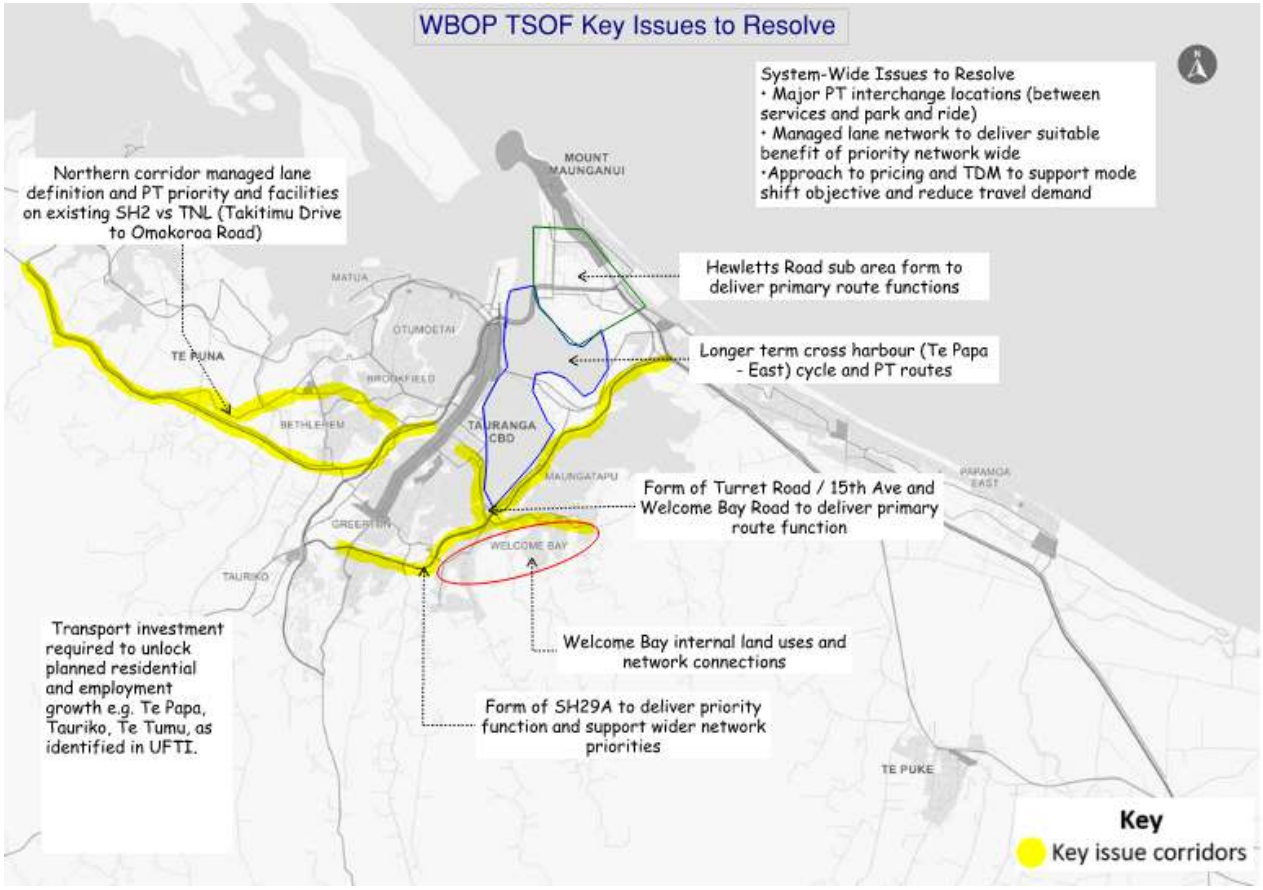


Figure 48: Ten Key Issues to Resolve

10.3 Draft Long List of Interventions for Assessment in Step 5

A draft long list of interventions to consider in Step 5 was prepared from the workshop outputs and from existing information such as relevant projects like the Tauranga NOP and Transport Programme.

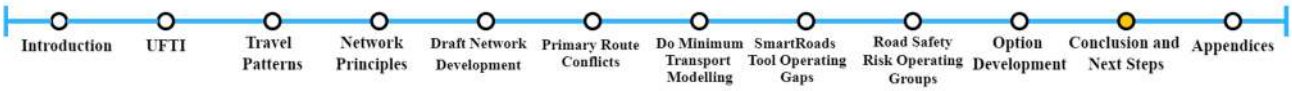
The following key assumptions were considered in developing the long list of interventions:

- The SH29 Tauriko Detailed Business Case will define the form and timing of interventions on SH29 including Barkes Corner, and these will be delivered within the next 10 years
- Te Tumu structure plan defines the network in the Wairakei / Te Tumu area assumed to be delivered, including the Papamoa East Interchange
- The Omokoroa Stage 3 structure plan will define the network in this area and is assumed to be delivered.

Long list interventions have been grouped within one of the UFTI packages that the project contributes to. Some of the long list interventions directly respond to UFTI key moves such as the 15th Avenue and Hewletts Road Sub-Area interventions, others respond to more detailed or lower level operating gaps but still align with the UFTI work packages.

This long list has been provided separately as a spreadsheet and is attached in **Appendix J**. The long list includes an initial sifting of interventions against feasibility and investment objective criteria. The sifting process led to some options being discounted or deferred. Discounted options were typically not considered feasible and deferred options were not considered to support the TSP objectives at this time but may be warranted in future or as part of different projects.

11 Conclusion and Next Steps



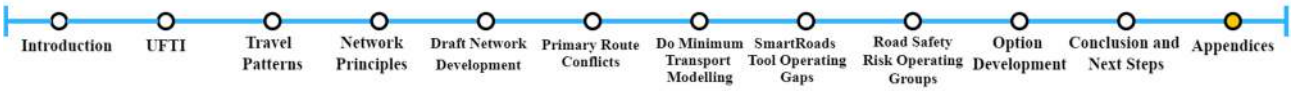
Progress through Step 3 and Step 4 of the TSOF development has established draft primary routes for each mode and indicative secondary routes that will be subject to further review and refinement through the TSP. This led to mode conflicts and operating gaps being identified for initial consideration in the early option development stage.

11.1 Next Steps

Step 5 of the TSOF development will focus on:

- Project Partner feedback on the projects
- Refine and confirm the list of projects based on Partner review
- Assessment of options in an MCA style evaluation
- Modelling of interventions to inform prioritisation and packaging
- Evaluation of recommended option / programme.

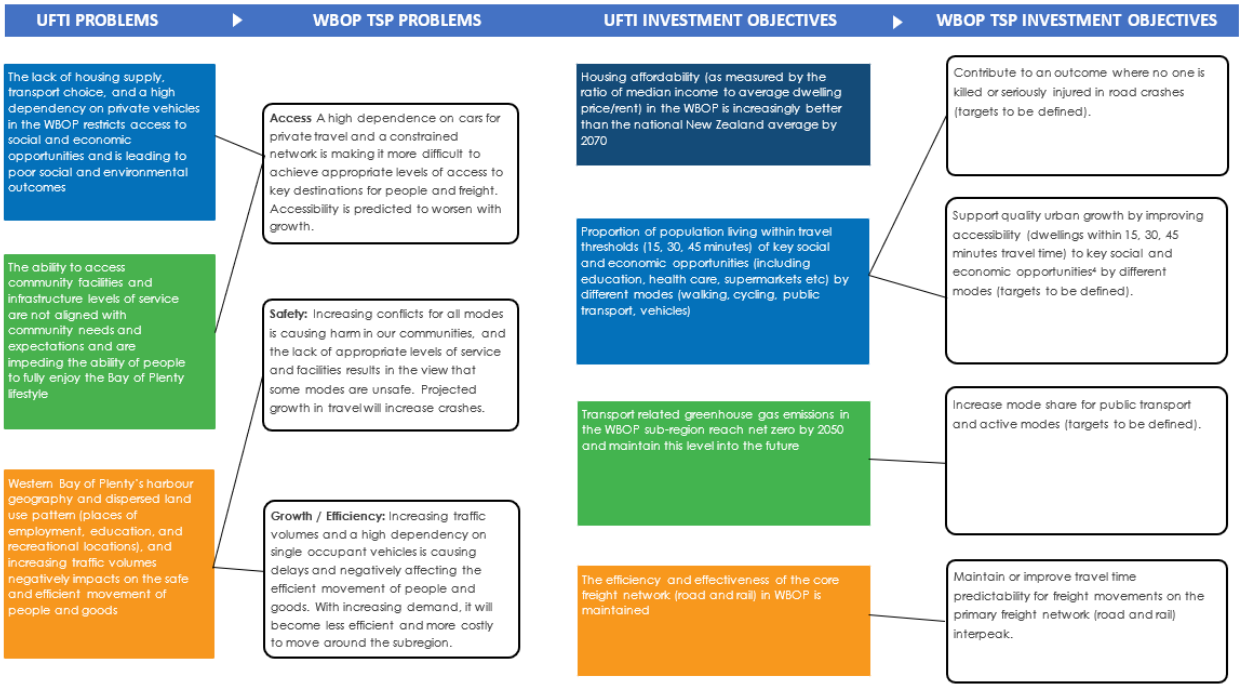
12 Appendices



A

Appendix A – TSP Problems and Objectives

WBOP Transport System Plan Objective Setting v2 24/06/2020



Notes:
1. The TSP does not adopt the UFTI housing affordability objective as the TSP does not have as much ability to influence housing affordability outcomes as UFTI (UFTI being a broader land use and transport programme).
2. The TSP safety objective responds to the 3rd UFTI problem statement "*impacts on the safe and efficient movement of people and goods*". The TSP is a suitable programme to respond directly to road safety problems.
3. The TSP mode shift objective supports the UFTI emissions objective by targeting a shift to low emission travel choices. This also responds to the first UFTI problem statement "*a high dependency on private vehicles*".
4. Such as; education, health care, major employers, activity centres, open space, green space, etc.

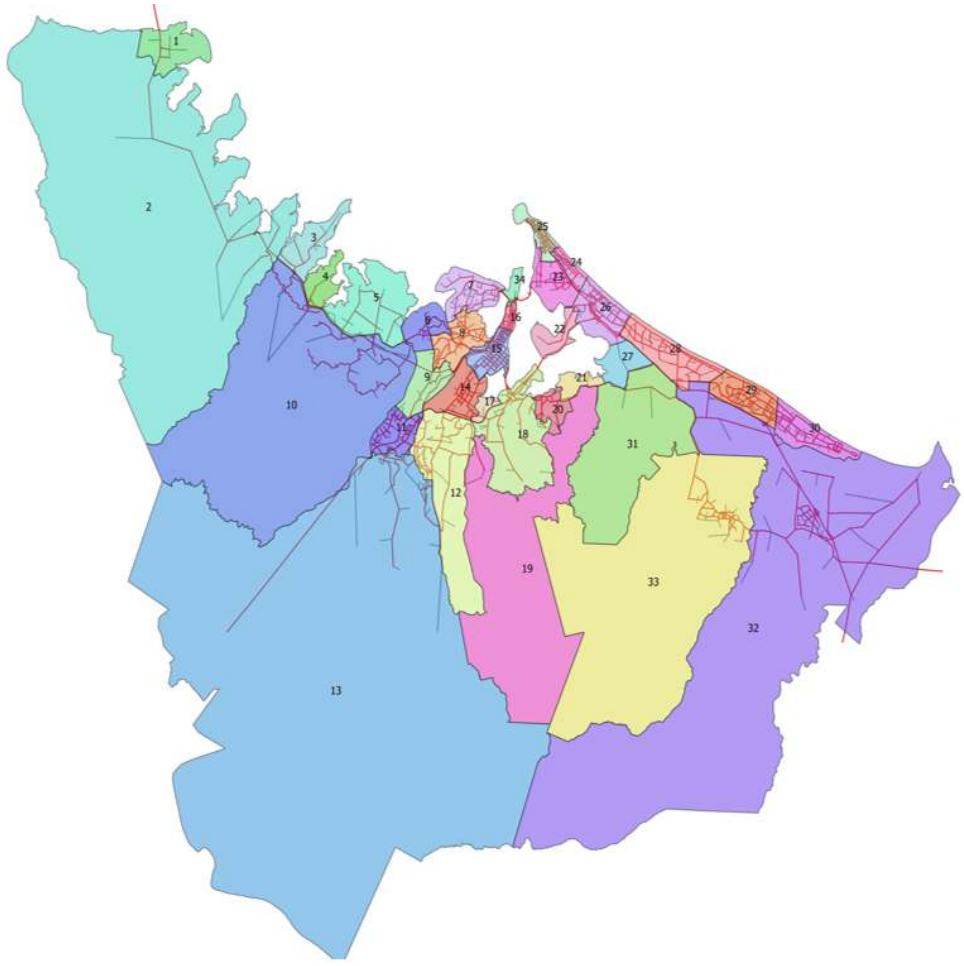
B

Appendix B – Travel Demand Analysis

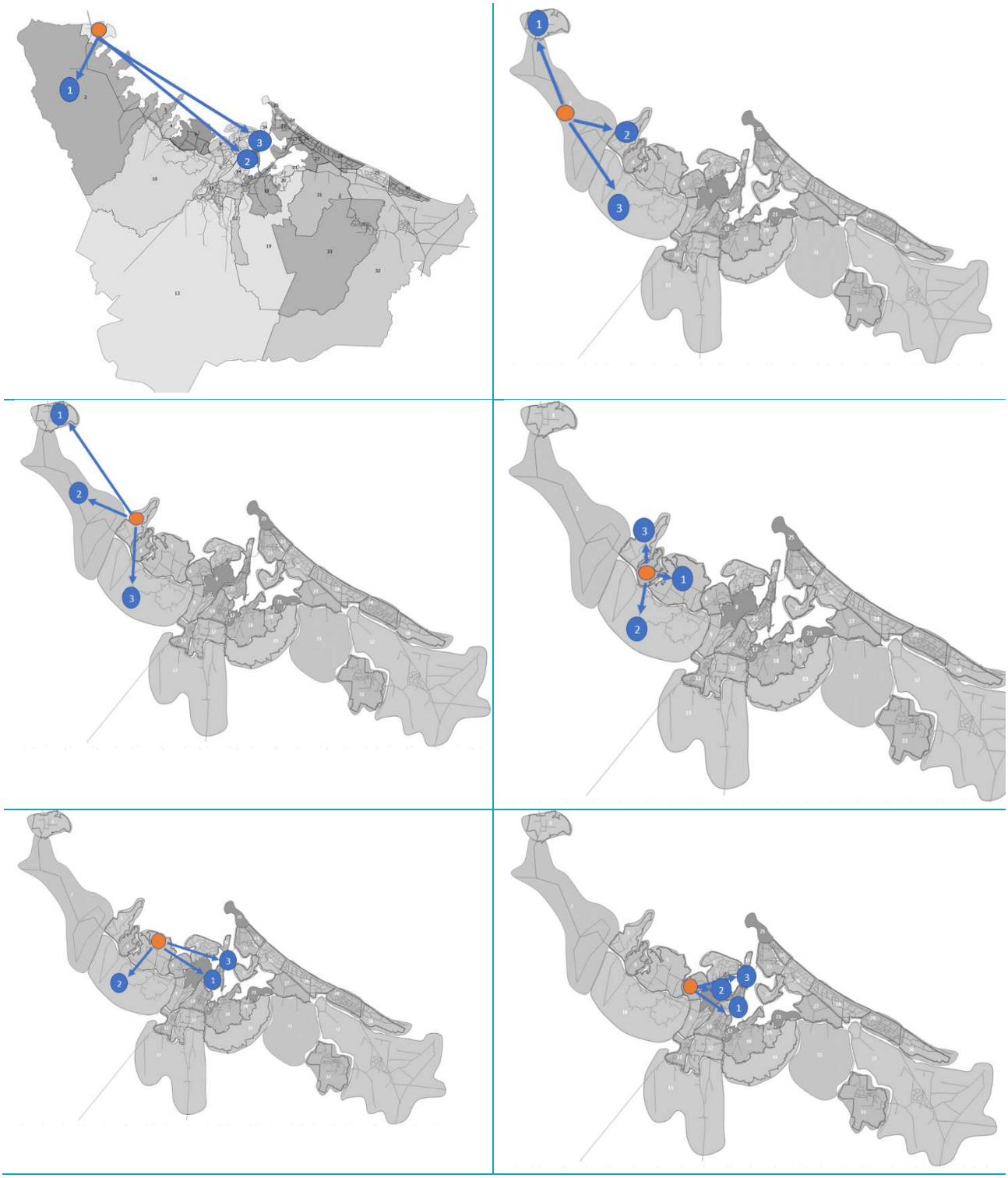
Method

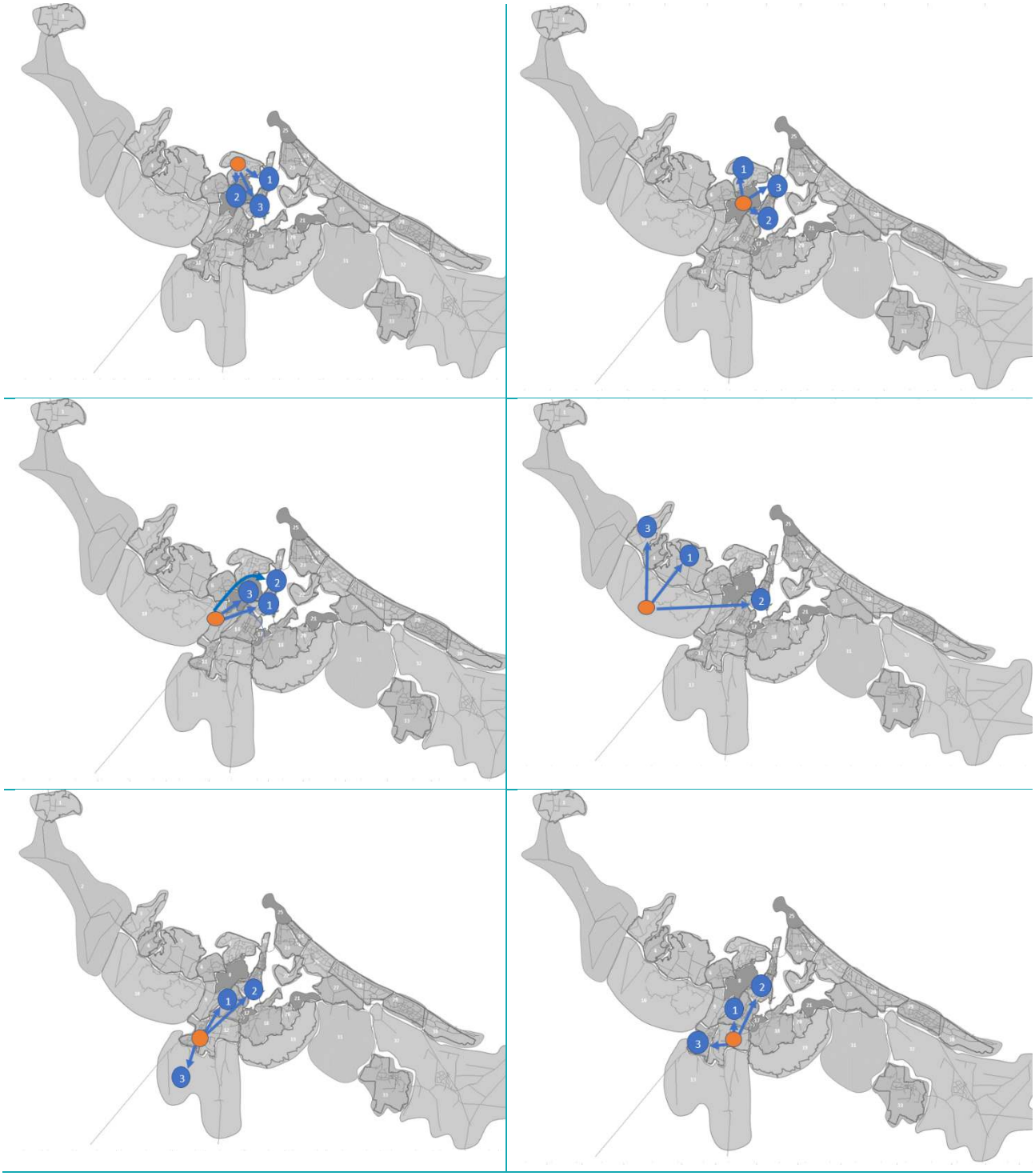
The TTM divides the sub-region into zones based on census area units. There are approximately 400 zones in the TTM. To simplify analysis the model zones can be aggregated into sub-areas in similar locations. This analysis uses sub-areas defined and applied in previous studies for consistency. There are 34 sub-areas used in the analysis as shown below.

Sub-area	General Location	Sub-area	General Location	Sub-area	General Location
1	Katikati	12	Pyes Pa	23	Hewletts
2	Apata	13	Omanawa	24	Omanu
3	Omokoroa	14	Greerton	25	Mount
4	Plummers Point	15	Tauranga South	26	Arataki
5	Te Puna	16	CBD	27	Kairua
6	Bethlehem	17	Poike	28	Papamoa
7	Otumoetai	18	Hairini	29	Wairakei
8	Brookfield	19	Ohauiti	30	Te Tumu
9	Cambridge Road	20	Welcome Bay	31	Papamoa Hills
10	Whakamarama	21	Waitao	32	Paengaroa
11	Tauriko	22	Matapihi	33	Te Puke
				34	Sulphur Point



AM Peak Hour Highest Movements from Each Zone

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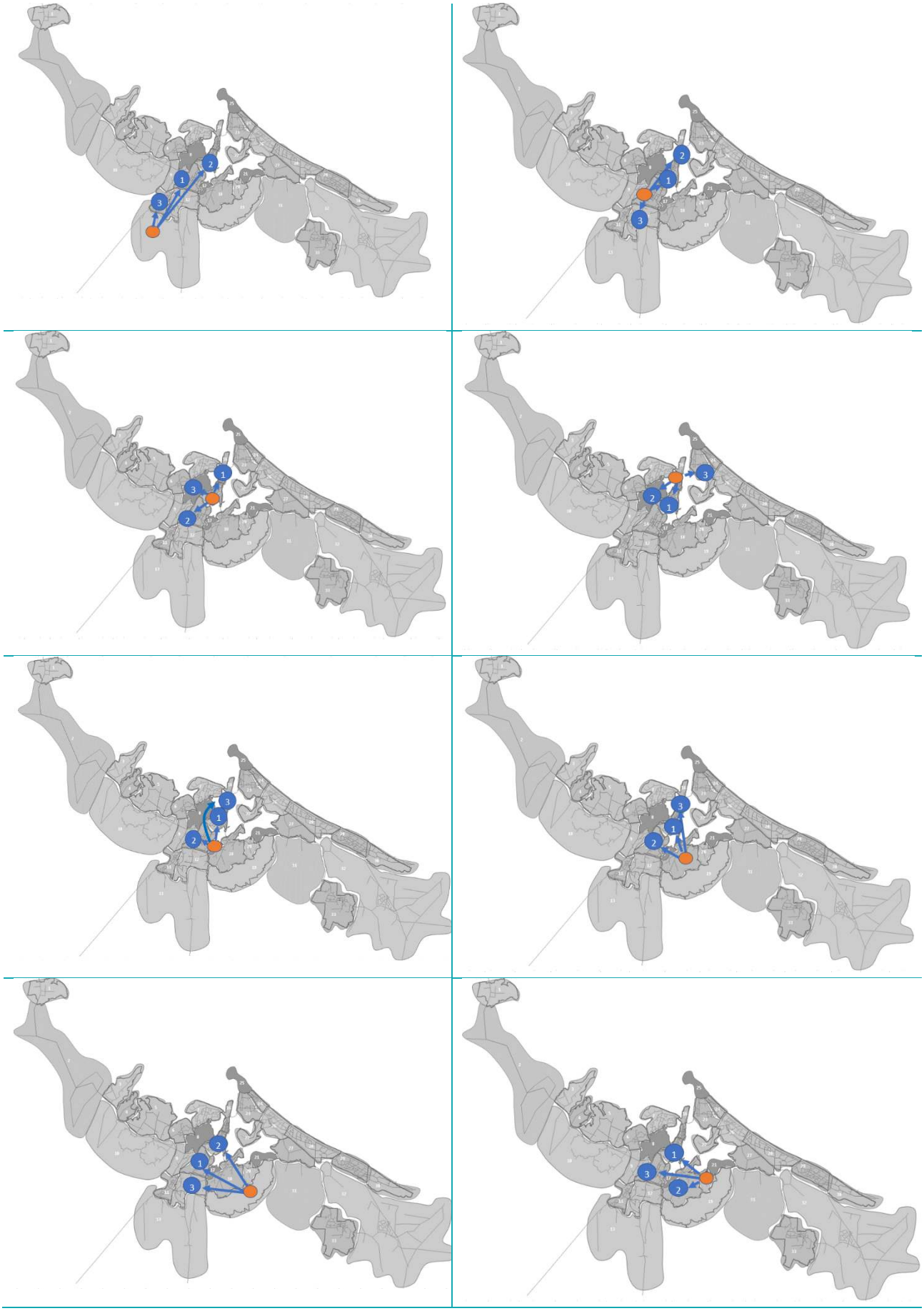
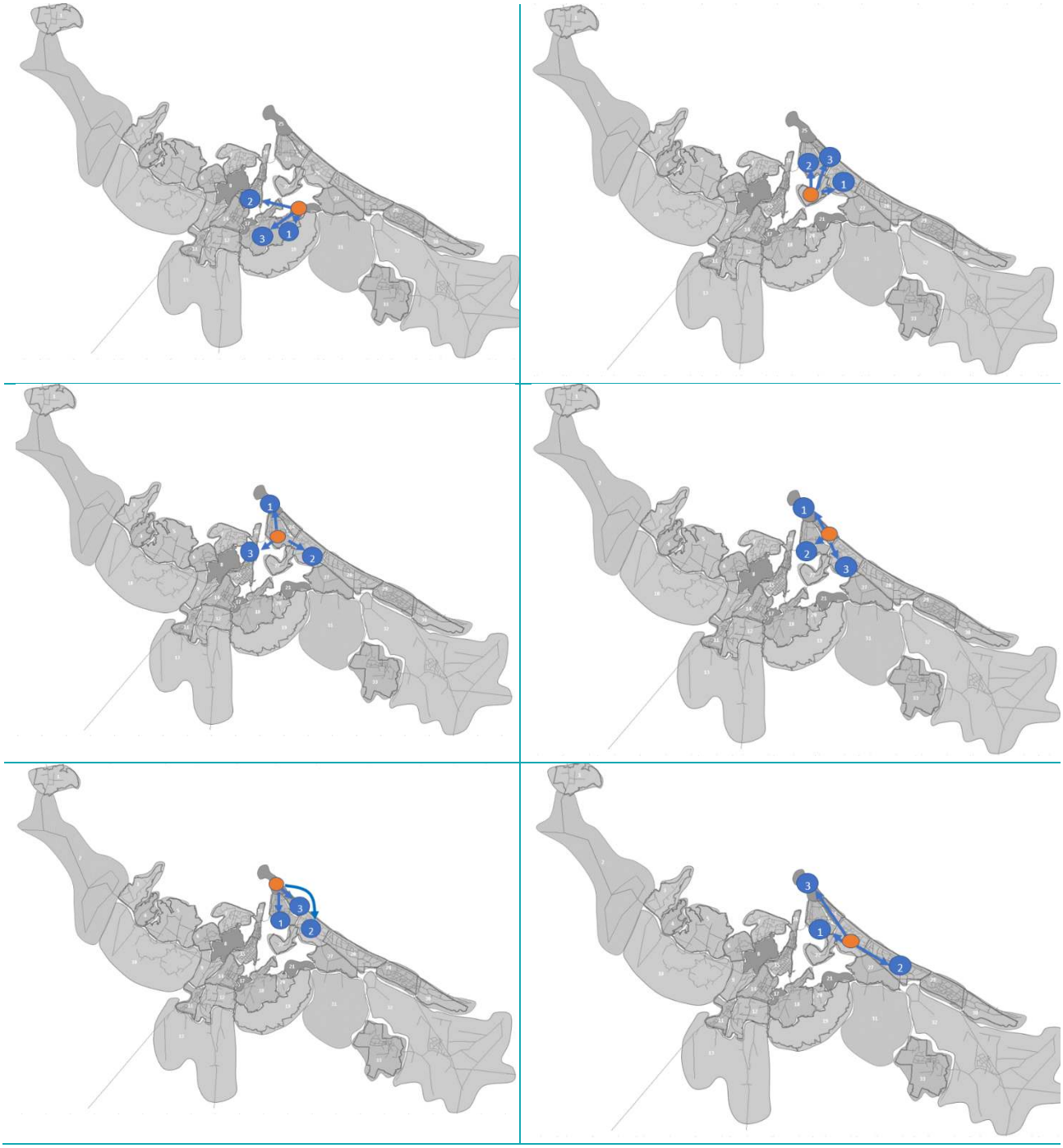
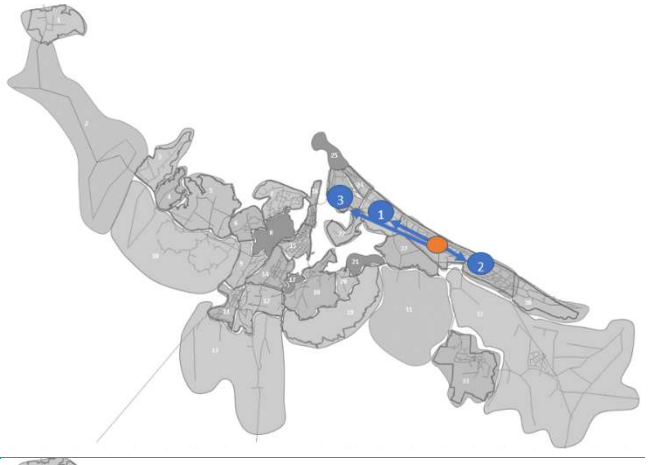
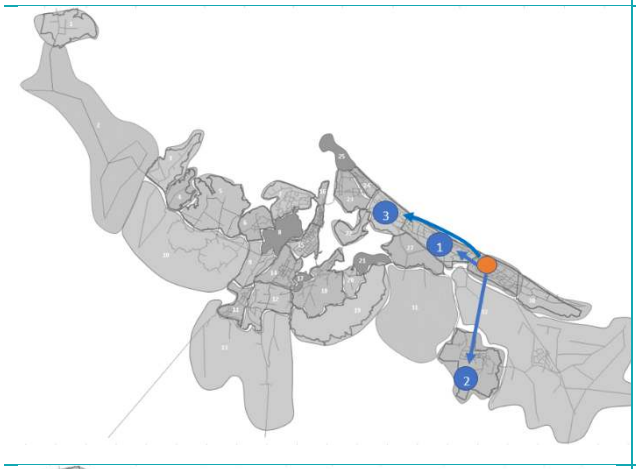
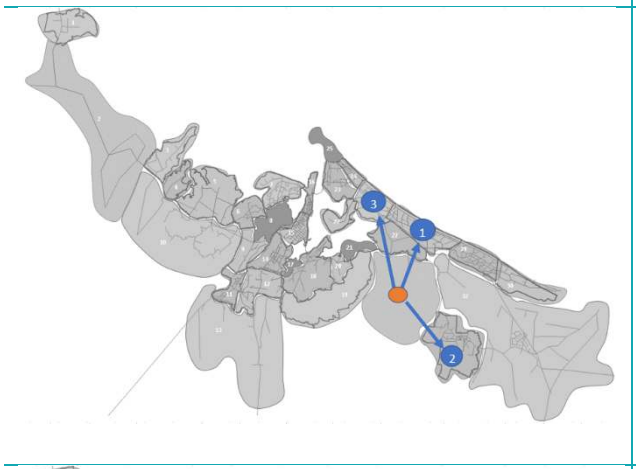
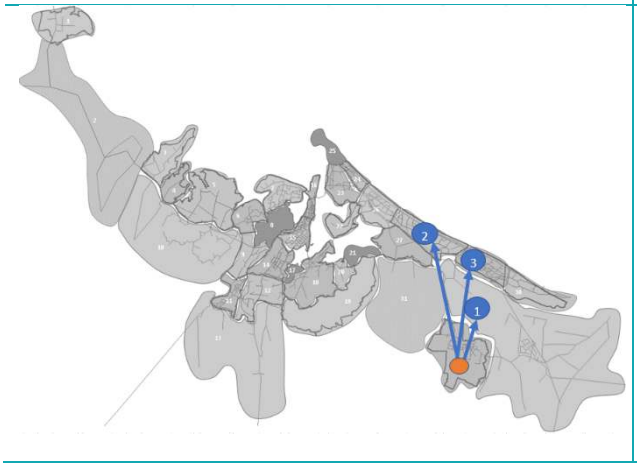




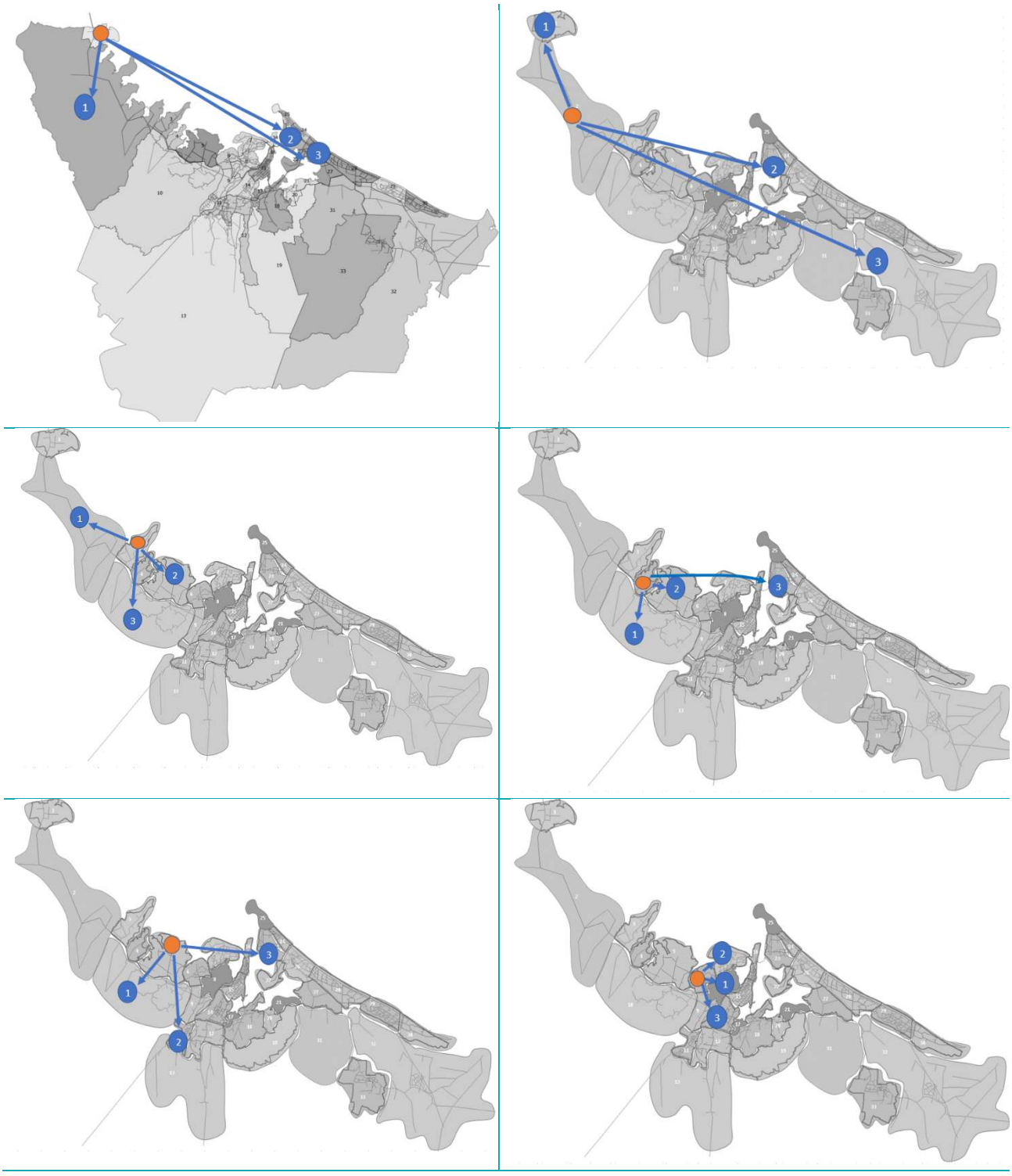


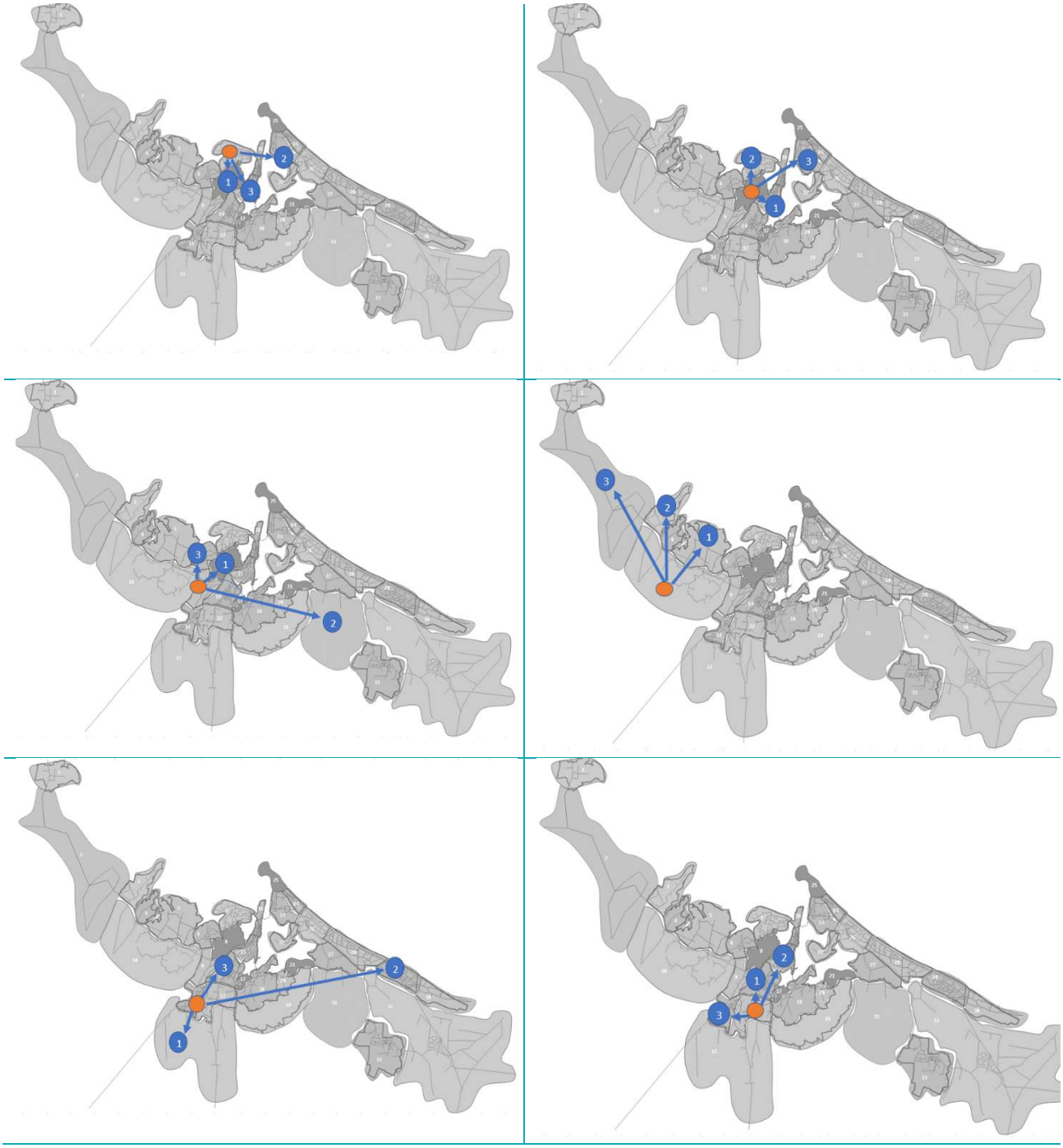


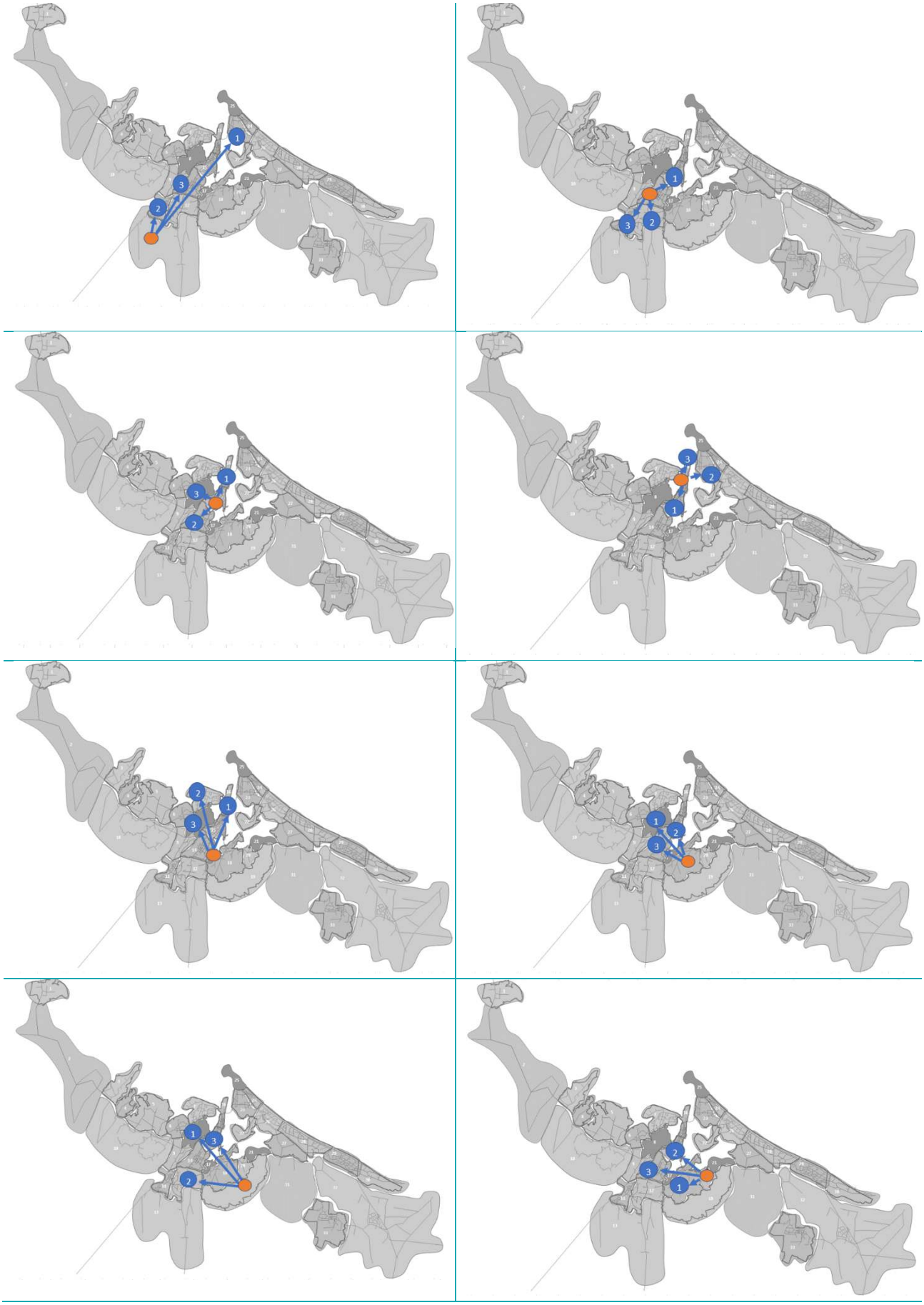

C

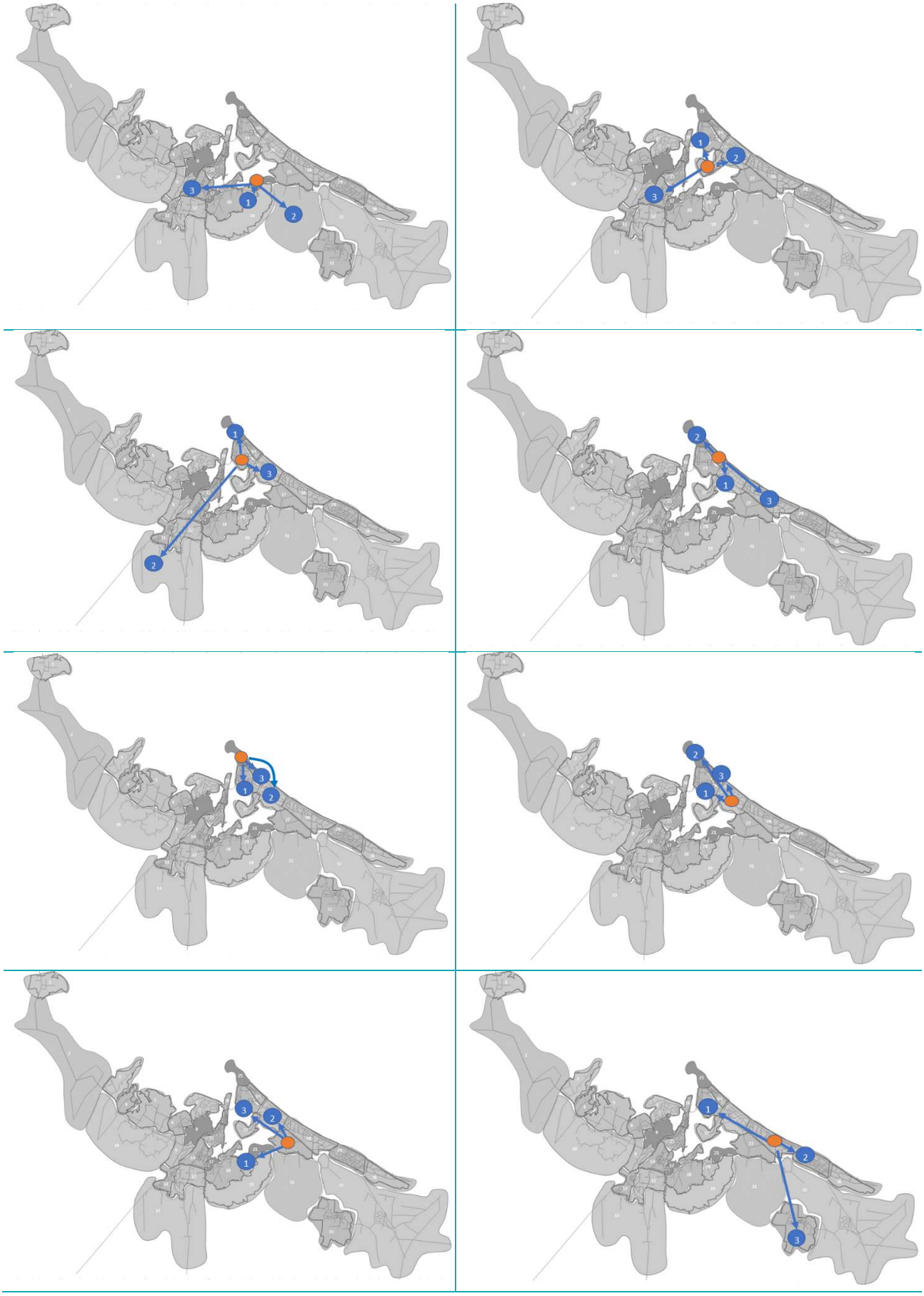
Appendix C – HCV O/D Data Analysis

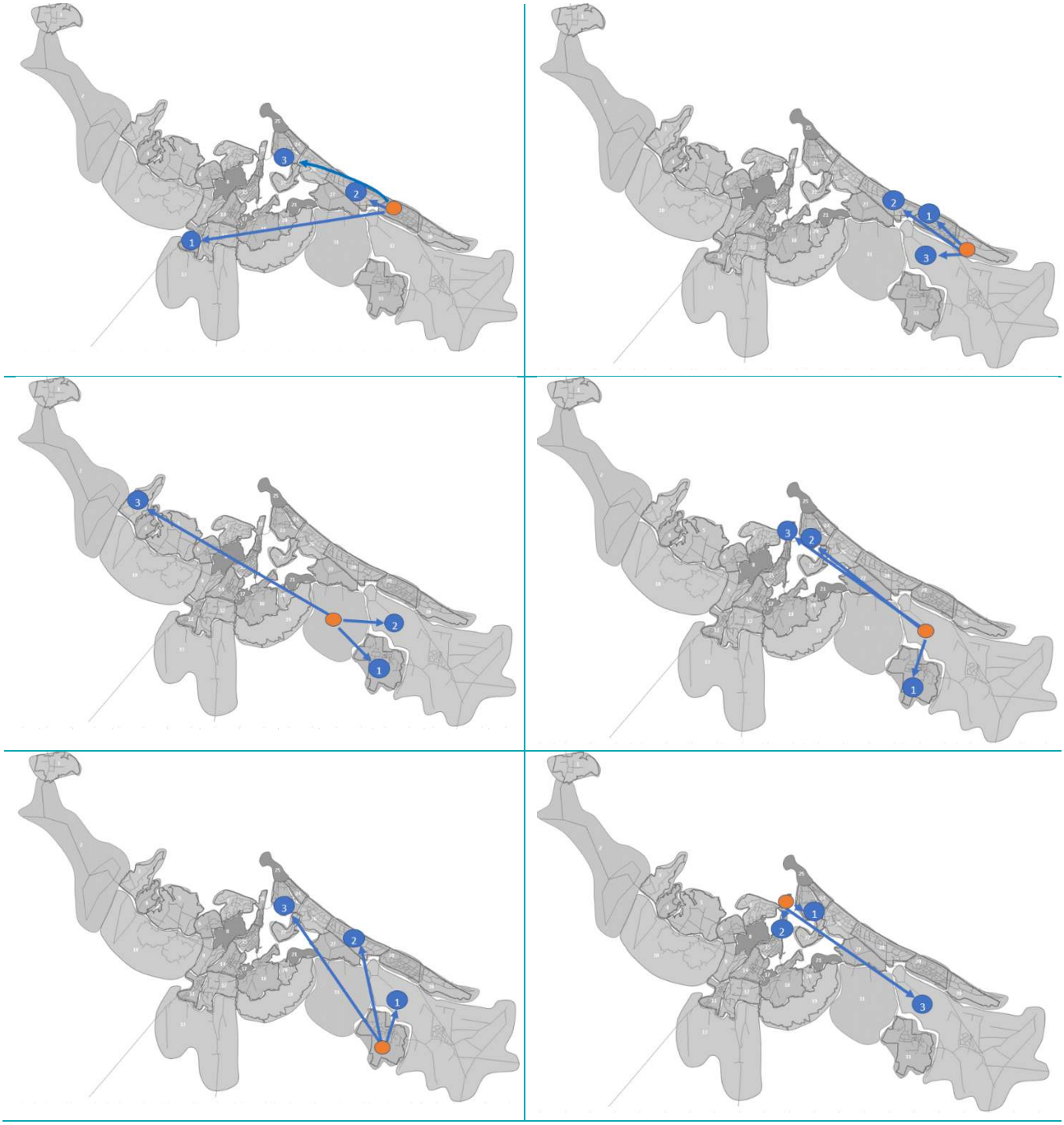
Heavy Goods Vehicles Daily Highest Movements from Each Zone









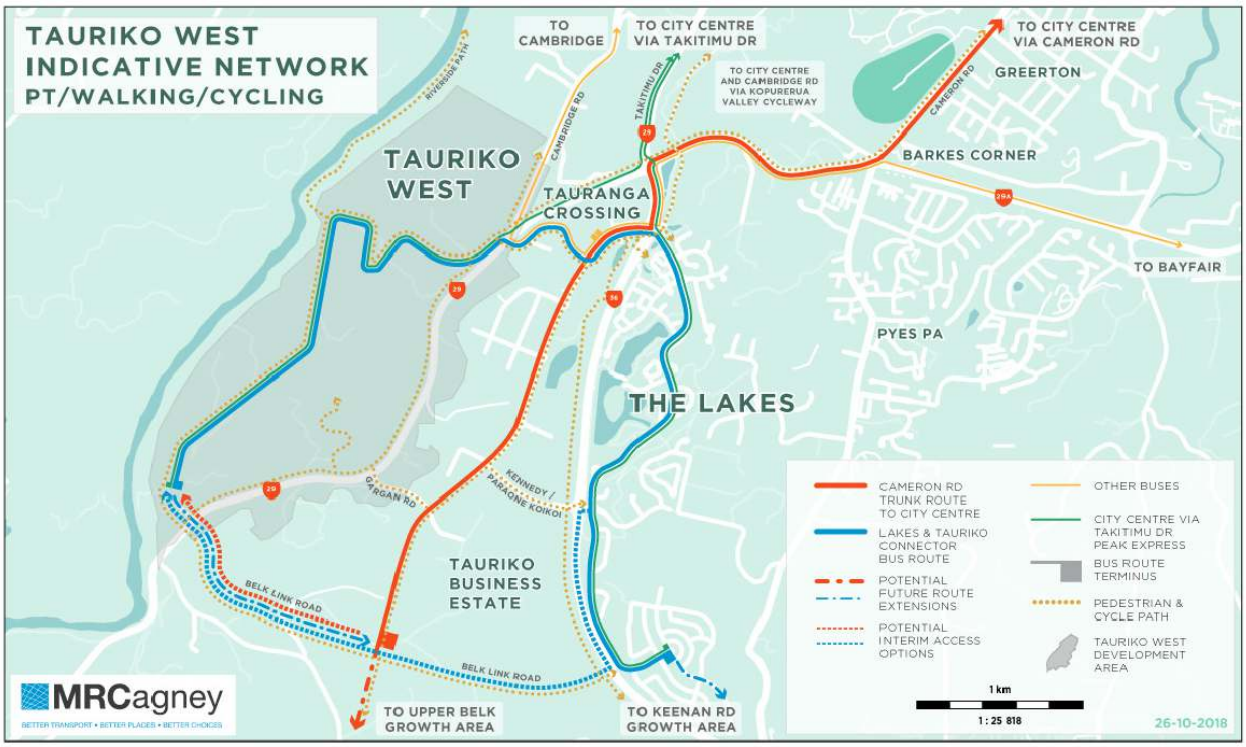


D

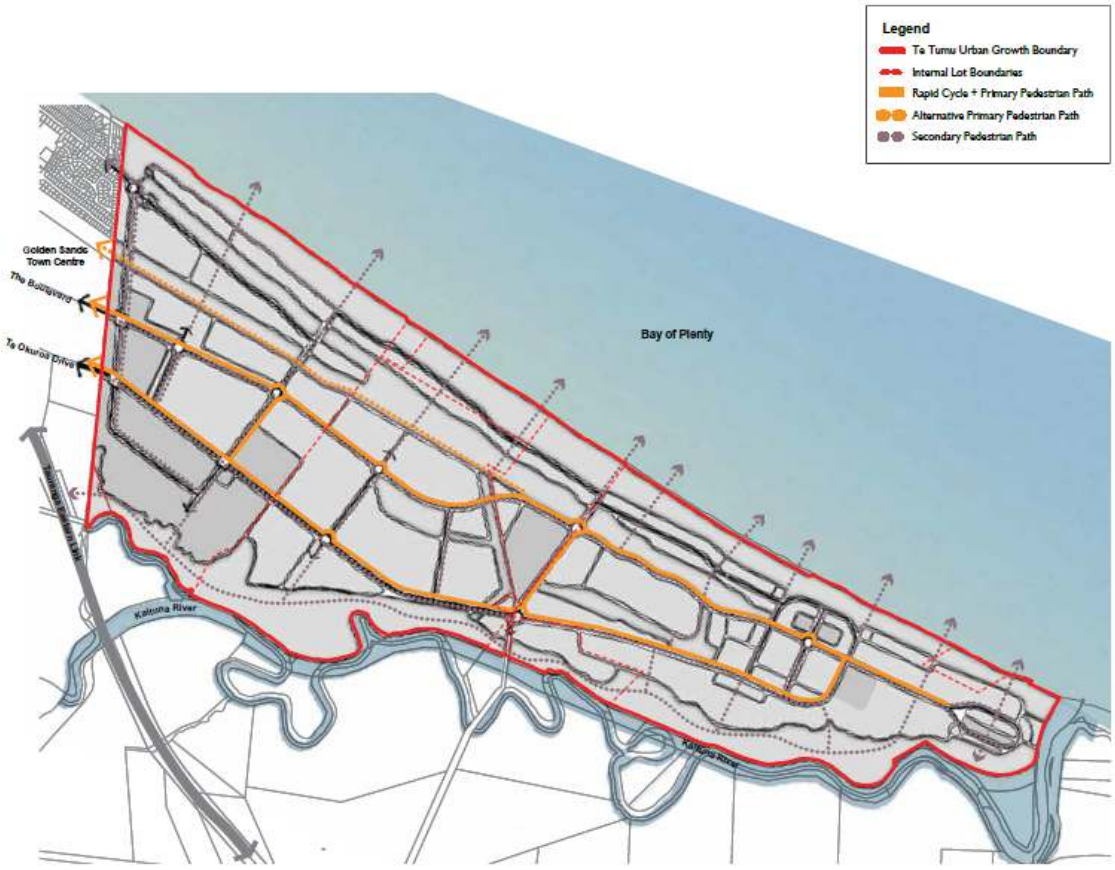
Appendix D – Structure Plan Information

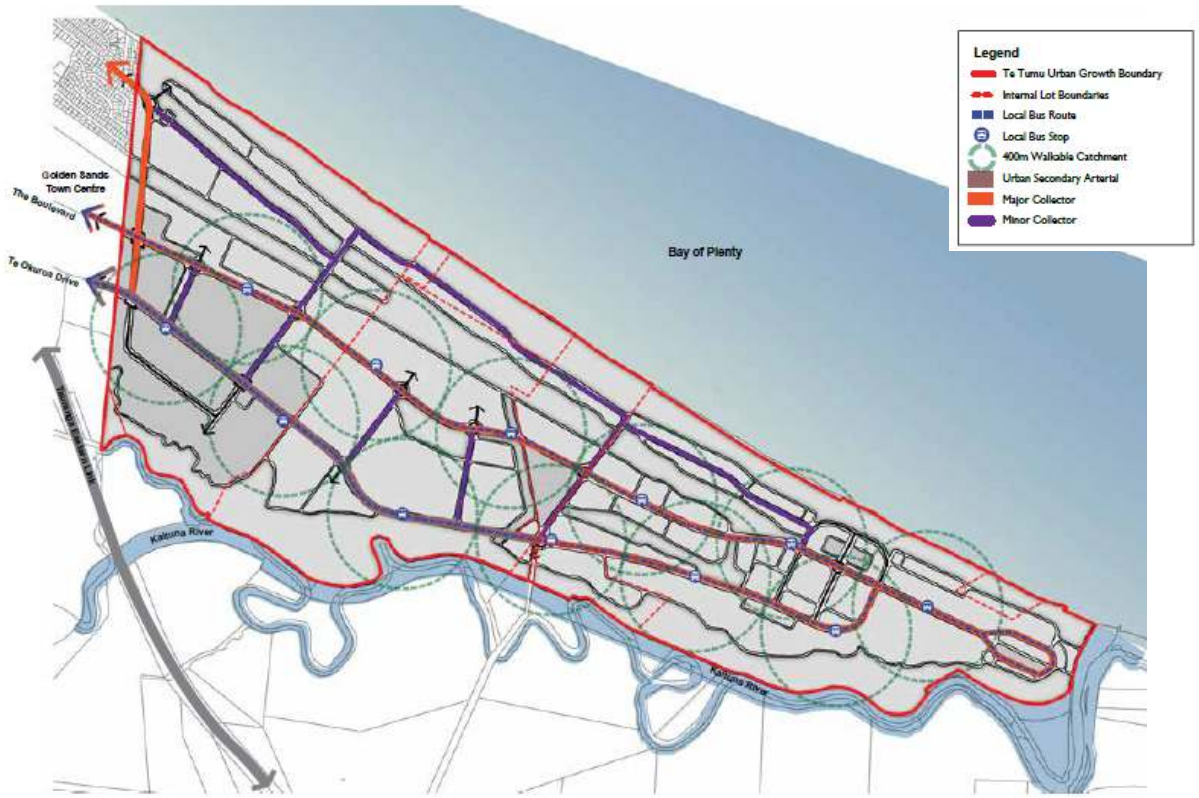
Te Tumu and Tauriko

The current draft network maps for these key growth areas are shown below.



Tauriko West Indicative Transport Network

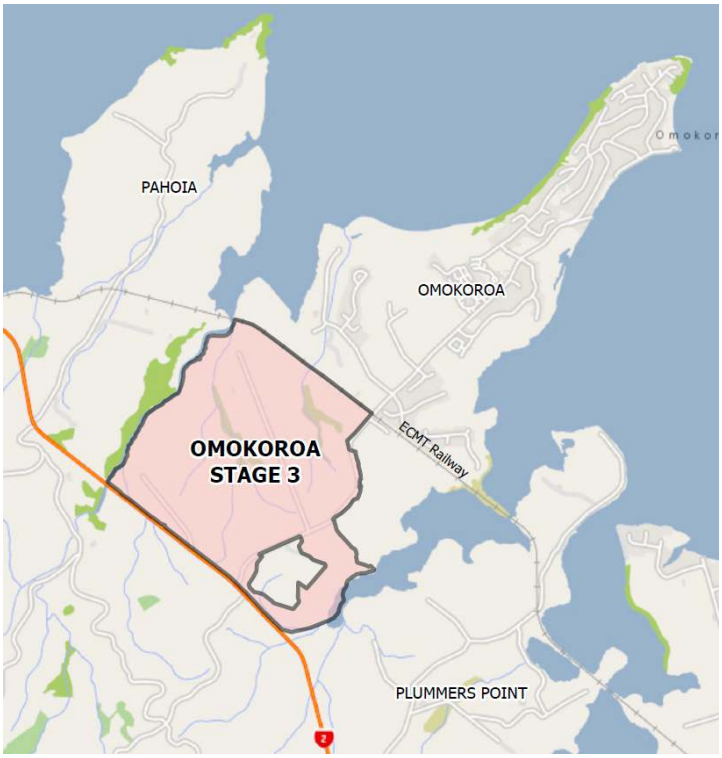




DRAFT Indicative Te Tumu Structure Plan

Omokoroa

Western Bay of Plenty District Council (WBOPDC) are working on a structure plan for the Omokoroa Stage 3 growth area. The structure plan is not yet available for use. The area considered by the structure plan is shown below.



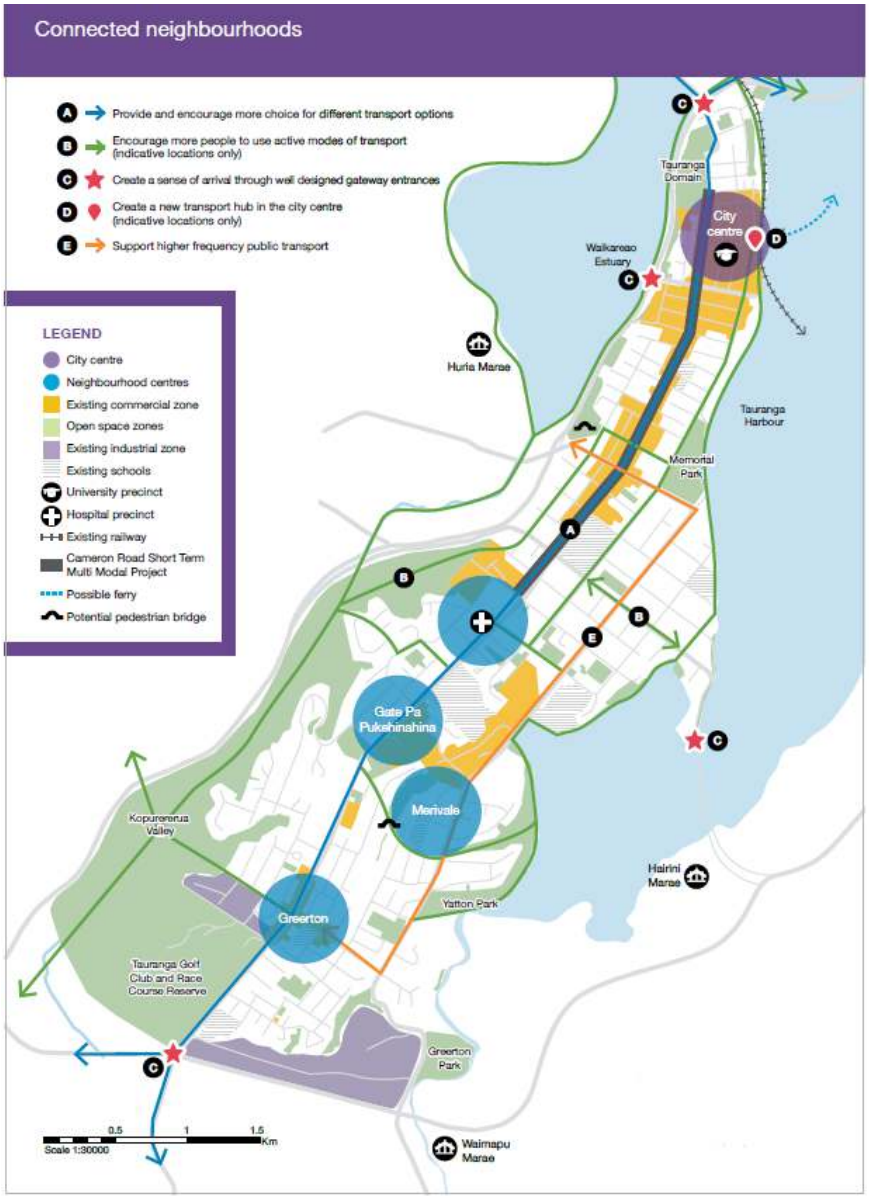
Draft Omokoroa Stage 3 Site

Te Papa Peninsula Indicative Business Case

The Te Papa IBC identifies a blueprint for the Tauranga Peninsula area within the sub-region for longer term improvements to housing choice, transport, local amenities and infrastructure. A primary focus of the blueprint is increasing housing densities and options along the Tauranga Peninsula specifically to help reduce urban sprawl and ultimately congestion on the transport network.

The Te Papa Peninsula is shown to have several blueprints which respond to different challenges of the area. The connected neighbourhoods blueprint provides proposed strategic improvements to respond to current gaps in the network and help improve connections between nodes and places. Notable improvements as part of the blueprint include:

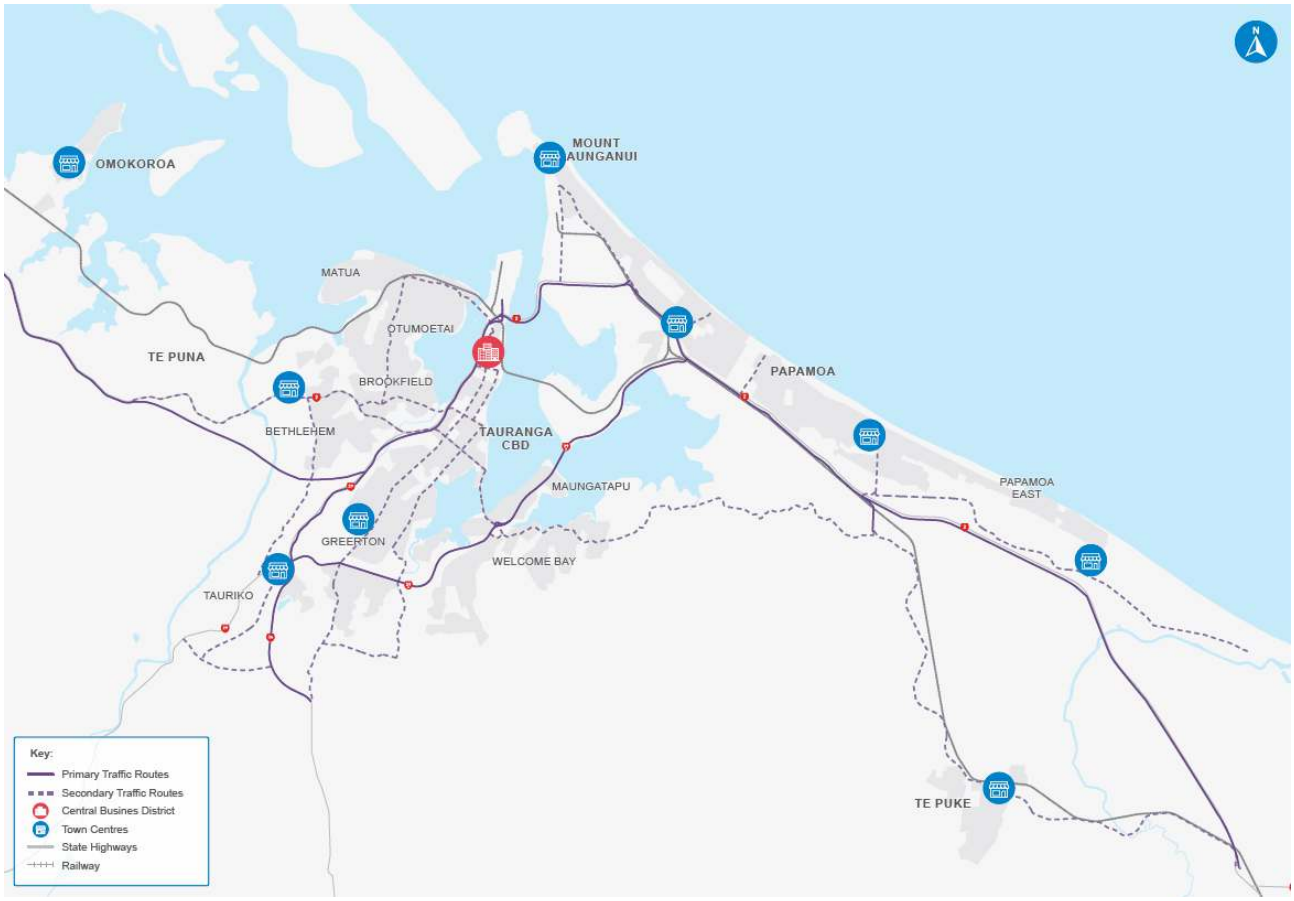
- Increased quality infrastructure for active transport users. This includes separated on road facilities and recreational pathways along the peninsula's harbour front.
- Improved public transport facilities and higher frequency bus services (operating at 15-minute headways)
- Improved sense of place and connection.



Connected Neighbourhoods Blueprint – Te Papa IBC

E

Appendix E – Draft Primary and Indicative Secondary Route Maps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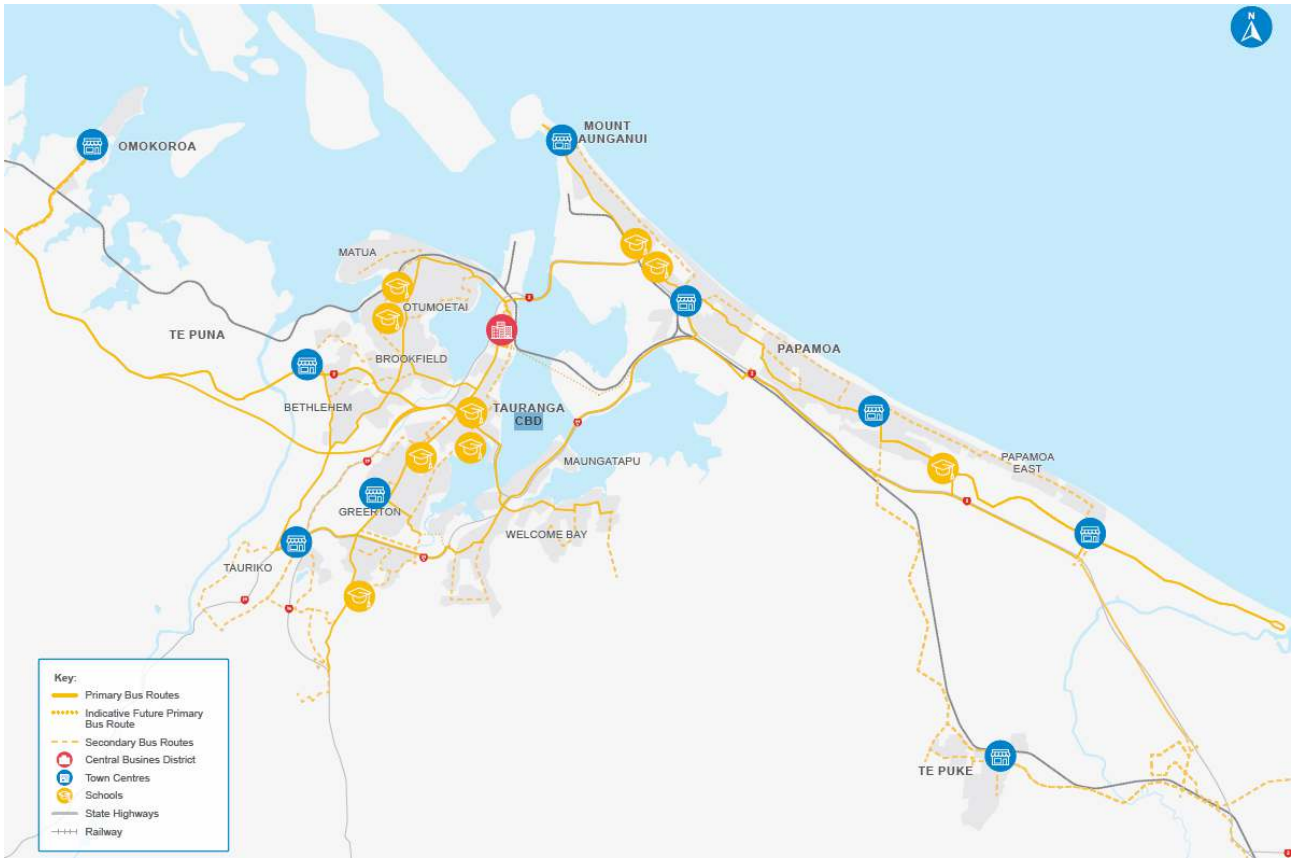
MOUNT MAUNGANUI
MATUA
OTUMOETAI
TE PUNA
BROOKFIELD
BETHLEHEM
TAURANGA CBD
PAPAMOA
MAUNGATAPU
PAPAMOA EAST
GREERTON
WELCOME BAY
TAURIKO
TE PUKE
Key:
Primary Traffic Routes
Secondary Traffic Routes
Central Busines District
Town Centres
State Highways
Railway


OMOKOROA
MOUNT MAUNGANUI
MATUA
OTUMOETAI
TE PUNA
BROOKFIELD
BETHLEHEM
TAURANGA CBD
PAPAMOA
MAUNGATAPU
PAPAMOA EAST
GREERTON
WELCOME BAY
TAURIKO
TE PUKE
Key:
Primary Cycling Routes
Secondary Cycling Routes
Central Busines District
Town Centres
Schools
State Highways
Railway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BROOKFIELD
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BETHLEHEM
TAURANGA CBD
MAUNGATAPU
PAPAMOA EAST
GREERTON
WELCOME BAY
TAURIKO
TE PUKE
Key:
Primary Bus Routes
Indicative Future Primary Bus Route
Secondary Bus Routes
Central Busines District
Town Centres
Schools
State Highways
Railway


OMOKOROA
MOUNT MAUNGANUI
MATUA
OTUMOETAI
TE PUNA
BROOKFIELD
PAPAMOA
BETHLEHEM
TAURANGA CBD
MAUNGATAPU
PAPAMOA EAST
GREERTON
WELCOME BAY
TAURIKO
TE PUKE
Key:
Primary Freight Routes
Secondary Freight Routes
Industrial Area
Tauranga Port
State Highways
Railway


OMOKOROA
MOUNT MAUNGANUI
MATUA
OTUMOETAI
TE PUNA
BROOKFIELD
BETHLEHEM
TAURANGA CBD
PAPAMOA
PAPAMOA EAST
MAUNGATAPU
GREERTON
WELCOME BAY
TAURIKO
TE PUKE
Key:
Primary Cycling Routes
Primary Traffic Routes
Primary Bus Routes
Indicative Future Primary Bus Route
Primary Freight Routes
Pedestrian Activity Centres
Central Busines District
Town Centres
Industrial Area
Local Shopping Areas
Tauranga Port
State Highways
Railway

F

Appendix F – TSOF Sub-Areas Memo

To: WBOP TSP Project Team **Date**: 19 June 2020

From: Craig Richards (Beca) and Duncan Tindall (GHD)

Subject: **Setting TSP Sub- Area Boundaries**

Purpose

The WBOP TSP needs to define sub areas for the purpose of developing and assessing interventions for the TSOF. These sub areas could also in future provide boundaries for business case development, possibly with changes arising through the TSOF process, should this be recommended and agreed through the TSOF.

This memo describes the TSOF sub areas for the option development stage.

Discussion

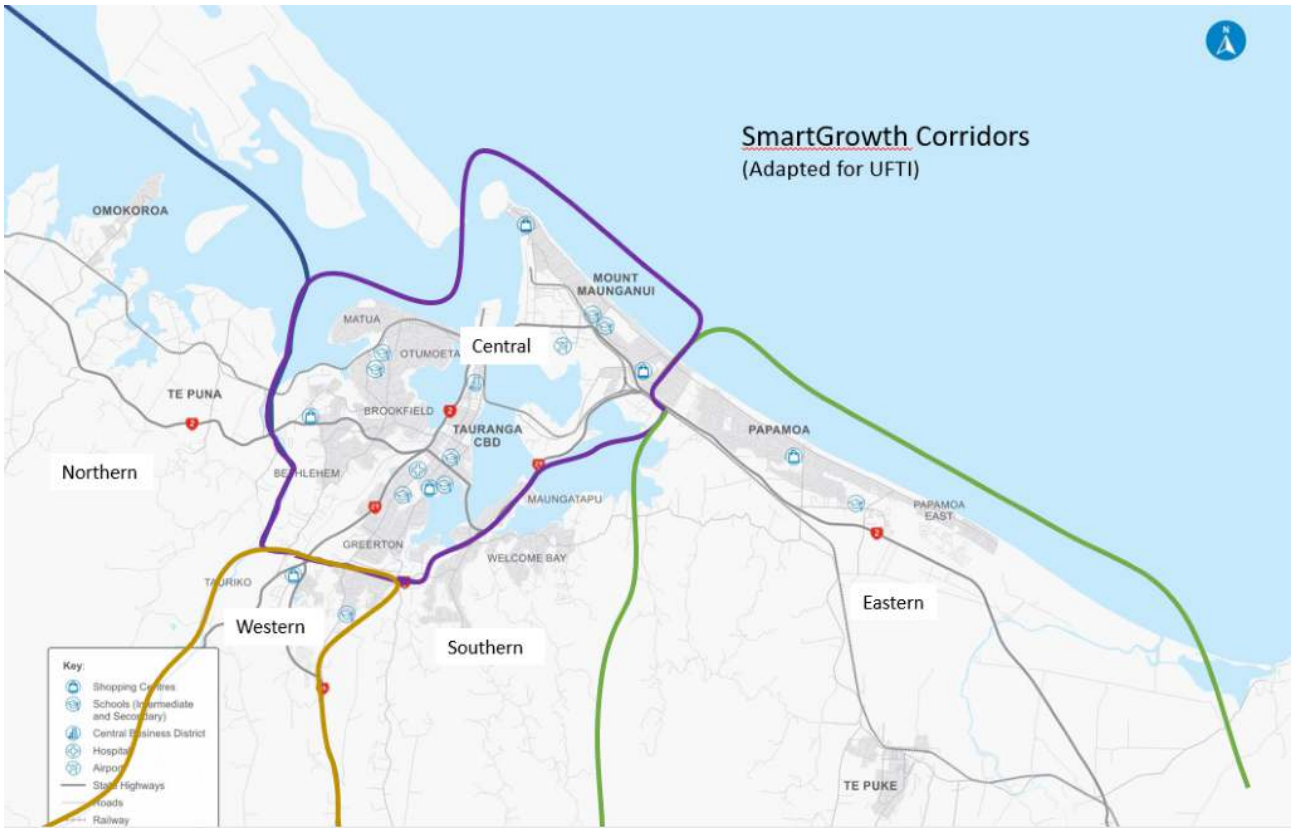
It is noted that SmartGrowth and UFTI have both used the term Corridors for the communication of future growth areas and these have broadly been aligned to follow State Highways (SH2 north and east), SH29 and SH36 with a 'central' corridor. These have been reflected in the historic growth of the City over the last 30 years, commencing in the central areas (Mount, Bethlehem), and then the east (Papamoa) and south (Pyes Pa, The Lakes) with the potential western corridor and eastern (Omokoroa, Te Tumu) development areas still to occur.

The sub areas being considered here for TSOF serve a different purpose. The SmartGrowth Corridors were defined to communicate the main trajectory of a logical pattern of urban growth along an existing infrastructure corridor. For the TSP sub areas, it is not the centre of the areas, but the boundary locations that are key to minimise the complexity of the assessment and stakeholder engagements. The SmartGrowth corridors provide useful guidance to defining the TSP sub areas. We are not proposing to change the SmartGrowth or UFTI corridors.

Draft Sub Area Definition

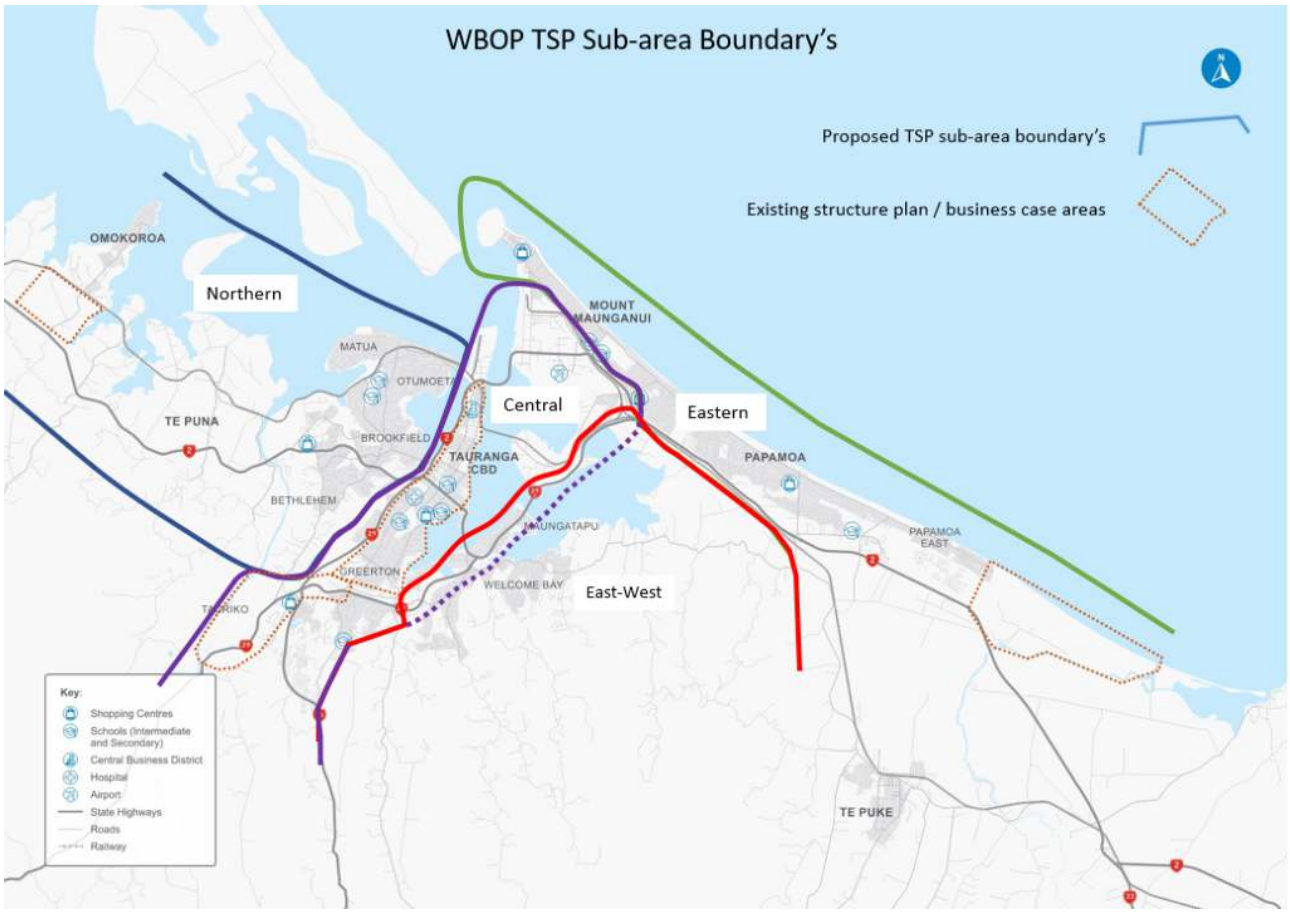
The following principles informed development of the TSP sub areas:

- Consider the key Strategic Journeys defined by UFTI in setting boundaries
- Include alternate routes along corridors within the same sub area ideally to support intervention assessment
- Define a reasonable number of sub areas to support efficient assessment, whilst avoiding very large and complicated single sub areas, i.e. possibly 4 or 5 sub areas would be reasonable
- Consider boundaries that ideally minimise the number of connections between adjacent sub areas
- Consider existing business case and structure plan work to inform sub area definition.
- The Smartgrowth (2013) 'Corridors' that have also been used by UFTI to describe key Strategic Journeys are shown indicatively below:



These Smartgrowth corridors provide some guidance on defining the TSP sub areas, but the corridors as they are do not achieve our principles. Particularly around right sizing the sub areas collectively and covering full strategic journeys within single sub areas.

The proposed TSP sub areas are shown in the following figure. These draw upon the SmartGrowth corridors with adjustments to suit the TSP requirements.



Of note:

- The northern sub area is largely as per the Smartgrowth norther corridor but includes Otumoetai. This is so the sub area considers the full SH2 journey (not split at the Wairoa River). Keeping Matua, Otumoetai and Brookfield in the same sub area is supported by origin / destination analysis showing high demand for movement between these suburbs. Chapel Street, Waihi Road, Cambridge Road and Route K (and the Valley Cycleways) are the only transport links across the boundary simplifying analysis.
- The Tauriko SH29 and Pyes Pa area (to Oropi Road inclusive) is within the central sub area. This covers the full journey from the Kaimai range to the Port of Tauranga (a primary freight route) and the Tauriko / Pyes Pa to CBD via Te Papa routes in one sub area. Much of the non-state highway area has been considered as part of the Cameron Road IBC, and by retaining this area as a cohesive block, avoids duplication of work.
- An east-west sub area is defined to cover the SH29A journey. This sub area also considers the southern suburbs (Oropi – Waitao). SH29A is primarily considered within this east-west sub area, but this route would also be considered influential in the central sub area when considering the role of SH29A in supporting the primary freight route on SH29/2.
- The boundary of the central sub area would overlap with the east-west sub area and there may be other important influences near the boundaries that need to be considered in two sub areas i.e. Baypark, Bayfair between the central and eastern sub areas.

- Mt Maunganui is within the eastern sub area. Origin / destination analysis shows strong demand for movement along the coastal strip and there are similar land use and transport characteristics between Mt Maunganui – Arataki – Papamoa. These being slightly different to the more commercial and higher intensity central sub area meaning that there is a modal consistency which will simplify the analysis.
- These boundaries achieve the desired outcomes of minimising the interdependency between adjacent sub-areas. The boundaries also provide for logical differentiation of stakeholders for future engagement processes. In all cases it is recognised these sub-areas all form a single system and will need to be integrated in both operation and phasing of delivery. However, it is considered that for both external purposes and internal analysis, these boundaries allow efficient and effective development of options for the TSP.

Kind regards

Craig Richards and Duncan Tindall

G

Appendix G – SmartRoads NFA Tool Memo

Sensitivity: General

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21 August 2020

WBoP Transport System Plan

Tauranga System Operating Framework, Smartroads Tool Assesment

This report summarises the identification and assessment of operating gaps for the WBOP Transport System Operating Framework (TSOF) using the SmartRoads 7.1.3 tool.

1.0 Purpose

The purpose of the tool is to inform the development of a SOF for the Western Bay of Plenty Transport System Plan project. The SmartRoads tool is one component in understanding 'operating gaps' in the transport network, representing the difference between the base level of service (LOS) and the target LOS for each mode and by time of day. This is important as it ensures options are targeted to areas and modes with the most significant service issues at different times of the day.

2.0 Methodology

A Network Operating Framework was developed for Tauranga using the SmartRoads software in 2018, which forms the basis of this update.

For the SOF, the tool required updating to:

1. Increase the spatial coverage of the tool, extending out to near Te Puke to the east, Katikati to the northwest, and State Highway 29 approaching from the south;
2. Update the transport demands to match those from the recently developed Aimsun transport model;
3. Improve the definition of the network with more roads, streets and routes included as per the Aimsun model network; and
4. Update mode priorities in the tool with priorities derived through workshops with project partners for the TSOF.

The SOF tool is based on the Aimsun network having the benefit of the network structure being the same. As a result, there is an easier and more rapid translation of scenario model flows to the tool and presenting the information with the same network definition in reporting.

A 2031 scenario is being used as the basis of comparison for the SOF tool, being the closest Aimsun forecast year to a decade from today as agreed with the SOF working group. This scenario will be used to:

A. Identify and understand the network gaps by mode to help inform the generation of options; and
B. As a basis to assess the effectiveness of the network options against.

This report describes the development of the SOF tool to assist with A above, and to be the basis of B.

2.1 Development of Strategic Network

The development of the SOF in workshop sessions utilised Strategic Objectives and Network Principles to define network and place roles for transport corridors in the project area. For each of the transport modes, priority networks were developed through collaborative exercises using GIS maps to determine the priorities for each mode.

The following outlines the steps taken to develop the strategic network which informed development of the SOF SmartRoads tool.

2.1.1 Strategic Objectives and Network Principles

Strategic Objectives and Network Principles set the strategic context and mode-based aspirations for the network. These underpinned and guided development of the Strategic Network. The Strategic Objectives outline aspirations and approach for operations for each mode in the network.

With the initial Strategic Objectives developed, Principles corresponding to each mode were developed. Principles guide the application of Strategic Objectives at a network level by attributing modal priority routes throughout the network. For each mode, there are two Principles, Primary and Secondary, to identify mode based route priorities. For general traffic, the primary and secondary priorities are translated to four levels of principles in the Smartroads tool to allow a greater level of prioritisation (from local access through to preferred access routes) to recognise the extent general traffic operates on the network.

Table 1: Network Principles

Mode	Route type	Network Principles
Pedestrians/ mobility impaired 	Primary	Provide connections and space for high volumes of pedestrian movement and placemaking within pedestrian activity centres[1].
	Secondary	Provide safe linkages within walking catchments to/from activity centres and other key destinations such as; major employers, libraries, local centres, residential areas, schools, recreation reserves, public transport nodes.
Cycles/ micro-modes[2] 	Primary	Provide safe and reasonably direct connections suitable for less confident cyclists to activity centres, major employers and on routes with high concentrations of school trips. Removed where possible from routes where there are higher volumes of large mass vehicles such as buses and trucks.
	Secondary	Connect primary routes and provide connectivity to key destinations such as; local centres, libraries, residential areas, schools, recreation reserves, public transport nodes.
Public Transport 	Primary	Connect residential areas with activity centres and major employers via direct routes served by frequent bus services e.g. 15min headway or less.
	Secondary	Provide public transport network coverage that connects suburbs with the primary public transport network and with local destinations and services such as; libraries, local centres, schools, recreation reserves.
Freight 	Primary	Provide inter-regional connections and connectivity to major industrial areas/ ports via higher speed direct routes, avoiding land use conflicts.
	Secondary	Provide connections between the primary freight routes and key business areas / freight trip generators.
General Traffic 	Primary	Provide for inter-regional and longer distance sub-regional movement. Minimise conflict with adjacent land uses.
	Secondary	Provide connections between residential catchments and activity centres and connectivity to primary traffic routes.

2.1.2 Strategic network definition

Using the network principles developed for each transport mode the project team defined priority networks throughout the project area in workshops with the Project Partners using online GIS maps.

For PT, cycling and freight the primary and secondary routes were translated directly into the tool. The primary and secondary traffic routes were translated as preferred traffic and traffic routes into the tool,

[1] For this project, activity centres are defined as the city centre, sub regional centres and town centres as described in the TCC City Plan and Urban Strategy

[2] For this project, micro-modes are defined as small, typically electric, personal powered vehicles such as e-scooters.

maintaining the methodology used in the 2018 Tauranga NOP. Pedestrian priority was defined within pedestrian activity centres.

2.2 Base network and traffic data

A 2031 SOF network was developed from the GIS based Aimsun model network, in a spatial format suitable to be read in the SmartRoads tool.

Demands by mode were extracted from the Aimsun model for each link and matched to the tool using unique IDs. This will allow simple updates as new scenarios or options need to be tested. Three time periods were modelled including morning peak (AM), inter peak (IP) and evening peak (PM), using average hourly traffic flows for general traffic, freight, bus and cycle modes. Pedestrian and inter peak cycling data were not available from Aimsun.

Primary and secondary routes for each mode were supplied from the SOF team, which were coded into the tool. When viewed in SmartRoads, the tool recognises that the relevant transport mode should take priority of movement along these primary and secondary transport routes. This is an important input for determining service gaps on each link, discussed further in Section 3.0.

2.3 Activity areas

Activity areas inform how the SOF tool establishes the target LOS and the level of encouragement of each mode. Area categories were initially developed for Australia and have since been redefined to fit the New Zealand context. Activity areas include:

- Activity Area Level 1 (Central Business District) – Significant function as a regional centre with an intense concentration of development and business;
- Activity Area Level 2 (Suburban Centre) – Containing a wide mix of community services and a diverse range of retail and commercial activities;
- Activity Area Level 3 (Local Town Centre) – Providing for the needs of surrounding local communities; and
- Activity Area Level 4 (Local Shopping Area) – Continuous retail or commercial development abutting a major arterial road or state highway.

The SOF team provided the activity areas in Tauranga as shown in Figure 1.

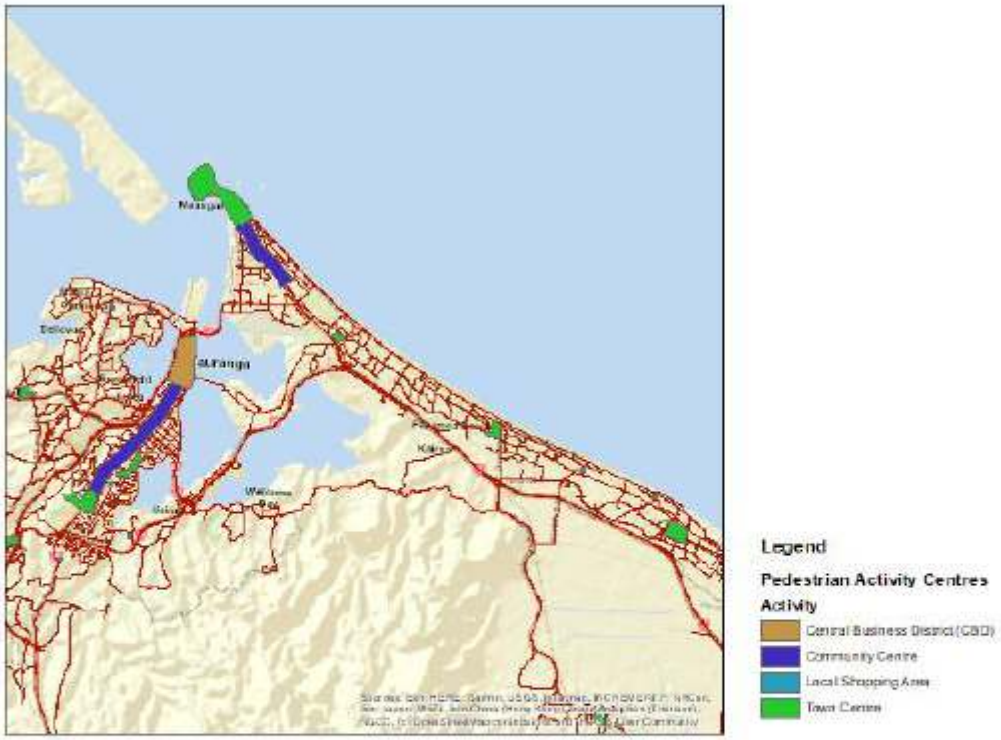

Figure 1 : System Operating Framework activity areas

Activity areas were subsequently adjusted to fit with definitions described above, thereby ensuring the tool assigned the appropriate levels of encouragement for each mode. Notably the classification of the Tauranga CBD as Level 1 was deemed unsuitable as SmartRoads considers a Level 1 activity area to be a major urban centre of similar scale to Auckland, Wellington or Christchurch. Updated activity areas are shown in Figure 2.

Figure 2: Redefined activity areas

2.4 Base Levels of Service

A base LOS is required for each link, with a letter value between A and F assigned based on how the link performs for different modes. In the 2018 NOF, this was a subjective process where relevant stakeholders collaboratively assessed LOS link by link considering a variety of aspects including mobility, safety, accessibility and amenity. Given the size and structure of the updated network, quantity of links, and time constraints, a simplified approach was adopted which is appropriate for the SOF network analysis.

Base LOS was calculated using the ratio of posted speed to modelled speed across the time periods based on the Aimsun model outputs for general traffic, freight and public transport. Results below 30% were considered LOS F, while results above 67% were LOS A. These bands are consistent with Tauranga transport modelling protocol, so the congested travel time between the two sources of information is consistent. The LOS bands are shown below in Table 2.

Table 2: General traffic, freight and bus LOS bands

Ratio (%)	LOS
<30	F
30-40	E
40-50	D
50-67	C
>67	A, B

Cycle LOS was based on the relative attractiveness scores for each route from the Tauranga Cycle model, with an 'attractiveness index' value assigned to links. 15 was considered a high standard with

designated cycling infrastructure, uninterrupted by vehicle movement. Values between 10 and 12 were regarded as a lower standard and included painted, unbuffered cycle lanes or no specific cycling infrastructure. Links ranked 15 were given a LOS A while values 10 and below were assigned an F, as shown in Table 3. This was necessary to convert the 15 attractiveness factors to LOS ratings.

Table 3: Cycle LOS bands

Attractiveness Index	LOS
15	A
14	B
13	C
12	D
11	E
10	F

The relative attractiveness definitions used to assign cycle LOS values differ slightly from the LOS band definitions used as standard in the tool. Attractiveness index scores were based on the provision of cycling infrastructure on different road types, whereas LOS definitions in the tool also consider other variables including delay, mode conflict, crossing points and disruption at intersections. For links ranked A, E or F, the definitions largely align as highly attractive/unattractive routes for cyclists are also likely to experience low/high levels of conflict and delay. For links ranked B, C and D, the alignment was less uniform. For example, an unsealed path would be ranked C for cycle attractiveness, yet this same path may have low levels of conflict or delay, therefore warranting a higher score based on the tool definitions. These differences in definitions were deemed insignificant with little or no impact on the high city-level outputs required for the SOF.

2.5 Vehicle occupancy

Data for each mode is input in vehicles per hours and then assigned an occupancy value by the tool to understand the efficiency of movement of people through the network. Occupancy values are consistent with the previous NOF investigations and are displayed in Table 4.

Table 4: Vehicle occupancy by mode

Mode	Occupancy
General Traffic	1.4
Bus	30.0
Bicycle	1.0
Freight	1.0

3.0 Mode encouragement

Based on the defined priority routes and activity areas, the SmartRoads tool assigns levels of encouragement for each transport mode. Levels of encouragement assigned to modes are based on their relative priority on each link, with each level of priority associated with a relative LOS. For example, on a bus priority route, buses are either encouraged or strongly encouraged depending on whether the route falls within an activity area and therefore should experience a relative LOS of B or above. Relative priority of each mode can be represented in the tool as priority arrows with arrow types representing levels of encouragement and associated with a relative LOS. Arrow symbology and corresponding relative LOS is summarised in Table 5.

Table 5: Priority arrows and relative LOS

Arrow types	Relative priority	Relative LOS
←	Strongly encourage	A
←	Encourage	B
	No specific encouragement	C
←- -	Encourage local access only	D
←····	Local access only	D-

The tool assigns encouragement to each mode based on time of day, activity area and whether the link falls on a priority route. Table 6 provides an example summary of encouragement for buses.

Table 6: Bus priority within the SmartRoads software

	Place				
	Bus priority within				Not on a bus priority route but within the bus network
Time of day	Outside of activity centres	Local Shopping Area & Community Centre	Major Town Centre	Central Business District	
AM Peak	←	←	←	←	←
Inter Peak	←	←	←	←	←
PM Peak	←	←	←	←	←
Off Peak					←

The following figures display priority arrows for key sections of the Tauranga network. Note, given the number of links within the network, the priority arrow display appears cluttered and difficult to interpret. This is due to the large number of links to replicate the full extent of Aimsun model network. Images should, however, provide confirmation that the tool is assigning mode priority as intended.

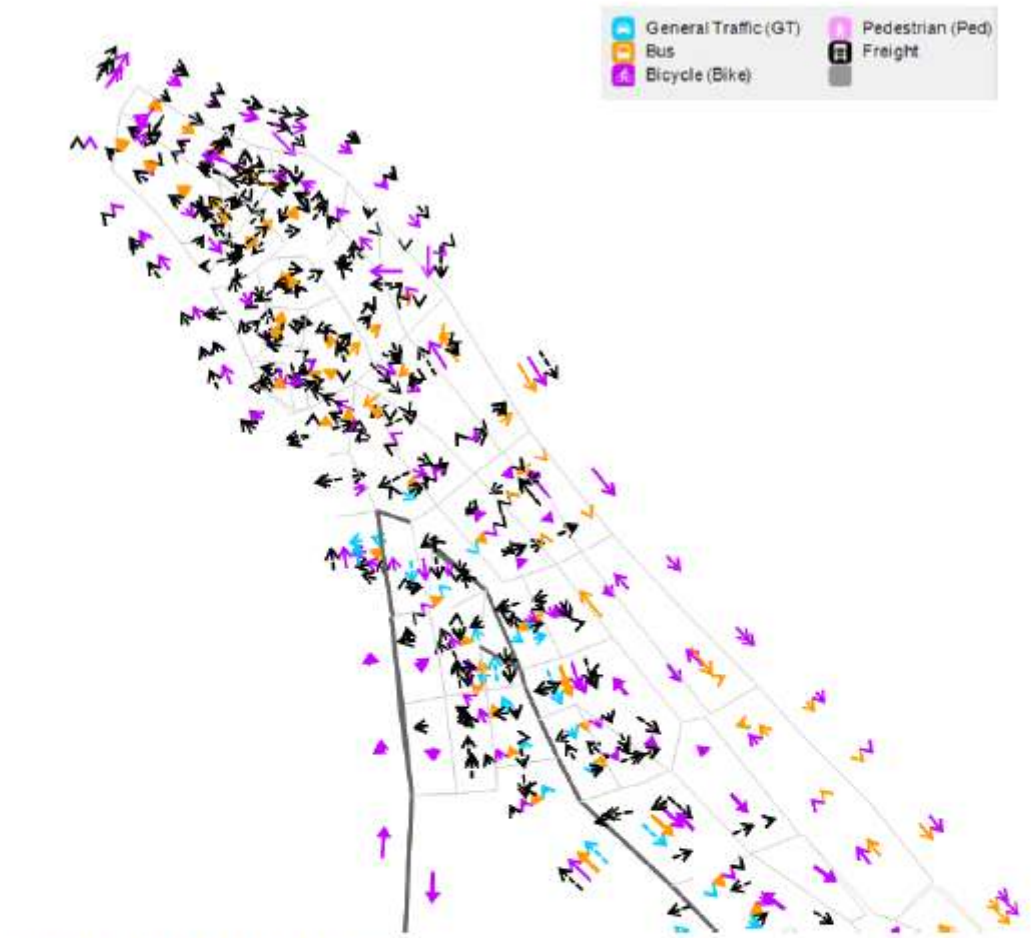

Figure 3: Mount Maunganui priority arrows

Figure 4: Hewletts Road priority arrows

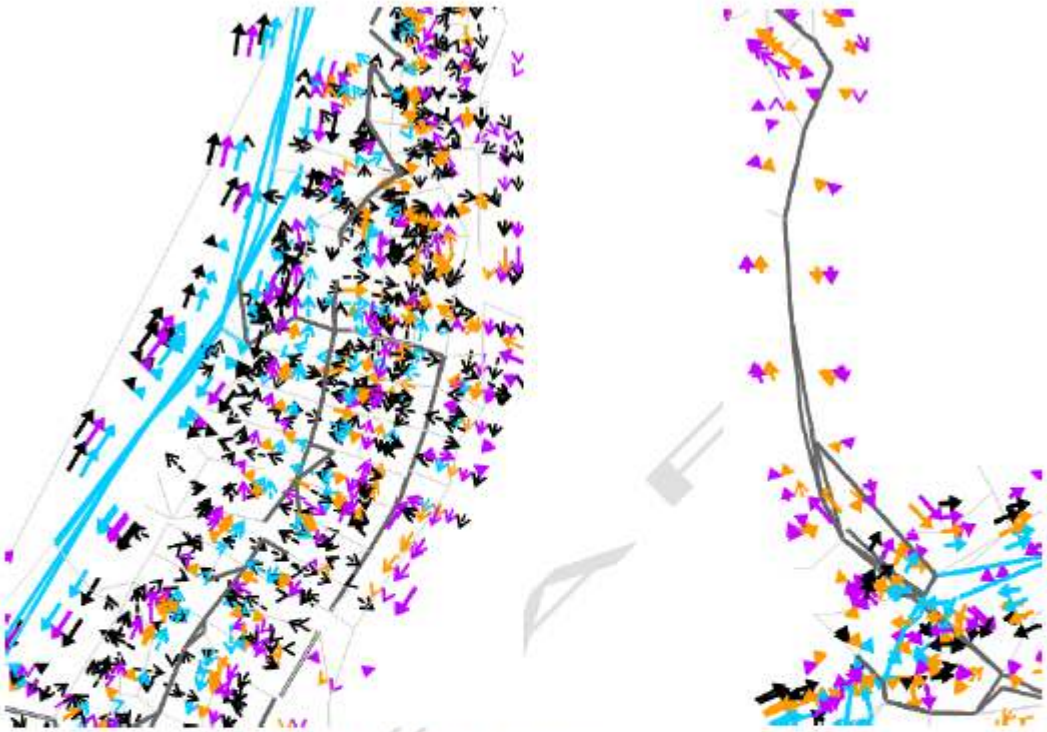

Figure 5: Cameron Road (left) and Turret Road (right) priority arrows

4.0 Operating Gaps

The SOF tool uses strategic routes, user throughputs, LOS and mode encouragement information to determine network operating gaps principally based on the difference between base and target LOS.

Operating gaps are determined by the tool using nationally defined factors related to levels of encouragement, activity areas, throughput, and strategic constants including a mode shift factor and relative efficiency factor.

The gap is then displayed in pie chart form with segments corresponding to a transport mode shown in different colours and segment size related to gap in service for that mode. Gaps can be displayed based on peak periods and across all periods.

Figure 6 shows AM peak operating gaps by mode in Tauranga. The size of the pie charts are relative to the size of the operating gap, considering the volume of users impacted by the gap, with a larger pie chart indicating a more significant gap for many users.

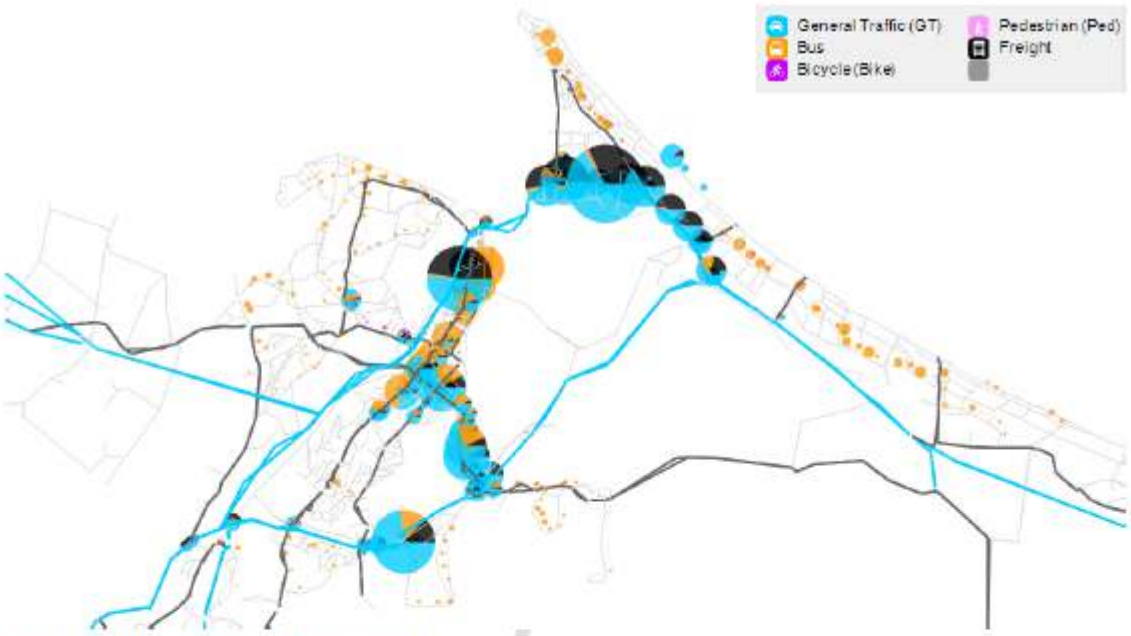

Figure 6: 2031 AM peak operating gaps by mode

As shown, gaps for general traffic (blue) and freight (black) are dominant, with large operating gaps evident around Hewletts Road to the north and Turret Road to the south.

Figure 7 shows operating gaps during PM peak hours. In contrast to Figure 6, much larger operating gaps for public transport are seen along Cameron Road corridor and around Manganui Road, with smaller gaps for general traffic on Turret Road and Hewletts Road.

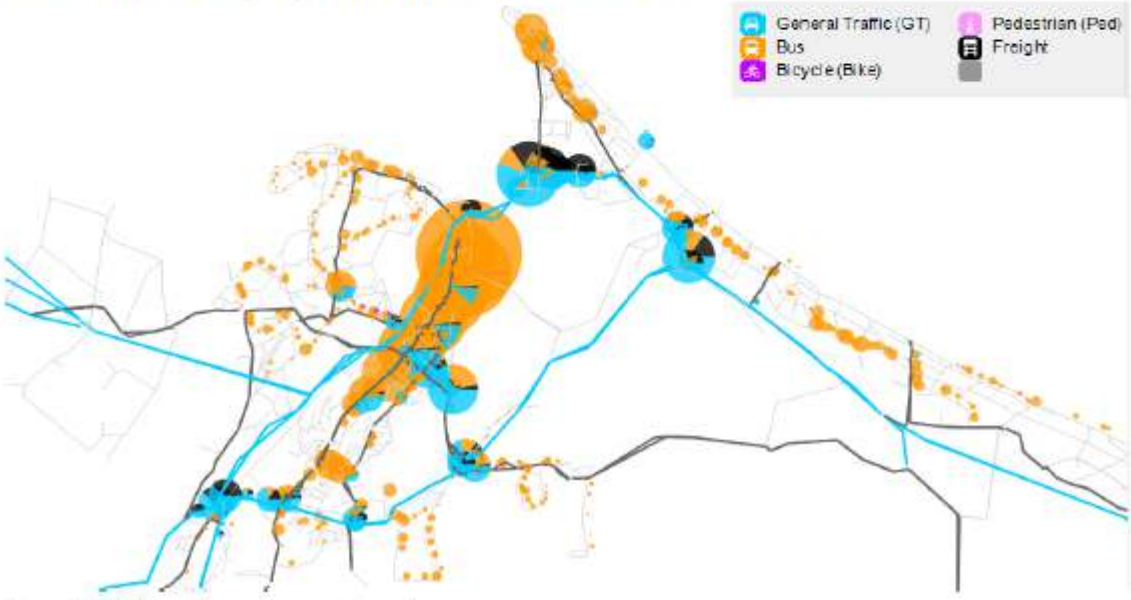

Figure 7: 2031 PM peak operating gaps by mode

While active modes do not present significant operating gaps in this tool, it is noted that modes such as cycling can have supressed demand on the network resulting in small throughput volumes.

One consideration is for assessment of future project options to consider an assumed 'supressed demand' as the base throughput to represent a theoretical operating gap reflecting demand rather than users.

5.0 Next steps

The SmartRoads tool is part of the TSP option evaluation to analyse the effectiveness of developed options against the Do Minimum. The tool will assist in understanding whether options are likely to result in a notable reduction in operating gaps and the comparative benefits for each transport mode.

Yours sincerely

Robyn Hyde

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H

Appendix H – Summary of Conflicts and Significant Operating Gaps

Northern Sub-Area, Significant Operating Gaps:

- Omokoroa Rd primary cycle and bus route conflict
- SH2 Wairoa river to Carmichael Rd primary cycle and bus route conflict
- Moffatt Rd and Bethlehem Rd primary cycle and bus route conflict
- Otumoetai loop (Chapel – Ngati – Waihi) primary cycle and bus route conflict
- Safety risk on existing SH2 north (also primary bus route).

Central Sub-Area, Significant Operating Gaps:

- SH2 harbour bridge / Hewletts Rd primary bus and general traffic route conflict
- Hewletts Rd and Totara St operating gaps for traffic and freight
- Totara St primary cycle and freight route conflict
- SH2 harbour bridge poor LOS for buses on primary bus route
- Totara St / Hewletts Road poor LOS for freight on primary freight route
- SH2 / Elizabeth Street poor LOS for freight on primary freight route
- Cameron Rd primary bus and cycle route conflict
- Cameron Rd operating gaps for buses
- Turret Rd primary bus and cycle route conflict
- Turret Rd poor LOS for buses on primary bus route
- Takitimu Dr primary bus and freight route conflict
- Pyes Pa Rd primary bus and cycle route conflict
- SH29A primary bus and general traffic route conflict (Tauriko to Oropi Rd)
- SH29A poor LOS for buses on primary bus route
- SH29A poor LOS for freight interpeak
- SH29A LOS for freight worsening by 2048
- High safety risk vulnerable road users
- LOS on primary bus routes worsening by 2048.

East-West Sub-Area, Significant Operating Gaps:

- SH29A primary bus and general traffic route conflict
- SH29A primary general traffic and cycle crossing conflicts (Oropi, Poike)
- SH29A poor LOS for buses on primary bus route
- Operating gaps for freight SH29A
- Maungatapu Rd primary bus and cycle route conflict
- Welcome Bay Rd primary bus and cycle route conflict

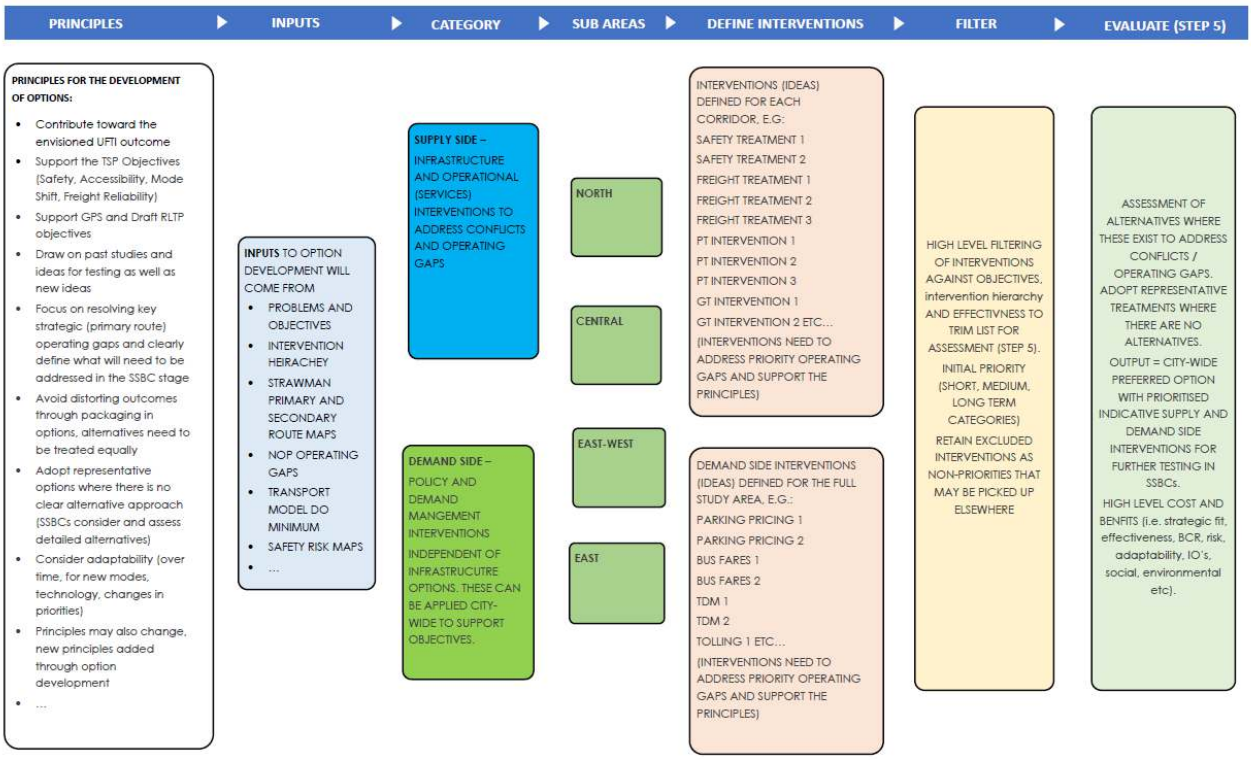
- Welcome Bay road poor LOS for buses on primary bus route
- Poor accessibility to CBD by PT
- LOS for buses worsening by 2048
- Welcome bay road high personal risk
- Kaitemako Rd high personal risk.

Eastern Sub-Area, Significant Operating Gaps:

- Doncaster Dr primary cycle and bus route conflict
- Grenada St primary cycle and bus route conflict
- Links Ave primary bus and cycle route conflict
- SH2 Baylink primary bus, freight and general traffic route conflict
- SH2 east PEI to Girven Rd primary freight and bus route conflict
- Maunganui Rd operating gap for buses on primary bus route
- Maunganui Rd poor LOS for buses on primary bus route
- Maunganui Rd /SH2 poor LOS for freight on primary freight route 2048
- Poor accessibility to CBD by PT
- Arataki area high safety risk for vulnerable road users.

Appendix I – Option Development and Assessment Framework

WBOP Transport System Plan Option Definition Process



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Appendix J – Draft Long List of Projects and Interventions

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Northern Corridor Package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess in TSOF Step 5	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
PT LOS	**Managed lane use**	a	Primary northern corridor bus route via existing SH2	To determine the preferred primary bus route	Demand management	High	High	Progress	
		b	Primary northern corridor bus route via TNL	To determine the preferred primary bus route	Demand management	High	Low	Discount	
PT accessibility	Park and Ride	a	Park and ride sites Omokoroa Road	To assess P&R locations, demand and scale	Demand management	High	Medium	Progress	
		b	Other park and ride sites e.g. Minden, Te Puna	To assess P&R locations, demand and scale	Demand management	Medium	Medium	Progress	
Accessibility	Omokoroa stage 3	a	Omokoroa Stage 3 networks for all modes as per structure plan	To consider the structure plan as part of the TSOF	Integrated planning	High	Medium	Progress	
PT accessibility	Ferry	a	Omokoroa - cbd ferry option (assess frequency etc.)	To provide an indication of demand for a ferry service	Demand management	Medium	Low	Defer	
Freight LOS	Pricing	a	TDM pricing for general traffic lanes only on TNL	To assess network benefits e.g. reduced demand e.g. at Elizabeth Street	Demand management	High	Medium	Progress	
		b	TDM pricing for all vehicles on TNL	To assess network benefits e.g. reduced demand e.g. at Elizabeth Street	Demand management	High	Low	Discount	
PT LOS	Omokoroa Road	a	Omokoroa Road general traffic capacity to TNL	To assess effect on poor LOS on primary bus route	New infrastructure	Medium	Low	Discount	
		b	Omokoroa Road managed lane capacity to TNL	To assess effect on poor LOS on primary bus route	New infrastructure	Medium	Medium	Progress	
PT LOS	TNL to CBD	a	General traffic lanes between TNL Takitimu Drive and Cameron Road	Assess network effects (volumes on Cam/15th) & input to HOV network plan	Use of existing network	High	Low	Discount	
		b	General and managed lanes between TNL Takitimu Drive and Cameron Road	Assess network effects (volumes on Cam/15th) & input to HOV network plan	Use of existing network	High	Medium	Progress	
		c	HCV restrictions between Takitimu Drive and Cameron Road	Assess network effects (volumes on Cam/15th) & input to HOV network plan	Use of existing network	High	Medium	Progress	
Mode share	Cross City PT	a	Cross city primary bus route via Moffat Road with interchange at Bethlehem	To determine the preferred primary bus route	Demand management	High	Medium	Progress	
		b	Cross city primary bus route via Cambridge Road with interchange at Judea	To determine the preferred primary bus route	Demand management	High	Medium	Progress	
Cycle conflicts	Otumoetai Loop	a	Primary cycle route via foreshore	To separate cycle and bus conflict encourage mode shift	Demand management	High	Low	Defer	
PT LOS		b	Chapel Street bus priority	Address poor LOS on priority bus route longer term	Demand management	High	Medium	Progress	
PT LOS		c	Waihi Road bus priority longer term	Encourage mode shift and address poor LOS for buses	Demand management	High	Medium	Progress	
PT LOS		d	Brookfield roundabouts upgrade with bus priority longer term	Encourage mode shift and address poor LOS for buses	Demand management	Medium	Medium	Progress	
Cycle conflicts	Cycle Routes	a	Primary cycle route connection Snodgrass Road to Te Puna Road	To improve the directness of the primary off road cycle route	Demand management	High	Medium	Progress	
Safety	Standard Interventions	a	Traffic calming and speed limit review in Otumoetai	Improve safety and perception of safety encouraging mode shift	Demand management	High	High	Progress	
PT accessibility	Standard Interventions	a	Remove laybys from primary bus routes and improve stop facilities	Improve bus travel time and passenger comfort	Demand management	High	Medium	Progress	
Accessibility	Standard Interventions	a	Improve personal mobility facilities and amenity to/within pedestrian activity centres	To improve safety and encourage mode shift to mico mobility	Demand management	High	High	Progress	
Mode share	Standard Interventions	a	Ebike locking and charging stations	To improve safety and encourage mode shift to mico mobility	Demand management	High	Medium	Progress	
Accessibility	Accessibility	a	Consider effects of proposed secondary school in Omokoroa and support access opportunities	Reduce demand for travel and improve safety	Integrated planning	High	Medium	Progress	
		b	Consider effects of larger shopping center in Omokoroa	Improve accessibility and reduce trip distances	Integrated planning	High	Medium	Progress	
Optimisation	Cycle routes	a	Deliver cycleways on primary cycle routes in northern sub area	Address conflict and improve quality of service for cycling	Demand management	High	High	Progress	
Optimisation	Bus routes	a	Deliver quality bus access facilities (stops and paths etc) on primary bus routes	Improve accessibility and mode shift for buses	Demand management	High	High	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Central Corridor urban form and transport corridor package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
PT LOS	**15th/Turret Road Movement**	a	Three managed lanes (tidal flow) within existing road reserve	To improve travel times for buses on primary bus route	Use of existing network	Low	Medium	Progress	
		b	Four lanes with HOV lanes	To improve travel times for buses on primary bus route	New infrastructure	Low	Medium	Progress	
		c	Four lanes with bus lanes	To improve travel times for buses on primary bus route	New infrastructure	Low	Medium	Progress	
PT LOS	15th TDM	a	Pricing strategy on SOV and HCV (for example new bridge toll longer term)	Test the TDM and network benefit of pricing	Demand management	High	Medium	Progress	
Freight LOS	SH29 Tauriko	a	Recommended option from SH29 Tauriko DBC	To reflect SH29 Tauriko option in TSOF	New infrastructure	High	Medium	Progress	
Accessibility	Tauriko West	a	Tauriko West networks for all modes as per structure plan	To consider the Tauriko West networks as part of TSOF	Integrated planning	High	Medium	Progress	
Cycle Accessibility	Second N-S Cycleway	a	Greerton Rd - Fraser Street	To improve cycling connectivity and encourage mode shift	Demand management	High	Medium	Progress	
		b	Devonport Road	To improve cycling connectivity and encourage mode shift	Demand management	High	Low	Discount	
PT LOS	Barkes Corner	a	Minor optimisation of roundabout for all modes	Reduce delay and improve reliability on primary bus route	Use of existing network	Low	Low	Discount	
		b	Grade separation (assumed part of Tauriko IBC)	Reduce delay and improve reliability on primary bus route	New infrastructure	High	Medium	Progress	
PT LOS	Cameron Road	a	Recommended option from Cameron Road SSBC	To reflect the Cameron Road SSBC recommendation in the TSOF	Demand management	High	Medium	Progress	
		b	Extended bus priority Cameron Road Hospital to Greerton	To reflect proposed extension to Cameron Road bus priority	Demand management	High	Medium	Progress	
		c	One traffic lane one bus lane on Cameron Road longer term	To reflect longer term UFTI outcome for Cameron Road	Demand management	High	Medium	Progress	
		d	Light rail along Cameron Road	To improve accessibility by PT	Demand management	Low	Low	Defer	
Poor accessibility	PT Interchange	a	High quality PT interchange at CBD only	To assess the benefit of interchange investment in Te Papa	Demand management	High	Medium	Progress	
		b	High quality PT interchange at CBD and Hospital	To assess the benefit of interchange investment in Te Papa	Demand management	High	Medium	Progress	
Poor accessibility	Te Papa IBC	a	Transport interventions defined in the Te Papa IBC	To reflect Te Papa recommendations in TSP assessment	Demand management	High	Medium	Progress	
Poor accessibility	Standard Interventions	c	Improve personal mobility facilities and amenity to/within pedestrian activity centres	To improve safety and encourage mode shift to mico mobility	Demand management	High	High	Progress	
Cycle LOS	Cycle routes	a	Deliver cycleways on primary cycle routes in central sub area	Address conflict and improve quality of service for cycling	Demand management	High	High	Progress	
Optimisation	Bus routes	a	Deliver quality bus access facilities on primary bus routes	Improve accessibility and mode shift for buses	Demand management	High	High	Progress	
Safety	Standard Interventions	a	Traffic calming and speed limit review within Te Papa Peninsular	Improve safety and perception of safety encouraging mode shift	Demand management	High	Medium	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI CBD and Mount Maunganui Package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
PT Accessibility	**PT Access**	a	Primary bus route CBD east via additional bus connection harbour bridge	To reduce bus travel times and support mode shift objective	Demand management	Low	Medium	Progress	
		b	Primary bus route CBD east via alternative PT crossing	To reduce bus travel times and support mode shift objective	Demand management	Low	Medium	Progress	
PT Accessibility	**PT Interchange**	a	Primary bus route interchange at Bayfair	To support mode shift to buses	Demand management	High	Medium	Progress	
		b	Primary bus route interchange at Baypark	To support mode shift to buses	Demand management	High	Medium	Progress	
Bus LOS	Golf to Hewletts	a	Bus priority within existing carriageway	To improve travel times by bus and support mode shift objective	Use of existing network	High	Medium	Progress	
		b	Bus priority outside existing carriageway (e.g. traffic signals)	To improve travel times by bus and support mode shift objective	New infrastructure	Medium	Medium	Progress	
		c	New bus connection	To improve travel times by bus and support mode shift objective	New infrastructure	Low	Medium	Discount	
Bus LOS	Maunganui Rd Bus Priority	a	Localised bus priority	To improve travel times by bus and support mode shift objective	Demand management	High	Medium	Progress	
		b	Full bus priority	To improve travel times by bus and support mode shift objective	New infrastructure	Low	Medium	Discount	
		c	Managed lanes	Assess effects and input to HOV network plan	New infrastructure	High	Low	Discount	
Cycle conflict	Maunganui Road freight	a	HCV ban on Maunganui Road divert to Newton Street	Remove HCVs from urban arterial reduce conflict with active modes	Demand management	High	Medium	Progress	
PT Accessibility	Ferry	a	Ferry Mount - CBD test different frequencies and price points	To improve LOS for freight on primary freight route	Demand management	High	Low	Defer	
Cycle LOS	Cycle routes	a	Deliver cycleways along all primary cycle routes in CBD Mount sub area	Address conflict and improve quality of service for cycling	Demand management	High	High	Progress	
Safety		a	Cycle route alignment mount golf course area	Assess opportunity and benefit of primary cycle route alignment	Demand management	Low	Medium	Progress	
	Standard Interventions	a	Cameron Road north signalised intersection	To improve safety and accessibility to activity center	Integrated planning	High	Low	Defer	
	Standard Interventions	a	Traffic calming and speed limit review in Mt Maunganui	Improve safety and perception of safety encouraging mode shift	Demand management	High	High	Progress	
Accessibility		b	Reduce speed limits and implement traffic calming in high risk areas	Reduce likelihood and consequence of crashes in high personal risk area	Integrated planning	High	High	Progress	
Optimization	Access to centres	c	Improve personal mobility facilities and amenity to/within pedestrian activity centres	To improve safety and encourage mode shift to mico mobility	Demand management	High	High	Progress	
	Bus routes	a	Deliver quality bus access facilities on primary bus routes	Improve accessibility and mode shift for buses	Demand management	High	High	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Eastern Package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
Bus Accessibility	Te Tumu to TEL PT	a	Te Tumu to TEL primary PT route via PEI	To determine the preferred primary bus route	Demand management	High	Medium	Progress	
		b	Te Tumu to TEL primary PT route via Domain Road	To determine the preferred primary bus route	Demand management	High	Medium	Progress	
Bus Accessibility	Primary Bus Route	a	Primary PT route via Granada Street	To determine the preferred primary bus route	Demand management	Medium	Medium	Progress	
		b	Primary PT route via Gloucester Road	To determine the preferred primary bus route	Demand management	Medium	Medium	Progress	
Bus Accessibility	Park and Ride	a	Provide a park and ride site at Baypark	To assess park and ride locations demand and scale	Demand management	High	Medium	Progress	
		b	Provide a park and ride site in the Domain Road area	To assess park and ride locations demand and scale	Demand management	Medium	Medium	Progress	
		c	Provide a park and ride site in the Wairakei area	To assess park and ride locations demand and scale	Demand management	Medium	Low	Discount	
Accessibility	Te Tumu	a	Wairakei Te Tumu networks for all modes as per structure plan	To consider the proposed Te Tumu growth area in TSOF	Integrated planning	High	Medium	Progress	
Cycle LOS	Cycle routes	a	Deliver cycleways on primary cycle routes in eastern sub area	Address conflict and improve quality of service for cycling	Demand management	Medium	High	Progress	
	Improve access	a	Improve personal mobility facilities and amenity to/within pedestrian activity centres	To improve safety and encourage mode shift to mico mobility	Demand management	High	High	Progress	
Optimization	Bus routes	a	Deliver quality bus access facilities on primary bus routes	Improve accessability and mode shift for buses	Demand management	High	High	Progress	
Safety	Standard Interventions	a	Traffic calming and speed limit review in Omanu / Arataki	Improve safety and perception of safety encouraging mode shift	Demand management	High	High	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Western Package

Initial sift of interventions

TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
PT LOS	Welcome Bay Road	a	Bus lane city bound on Welcome Bay Road	To improve poor LOS for buses on primary bus route	Use of existing network	Low	Medium	Progress	
		b	Southern links (Welcome Bay to Ohauiti)	To improve poor LOS for buses on primary bus route	New infrastructure	Low	Low	Defer	
PT LOS	Poike Road	a	Joyce Road to Oropi Road connection	To improve poor LOS for buses on primary bus route	New infrastructure	High	Low	Progress	
	Cycle routes	a	Deliver cycleways on primary cycle routes in east-west sub area	Address conflict and improve quality of service for cycling	Demand management	High	Medium	Progress	
Accessibility	Maungatapu Road	a	Close access between SH29A roundabout and Maungatapu Road	To improve bus travel times on primary bus route	Use of existing network	High	Low	Discount	
		b	Restrict access (LI and bus only) between SH29A roundabout and Maungatapu Road	To improve bus travel times on primary bus route	Use of existing network	High	Low	Discount	
PT Accessibility	Ferry	a	Ferry between Hairini and CBD	To improve accessibility by PT	Demand management	Low	Low	Discount	
PT Accessibility	Park and Ride	a	Park and ride site within Hairini Welcome Bay	Improve accessibility by PT	Demand management	Low	Medium	Discount	
	Oropi Road	a	Minor upgrade of capacity	To improve bus travel times on primary bus route	Use of existing network	High	Low	Discount	
PT Accessibility	Aerial Tram	a	Aerial tram (tram cars on suspended wires) accross harbour welcome bay / hairini to CBD	To improve accessibility by PT	Demand management	Low	Low	Discount	
Accessibility	New land uses	a	New small shopping Centre in welcome bay	To improve accessibility and reduce trip lengths	Integrated planning	Medium	Medium	Progress	
		b	Secondary school in Welcome Bay area	To improve accessibility and reduce trip lengths	Integrated planning	Low	Medium	Discount	
		c	New shopping Centre and secondary school in welcome bay	To improve accessibility and reduce trip lengths	Integrated planning	Low	Medium	Discount	
Safety	Standard Interventions	a	Traffic calming and speed limit review in Welcome Bay	Improve safety and perception of safety encouraging mode shift	Demand management	High	Medium	Progress	
Poor accessibility	Standard Interventions	a	Improve personal mobility facilities and amenity to/within pedestrian activity centres	To improve safety and encourage mode shift to mico mobility	Demand management	High	High	Progress	
Optimization	Bus routes	a	Deliver quality bus access facilities on primary bus routes	Improve accessibility and mode shift for buses	Demand management	High	High	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Freight Package

Initial sift of interventions

TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
Freight LOS	**Form of SH29A**	a	Additional capacity managed lanes	Assess benefit on SH29-2 freight priority route	New infrastructure	Medium	Medium	Progress	
		b	Additional capacity all vehicles	Assess benefit on SH29-2 freight priority route	New infrastructure	Medium	Low	Discount	
Freight LOS	**Hewletts Road sub area network**	a	Managed lanes on Hewletts Road	Assess freight benefit and input to HOV network plan	Demand management	High	Medium	Progress	
		b	Alternative connections for freight off Hewletts Road	Assess benefit for freight on primary freight route	New infrastructure	Medium	Medium	Progress	
		c	Intersection capacity improvements on Hewletts Road	Assess benefit for freight on primary freight route	Use of existing network	Low	Low	Defer	
		d	Managed lanes on Hewletts Maunganui flyover	Assess benefit for freight on primary freight route	Use of existing network	Low	Low	Discount	
Freight LOS	SH2 Waihi Road to Chapel Street	a	Left in left out at Elizabeth Street intersection	Freight travel time reliability on primary freight route	Use of existing network	Medium	Medium	Progress	
		b	SH2 managed lanes for freight interpeak	Freight travel time reliability on primary freight route	Use of existing network	Low	Medium	Discount	
		c	Additional capacity at Elizabeth Street intersection	Freight travel time reliability on primary freight route	New infrastructure	Medium	Medium	Progress	
Freight LOS	SH29A Intersections	a	High SH29A through movement priority at intersections	Assess benefit on SH29-2 freight priority route	New infrastructure	Medium	Low	Defer	
		b	Balanced through and across (access) priority at intersections	Assess benefit on SH29-2 freight priority route	New infrastructure	Medium	Medium	Progress	
Freight LOS	Tolling	a	Harbour bridge toll for all vehicles	Assess benefit on SH29-2 freight priority route	Demand management	Low	Low	Discount	
		b	Harbour bridge toll for private cars only	Assess benefit on SH29-2 freight priority route	Demand management	Low	Medium	Progress	
		c	Harbour bridge toll for private cars peak period only	Assess benefit on SH29-2 freight priority route	Demand management	Low	Medium	Progress	
Freight LOS	Hewletts Road optimisation	a	Do minimum e.g. Aerodrome LILO	Assess benefit for freight on primary freight route	Use of existing network	High	Medium	Progress	
		b	Te Marie Link Maru LILO Aerodrome LILO	Assess benefit for freight on primary freight route	Use of existing network	High	Medium	Progress	
		c	As above plus Waimarie Street LILO	Assess benefit for freight on primary freight route	Use of existing network	Medium	Medium	Progress	
Freight LOS	Road rail freight transfer	a	Low uptake of freight interchange at external freight hubs	Assess network benefits/disbenefits for freight, PT, safety	Integrated planning	Medium	Medium	Defer	
		b	Higher uptake of freight interchange at external freight hubs	Assess network benefits/disbenefits for freight, PT, safety	Integrated planning	Medium	Medium	Defer	
Freight LOS	Land use controls	a	Restrict any further commercial land use in Hewletts sub area	Reduce trip generation and improve freight accessibility	Use of existing network	Medium	Low	Progress	
		b	Actively seek to reduce commercial land use in Hewletts sub area	Reduce trip generation and improve freight accessibility	Use of existing network	Low	Low	Discount	
Freight LOS	Rail access to the Port	a	Totoert	Reduce freight travel times and remove freight trains from CBD	New infrastructure	Low	Low	Discount	
		b	Sulphur point to port multimodal freight, PT and cycle bridge	Reduce freight travel times and remove freight trains from CBD	New infrastructure	Low	Medium	Defer	
Freight LOS	Totara Street level crossings	a	Grade separate one level crossing on Totara Street	Assess benefit for freight on primary freight route	New infrastructure	Low	Medium	Discount	
		b	Grade separate both level crossings on Totara Street	Assess benefit for freight on primary freight route	New infrastructure	Low	Medium	Discount	
Freight LOS	Totara Street freight priority	a	Freight only priority lanes on Totara Street	Assess benefit for freight on primary freight route	Use of existing network	High	Medium	Progress	
		b	Managed lanes on Totara Street	Assess benefit for freight on primary freight route inform HOV plan	Use of existing network	High	Medium	Progress	
Freight LOS	Relocate the Port	a	Shift the port to Opotiki or Matakana Island	Assess benefit for freight on primary freight route	New infrastructure	Low	Low	Discount	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI sub regional public transport, mode shift and emission reduction initiatives package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
PT accessibility	Bus services	a	Bus service pattern and frequencies to be provided by BOPRC	Mode shift to bus	Demand management	High	Medium	Progress	
		b	Bus service pattern and frequencies to be provided by BOPRC	Mode shift to bus	Demand management	High	Medium	Progress	
		c	Bus service pattern and frequencies to be provided by BOPRC	Mode shift to bus	Demand management	High	Medium	Progress	
	Bus fares	a	Free school buses	Mode shift to bus	Demand management	High	Medium	Progress	
		b	Subsidize bus fares in target areas, campaigns to encourage mode shift	To encourage mode shift to buses	Demand management	High	Medium	Progress	
		c	Reduce bus fares for all users subsidize from other sources	To encourage mode shift to buses	Demand management	Low	Medium	Discount	
PT accessibility	On demand bus service	a	Local electric on demand shuttle buses connecting suburbs with PT hubs	Improve accessibility and mode shift to PT	Demand management	Medium	Medium	Progress	
		b	Self driving electric on demand mobility shuttles connecting suburbs with PT hubs	Improve accessibility and mode shift to PT	Demand management	Low	Medium	Defer	
	Mobility as a Service	a	Technology that enables access and payment to a range of personalised transport options	Improve accessibility and mode shift to more efficient modes	Demand management	Medium	Medium	Progress	
Accessibility	Travel behavior change	a	Light travel behavior change campaigns, travel plans etc.	To encourage mode shift from SOV fossil fueled vehicles	Demand management	High	Medium	Progress	
		b	Emphasised travel behavior change campaigns, travel plans etc.	To encourage mode shift from SOV fossil fueled vehicles	Demand management	High	Medium	Progress	
Accessibility	Micomodes sharing scheme	a	Support and promote micromodes (escooter, ebike) sharing schemes	Mode shift to micro mobility	Demand management	High	Medium	Progress	

WBOP Transport System Plan DRAFT Long List Interventions

Supporting UFTI Transport Policy and Pricing Interventions Package

							Initial sift of interventions		
TSOF Gap	Project	Option Reference	Options to Assess	Purpose	Intervention Hierarchy	Feasibility	Contribution to Objectives	Preliminary Decision	Partner Feedback
Mode share	Parking management	a	Low change parking management approach	To encourage mode shift and increase revenue	Demand management	High	Medium	Progress	
		b	Medium change parking management approach	To encourage mode shift and increase revenue	Demand management	High	Medium	Progress	
		c	Higher change parking management approach	To encourage mode shift and increase revenue	Demand management	High	Medium	Progress	
		d	Levy on car parks in retail/commercial centres	TDM and dispersal of trips increase revenue for transport	Demand management	Low	Medium	Discount	
Mode share	TDM	a	Regional fuel levy	Reduce travel demand and increase revenue for transport projects	Demand management	Medium	Low	Defer	
		b	Toll all vehicles on state highways (e.g. SH2 and SH29)	To reduce travel demand and increase revenue	Demand management	Medium	Low	Discount	
		c	Toll SOV during peak periods on state highways (e.g. SH2 and SH29)	To reduce demand in peak periods and increase revenue	Demand management	Medium	Medium	Progress	
Travel Demand	TDM	a	Promote work from home	To reduce travel demand	Demand management	High	Medium	Progress	
Mode share	Micromobility	a	Strategy to support uptake of small personal electric vehicles	Maximise the potential benefit of mico mobility on mode shift	Demand management	High	Medium	Progress	

Document Acceptance

Action	Name	Signed	Date
Prepared by	Matthew Kilpatrick		9 October 2020
Reviewed by	Craig Richards		9 October 2020
Approved by	Tania Hyde		9 October 2020
on behalf of	Beca Limited